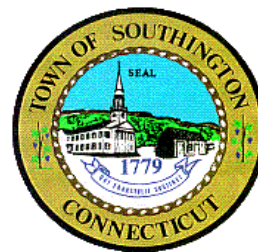


Southington Board of Education Meeting

Thursday, October 26, 2023 6:30 PM
John Weichsel Municipal Center Public Assembly Room
200 North Main Street
Southington, CT 06489



COMMITTEE OF THE WHOLE - INSTRUCTION

1. CALL TO ORDER
2. Executive Session
 - a. Unaffiliated Compensation - Technology Department Salaries
 - b. Student Matters
3. Reconvene Meeting - Regular Session 7:00 p.m.
4. Pledge of Allegiance - Moment of Silence
5. Approval of Minutes - October 12, 2023
6. Public Communications
 - a. Communications from Student Board Representatives
 - b. Communications from Board of Education
 - c. Communications from Administration
 - d. Communications from Public - Agenda Items Only
7. Committee Reports
 - a. Policy & Personnel Committee Meeting - October 11, 2023
 - b. Curriculum & Instruction Committee - October 20, 2023
 - c. Finance Committee Meeting - October 19, 2023
 1. Transfer of Funds - STEAP Athletic Project
 2. Transfer of Funds - Computer Lab Update
 3. New maintenance vehicle purchase with four-year financing.
8. Old Business
 - a. Town Government Communications
 - b. ConEd Battery Storage Project
 - c. SHS Accelerated Physics Unit #3 Momentum & Impulse - Second Reading
 - d. SHS Accelerated Physics Unit #4 - Work & Energy - Second Reading
 - e. SHS Accelerated Physics Unit #5 - Simple Harmonic Motion - Second Reading
 - f. SHS Accelerated Physics Unit #6 - Electrostatics & Circuits - Second Reading
 - g. SHS Accelerated General Chemistry Unit #3 - Matter & Energy Changes - Second Reading
 - h. SHS Accelerated General Chemistry Unit #4 - Gas Law & Kinetics - Second Reading
 - i. SHS Accelerated General Chemistry Unit #5 - Flint Water Crisis - Second Reading
 - j. Middle School Needs Assessment - Second Reading
9. New Business
 - a. Student Data Presentation - 2022-2023

- b. Policy 3542.1- Purposes and Facilities: Food Service - Revision - First Reading
 - c. SHS - Comprehensive Learning Center (formerly ACHIEVE) Artshop Curriculum - First Reading
 - d. SHS - Computer Science Course Proposal - First Reading
 - e. SHS - Accelerated Biology Unit #3 - Cell Energetics - First Reading
 - f. Approval of Special Education Positions
 - g. Unaffiliated Compensation - Technology Department
 - h. Superintendent's Proposed Goals 2023-2024
10. Public Communications
- a. Public
11. Adjournment

The minutes presented within this document provide a summary of the discussion that took place at the Board of Education meeting. For the complete discussion of the agenda items, please view the video of the Board meeting on our website at www.southingtonschools.org. These minutes are considered a draft until approved at the following regular Board of Education meeting.

**SOUTHINGTON BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

**REGULAR MEETING
OCTOBER 12, 2023**

The regular meeting of the Southington Board of Education (Committee of the Whole - Operations) was held on Thursday, October 12, 2023, at 7:00 p.m. as a public meeting in the John Weichsel Municipal Center Public Assembly Room, 200 North Main Street, Southington, Connecticut with an Executive Session preceding at 6:30 p.m.

1. CALL TO ORDER

Mrs. Colleen Clark, Chairperson, called the meeting to order at 6:35 p.m.

Board members present: Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson (*arrived 6:50 p.m.*), Mr. James Chrzanowski, Mrs. Colleen Clark, Mr. David Derynoski, Mr. Zaya Oshana, Mr. Jasper Williams.
Cabinet administrators present: Mr. Steve Madancy, Superintendent of Schools, and Mr. Frank Pepe, Assistant Superintendent

2. EXECUTIVE SESSION –TECHNOLOGY DEPARTMENT STAFF, STUDENT MATTERS AND PERSONNEL

MOTION: by Mr. Derynoski, seconded by Mrs. Carmody:

“Move to go into Executive Session, excluding the public and the press, for the purpose of discussing Technology Department Staff, Student Matters and Personnel, and upon conclusion reconvene to public session.”

Motion carried unanimously by voice vote.

*Mrs. Clark ended the Executive Session at 6:50 p.m.
The Regular Board meeting was reconvened at 7:00 p.m.*

3. RECONVENE MEETING – REGULAR SESSION

Board members present: Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson, Mr. James Chrzanowski, Mrs. Colleen Clark, Mr. David Derynoski, Mr. Zaya Oshana, Mr. Jasper Williams
Cabinet administrators present: Mr. Steven Madancy, Superintendent of Schools; Mr. Frank Pepe, Assistant Superintendent; Mrs. Jennifer Mellitt, Director of Business & Finance; Ms. Rebecca Cavallaro (*arrived 7:03 p.m.*), Director of Pupil Personnel Services
Student Representatives present: Uptej Singh, Chelsey Arduini, Akari Win

4. PLEDGE OF ALLEGIANCE & MOMENT OF SILENCE

The Student Representatives led in reciting the Pledge of Allegiance.

5. APPROVAL OF MINUTES – September 14, 2023

MOTION: by Mrs. Carmody, seconded by Mr. Derynoski:

“Move to approve the regular Board of Education Meeting Minutes of September 14, 2023, as submitted.”

Motion carried unanimously by voice vote.

MOTION: by Mr. Oshana, seconded by Mr. Baczewski:

“Move to add Agenda Item 11.b ‘Student Expulsion’ to the agenda.”

Motion carried unanimously by voice vote.

6. PUBLIC COMMUNICATIONS

a. Communications from Student Board Representatives

Akari Win reported on the following high school events: College Fair, SHS Open House, SHS Clubs booths at the Apple Harvest Festival and Marching Band participation in the parade, STEM for All event, PSATs, National Honor Society Senior Fall Induction, Powder Puff team practice, SHS Music of the Knight competition October 21, 2023, SHS Fall Concert October 24, 2023, Marine Biology class field trip to Mystic Aquarium on October 2, 2023.

Uptej Singh reported on the SHS fall athletic events and scores to date for Girls Volleyball, Girls Swimming & Diving, Boys & Girls Cross Country, Girls Soccer, Boys Soccer, SHS Golf.

Chelsey Arduini gave the district report for the other schools: DePaolo Middle School (JAD): Over 250 Middle School students took part in the JAD Leadership Program by selecting the leadership opportunity that interested them and volunteering in the community; JAD fall sports teams started despite the rainy weather; JAD participated at the Apple Harvest Festival for two weekends and collected donations for Alex’s Lemonade Stand to raise funds for pediatric cancer research; JAD Garden Club wrapped up the growing season and thanked the community members who supported them throughout the summer; JAD students volunteered to help at the Soup Night for Bread for Life.

b. Communications from Board Members

Board members addressed the Soup Night at SHS with DePaolo Middle School students busing and waiting on the tables; Apple Harvest Festival parade with the impressive elementary floats and SHS Marching Band; receiving complaints on curriculum and requests for a formal curriculum review along with the steps needed to be taken. Mr. Madancy explained Policy #1312 procedures for a review including paperwork that needed to be completed with rationale by complainant and 15 days to initiate action to form a committee to review and forward the

recommendation to the Superintendent who in turn will forward his recommendation to the full Board, then notifying parents of decisions, and appeals.

c. Communications from Administration

1. Redistricting-PTO Meetings: Mr. Madancy stated that he attended, along with some Board members, PTO meetings at South End, Kelley, Flanders, and Thalberg Elementary Schools to give an update and answer questions regarding the status of renovations and redistricting.

2. Kindergarten Starting Age Update: Mr. Madancy stated that at the PTO meetings he addressed the new state mandate for the starting age for kindergarten that would impact between 99-125 Southington families for students born after September 1, instead of January 1, to start kindergarten in the 2024-2025 school year. He explained communication from the Commissioner of Education indicated that there would not be a universal assessment given to school districts by the state resulting in every district using their own assessment to determine whether children can qualify for an exception and start school. He had concerns about that because every child is different with districts using different assessments. The legislation states that the principal of a school can make the assessment if a child starts school or not. Mr. Madancy explained the inequities that it would cause and planned to speak to the state for more details and guidance. He spoke at length on the effect to the school district. He noted that he was meeting with the Early Childhood Collaborative and community partners regarding subsidies if a parent decides to put their child in a preschool program to help defray the cost.

3. UEL Program Development: Mr. Madancy explained that he and Mr. Crocco, SHS Principal, met with Mr. Owen McLaughlin, Director of the SHS Ag-Science Center, regarding applying for the Unpaid Experiential Learning Program (UEL) where students receive Ag-Science field-level experience in exchange for high school credit. Mr. McLaughlin volunteered to apply for the entire high school to expand the UEL opportunities beyond Ag-Science. He is waiting to hear if the grant was approved.

4. Science of Reading Update: Mr. Madancy reported that a district committee applied for a Science of Reading Master Class, which is a partnership between the State Department of Education and the Connecticut Association of Public Schools Superintendents (CAPSS). It is professional development for the literary team to help the district to make informed assessments about shifts to reading and literacy instruction in the district with the recent legislative changes.

5. District-wide Facilities Committee: Mr. Madancy planned to schedule a District-wide Facilities Committee meeting within the next couple of weeks to discuss next steps now that they are not going to referendum in November 2023. He noted that with the upcoming November elections there might be changes of members to the Facilities Committee.

d. Communication from Public – Agenda Items Only

Mrs. Susan Zabahonski came to the podium to address a curriculum complaint and was told by Mrs. Clark that it was not an agenda only item. There was no communication from the public on agenda items.

7. COMMITTEE REPORTS

a. Curriculum & Instruction Committee Meeting – September 22, 2023

Mrs. Anastasio reported that the committee met and received a presentation on revisions to the SHS Accelerated Physics Course - Units #3, 4, 5 & 6. They also received a presentation on three updated units (#3, 4 & 5) within the SHS Accelerated General Chemistry course. The committee was presented a Middle School Needs Assessment by Jennifer Discenza, Director of Counseling. This assessment will inform support staff in each middle school of potential topics for group discussions. Student participation in groups is only permitted with parent permission. The committee members agreed to forward these items to the full Board for review and approval.

8. SUPERINTENDENT'S REPORT

a. Personnel Report

MOTION: by Mrs. Carmody, seconded by Mr. Derynoski:

“Move to approve the Personnel Report, as submitted by the Human Resources Department.”

Motion carried unanimously by voice vote.

9. OLD BUSINESS

a. Town Government Communications

There was no Town Government Communication.

b. ConEd Battery Storage Project

Mr. Madancy explained why he put this item on the agenda for Board discussion and possible action or to wait until the next Board meeting on October 26, 2023.

Mrs. Clark explained that she visited Ardsley Middle School in New York to view the battery storage system and noted where it was located on the property, which did not appear attractive and were big white cabinets behind fencing with electrical equipment. When she visited, she had missed the discharge period so there was no noise. She was told by Adam Teff that RWE would address any noise attenuation if there was any from the discharging batteries. She would like it to be not so obvious at the Southington middle schools. Mrs. Carmody questioned if there was an area at the middle schools to put the system where it would not interfere with the location of the air conditioning units. A question that a Board member asked was if they move forward with this project if the \$50,000 that they would receive goes to the Town or the Board of Education. Mr. Madancy stated that the Town Manager explained that it would go through the Town and then appropriated to the Board of Education. Another question regarded theft or vandalism of the units (It would be the responsibility of RWE who owns the equipment and are leasing the property with no responsibility to the Town or the BOE). Also discussed was that the Southington Public Schools electricity contract that was due to be negotiated before it expires in October 2024. Currently, the rate is \$0.7 per KWH and projected to be \$0.11 per KWH, which would be an increase of \$250,000 annually. Mr. Madancy thought that the \$50,000 from leasing would help. The Board members discussed that the chiller unit at the middle schools were already a large eyesore, and they did not need a second eyesore. If the Board agreed to move ahead and approve the contract it would be with the stipulation that it is an agreed upon location between the administration and RWE to find a less conspicuous area. Mr.

Madancy explained that RWE offered to install an Electric Vehicle (EV) charging station at the high school, at their expense, to sweeten the deal.

MOTION: by Mr. Oshana, seconded by Mr. Williams:

“Move that the Board of Education approve moving forward with the concept of the RWE property lease for the battery storage system at Joseph A. DePaolo and John F. Kennedy Middle Schools to be considered by the Town Council with the stipulation that its final location be mutually agreed upon between RWE and the administration.”

Mr. Carson stated that he thought that there were still outstanding questions and concerns such as the location of the battery packs as well as the EV charging station at the high school and who would be responsible to pay for the EV charging events. He would rather see an EV charging station at each of the middle schools to tap into the battery storage pack to charge those units. He believed that the EV charging stations cost between \$1,500-\$2,000 per year to charge vehicles throughout the year. He thought that a conversation needed to take place with the Town Manager and Town Council regarding what the tax benefit to the town would be for this equipment including the value of the equipment and how it would enter the tax roll in addition to the \$50,000 in lease payments.

TABLE MOTION: by Mr. Carson, seconded by Mr. Williams:

“Move to table a vote until the next scheduled Board of Education meeting.”

ROLL CALL VOTE: YES – Mr. Baczewski, Mrs. Anastasio, Mr. Carson, Mr. Chrzanowski, Mr. Derynoski, Mr. Oshana, Mr. Williams, Mrs. Clark. NO – Mrs. Carmody
Motion to table passed with eight in favor and one opposed.

Mr. Madancy stated that he would get answers to those questions for the Board at their next meeting for action.

10. NEW BUSINESS

a. Multilingual Presentation

Ms. Simone Crouch, Assistant Principal and Multilingual Coordinator at Southington High School, gave a PowerPoint presentation on the Multilingual Department for the district (formerly known as the English Language (EL) Department) explaining the growth of multilingual students into the district, primary responsibilities for the five full time and one part time multilingual tutors (non-certified staff) and TESOL (Teaching English to Speakers of Other Languages) Certified Staff consisting of three staff members supporting students with limited English language skills. She explained their responsibilities. For the 2023-2024 school year, there are currently 210 multilingual students in the district at a level 1-2 in English proficiency speaking 27 different languages. Ms. Crouch addressed state requirements, translation support, and family support including Parent Square software that can change the language. She explained the need for more help and tutors especially with the influx of students from war-torn Ukraine who also need counseling and emotional support. At the high school, they have 41 Multilingual students. A survey was distributed to staff for volunteers who could help with the different languages.

Board members questioned the legal obligations of a district to deliver English language skills to students along with legislation laws and state and federal funding, if there were bilingual paras, and if the tutors work under certified staff. Ms. Crouch explained the limited bilingual staff/aides/volunteers that have helped with interpretation of different languages. She addressed the Title III (ESEA) grant that helps to ensure that English learners attain English language proficiency and meet state academic standards. She noted that the many immigrants moving into the district are very studious, eager to learn, and hard workers. Ms. Crouch belongs to an organization of administrators who work with English Language Learners in other school districts that meet four times a year to collaborate. Board members questioned the use of translation software such as Google Translate. Ms. Crouch stated that the district uses Google Translate software for older students, but it is a problem for younger students who do not read or write yet. Monitoring Academic growth of the multilingual students was questioned. The Board members were very appreciative of the dedication to this program and offered their support.

b. STEAP Matching Funds (Small Town Economic Assistance Program)

Mr. Madancy explained that the town applied for and received a \$500,000 grant award for the purpose of resurfacing the SHS track. The STEAP grant is a town administered grant with a stipulation of the grant that the community who applies for it must put up a percentage of funds. The Board of Education's share of the funds is \$206,000 with the town kicking in their share of the \$500,000. He questioned from where the Board wanted to reallocate the Board's share of \$206,000 in order to proceed. The timeline to do the work would be June 2024 through August 2024. The resurfacing of the SHS track was part of the Athletic Facilities Project that went to referendum and did not pass. This grant would allow the track resurfacing to move forward without waiting for it to be addressed over the years as part of the Capital Plan. Mr. Madancy pointed out that there was \$235,000 in unencumbered MERS funds and approximately \$86,366 in unexpended carryover funds. He explained the Board options for the funding source. Mr. Baczewski asked if the district was due to replace the turf field. Mr. Madancy explained that the turf field was at year 12 and in good shape for its age; however, the track was in disrepair and needed to be repaired now but it would have been ideal to replace both at the same time.

MOTION: by Mr. Williams, seconded by Mr. Carson:

“Move that the Board of Education approves the reallocation of \$206,000 using first the \$86,366 in Non-Lapsing Funds and the balance of \$119,634 from the Operating Budget to Matching Funds as identified in the recently submitted STEAP Grant, as recommended by the administration.”

Motion carried unanimously by voice vote.

- c. SHS Accelerated Physics Unit #3 Momentum & Impulse - First Reading**
- d. SHS Accelerated Physics Unit #4 - Work & Energy - First Reading**
- e. SHS Accelerated Physics Unit #5 - Simple Harmonic Motion - First Reading**
- f. SHS Accelerated Physics Unit #6 - Electrostatics & Circuits - First Reading**
- g. SHS Accelerated General Chemistry Unit #3 - Matter & Energy Changes - First Reading**
- h. SHS Accelerated General Chemistry Unit #4 - Gas Law & Kinetics - First Reading**

- i. **SHS Accelerated General Chemistry Unit #5 - Flint Water Crisis - First Reading**
- j. **Middle School Needs Assessment - First Reading**

These agenda items are all first readings and will come before the Board for approval at the next Board meeting. Mrs. Carmody explained that the Middle School Needs Assessment was a survey that would go home to the parents before students take it in case there were concerns regarding participation. Mr. Carson asked what prompted the need for the middle school assessment.

11. PUBLIC COMMUNICATIONS

Mrs. Clark acknowledged that the Board received numerous letters regarding various topics that were not going to be read into the minutes but would be attached to the minutes. Reading the letters at the Board meeting was done during the COVID pandemic only. Mrs. Clark stated that the emails were received from Michael Kryzanski, Shama Greene, Jim & Shelly Nadwairski, Krista Perrella and Nick & Shelley Vincenzo (attached). Mrs. Zabohonski delivered forms requesting curriculum review that were given to the Superintendent.

a. Public

The following people addressed the Board during Public Communications:

Susan Zabohonski, read a passage from the book Native Son by Richard Wright that was given to 15-year-old students in English class at the high school, which was sexually explicit and written in 1940 and released at that time in the abridged edition due to content. In 1991, it was released in its unabridged edition. She stated that many parents completed a form for curriculum review of this book. She questioned Board of Education Policy #1312 and how this book was approved into the curriculum and the edition. She read both the abridged and unabridged versions of the book and stated that it was controversial material. If reviewed and approved, she requested that parents should sign-off for their child to read it. She thought the book was political, about systemic racism, and family issues causing criminal behavior, which she thought was not appropriate. She noted that the process for review started one week ago.

Effie Moutogiannis, 53 Rustic Oak Drive: She is a parent of a 10th grade student who is currently reading the unabridged version of the book Native Son in school. Mrs. Moutogiannis read this book when she was in high school accelerated English class and agreed that it was a challenging topic but did not have any issues about her daughter reading it and discussing at home. Her daughter's teacher sent home a notice to parents that they would be reading the book before it was distributed to students.

Leslie Parmentier, Hunters Lane: (Read by Susan Zabohonski) Ms. Parmentier is a retired Special Education Teacher with 30 years classroom experience at middle and high school levels. Her background includes degrees in BS SPED, MS Learning Disabilities, and 6th Yr. Degree in SPED Administration/Curriculum. She objected to the explicit sexual content being taught in the book Native Son, unabridged version, at the high school. She believed that during the school year educators spend more time with the students than the children's own parents. She sent the Board members a link to one notable study completed by the United States Bureau of Labor Statistics in 2022 that measured time parents spent with children in their homes under the age of 18. The outcomes of the study suggest that American parents spent significantly less time with their children than the classroom teachers. The teacher's role in educating young minds is also to shape social and emotional behaviors and the parents have trusted public schools to teach approved curriculum that is right and good for their children's future success. Parents expect that

curriculum has been reviewed and approved by trusted school administration and the elected Board of Education. She thought that materials with explicit sexual content should never be included in public school classrooms. Parents should be the ones to decide what to introduce sex education that aligns with their own religious beliefs and family values.

b. Student Expulsion

MOTION: by Mr. Oshana, seconded by Mr. Derynoski:

“Move to expel student #2023-2024-01, as stipulated by the administration.”

Motion carried unanimously by voice vote.

12. ADJOURNMENT

MOTION: by Mr. Derynoski, seconded by Mr. Oshana:

“Move to adjourn.”

Motion carried unanimously by voice vote.

The meeting adjourned at 8:38 p.m.

Respectfully submitted,

Linda Blanchard

Recording Secretary

PUBLIC COMMUNICATIONS
EMAILS SUBMITTED BY PUBLIC

From: Michael Kryzanski <mkryzanski@yahoo.com>
Sent: Friday, September 29, 2023 3:49 PM
To: SBOE
cc: MICHAEL CROCCO
Subject: The book "Native Son" and its use at Southington High School
Attachments: ns.jpg

CAUTION: This message has originated from an External Source. Please use proper judgment and caution when opening attachments, clicking links, or responding to this email.

Hello Southington Board of Ed Members,

I was recently made aware that the book Native Son is being used in some English classes taught at Southington High School. If I have heard wrong and am mistaken, please let me know and I won't trouble you any more on this topic. I have not read the book but I was made aware of one page of the book that is attached here. After seeing that page, I read some summaries online about the book because I was disturbed by the content on the page I saw. Unfortunately, I don't have the time to read the entire book so I do not have feedback on the rest of the book. I don't like commenting on something that I don't know about (i.e. the rest of the book). However, what I see here is disturbing. I won't go into graphic detail about what this page is describing. I realize that parents have different views on what is appropriate and what is not in a school setting. This makes it a difficult job for school administrators to balance what is allowed and what is not. I think the material on this page is entirely inappropriate for a high school setting. I can discuss my reasoning in a phone conversation with whoever appropriate. I was planning on speaking at the BOE meeting this week on this topic but decided to go to Castle Craig in Meriden with my family to see the full moon from the tower at the top (it is a lot of fun and I highly recommend it). Anyway, If parents want their children to read that book, they can easily do that outside of school. The book is available on Amazon.com. And, no this is not book banning. There are plenty of other reading materials that are not allowed in a school (like pornographic books and magazines) and that is not considered book banning.

Please let me know who will reach out to me regarding my concerns.

Thank you!

Michael Kryzanski
Parent of 9th grader Daria Kryzanski
27 Hitching Post Drive
860-893-5251

From: Shama Greene <shama.greene@gmail.com>
Sent: Tuesday, September 26, 2023 9:52 PM
To: STEVEN MADANCY; SBOE
Subject: A concern from a Southington parent

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PLEASE READ THIS CORRESPONDENCE ALOUD AT THE NEXT BOARD OF EDUCATION MEETING.
THANK YOU

Mr. Madancy & Board of Education Members,

My husband and I are lifelong residents of Southington, both graduating from Southington High School. When deciding where we wanted to raise our family, we both agreed that Southington had a great school system and we should raise our family here. Our daughter is currently a third grader.

I emailed Mr. Madancy last year, as I saw some inconsistencies on how report cards were being done across the elementary schools. I was only looking at one particular strand "Reads and comprehends grade level texts". I am emailing this year because I am continuing to see inconsistencies throughout our elementary schools and it has me very concerned.

My main concern is the inconsistency with homework assigned in 3rd grade (because that is what grade my child is in) across all elementary schools in Southington. I have asked a variety of parents in all eight elementary schools and have found there to be little consistency. The only consistent homework I was told about was reading. The amount varies, but nightly reading is assigned.

That is where the consistency ends. A few schools have no homework thus far in 3rd grade. One school assigns reading and cursive. Another school assigns reading and an occasional math worksheet. Yet another school assigns reading and study for a spelling quiz. My child's school assigns reading with a written response and iReady. This is alarming. Students in these schools are going to have different homework, different learning backgrounds. That will filter to the two middle schools. Now, we will have students in sixth grade who did not have the same homework, the same amount of homework, kids with different skill sets, going to middle school where teachers will have to deal with the different learning backgrounds. I am not saying it should be completely the same. However, teachers should be assigning similar things across the grade level in Southington. It should not matter what elementary school your child goes to, they should be getting similar learning and homework experiences to keep the playing field level for all students in Southington. I'd love for my child to learn cursive, but we are apparently not learning that this year because we do not go to that school.

My next concern is in regards to the chromebooks. It is great that Southington is fortunate enough to have each child use a chromebook in school when needed. However, no one is teaching our children how to type. My child is in third grade and still "pecks" at the keyboard. It takes her at least 5 minutes to type a sentence. But now, her homework will be given on a chromebook where she has to type? It will take her 20 minutes to type three sentences. When I asked her teacher about it at Open House, the response was "She can access the typing program on ClassLink and practice at home" Why should my child have extra work to do at home? If Southington schools are giving her the chromebook, shouldn't Southington schools be teaching her how to type? And furthermore, if she cannot type fluently because she has not been taught- why is homework being assigned where she has to type?

Another concern that is becoming more alarming is, when are children being taught to write? Work on their fine motor skills? Learn cursive? How is the town of Southington helping my 'graduate' be able to sign a legal document with her name when she gets older? I am an educator, and the handwriting of students has gotten worse as the years have gone on. Yes, children should become familiar and comfortable with technology. However, they should still be writing things by hand to practice their handwriting and work on their fine motor control.

My last concern for this email is the homework policy. The Board of Education homework policy has not been revised since 2012. I was shocked to see that Grades 9-12 was still under revision, yet, no revision had actually been made public. Since that policy, there has been plenty of research to support that homework, especially in the elementary school, has no effect on student performance. None of us know what a student's life looks like outside of school. No one has any idea of how many extra-curricular activities they may be involved in or if both parents are working and whether the student has support to complete the homework at night. The only truly beneficial homework is reading. I'm going to include some current article links that show the research on homework for elementary school students.

Mr. Madancy & current Board of Education members, I urge you to look into this matter. Not just for third grade, but for all grade levels. Southington should have consistency throughout the grade levels no matter where a student attends elementary school. Teach our students to become proficient with technology if they are going to utilize it in and out of school. Teach our "graduates" how to be successful by giving them the keys to success— which includes being able to use cursive to sign their name on a legal document. Revisit your homework policy, taking into consideration that no one knows what a student's life looks like outside of school. No one knows if that child has the opportunity to complete assignments in a timely manner. My husband and I chose Southington as the town to raise our daughter in because of our exceptional education experience. Please give our daughter the same experience.

Sincerely,
Shama Greene
67 Memorial Drive
Southington

Article Links:

<https://time.com/4466390/homework-debate-research/>

<https://www.greatschools.org/qk/articles/what-research-says-about-homework/#~:text=The%20average%20high%20school%20student,remains%20something%20of%20a%20mystery>

<https://www.popsci.com/science/do-kids-need-homework/>

From: STEVEN MADANCY
Sent: Thursday, October 12, 2023
12:41 PM
To: TERESA COLEGROVE
Subject: FW: Board Of Ed

From: James Nadwairski <jsnads@att.net>
Sent: Monday, October 9, 2023 7:52 PM
To: SBOE <SBOE@southingtonschools.org>
Subject: Board Of Ed

CAUTION: This message has originated from an External Source. Please use proper judgment and caution when opening attachments, clicking links, or responding to this email.

Dear Southington Boards Members.

I am writing to request a formal review of the book Native Son, an approved book that was assigned reading for the 10th grade English classes.
The book contains sexually explicit content that is not appropriate for minors.
I am requesting this review per Policy #1312

Please read my email into record at the next board meeting:

Our children should be protected in their innocence as long as they can. Don't rush the inhumanity of adulthood.

Jim & Shelly Nadwairski

From: Krista Perrella <kristaperrella@gmail.com>
Sent: Monday, September 25, 2023 7:58 PM
To: SBOE
Subject: Don't delay the elementary facility project any further

CAUTION: This message has originated from an External Source. Please use proper judgment and caution when opening attachments, clicking links, or responding to this email.

Hello BOE members,

I'm a mother of a current and future Kelley school student. I've seen the state of the building and I'm asking you to reinstate the vote on this project as soon as possible. The building was too hot the first week of school. Now there are garbage cans collecting rain water in the gym because of leaks in the roof. The playground is gone because it was too old to repair. The condition of this building is unacceptable for children and adults to be in.

I do not support the BOE decision to delay for referendum til 2025! We need this project to move forward. Please put in a grant application as soon as possible, to receive funding from the state. Please do whatever needs to be done to rebuild this school.

The BOE has already spent thousands of dollars on having a company do cost analysis, building/land analysis and provided their findings to the BOE and even parents last year at a special elementary facility project meeting for parents. Please consider these findings this year and vote to rebuild Kelley school by next May. Building costs are only going to rise.

Please consider moving the vote to may or next November at the latest. We can not wait until 2025. Kelley school is run down and in desperate need of repair.

Best,
Krista Antigiovanni

From: Shelley Vincenzo <shelley.vincenzo@yahoo.com>
Sent: Thursday, September 28, 2023 1:07 PM
To: SBOE <SBOE@southingtonschools.org>
Subject: September 28 BOE Meeting

CAUTION: This message has originated from an External Source. Please use proper judgment and caution when opening attachments, clicking links, or responding to this email.

Good Afternoon,

I hope this email finds you well. My husband and I are unable to make it to the BOE meeting tonight, and I ask that the following be read into the record. I appreciate your assistance.

”Dear Members of the Board of Ed:

Thank you for the opportunity to be a part of tonight's meeting. Our names are Nick and Shelley Vincenzo, and we moved to Southington at the beginning of August. Our oldest just started Kindergarten at Kelley Elementary School.

We were told by many neighbors when we moved in how great of a community Southington is, and how Kelley school is second to none. Our son is thriving in Kindergarten and he is loving his experience so far, however, it is no secret that the school itself is lacking. I don't think we need to tell you to drive by (or visit) and see for yourselves because as we understand it, the prospect of rebuilding and/or renovating Kelley School has been before you for a while now.

You are all on the Board of Education because the students in this great town are important to you. Their health, wellness, and education are certainly at the forefront of your minds. We, as parents, share that same mindset. By way of this letter, we are before you tonight to urge you to NOT delay the improvements at Kelley School any further. Please do not delay the referendum any longer and instead move it up and put in a grant application this year so that a decision can be made on which building scenario to go with. The families and students at Kelley School are counting on you.

We appreciate your time.

Nick and Shelley Vincenzo
246 Hightower Road"

Respectfully,
Shelley Vincenzo

Board of Education

Administrative Report

October 26, 2023



1. School Swatting webinar (Steve)
2. K Guidance received from CSDE (Steve)
3. Athletic Facilities Update (Steve)
4. Threat Assessments and UCC's (Frank)



SOUTHINGTON PUBLIC SCHOOLS

Board of Education Southington, Connecticut *Policy & Personnel Committee Meeting*

Wednesday, October 11, 2023 - 5:30pm
Superintendent's Conference Room
Municipal Center, 200 North Main Street
Southington, CT 06489

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT
OF SCHOOLS

BOARD OF EDUCATION

COLLEEN W. CLARK
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TERRI C. CARMODY

SEAN M. CARSON

JAMES J. CHRZANOWSKI

DAVID J. DERYNOSKI

ZAYA G. OSHANA

JASPER P. WILLIAMS

Members Present: Committee Chair – Jasper Williams, Dawn Anastasio, Dave Derynoski, and Zaya Oshana

Administration Present: Assistant Superintendent – Frank Pepe

Committee Chair Jasper Williams called the meeting to order at 5:30 p.m.

Policy 3542.1 – Purposes and Facilities: Food Service revisions were reviewed. Although the policy was revised in February 2022, recent legislative changes prompted further language adjustments.

Policy 6141.4 – Curricular Exemptions was presented and reviewed. The committee requested additional samples and related terms further defined. The information will be brought forth for review at the November meeting.

Language within associated **Regulations for Policy 6172 – Curriculum Extensions – Gifted and Talented Program** were reviewed. The change accurately identifies where related information is found.

Revisions to **Policy 9160 – Student Representatives on the Board of Education** – were reviewed. Additional edits were requested by subcommittee members. Mr. Pepe was directed to investigate the potential to identify policy language which would provide the student representatives the responsibility to solicit district information related to “issues, items and concerns” of students. Mr. Pepe will meet with Mr. Crocco and the current three BOE representatives to explore this option as well as refine the Selection Committee Procedures.

The dates for Policy & Personnel Committee Meetings for 2023-2024 School Year were approved as presented.

Meeting adjourned at 6:00 p.m.

Respectfully Submitted,

Frank Pepe

200 NORTH MAIN ST.
SOUTHINGTON, CT 06489

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(860) 628-3202

FAX
(860) 628-3205



SOUTHINGTON PUBLIC SCHOOLS

Board of Education
Southington, Connecticut

Curriculum & Instruction Committee Meeting Minutes
October 20, 2023 - 9:30 a.m.

Public Assembly Room - Technology Training Lab
200 North Main Street, Southington, CT

STEVEN G. MADANCY

SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE

ASSISTANT SUPERINTENDENT
OF SCHOOLS

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ZAYA G. OSHANA

JASPER P. WILLIAMS

Members Present: Committee Chair, Dawn Anastasio; Terri Carmody; Jasper Williams

Administration Present: Assistant Superintendent Frank Pepe; Director of Teaching and Learning for Secondary Education Amy Zappone

School Staff Present: Dept Leader Math/Teacher Tom Hinman and SHS teacher Sara Levinthal

Meeting called to order at 9:30 a.m. by Committee Chair Dawn Anastasio.

SHS teacher Sara Levinthal presented the Comprehensive Learning Center (formerly ACHIEVE) **ArtShop Curriculum**. The focus is to teach a combination of art and photography to students with varying disabilities. The course is broken into three main categories, 1. Art Minds Units which consists of 26 mini units, 2. Flash Friends Photography which consists of 26 mini units and Open Studio which the unit total will vary based on student choice. All units are hands on with direct instruction and highly collaborative.

SHS Department Leader Tom Hinman presented revisions to **Computer Science Principles**. Currently this course is only taught at the AP level. The proposal is to continue to offer the AP level and offer **Computer Science Principles** at the accelerated level. These two courses will be taught in different coding languages and at a different pace and associated rigor. This proposed course is a result of conversations with students who are aware the AP class is taught in APP Inventor, which is a block-based coding language. Some students prefer a text-based language and may not want the associated rigor of an AP course. The revised course at the accelerated level offers students the building blocks to be successful in future computer science courses.

Visual Basic Programming I and II will be reclassified as accelerated and successful students will feed into either AP or the Accelerated Computer Science Principles course.

On behalf of Keagan Radziwon, Amy Zappone presented **SHS – Accelerated Biology, Unit 3: Cellular Energetics**. Students explore the role of carbon in living things and the ecosystem through the lens of climate change. Students examine how plants that undergo photosynthesis impact the composition of the atmosphere and the factors

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SOUTHINGTON PUBLIC SCHOOLS

STEVEN G. MADANCY
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JASPER P. WILLIAMS

which impact the rate of photosynthesis. Students then explore a germinating seed to determine where it gets its mass and energy from.

This leads to cellular respiration and the respective roles of oxygen and carbon dioxide. The unit concludes with how carbon cycles through the ecosystem beyond photosynthesis and respiration impact climate change. Students will evaluate if planting trees mitigates climate change and compare to other solutions.

The dates for **Curriculum & Instruction Meetings for 2023-2024 School Year** were reviewed.

Committee members unanimously agreed to forward the above items to the full Board for review.

Meeting was adjourned at 10:07 a.m.

Respectfully Submitted,

Frank Pepe

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SOUTHINGTON PUBLIC SCHOOLS

FINANCE COMMITTEE MEETING

Thursday, October 19, 2023, 6:30 p.m.

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT
OF SCHOOLS

BOARD OF EDUCATION

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Board Members Present: James Chrzanowski, Chair, Sean Carson,
David Derynoski and Zaya Oshana

Present from Administration: Jennifer Mellitt, Director of Business &
Finance; Kyle Fickel, Accounting
Manager,

The Finance Committee meeting was called to order at 6:30pm.

New Maintenance Vehicle Purchase:

Mr. Fickel reviewed a request for a new vehicle from the Maintenance Department. The funding for the vehicle lease is included in the approved FY24 budget under the Rental of Equipment account. The district has been purchasing vehicles using the state contract and four-year financing. The current leasing information from Ford quoted a 9% interest rate.

The committee discussed the condition of the current fleet of vehicle, including the lift gate truck which was placed on hold last January. A discussion was held about buying versus financing the purchase. Although the committee supported the purchase of the new vehicle, the committee requested the administration obtain quotes from alternative financing sources for comparison.

UPDATE: Vehicle financing was obtained from Municipal Leasing Credit Corporation with an 8.25% rate. The information was shared with the committee on Friday, October 20th. The Consensus was to bring this item to the full board for further discussion and possible action.

Transfer of Funds:

2a-STEAP Athletic Project

The committee reviewed the transfer request to move funds from the CT Municipal Retirement account into a major project and equipment account to fund the STEAP Athletic project. The use of funds was approved by the Board at the October 12th meeting. The committee unanimously approved the transfer.

2b-Computer Lab Update

The committee reviewed the transfer request made by Tyler Savage and Rebecca Savelkoul to transfer funds from computer software to computer hardware to update the computers in three labs at the high school. Mr.



SOUTHINGTON PUBLIC SCHOOLS

Savage provided a memo with information about why Chromebooks are not used in the art labs and the Project Lead the Way lab.

A discussion was held about the transfer and the committee unanimously approved the transfer.

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT
OF SCHOOLS

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DAVID J. DERYNOSKI

ZAYA G. OSHANA

JASPER P. WILLIAMS

School Lunch Update on \$300,000 Loan:

Mrs. Mellitt shared information about the \$300,000 loan made to the School Lunch Program in October of 2020. No payments have been made on the loan at this time. The request from the administration was to release the loan from being repaid back into our BOE Non-Lapsing FY2020 account and allow the program to utilize the funds to purchase equipment improve the program. A discussion was held about the loan and the possible equipment needs. Mrs. Mellitt shared that the auditors would be back on site the week of October 30th. The committee asked Mrs. Mellitt to report back to the committee after meeting with the auditors.

MISCELLANEOUS:

None.

The meeting adjourned at 7:37 p.m.

Respectfully submitted,

Jennifer Mellitt
Director of Business & Finance

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SOUTHINGTON, CT
06489

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Southington Public Schools

200 North Main Street
Southington, CT 06489



To: **DIRECTOR OF BUSINESS & FINANCE/SUPERINTENDENT**

From: **BOE Requested Action on 10/12/23**

Location: **District - 500**

Subject: **REQUEST FOR TRANSFER OF FUNDS**

Please authorize the following transfers within the accounts assigned to my program location:

	FUND	ACCOUNT NUMBER	NAME OF ACCT.	OBJECT CODE	FUNCTION	SITE CODE	KEY #	AMOUNT
FROM:	10	20110	CT Municipal Retirement	200	1000	500	0369	\$120,297
TO:	10	74400	M P & E	420	2600	500	4977	\$120,297
FROM:								
TO:								
FROM:								
TO:								

BRIEFLY JUSTIFY YOUR REASONS FOR MAKING THE ABOVE REQUEST.

Reclass MERS to Major Projects & Equipment Account for the STEAP Grant Matching funds \$206,663 less FY23 Non-Lapsing balance of \$86,366.

BUSINESS OFFICE USE ONLY

Approved

Denied

COMMENTS

- Insufficient balance
- Outstanding encumbrance
- Other (See COMMENTS)

Jennifer Mellett
Director of Business & Finance

10/16/23
Date



SOUTHTON PUBLIC SCHOOLS

Tyler Savage
Network Manager

MEMO

TO: Board of Education Finance Committee
DATE: October 16, 2023
RE: SHS Computer Lab Transfer of Funds

Over the past 3 years we have been systematically working to remove computer labs throughout the district. As result of this, we were able to decommission at least 16 labs. The team worked with the teaching staff to create alternatives for all labs. After all options were exhausted there was a meeting between Mr. Pepe, Mrs. Leah Clark, Department Leaders, and Technology. The outcome of the trials and meeting left a requirement for only 12 labs at SHS.

The Technology Leadership team was able to find funding for 3 labs (69 Computers) to be replaced this year.

Q. Why is there a surplus in the School Based Software?

A. During the budget request last year, the team was hopeful that a \$20,000 per year cloud option would replace these remaining labs. Unfortunately, that was not the case, and these labs will still be required. The \$20,000 software can be used towards the cost of the computer labs.

Q. Why is there a surplus in the Districtwide Computer Software?

A. We currently have a legacy license for Microsoft Office products. Last year we were informed that we would be required to transition to this new licensing model. Microsoft allowed us to delay the upgrade for one more year. They did inform us that next year we will be required to upgrade.

Q. Why do these labs require replacement?

A. The team was very hopeful that we would find a suitable option to run on the Chromebooks. Due to this, we were trying to stretch the labs as far as they would go. Deploying minor upgrades over the years at a low cost to the district. Unfortunately, currently these labs are 10 to 12 years old and are starting to fail. Additionally, these labs are struggling to run the latest versions of the required software.

Q. Why aren't the students able to use their Chromebooks?

A. Two of these labs utilize Photoshop which requires a Windows/Mac computer. This is due to the graphical requirements of the application. The third lab is a Project Lead the Way lab. These labs have multiple software that require a Windows computer. The most well-known software is the Inventor app.

The administration recommends approval to transfer \$20,000 from School Based Software and \$55,000 from Districtwide Computer Software to the Districtwide Computer Hardware.

Southington Public Schools

200 North Main Street
Southington, CT 06489



To: **DIRECTOR OF BUSINESS & FINANCE**

From: _____ Network Manager Tyler Savage

Location: _____ District Office

Subject: **REQUEST FOR TRANSFER OF FUNDS**

Please authorize the following transfers within the accounts assigned to my program location:

	FUND	ACCOUNT NUMBER	NAME OF ACCT.	OBJECT CODE	FUNCTION	SITE CODE	KEY #	AMOUNT
FROM:	10	42500	SCHOOL BASED SOFTWARE	611	2220	500	2367	\$20,000
TO:	10	32324	DISTRICT COMPUTER HARDWARE	590	2300	500	1470	\$20,000
FROM:	10	32325	DISTRICTWIDE COMPUTER SOFTWARE	590	2300	500	1475	\$55,000
TO:	10	32324	DISTRICT COMPUTER HARDWARE	590	2300	500	1470	\$55,000
FROM:								
TO:								

BRIEFLY JUSTIFY YOUR REASONS FOR MAKING THE ABOVE REQUEST.

See attached memo


 Signature: *Principal - Administrator*

10/4/23
 Date

BUSINESS OFFICE USE ONLY

Approved

Denied

COMMENTS

- _____ Insufficient balance
- _____ Outstanding encumbrance
- _____ Other (See COMMENTS)

Director of Business & Finance

Date



SOUTHTON PUBLIC SCHOOLS

KYLE FICKEL
ACCOUNTING MANAGER

MEMO

TO: Board of Education Finance Committee

RE: Vehicle Purchase for Maintenance Department

DATE: October 18, 2023

A new vehicle has been requested by our Maintenance Department. Please see the attached memo from Mr. Romano, Director of Operations, in support of the new vehicle. This vehicle is designated as a replacement for the current carpenter's van. The vehicle's purchase will be financed using a four-year lease and is currently budgeted in the FY24 Operating Budget. The requested vehicle is a 2024 Ford Transit 250 Van. Our current vehicle is a 2008 Chevy Express Van with 94,314 miles as of December 2022. The existing vehicle will remain in the fleet to be used by other maintenance staff and/or replacement for the recently junked mail vehicle.

The proposed vehicle will be purchased under the State of Connecticut Contract #19PSX0161. Attached is the vehicle quote and a summary of our current maintenance vehicles showing the current condition of our fleet. The total price for this vehicle is \$53,544.10 payable in four annual installments of \$15,334.68 with the first installment paid up front.

The Administration recommends the new vehicle financed by a four year lease to continue with our maintenance vehicle replacement cycle. This purchase was budgeted in the Rental of Equipment account (32510) in FY24.

Update 10/20/2023: The committee requested alternative financing option with a lower rate. The administration shared a new leasing quote with the committee at 8.25% with four annual payments of \$15,157 through Municipal Leasing Credit Corporation. The Administration recommends approval of the vehicle purchase.

Summary of Current Maintenance Vehicles

Year	Vehicle Make	Body Style	Description	Plate Number	Original Purchase Price	Mileage as of December 2022	Condition as of December 2022
1994	**Ford	Ranger XL Pickup	Laborer	208 SO	*	150,939	Poor
1999	Ford	4x4 250 XL Pickup	Laborer	137 SO	\$20,998	143,908	Poor
1999	Ford	Taurus	Mail	187 SO	**	64,015	Junked
2005	Chevy	2500 Express Van	Electrician	140 SO	\$17,136	84,910	Fair
2006	Chevy	4x4 Dump 3500	Laborer	95 SO	\$25,244	152,041	Poor
2008	Chevy	Express Van	Carpenter	132 SO	\$18,354	94,314	Fair
2010	Ford	E250 Cargo Van	Plumber	55 SO	\$19,184	70,300	Fair
2010	Ford	E250 Cargo Van	HVAC	62 SO	\$19,184	91,284	Fair
2011	Ford	F350 4x4 rack body	Laborer	49 SO	\$39,656	80,800	Fair
2011	Ford	E350 Cargo Van	Electrician	56 SO	\$19,184	72,043	Good
2014	Ford	E250 Cargo Van Super Duty	HVAC	170 SO	\$21,164	51,256	Excellent
2015	Ford	F350 4x4 Supercab	Carpenter	45 SO	\$33,254	46,045	Excellent
2017	Ford	F150 Regular Cab	Foreman	104 SO	\$25,434	54,140	Excellent
2019	Ford	F250 Transit Van	Painter	330 SO	\$32,213	16,203	Excellent
2021	Ford	F150 Transit Van	Electrician	339 SO	\$33,878	8,400	Excellent



FACTS SHEET

11184 Antioch, Ste. 313
Overland Park, KS 66210-2420
www.mlcfinance.com

800/333-4910 • 913/381-1900 • 913/381-0105 (Fax)

Attn: KYLE FICKEL Fax to: _____ # of pages: 1
 For: SOUTHINGTON, CT BOARD OF EDUCATION Documentation Fee: 500.00
 Equipment Cost + fee: 53,544.10
 Estimated Delivery: ?? Payment at delivery: FIRST PAYMENT
 Type of Equipment: 2024 FORD TRANSIT T250 CARGO VAN Today's Date: OCT. 20, 2023

AMOUNT FINANCED	TERM	MODE	PAYMENT AMOUNT	FIRST PAYMENT DUE	INTEREST RATE
<u>54,044.10</u>	<u>4 YEARS</u>	<u>ANNUAL</u>	<u>15,157</u>	<u>ADVANCE</u>	<u>8.25%</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

THERE ARE NO ADDITIONAL FEES and buyout at the end of the Lease is \$1.00. Rates are good for 30 days, pending mutually acceptable documentation and credit approval. Lessee must qualify as an issuer of less than \$10 million in new debt during the calendar year.

COMMENTS: GORDON: Please call 800-333-4910 or email carol@mlcfinance.com with questions. Many thanks!

Carol D. Searcy



SOUTHINGTON PUBLIC SCHOOLS

Peter Romano .
Director of Operations .

MEMO

To: Steven G. Madancy, Superintendent

Date: October 16, 2023

Re: **Vehicle Purchase for Maintenance**

Maintenance is in need of a replacement vehicle. We were anticipating a liftgate pickup truck this last year. There were funds in the budget but the lease wasn't approved. At your request this is background information on the maintenance vehicle fleet that I was speak with you about:

Vehicles

- There are (15) vehicles in the maintenance fleet
- The average age of the vehicles is 13.9 years old.
- (2) of the vehicles were donated to us from the water department and the TOS when they retired them. They are 24 and 29 years old.
- 60% of the (15) vehicles in the fleet have a rating of less than good

Staffing

- We have (18) staff that share the (15) vehicles: (13) FT maintenance staff, (1) PT mailperson and an average of (3) summer staff.
- While it isn't possible for the Tech I staff to share vehicles because they carry specific tools, we do have the Tech II and summer help share vehicles for tasks whenever possible. With only (4) Tech II staff to service (13) schools and field preparation at SHS and the middle schools, much of their time needs to be in individual vehicles or there is a loss in productivity.

Vehicle Maintenance

- Oil changes, tire replacement, and general maintenance of the vehicles often keeps us down a vehicle for a day here and there.
- When we have larger repairs, production is impacted by the downtime. Repairs like restrapping a gas tank that has fallen from the vehicle due to road salt corrosion and the parts are not in stock have cost us the use of a vehicle for 6 weeks. Even longer was the repair of the lift gate on the flatbed truck. It took several months to get the parts for that repair.
- While the staff washes the vehicles, they cannot wash the undercarriage of the vehicle where the salt corrosion does considerable damage. This reduces the life of the vehicle and creates downtime for repairs

to exhaust systems, suspensions, etc. A fleet car wash program like the SPD has with a local vendor on Queen St. would be desirable but under the current economic climate, I realize it is too large of an ask.

Vehicle Replacement Program

- The current vehicle replacement planning is to replace a vehicle using a (4) year lease. When that lease is satisfied, we own the vehicle, and another vehicle is leased. With a fleet of (15) vehicles we will need to get 60 years of useful life out of each vehicle before it will be up for replacement.

Summary

For the maintenance staff a vehicle is not a luxury. It is a tool that is necessary to get their work completed. The more the fleet is compromised the greater the loss of productivity. The appearance of a vehicles that have been doing a job for more than 20+ years is less than professional. We are stressing the system when we try to keep the vehicles on the road for this long.

The safety of the vehicle, the appearance of the vehicle to the taxpayers, and the professionalism of the team are judged with each vehicle that we have on the road. We are falling behind on maintaining the fleet. The longer we let vehicle replacement slip, the harder it is going to be to catch back up. We, unsuccessfully, reached out to the Highway and Water Department for any vehicles they are disposing in an effort to improve our fleet. I recommend that we find a way to continue to purchase the vehicle that that has currently been put on hold.

HOW DO WE WANT OUR DISTRICT REPRESENTED?



Gengras Ford, LLC

225 New Britain Avenue
 Plainville, CT 06062
 Phone: 860.727.6302
 www.gengras.com



Quote Number: **231017007**

Make	MY	Model	Contract Price
Ford	2023	Transit MR CARGO RWD (R1C) - 130" wheelbase	\$ 41,117.00

All specifications are subject to verification of manufacturer's published standard and optional equipment. Vehicle to include all manufacturers standard equipment plus the following options:

	Option Code	Description	List Price
1	YZ	Oxford White	\$ -
2	VK	Palazzo Gray	\$ -
3	998	3.5L PFDI V6 Engine	\$ -
4	44U	Ten speed automatic transmission	\$ -
5	X7L	3.73:1 Limited Slip	\$ 325.00
6	15F	Rear Compartment Light	\$ 75.00
7	19X	Start/Stop Delete	\$ (50.00)
8	19Z	WIFI Delete	\$ (20.00)
9	WB	148" Wheelbase vs standard	\$ 1,275.00
10	53B	Trailer Tow package	\$ 485.00
11	21L	Two-way Cloth front seats	\$ 115.00
12	58V	SYNC 3 (bluetooth)	\$ 280.00
13	60C	Cruise Control	\$ 325.00
14	63E	Dual Batteries	\$ 295.00
15	67D	Brake Controller	\$ 405.00
16	86F	Fleet Keys (4 keys total)	\$ 75.00
17	96D	Load Area Package	\$ 450.00
18	17A	Rear Door Glass (only)	\$ 250.00
19			\$ -
20			\$ -
21			\$ -
22			\$ -
23			\$ -
24			\$ -
25			\$ -
Total Options per Contract Price (list price)			\$ 4,285.00
Total Factory Options Discount (6%)			\$ (257.10)
Total Options per Contract Price (net price)			\$ 4,027.90

Financing Quote # 103196

October 17, 2023

Municipality: Southington Board of Education
Dealer: Gengras Ford

Ford Credit Municipal Finance is pleased to provide the following quote for your consideration.
Expiration Date: 12/16/2023

Description	Unit Price
2024 Ford Transit 250	\$53,544.10

Total Asset Cost	\$53,544.10
Underwriting Fee	\$545.00
Amount Financed	\$54,089.10
Number of Payments	4
Payment Timing	Annual
Rate	9.09%
Payment Amount	\$15,334.68

This quote was prepared assuming the lease qualifies for Federal Income Tax Status for Ford Credit Company LLC under Section 103 of the IRS Code and is not a commitment by Ford Credit Municipal Finance. Financing is subject to credit review.

Thank you for the opportunity to provide this quote. If you have any questions, need additional options, or would like to proceed with the application process, please contact by using the information below.

Sincerely,

Bri Tvenstrup

Bri Tvenstrup
Marketing Coordinator
bminnic3@ford.com
1-800-241-4199, press 1

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 b.

AGENDA REPORTING FORM

Agenda Topic: ConEd Battery Storage Project

Summary of Issue: The Town of Southington is considering entering into an agreement with RWE to lease property at Joseph A. DePaolo and John F. Kennedy Middle Schools for a battery storage system.

Background: N/A

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: TBD

Ending Date of Program or Project: TBD

Recommendation or Comment: Move that the Board of Education approve moving forward with the concept of the RWE property lease for the battery storage system at Joseph A DePaolo and John F. Kennedy Middle Schools to be considered by the Town Council.



Signature of Superintendent of Schools

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 c.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated Physics – Unit #3 – Momentum & Impulse – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated Physics – Unit #3 – Momentum & Impulse.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated Physics – Unit #3 – Momentum & Impulse as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

UNIT 3: Momentum

Unit Documents:

[Unit Notes](#) ; [Unit Launch](#) ; [Summary Table](#) ; [TIPERs & Engagement Points](#) ; [Quiz 1](#); [Summative](#)

Unit Overview	
Unit Title:	Unit 3: Momentum & Impulse
Teacher:	Ouellette
Grade Level/Course:	11-12 (Accelerated Physics)
Length/Dates:	~ 14 (88 minute) instructional periods
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students discover properties of matter in motion, which defines momentum. An emphasis is placed on collisions. Students investigate the momentum of massive objects in motion or at rest before and after a collision. Students first encounter the idea of conservation, which plays an important role throughout other units of study. Students build a device to protect a fragile payload.

Standard Bundles

Performance Expectations
<ul style="list-style-type: none"> HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. [Clarification Statement: Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle.] [Assessment Boundary: Assessment is limited to systems of two macroscopic bodies moving in one dimension.] HS-PS2-3 Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* [Clarification Statement: Examples of evaluation and refinement could include determining the success of the device at protecting an object from damage and modifying the design to improve it. Examples of a device could include a football helmet or a parachute.] [Assessment Boundary: Assessment is limited to qualitative evaluations and/or algebraic manipulations.]

SEP Implications	DCI Implications	CCC Implications
<p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical and empirical models.</p> <ul style="list-style-type: none"> Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-PS2-5) <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> Apply scientific ideas to solve a design problem, taking into account possible unanticipated effects. (HS-PS2-3) 	<p>PS2.A: Forces and Motion</p> <ul style="list-style-type: none"> Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. (HS-PS2-2) If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system. (HS-PS2-2),(HS-PS2-3) <p>ETS1.A: Defining and Delimiting an Engineering Problem</p> <ul style="list-style-type: none"> Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3) <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (secondary to HS-PS2-3) 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-PS2-1),(HS-PS2-5) Systems can be designed to cause a desired effect. (HS-PS2-3) <p>Systems and System Models</p> <ul style="list-style-type: none"> When investigating or describing a system, the boundaries and initial conditions of the system need to be defined. (HS-PS2-2)

Transfer Goals (Vision of the Graduate)

List the long-term and/or school-wide independent student behaviors that this unit will address.

Transdisciplinary Goal:

Critical Thinking Transdisciplinary Goal:

Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s).

Creativity/Innovation Transdisciplinary Goal:

Students work creatively to design and refine implementation of ideas by taking risks, persevering, and exploring possibilities.

Explore Anchoring Phenomenon: Bennu and the DART Mission

Attempt to Make Sense: Impulse and Momentum Investigation ; Conservation of Momentum Investigation

Identify Related Phenomena: Egg Drop, Seatbelts, Airbags and Crumple Zone Readings and Investigation

Develop Potential Student Questions/Observations:

- What options do we have in stopping an asteroid?
- Can we watch those movies?
- Is NASA doing it?
- We should blow it up.
- We need to deflect/change the motion of the asteroid.
- We should apply a force and cause acceleration

Preconceptions:

- Students have little intuition for the idea of an impulse
- Momentum is often thought of as being synonymous with inertia
- Difficulty distinguishing between p and Δp
- Thinking of “before” and “after” an interaction
- Impulse causes momentum
- Signs of p and J . Students see momentum as an inherently positive quantity similar to mass and speed.

Sample Student Explanation:

We should blow Bennu up into a bunch of little pieces or hit it really hard to knock it off course.

Momentum Bundle

Day(s)	Target Question(s)	Lesson-level phenomenon	Activities & Assessments	What Students Will Learn/Expected Outcome (Knowledge and Skills)
1	How can humanity protect itself from an asteroid?	Anchoring Phenomenon Launch	<ul style="list-style-type: none"> • Unit 4 Phenomenon Launch 	<p>DCI: HS-PS2-2</p> <p>SEP: Asking questions and defining problems.</p> <ul style="list-style-type: none"> • I can ask questions that arise from careful observation of phenomenon, or unexpected results, to clarify and/or seek additional information. • I can evaluate a question to determine if it is testable and relevant. <p>CCC: Systems and System Models</p> <ul style="list-style-type: none"> • I can investigate or analyze a system by defining its boundaries and initial conditions, as well as its inputs and outputs • I can use models (e.g., physical, mathematical, computer models) to simulate the flow of energy, matter, and interactions within and between systems at different scales. <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can identify and describe the momentum of each object in the system as the product of its mass and its velocity, $p = mv$, using the mathematical representations. <p>Connection to Anchoring Phenomenon: N/A</p> <p>What's next? Students are familiar with forces and motion at this point. How can we apply previous learning to the anchoring phenomenon?</p>
2 - 8	How can force change the motion of an object via a collision?	Impulse-Momentum Theorem	<ul style="list-style-type: none"> • Impulse and Momentum Investigation • Summary Table • Notes/Examples • Impulse and Momentum Problem Set 	<p>DCI: HS-PS2-2</p> <p>SEP: Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> • I can plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time) • I can select appropriate tools to collect, record, analyze, and

				<p>evaluate data.</p> <ul style="list-style-type: none"> I can make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> I can use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. <p>Learning Targets:</p> <ul style="list-style-type: none"> I can identify and describe the momentum of each object in the system as the product of its mass and its velocity, $p = mv$, using the mathematical representations. I can use mathematical representations to support the claim that the total momentum of a system is changed when an external force acts on the system <p>Connection to Anchoring Phenomenon: A net force acting on an object for some amount of time can change that object's momentum. If we want to change the momentum (motion) of an asteroid, we need to provide an impulse. We can hit it very hard very quickly or hit it with a smaller force over a longer period of time. This corresponds to some of the various ways we can deal with an asteroid, like a kinetic impact or a solar sail.</p> <p>What's next? External net forces cause changes in momentum. What happens when no net force acts on a system?</p>
9 - 12	What happens when no external forces act on a system with momentum?	Conservation of Linear Momentum	<ul style="list-style-type: none"> Conservation of Momentum Investigation Momentum Conservation Problem Set Bennu Anchoring Phenomenon Problem Impulse and Conservation of Momentum Quiz 	<p>DCI: HS-PS2-2</p> <p>SEP: Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> I can use mathematical representations of phenomena to describe explanations <p>CCC: Systems and System Models</p> <ul style="list-style-type: none"> When investigating or describing a system, the boundaries and initial conditions of the system need to be defined. <p>Learning Targets:</p> <ul style="list-style-type: none"> I can analyze the total momentum of a system and support the claim that the initial momentum of a system is equal to the

				<p>final momentum of a system if that system experiences no external net force.</p> <p>Connection to Anchoring Phenomenon: Bennu’s momentum will remain constant (conserved) if there is no external impulse. A collision with Earth would be a perfectly inelastic collision, and momentum would be conserved as long as no external impulses are applied. Momentum is also conserved in the explosion (nuclear) option.</p> <p>We also carry out a problem around Bennu with a kinetic impact approach and decide if we’ve done enough to knock Bennu off course.</p> <p>What’s next? How can we use our understanding of impulse and momentum to design safety features for cars?</p>
13 - 15	How can we make cars/driving safer by understanding momentum?	Car/Driver Safety	<ul style="list-style-type: none"> • Seatbelts, Airbags and Crumple Zone Readings and Investigation • Blueprint Discussion <ul style="list-style-type: none"> • Egg Drop Performance Task 	<p>DCI: HS-PS2-3</p> <p>SEP: Constructing Explanations and Defining Solutions</p> <ul style="list-style-type: none"> • I can apply scientific ideas to solve a design problem, taking into account possible unanticipated effects. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> • Systems can be designed to cause a desired effect. <p>Connection to Anchoring Phenomenon: Seatbelts and crumple zones are engineered to help passengers undergo a safer change in momentum by increasing the time of collision and thus decreasing the amount of force acting on the passenger. Seatbelts act as an external force, which allows a person to not continue to move with their initial momentum.</p> <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can conduct a literature review of common safety devices and evaluate their effectiveness • I can incorporate physics principles into my design process. <p>What’s next? Now that we understand why seatbelts, airbags, and crumple zones are important, can we engineer a device to protect a payload using material restraints?</p>

16 - 24	How can we engineer devices to protect a payload?	Egg Drop	Egg Drop Performance Task	<p>DCI: HS-PS2-3</p> <p>SEP: Constructing Explanations and Defining Solutions</p> <ul style="list-style-type: none"> I can apply scientific ideas to solve a design problem, taking into account possible unanticipated effects. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> Systems can be designed to cause a desired effect. <p>Learning Targets:</p> <ul style="list-style-type: none"> I can conduct a literature review of common safety devices and evaluate their effectiveness. I can describe the scientific rationale for choice of materials and for the structure of my device. I can design a device that minimizes the forces acting on an object during a collision <p>Connection to Anchoring Phenomenon: Seatbelts and crumple zones are engineered to help passengers undergo a safer change in momentum by increasing the time of collision and thus decreasing the amount of force acting on the passenger. Seatbelts act as an external force, which allows a person to not continue to move with their initial momentum.</p> <p>What's next? Unit review and assessment</p>
25 - 27			Momentum Problem Set Momentum Exam	

Evaluative Criteria

Performance Statements (PS2-2, PS2-3)

Observable features of the student performance by the end of the course:	
1	Representation
a	Students clearly define the system of the two interacting objects that is represented mathematically, including boundaries and initial conditions.
b	Students identify and describe* the momentum of each object in the system as the product of its mass and its velocity, $p = mv$ (p and v are restricted to one-dimensional vectors), using the mathematical representations.
c	Students identify the claim, indicating that the total momentum of a system of two interacting objects is constant if there is no net force on the system.
2	Mathematical modeling
a	Students use the mathematical representations to model and describe* the physical interaction of the two objects in terms of the change in the momentum of each object as a result of the interaction.
b	Students use the mathematical representations to model and describe* the total momentum of the system by calculating the vector sum of momenta of the two objects in the system.
3	Analysis
a	Students use the analysis of the motion of the objects before the interaction to identify a system with essentially no net force on it.
b	Based on the analysis of the total momentum of the system, students support the claim that the momentum of the system is the same before and after the interaction between the objects in the system, so that momentum of the system is constant.
c	Students identify that the analysis of the momentum of each object in the system indicates that any change in momentum of one object is balanced by a change in the momentum of the other object, so that the total momentum is constant.

Observable features of the student performance by the end of the course:	
1	Using scientific knowledge to generate the design solution
a	Students design a device that minimizes the force on a macroscopic object during a collision. In the design, students: <ol style="list-style-type: none"> i. Incorporate the concept that for a given change in momentum, force in the direction of the change in momentum is decreased by increasing the time interval of the collision ($F\Delta t = m\Delta v$); and ii. Explicitly make use of the principle above so that the device has the desired effect of reducing the net force applied to the object by extending the time the force is applied to the object during the collision.
b	In the design plan, students describe* the scientific rationale for their choice of materials and for the structure of the device.
2	Describing criteria and constraints, including quantification when appropriate



Accelerated Physics:

Unit 3: Momentum and Impulse Unit





Unit Overview

- ▶ Students discover properties of matter in motion, which defines momentum. An emphasis is placed on collisions.
- ▶ Students investigate the momentum of massive objects in motion or at rest before and after a collision.
- ▶ Students first encounter the idea of conservation, which plays an important role throughout other units of study.
- ▶ Students build a device to protect a fragile payload.

Performance Expectations

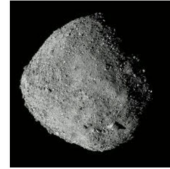
Performance Expectations

- **HS-PS2-2.** Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. **[Clarification Statement: Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle.] [Assessment Boundary: Assessment is limited to systems of two macroscopic bodies moving in one dimension.]**
- **HS-PS2-3** Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* **[Clarification Statement: Examples of evaluation and refinement could include determining the success of the device at protecting an object from damage and modifying the design to improve it. Examples of a device could include a football helmet or a parachute.] [Assessment Boundary: Assessment is limited to qualitative evaluations and/or algebraic manipulations.]**

Anchoring Phenomenon

Bennu and the DART Mission

Bennu and the DART Mission



There's a number of different proposals in how to take care of potential Near Earth Objects (NEOs) like Bennu. They include:

- Nuclear Missile
- Kinetic Impact
- Slow Tug or Push
- Solar Sail



Culminating Performance Task



POTENTIAL BKAPP IDEA - CREATIVITY



Your Task:

Design the most cost-effective device that can protect an object (perhaps an egg) as it drops in freefall to the ground. You will submit a google slide that provides evidence of the materials in the scoring rubric.

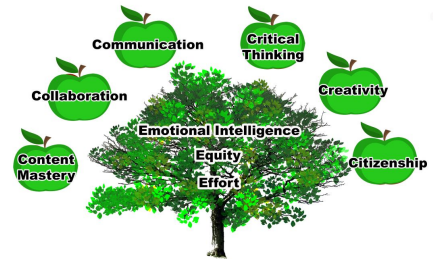
Design Progression:

1. **Blueprint:** You will create a blueprint that shows your proto-type design, including all of the specifications that go into a blueprint (labeling, measurements, multiple profiles, etc.)
2. **Explaining the physics:** You will then describe how your design takes into account the physics principles we've explored throughout our momentum unit. Your explanation must include the following words/phrases:
 - a. Impulse
 - b. Change in momentum
 - c. Force
 - d. Time interval
 - e. Initial and final velocity
 - f. Mass
 - g. Inelastic or Elastic Collision

The explanation must also refer and connect back to investigations and readings we've done throughout the unit. For example, if you go into the physics of a crumple one, where did you learn about that? Reference and cite it.

3. **Build and cost analysis:** You will now build your design using the allowed materials. Each material costs a certain amount of money. Once your build is finalized, calculate the total cost of your design.

Southington Public Schools Vision of a Graduate



**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 d.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated Physics – Unit #4 – Work & Energy – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated Physics – Unit #4 – Work & Energy.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated Physics – Unit #4 – Work & Energy as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

UNIT 4: Energy

Unit Documents:

[Unit Notes](#) ; [Summary Table](#) ; [TIPERs & Engagement Points](#) ; [Quiz 1](#) ; [Summative](#)

Unit Overview	
Unit Title:	Unit 4: Work & Energy
Teacher:	Ouellette
Grade Level/Course:	11-12 (Accelerated Physics)
Length/Dates:	~ 17 (88 min) instructional periods
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students discover various forms of energy and its transformations throughout a physical process. An emphasis is placed on energy systems and the transformation of energy into, out of, or within a system. Students investigate Students build on their understanding of conservation, this time with conservation of energy. Students use energy diagrams to help structure conservation of energy equations.

Standard Bundles

Performance Expectations
<ul style="list-style-type: none"> HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. [Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model.] [Assessment Boundary: Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.] HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects). [Clarification Statement: Examples of phenomena at the macroscopic scale could include the conversion of kinetic energy to thermal energy, the energy stored due to position of an object above the earth, and the energy stored between two electrically-charged plates. Examples of models could include diagrams, drawings, descriptions, and computer simulations.]

SEP Implications	DCI Implications	CCC Implications
<p><u>Using Mathematics and Computational Thinking</u> Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.</p> <ul style="list-style-type: none"> Create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1) <p><u>Developing and Using Models</u> Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) 	<p><u>PS3.A: Definitions of Energy</u></p> <ul style="list-style-type: none"> Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system’s total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. (HS-PS3-1),(HS-PS3-2) At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. (HS-PS3-2) These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves 	<p><u>Systems and System Models</u></p> <ul style="list-style-type: none"> Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models. (HS-PS3-1) <p><u>Energy and Matter</u></p> <ul style="list-style-type: none"> Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2)

across space. (HS-PS3-2)

PS3.B: Conservation of Energy and Energy Transfer

- Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system. (HS-PS3-1)
- Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. (HS-PS3-1)
- Mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior. (HS-PS3-1)
- The availability of energy limits what can occur in any system. (HS-PS3-1)

Transfer Goals (Vision of the Graduate)

List the long-term and/or school-wide independent student behaviors that this unit will address.

Collaboration Transdisciplinary Goal:

Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal.

Explore Anchoring Phenomenon: Truck Pull ; 007 Bungee Jump

Attempt to Make Sense: Work Investigation ; Energy is Pain Notes ; Work-Kinetic Energy Investigation ;

Identify Related Phenomena: Energy Stations, Popper Toy

Develop Potential Student Questions/Observations:

- How hard are they pulling the truck?
- How fast do the trucks move?
- Are the trucks moving at a constant speed?
- How tall is the bungee dam?
- How fast are they moving before the bungee cord breaks their fall?

Preconceptions:

- Energy is not well defined
- Understanding energy can either be transferred to or from the system or transformed within the system
- Understanding that potential energy is an interaction between two objects
- Internal energy transfers

Sample Student Explanation:

The truck puller has to pull very hard to get the truck to move. The truck has kinetic energy. The bungee cord stretches to slow the jumper down.

Energy Unit Bundle

Day(s)	Target Question(s)	Lesson-level phenomenon	Activities & Assessments	What Students Will Learn/Expected Outcome (Knowledge and Skills)
1 - 4	How does an external force change the motion of a system?	Work	<ul style="list-style-type: none"> • Work Investigation • Anchoring Phenomenon Launch (in "Notes", students generate observations and questions) • Practicing Work is Hard Work • Work and Motion Investigation • Summary Table • Notes 	<p>DCI: HS-PS3-1</p> <p>SEP: Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> • I can create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1) <p>CCC: Systems and System Models</p> <ul style="list-style-type: none"> • I can define the boundaries and initial conditions of a system. (HS-PS3-1) <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can determine the work done on an object by an external force via an investigation • I can describe how the work done on a system affects the motion of a system. <p>Connection to Anchoring Phenomenon: Truck pullers do work on the trucks. This causes the fire trucks to move. When positive work is done on systems, systems speed up. When negative work is done on systems, systems slow down.</p> <p>What's next? What exactly is energy?</p>
5 - 7	What is energy?	Various everyday examples to explore different types of energy	<ul style="list-style-type: none"> • Energy is Pain Notes • Name That Energy • Follow-Up Form • Everything You Need to Know about Energy Reading • Energy Types Problem Set • Summary Table • Notes 	<p>DCI: HS-PS3-2</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> • I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) <p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> • I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2) <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can describe the characteristics of kinetic, gravitational potential, spring potential, and chemical potential energies

				<p>Connection to Anchoring Phenomenon: The trucks have kinetic energy when they are in motion. The truck pullers have chemical potential energy from the food they ate previously. Truck pullers also have kinetic energy as they move.</p> <p>What's next? How is energy related to work?</p>
8 - 12	How is work related to energy?	Work-Kinetic Energy Theorem	<ul style="list-style-type: none"> • Work-Kinetic Energy Investigation • Work-Kinetic Energy TIPERs • Summary Table • Notes 	<p>DCI: HS-PS3-2</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> • I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) <p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> • I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2) <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can relate the work done on a system to that system's change in kinetic energy <p>Connection to Anchoring Phenomenon: The truck pullers do positive external work on the firetruck system and thus the firetrucks gain kinetic energy (from rest). Chemical potential energy stored in the truck puller is transferred into the firetruck system in the form of kinetic energy.</p> <p>What's next? What happens to a system's energy when no external work is done on the system?</p>
13 - 16	How can we visualize energy transfers within systems? Why can't energy be created nor	Energy Stations	<ul style="list-style-type: none"> • Initial LOL Diagram Practice • Energy Stations and LOL Diagrams • Energy Station Graphic Organizer • LOL Diagrams and 	<p>DCI: HS-PS3-2</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> • I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2)

	destroyed?		<ul style="list-style-type: none"> Conservation of Energy Equations Summary Table Notes Quiz 1 	<p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2) <p>Learning Targets:</p> <ul style="list-style-type: none"> I can diagram the conservation of mechanical energy I can create mathematical expressions that show energy transfer within an open or closed energy system <p>Connection to Anchoring Phenomenon: The energy of the fire truck-truck puller-road system is a closed system where energy is constant.</p> <p>What's next? The truck pull event is also about beating everyone to the finish line. What does it mean to change the energy of the trucks the smallest amount of time?</p>
16 - 18	What does it mean to be powerful?	Power of different parts of body	<ul style="list-style-type: none"> Power Investigation Summary Table Notes 	<p>DCI: HS-PS3-2</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) <p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2) <p>Learning Targets:</p> <ul style="list-style-type: none"> I can determine how powerful I am via an investigation. <p>Connection to Anchoring Phenomenon: The truck puller who wins the competition is the most powerful in terms of physics because power is the rate at which work (or change in energy) is done on a system.</p> <p>What's next? How many things can we find out about the truck pull phenomenon?</p>
19 - 20	How can a person	Truck pull	<ul style="list-style-type: none"> Energy Goalless 	<p>DCI: HS-PS3-2</p>

	move massive objects?		<p>Problem</p> <ul style="list-style-type: none"> Gallery Walk 	<p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) <p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2) <p>Learning Targets:</p> <ul style="list-style-type: none"> I can use multiple representations to demonstrate my thinking <p>Connection to Anchoring Phenomenon: Students solve as many physics problems tied to the anchoring phenomenon as they can.</p> <p>What's next? Now that we understand energy, what does this mean for collision types in momentum?</p>
21-22	How is energy related to momentum and collisions?	Collision types and kinetic energy	<ul style="list-style-type: none"> Revisiting Momentum with Energy Summary Table Notes 	<p>DCI: HS-PS3-2</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) <p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2) <p>Learning Targets:</p> <ul style="list-style-type: none"> I can use kinetic energy to differentiate collision types <p>Connection to Anchoring Phenomenon: N/A</p> <p>What's next? What is spring potential energy all about?</p>

23 - 26	Why do bungee cords allow us to fall great distances safely?	Hooke's Law 007 Bungee Jump	<ul style="list-style-type: none"> • Spring Force Investigation • Summary Table • Notes 	<p>DCI: HS-PS3-1</p> <p>SEP: Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> • I can create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1) <p>CCC: Systems and System Models</p> <ul style="list-style-type: none"> • I can define the boundaries and initial conditions of a system. (HS-PS3-1) <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can plan and carry out an investigation to determine relationships between variables <p>Connection to Anchoring Phenomenon: 007's initial gravitational potential energy is transferred into kinetic energy as they fall. As the bungee cord stretches, some energy is stored in the cord in the form of spring potential energy. This slows down 007 to a safe landing speed.</p> <p>What's next? How can we use the principles of conservation of energy to determine unknown properties of a system?</p>
27 - 29	How can we use energy conservation to determine a spring constant?	Emoji popper toy	<ul style="list-style-type: none"> • Popper Performance Task 	<p>DCI: HS-PS3-1</p> <p>SEP: Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> • I can create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1) <p>CCC: Systems and System Models</p> <ul style="list-style-type: none"> • I can define the boundaries and initial conditions of a system. (HS-PS3-1) <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can use the conservation of energy to determine unknown properties of a system <p>Connection to Anchoring Phenomenon: N/A</p> <p>What's next? Energy exam</p>

30 - 34		Exam Review	<ul style="list-style-type: none"> • Energy Grudgeball • Energy Problem Set • Energy Exam 	<p>DCI: HS-PS3-1</p> <p>SEP: Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> • I can create a computational model or simulation of a phenomenon, designed device, process, or system. (HS-PS3-1) <p>CCC: Systems and System Models</p> <ul style="list-style-type: none"> • I can define the boundaries and initial conditions of a system. (HS-PS3-1) <p>DCI: HS-PS3-2</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> • I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-PS3-2) <p>CCC: Energy and Matter</p> <ul style="list-style-type: none"> • I can describe why energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. (HS-PS3-2)
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**Evaluative Criteria
Performance Statements (PS3-1, PS3-2)**

June 2023

Observable features of the student performance by the end of the course:	
1	Representation
a	Students identify and describe* the components to be computationally modeled, including: <ol style="list-style-type: none"> i. The boundaries of the system and that the reference level for potential energy = 0 (the potential energy of the initial or final state does not have to be zero); ii. The initial energies of the system's components (e.g., energy in fields, thermal energy, kinetic energy, energy stored in springs — all expressed as a total amount of Joules in

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	each component), including a quantification in an algebraic description to calculate the total initial energy of the system;
	iii. The energy flows in or out of the system, including a quantification in an algebraic description with flow into the system defined as positive; and
	iv. The final energies of the system components, including a quantification in an algebraic description to calculate the total final energy of the system.
2	Computational Modeling
a	Students use the algebraic descriptions of the initial and final energy state of the system, along with the energy flows to create a computational model (e.g., simple computer program, spreadsheet, simulation software package application) that is based on the principle of the conservation of energy.
b	Students use the computational model to calculate changes in the energy of one component of the system when changes in the energy of the other components and the energy flows are known.
3	Analysis
a	Students use the computational model to predict the maximum possible change in the energy of one component of the system for a given set of energy flows.
b	Students identify and describe* the limitations of the computational model, based on the assumptions that were made in creating the algebraic descriptions of energy changes and flows in the system.

June 2023

Observable features of the student performance by the end of the course:	
1	Components of the model
a	Students develop models in which they identify and describe* the relevant components, including: <ol style="list-style-type: none"> i. All the components of the system and the surroundings, as well as energy flows between the system and the surroundings; ii. Clearly depicting both a macroscopic and a molecular/atomic-level representation of the system; and

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	iii. Depicting the forms in which energy is manifested at two different scales: <ol style="list-style-type: none"> a) Macroscopic, such as motion, sound, light, thermal energy, potential energy or energy in fields; and b) Molecular/atomic, such as motions (kinetic energy) of particles (e.g., nuclei and electrons), the relative positions of particles in fields (potential energy), and energy in fields.
2	Relationships
a	Students describe* the relationships between components in their models, including: <ol style="list-style-type: none"> i. Changes in the relative position of objects in gravitational, magnetic or electrostatic fields can affect the energy of the fields (e.g., charged objects moving away from each other change the field energy). ii. Thermal energy includes both the kinetic and potential energy of particle vibrations in solids or molecules and the kinetic energy of freely moving particles (e.g., inert gas atoms, molecules) in liquids and gases. iii. The total energy of the system and surroundings is conserved at a macroscopic and molecular/atomic level. iv. Chemical energy can be considered in terms of systems of nuclei and electrons in electrostatic fields (bonds). v. As one form of energy increases, others must decrease by the same amount as energy is transferred among and between objects and fields.
3	Connections
a	Students use their models to show that in closed systems the energy is conserved on both the macroscopic and molecular/atomic scales so that as one form of energy changes, the total system energy remains constant, as evidenced by the other forms of energy changing by the same amount or changes only by the amount of energy that is transferred into or out of the system.
b	Students use their models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles/objects and energy associated with the relative positions of particles/objects on both the macroscopic and microscopic scales.



Accelerated Physics:

Unit 4: Work and Energy Unit



Unit Overview



- ▶ Students discover various forms of energy and its transformations throughout a physical process. An emphasis is placed on energy systems and the transformation of energy into, out of, or within a system.
- ▶ Students build on their understanding of conservation, this time with conservation of energy.
- ▶ Students use energy diagrams to help structure conservation of energy equations.
- ▶ Students will also study how changes in energy can be made via work

Performance Expectations

Performance Expectations

- **HS-PS3-1** Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. **[Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model.] [Assessment Boundary: Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.]**
- **HS-PS3-2.** Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects). **[Clarification Statement: Examples of phenomena at the macroscopic scale could include the conversion of kinetic energy to thermal energy, the energy stored due to position of an object above the earth, and the energy stored between two electrically-charged plates. Examples of models could include diagrams, drawings, descriptions, and computer simulations.]**

Anchoring Phenomenon

Truck Pull & 007 Bungee Jump



Culminating Performance Task



POTENTIAL BKAPP IDEA - COLLABORATION



Your Task: Design and conduct an experiment to determine the effective spring constant, k , for your popper using energy conservation. Assume air resistance and other forms of friction is negligible.

What To Submit:

One submission per group on the corresponding Canvas assignment. Work can be submitted as a document or a slideshow.

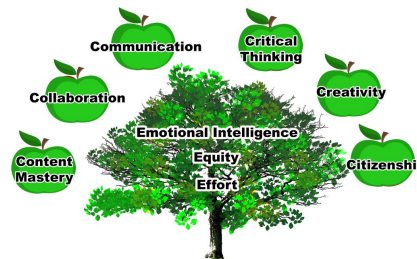
Must Haves:

- Procedure
- Data across multiple trials and data tables
- Analysis to include (3) LOLs for the following initial and final conditions
 - Full compression to when popper is uncompressed and at max velocity
 - Full compression to when popper is at the halfway point
 - Full compression to when the popper is at max height.
- Calculation of effective spring constant, k .
- [Individual Follow-Up Questions](#)
- [Individual BKAPP Survey](#)

Rubric

Category	Description	Teacher Assessment
Experimental Design (4 pts)	<input type="checkbox"/> Quantities measured (1 pt)	

Southington Public Schools Vision of a Graduate



A grad
well
found
with
effort

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 e.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated Physics – Unit #5 – Simple Harmonic Motion – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated Physics – Unit #5 – Simple Harmonic Motion.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated Physics – Unit #5 – Simple Harmonic Motion as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

UNIT 5: Simple Harmonic Motion (SHM)

Unit Documents:

[Unit Notes](#) ; [Summary Table](#) ; [TIPERs & Engagement Points](#) ; [Summative](#)

Unit Overview	
Unit Title:	Unit 5: Simple Harmonic Motion (SHM)
Teacher:	Ouellette
Grade Level/Course:	11-12 (Accelerated Physics)
Length/Dates:	~ 10 (88 min) instructional periods
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students encounter a new type of motion, simple harmonic motion, which describes some repetitive motion seen in nature. Students apply the physics they have learned to this point to make sense of oscillating motion. Students explore the kinematics, forces, momentum, and energy of two oscillating systems: the spring-mass system and a pendulum. SHM serves as a bridge between mechanics and wave motion.

Standard Bundles

Performance Expectations
<ul style="list-style-type: none"> HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. [Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.] [Assessment Boundary: Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.]

SEP Implications	DCI Implications	CCC Implications
<p>Analyzing and Interpreting Data Analyzing data in 9-12 builds on K-8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.</p> <ul style="list-style-type: none"> Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. <p>Using Mathematics and Computational Thinking Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis; a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms; and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.</p> <ul style="list-style-type: none"> Use mathematical representations of phenomena to describe explanations. 	<p>PS2.A: Forces and Motion</p> <ul style="list-style-type: none"> Newton's Second Law accurately predicts changes in the motion of macroscopic objects. 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and makes claims about specific cause and effects Systems can be designed to cause a desired effect.

Transfer Goals (Vision of the Graduate)
List the long-term and/or school-wide independent student behaviors that this unit will address.
<p>Transdisciplinary Goal:</p> <p>Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s).</p>

Explore Anchoring Phenomenon: Russian Car Bounce ; Mesmerizing Pendulums

Attempt to Make Sense: Spring-Mass System Investigation, Period of a Pendulum Investigation

Identify Related Phenomena: Dancing Pendulums

Develop Potential Student Questions/Observations:

- The car bounces up and down because something is pushing on it
- There is something wrong with the car
- The potholes are making it bounce
- The pool balls are start with the same amplitude
- The pool balls have different periods
- The string lengths are different
- The mass of each pool ball is probably the same

Preconceptions:

- A significant fraction of students don't really understand sines and cosines as oscillatory functions
- Many students don't know the term *sinusoidal function* and think it refers only to the specific function $\sin(x)$
- Understanding that sine and cosine functions are the same oscillatory function with different phase constants
- Small angle approximation
- Some new terminology

Sample Student Explanation:

The car bounces because there's something wrong with it. This could be due to the springs (shock absorbers) not working properly. The car bounces even when it is on a flat surface.

The pendulums move the way they do because each pendulum is set up slightly differently.

SHM Unit Bundle

Day(s)	Target Question(s)	Lesson-level phenomenon	Activities & Assessments	What Students Will Learn/Expected Outcome (Knowledge and Skills)
1	How can we model motion that repeats itself?	Russian Car Bounce	<ul style="list-style-type: none"> • SHM Unit Launch 	<p>DCI: HS-PS2-1</p> <p>SEP: Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> • I can ask questions that challenge the premise(s) of an argument, the interpretation of a physical phenomenon, or the suitability of a design. <p>CCC: Structure and Function</p> <ul style="list-style-type: none"> • I can investigate or design new systems or structures by detailed examination of the properties of that system <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can ask questions that challenge the premise(s) of an argument, the interpretation of a physical phenomenon, or the suitability of a design. <p>Connection to Anchoring Phenomenon: N/A</p> <p>What's next? How can we model the bouncing car?</p>
2 - 7	How can we describe the physics of the spring-mass system?	Spring - Mass System	<ul style="list-style-type: none"> • Spring-Mass System Investigation • Follow-up Form • Energy of a Spring-Mass Investigation • Notes • Summary Table 	<p>DCI: HS-PS2-1</p> <p>SEP: Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> • I can plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> • I can use empirical evidence to differentiate between cause and correlation and make claims about specific causes and

				<p>effects.</p> <p>Learning Targets:</p> <ul style="list-style-type: none"> I can carry out an investigation of an oscillating system to determine its properties <p>Connection to Anchoring Phenomenon: The car oscillates with a given period or frequency. The car can be modeled as a spring-mass system. Plotting the motion of this oscillation would look like a sine or cosine graph. The car experiences a maximum vertical velocity, momentum, and kinetic energy at the equilibrium point of the oscillation. The car experiences a maximum restoring force and acceleration at the amplitude of its motion.</p> <p>What's next? The repetitive motion of the car's bounce is related to the period. How can we find the period of a spring-mass system?</p>
8 - 10	What factors affect the period of a spring-mass system?	Spring-mass system	<ul style="list-style-type: none"> Period of a Spring-Mass System Investigation Notes Summary Table 	<p>DCI: HS-PS2-1</p> <p>SEP: Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> I can plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> I can use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. <p>Connection to Anchoring Phenomenon: The car's period of oscillation and frequency of the bouncing depends on the mass of the object and the value of the spring constant</p> <p>What's next? What physics properties of our anchoring phenomenon could we solve for and describe?</p>

11 - 12	How can we apply our physics knowledge to the bouncing car?	<ul style="list-style-type: none"> Russian Bouncing Car 	<ul style="list-style-type: none"> SHM Goalless Problem 	<p>DCI: HS-PS2-1</p> <p>SEP: Developing and Using Models</p> <ul style="list-style-type: none"> I can develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> Systems can be designed to cause a desired effect. <p>Learning Targets:</p> <ul style="list-style-type: none"> I can use multiple representations to analyze a system in simple harmonic motion <p>Connection to Anchoring Phenomenon: Students explore the physics of the anchoring phenomenon.</p> <p>What's next? Are there other systems that can be considered to be in simple harmonic motion?</p>
13 - 15	How can we apply our physics knowledge to a pendulum?	<ul style="list-style-type: none"> Mesmerizing Pendulums 	<ul style="list-style-type: none"> Period of a Pendulum Investigation Pendulum Problem Set Notes Summary Table 	<p>DCI: HS-PS2-1</p> <p>SEP: Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> I can plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> I can use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. <p>Learning Targets:</p> <ul style="list-style-type: none"> I can carry out an investigation of an oscillating system to determine its properties <p>Connection to Anchoring Phenomenon: The pendulums move the way they do by affecting the period of each</p>

				<p>pendulum. For a simple pendulum released from a small angle, the period only depends on the length of the pendulum and the local gravitational field strength.</p> <p>What's next? What are some applications of pendulums?</p>
16	<p>How can we determine Earth's gravitational field strength value using a pendulum?</p>	<ul style="list-style-type: none"> • Pendulum in SHM 	<ul style="list-style-type: none"> • Determining "g" with a Pendulum Performance Task 	<p>DCI: HS-PS2-1</p> <p>SEP: Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> • I can plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> • I can use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can carry out an investigation of an oscillating system to determine its properties <p>Connection to Anchoring Phenomenon: A local value for gravitational field strength can be worked out if the length and period of a simple pendulum is known.</p> <p>What's next? What are some more applications of pendulums?</p>
17 - 18	<p>How can a pendulum keep a building upright in a storm?</p> <p>How can a pendulum be made to match the tempo of a song?</p>	<ul style="list-style-type: none"> • Tuned Mass Dampers • "Lights" that match the beat of a song 	<ul style="list-style-type: none"> • How a Skyscraper Stays Upright In a Typhoon Reading <ul style="list-style-type: none"> ◦ Tuned Mass Damper • Dancing Pendulums 	<p>DCI: HS-PS2-1</p> <p>SEP: Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> • I can plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design

				<p>accordingly.</p> <p>CCC: Cause and Effect</p> <ul style="list-style-type: none"> I can use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. <p>Learning Targets:</p> <ul style="list-style-type: none"> I can carry out an investigation of an oscillating system to determine its properties <p>Connection to Anchoring Phenomenon: N/A</p> <p>What's next? Unit exam</p>
19 - 20		Exam review	<ul style="list-style-type: none"> SHM Grudgeball SHM Exam 	

**Evaluative Criteria
Performance Statements (PS2-1)**

Observable features of the student performance by the end of the course:	
1	Organizing data
a	Students organize data that represent the net force on a macroscopic object, its mass (which is held constant), and its acceleration (e.g., via tables, graphs, charts, vector drawings).
2	Identifying relationships
a	Students use tools, technologies, and/or models to analyze the data and identify relationships within the datasets, including: <ul style="list-style-type: none"> i. A more massive object experiencing the same net force as a less massive object has a smaller acceleration, and a larger net force on a given object produces a correspondingly larger acceleration; and ii. The result of gravitation is a constant acceleration on macroscopic objects as evidenced by the fact that the ratio of net force to mass remains constant.
3	Interpreting data
a	Students use the analyzed data as evidence to describe* that the relationship between the observed quantities is accurately modeled across the range of data by the formula $a = F_{net}/m$ (e.g., double force yields double acceleration, etc.).
b	Students use the data as empirical evidence to distinguish between causal and correlational relationships linking force, mass, and acceleration.
c	Students express the relationship $F_{net}=ma$ in terms of causality, namely that a net force on an object causes the object to accelerate.



Accelerated Physics:

Unit 5: Simple Harmonic Motion Unit



Unit Overview



- ▶ Students encounter a new type of motion, simple harmonic motion, which describes some repetitive motion seen in nature.
- ▶ Students apply the physics they have learned to this point to make sense of oscillating motion.
- ▶ Students explore the kinematics, forces, momentum, and energy of two oscillating systems: the spring-mass system and a pendulum.
- ▶ SHM serves as a bridge between mechanics and wave motion.

Performance Expectations

Performance Expectations

- **HS-PS2-1** Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. [Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.] [Assessment Boundary: Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.]

Anchoring Phenomenon

**Russian Car Bounce &
Mesmerizing
Pendulums**



Culminating Performance Task



POTENTIAL BKAPP IDEA - COMMUNICATION



Determining “g” with a Pendulum Performance Task

Your Task: Individually, Design a pendulum and experiment, collect data, and experimentally verify the gravitational field strength of Earth. Use anything around to act as the pendulum bob.

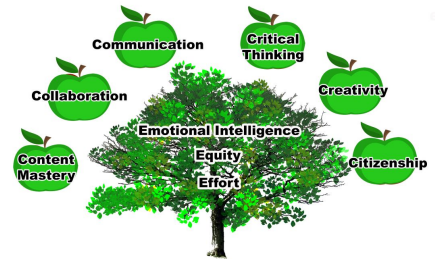
What to Submit:

- A procedure. Detailed enough so another student could follow your experiment. Include a detailed diagram which shows the dimensions of your pendulum. Include how you plan to address experimental error and uncertainty.
- Data table with relevant data, to include all titles and units. A friend may help you start and stop a timer, if needed.
- Use of your experimental data to calculate and verify Earth’s gravitational field strength
- Percent Difference between your experimental value and the known value of Earth’s gravitational field strength ($g = 9.81 \text{ N/kg}$)
- A paragraph reflection on how the process went: what went well, what was challenging, what would you change if you could do it again?
- A [BKAPP Google Form](#)
- **This can be submitted on a Google Doc or Google Slide**
 - This is an individual performance task. Each student is to submit their own document.

Rubric:

Criteria	Description	Points
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Southington Public Schools Vision of a Graduate



Key
well
know
attain

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 f.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated Physics – Unit #6 – Electrostatics & Circuits – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated Physics – Unit #6 – Electrostatics & Circuits.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated Physics – Unit #6 – Electrostatics & Circuits as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

UNIT 6: Electrostatics and Circuits

Unit Documents:

Unit Notes ; Summary Table ; Quiz

Unit Overview	
Unit Title:	Unit 6: Electrostatics and Circuits
Teacher:	Ouellette
Grade Level/Course:	11-12 (Accelerated Physics)
Length/Dates:	15 (88 min) class periods
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit is broken up into two parts: Electrostatics and Circuits. Students will learn about charge, forces between charges, moving charge, and applications of current, resistance, and potential difference (voltage). Students will construct basic circuits and investigate their properties. Students conclude the unit with investigating a solar panel, its properties, and a performance task where they wire a “house.”

Standard Bundles

Performance Expectations

- **HS-PS2-4.** Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between objects. [Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational and electric fields.] [Assessment Boundary: Assessment is limited to systems with two objects.]
- **HS-PS3-5.** Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. [Clarification Statement: Examples of models could include drawings, diagrams, and texts, such as drawings of what happens when two charges of opposite polarity are near each other.] [Assessment Boundary: Assessment is limited to systems containing two objects.]
- **HS-PS2-6.** Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provided molecular structures of specific designed materials.]
- **HS-PS4-5.** Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.* [Clarification Statement: Examples could include solar cells capturing light and converting it to electricity; medical imaging; and communications technology.] [Assessment Boundary: Assessments are limited to qualitative information. Assessments do not include band theory.]

SEP Implications	DCI Implications	CCC Implications
<p>Using Mathematics and Computational Thinking Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.</p> <ul style="list-style-type: none"> ● Use mathematical representations of phenomena to describe explanations. <p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical and empirical models.</p> <ul style="list-style-type: none"> ● Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. <p>Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs.</p> <ul style="list-style-type: none"> ● Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). 	<p>PS2.B: Types of Interactions</p> <ul style="list-style-type: none"> ● Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. ● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields. ● Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. <p>PS3.D: Energy in Chemical Processes</p> <ul style="list-style-type: none"> ● Solar cells are human-made devices that likewise capture the sun’s energy and produce electrical energy. (secondary) 	<p>Patterns</p> <ul style="list-style-type: none"> ● Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. <p>Cause and Effect</p> <ul style="list-style-type: none"> ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>Structure and Function</p> <ul style="list-style-type: none"> ● Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

Transfer Goals (Vision of the Graduate)

List the long-term and/or school-wide independent student behaviors that this unit will address.

Transdisciplinary Goal:

Creativity/Innovation Transdisciplinary Goal:

Students work creatively to design and refine implementation of ideas by taking risks, persevering, and exploring possibilities.

Explore Anchoring Phenomenon: Electrostatic Stations & How Do Solar Panels Work?

Attempt to Make Sense: Coulomb's Law Investigation, Ohm's Law Circuit, Resistors in Series and Parallel Investigation

Identify Related Phenomena: Coulomb's Law, Ohm's Law, Circuits

Develop Potential Student Questions/Observations:

- Do solar panels absorb the energy from the sun?
- Do solar panels reflect sun rays?
- What does a battery do?
- How can we get energy from the sun to a battery?
- Why is solar energy renewable and sustainable(ish)?
- Is getting solar energy with your house worth it?
- How do solar panels work?
- What is a solar panel made of?
- How effective/efficient are solar panels?
- How can we make solar panels better?

Preconceptions:

- Students do not distinguish between charge and current
- Students think of charge as a object rather than a property of matter
- Student's don't recognize charge conservation
- Most students think there is a fundamental reason that electrons have to be negative
- Most students think that a positively charged object has received an excess of protons
- A majority of students think that batteries are a source of constant current, delivering the same current to any circuit, rather than as voltage sources
- Student's don't acquire a conceptual model of potential or potential difference
- Students are unable to relate the electric potential to the electric field
- Students do not differentiate between the concepts of current, voltage, energy, and power, it's all "electricity"
- Students have no micro/macro understanding of circuits. They do not see any connection between macroscopic quantities, such as current or resistance, and their previous study of charges, forces, and fields. To students, circuits are a subject entirely independent of electrostatics

Electrostatics and Circuits Unit Bundle

Day(s)	Target Question(s)	Lesson-level phenomenon	Activities & Assessments	What Students Will Learn/Expected Outcome (Knowledge and Skills)
1 -2	What is charge?	Electrostatics	<ul style="list-style-type: none"> • Electrostatics and Circuit Stations • Station Graphic Organizer • Notes 	<p>DCI: HS-PS2-4 SEP: Planning and Conducting Investigations CCC: Systems and System Models</p> <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can make observations of and ask questions about a physical phenomenon to determine properties of charged systems <p>Connection to Anchoring Phenomenon: Electrons (charge) flow in a photovoltaic cells, which are arranged to make solar panels</p> <p>What's next? We find that charges can be distributed in different ways, which lead to repulsive or attractive interactions. These interactions cause accelerations, and Newton's laws suggest there must be a net force. What's up with the electrostatic force?</p>
3 - 7	How can we interact with objects without contact?	Coulomb's Law	<ul style="list-style-type: none"> • Coulomb's Law Investigation • Coulomb's Law Problem Set • Electric Field Investigation • Notes • Electrostatics Quiz 	<p>DCI: HS-PS2-4 SEP: Using Mathematics and Computational Thinking CCC: Patterns</p> <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can conduct an investigation and analyze data to determine the mathematical properties of the electrostatic force between two charges <p>Connection to Anchoring Phenomenon: A charge produces an electric field. Fields model non-contact interactions between charges.</p> <p>What's next? Electrostatics is the study of charges when they are not in motion. Coulomb's Law describes the force charges exert onto one another. What is moving charge? Can we control it?</p>
END OF ELECTROSTATICS				

<p>8 - 15</p>	<p>What is moving charge?</p> <p>What is electrical resistance?</p> <p>What is electric potential?</p>	<p>Current & Resistance Voltage</p>	<ul style="list-style-type: none"> • Current • Resistance and Resistivity Investigation • Electric Potential and Potential Mapping Investigation • Notes 	<p>DCI: HS-PS2-6 SEP: Obtaining, Evaluating, and Communicating Information CCC: Structure and Function</p> <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can describe how the material and physical properties of a resistor affect its resistance. <p>Connection to Anchoring Phenomenon: Free electrons as a result of the photoelectric effect flow in a photovoltaic cell to produce a current. That current can be controlled with resistors, which prevent the flow of charge. Charge can be stored in a battery, which has a certain voltage.</p> <p>What's next? A potential difference moves charge (current) through wires and resistors. What's the relationship between these variables?</p>
<p>16 - 22</p>	<p>What is the relationship between current, resistance, and potential difference?</p> <p>How do resistors behave in different circuit configurations?</p>	<p>Ohm's Law / Circuits</p>	<ul style="list-style-type: none"> • Ohm's Law Investigation • Ohm's Law Problem Set • Notes • Kirchhoff Loop and Current Rules • Series and Parallel Circuits Investigation • Series and Parallel Circuits Problem Set • How Do Solar Panels Work? Jigsaw Reading and Whiteboard 	<p>DCI: HS-PS4-5 SEP: Obtaining, Evaluating, and Communicating Information CCC: Cause and Effect</p> <p>Learning Targets:</p> <ul style="list-style-type: none"> • I can obtain and communicate information on how solar panels work and some of their basic properties <p>What's next? Circuit Building Performance Task</p>

23 - 28	How can circuits be made to do certain tasks?	Home Wiring	Lighting a Home Performance Task	DCI: HS-PS2-6 SEP: Obtaining, Evaluating, and Communicating Information CCC: Structure and Function Learning Targets: <ul style="list-style-type: none">• I can wire a “home” to perform real world applications with simple materials
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Evaluative Criteria Performance Statements:

Observable features of the student performance by the end of the course:	
1	Representation
a	Students clearly define the system of the interacting objects that is mathematically represented.
b	Using the given mathematical representations, students identify and describe* the gravitational attraction between two objects as the product of their masses divided by the separation distance squared ($F_g = -G \frac{m_1 m_2}{d^2}$), where a negative force is understood to be attractive.
c	Using the given mathematical representations, students identify and describe* the electrostatic force between two objects as the product of their individual charges divided by the separation distance squared ($F_e = k \frac{q_1 q_2}{d^2}$), where a negative force is understood to be attractive.
2	Mathematical modeling
a	Students correctly use the given mathematical formulas to predict the gravitational force between objects or predict the electrostatic force between charged objects.
3	Analysis
a	Based on the given mathematical models, students describe* that the ratio between gravitational and electric forces between objects with a given charge and mass is a pattern that is independent of distance.

June 2015

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b	Students describe* that the mathematical representation of the gravitational field ($F_g = -G \frac{m_1 m_2}{d^2}$) only predicts an attractive force because mass is always positive.
c	Students describe* that the mathematical representation of the electric field ($F_e = k \frac{q_1 q_2}{d^2}$) predicts both attraction and repulsion because electric charge can be either positive or negative.
d	Students use the given formulas for the forces as evidence to describe* that the change in the energy of objects interacting through electric or gravitational forces depends on the distance between the objects.

Observable features of the student performance by the end of the course:	
1	Communication style and format
a	Students use at least two different formats (including oral, graphical, textual and mathematical) to communicate scientific and technical information, including fully describing* the structure, properties, and design of the chosen material(s). Students cite the origin of the information as appropriate.
2	Connecting the DCIs and the CCCs
a	Students identify and communicate the evidence for why molecular level structure is important in the functioning of designed materials, including: <ul style="list-style-type: none"> i. How the structure and properties of matter and the types of interactions of matter at the atomic scale determine the function of the chosen designed material(s); and ii. How the material's properties make it suitable for use in its designed function.
b	Students explicitly identify the molecular structure of the chosen designed material(s) (using a representation appropriate to the specific type of communication — e.g., geometric shapes for drugs and receptors, ball and stick models for long-chained molecules).
c	Students describe* the intended function of the chosen designed material(s).
d	Students describe* the relationship between the material's function and its macroscopic properties (e.g., material strength, conductivity, reactivity, state of matter, durability) and each of the following: <ul style="list-style-type: none"> i. Molecular level structure of the material; ii. Intermolecular forces and polarity of molecules; and iii. The ability of electrons to move relatively freely in metals.
e	Students describe* the effects that attractive and repulsive electrical forces between molecules have on the arrangement (structure) of the chosen designed material(s) of molecules (e.g., solids, liquids, gases, network solid, polymers).
f	Students describe* that, for all materials, electrostatic forces on the atomic and molecular scale results in contact forces (e.g., friction, normal forces, stickiness) on the macroscopic scale.

Observable features of the student performance by the end of the course:	
1	Components of the model
a	Students develop a model in which they identify and describe* the relevant components to illustrate the forces and changes in energy involved when two objects interact, including: <ul style="list-style-type: none"> i. The two objects in the system, including their initial positions and velocities (limited to one dimension). ii. The nature of the interaction (electric or magnetic) between the two objects. iii. The relative magnitude and the direction of the net force on each of the objects. iv. Representation of a field as a quantity that has a magnitude and direction at all points in space and which contains energy.
2	Relationships
a	In the model, students describe* the relationships between components, including the change in the energy of the objects, given the initial and final positions and velocities of the objects.
3	Connections
a	Students use the model to determine whether the energy stored in the field increased, decreased, or remained the same when the objects interacted.
b	Students use the model to support the claim that the change in the energy stored in the field (which is qualitatively determined to be either positive, negative, or zero) is consistent with the change in energy of the objects.
c	Using the model, students describe* the cause and effect relationships on a qualitative level between forces produced by electric or magnetic fields and the change of energy of the objects in the system.



Accelerated Physics:

Unit 6: Electrostatics and Circuits



Unit Overview



- ▶ This unit is broken up into two parts: Electrostatics and Circuits.
- ▶ Students will learn about charge, forces between charges, moving charge, and applications of current, resistance, and potential difference (voltage).
- ▶ Students will construct basic circuits and investigate their properties.
- ▶ Students conclude the unit with investigating a solar panel, its properties, and a performance task where they wire a “house.”

Performance Expectations

Standard Bundles

Performance Expectations

- **HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.** [Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational and electric fields.] [Assessment Boundary: Assessment is limited to systems with two objects.]
- **HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.** [Clarification Statement: Examples of models could include drawings, diagrams, and texts, such as drawings of what happens when two charges of opposite polarity are near each other.] [Assessment Boundary: Assessment is limited to systems containing two objects.]
- **HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*** [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provided molecular structures of specific designed materials.]
- **HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*** [Clarification Statement: Examples could include solar cells capturing light and converting it to electricity; medical imaging; and communications technology.] [Assessment Boundary: Assessments are limited to qualitative information. Assessments do not include band theory.]

Anchoring Phenomenon

**Electrostatic Stations &
How Do Solar Panels
Work?**



Culminating Performance Task



POTENTIAL BKAPP IDEA - CREATIVITY



Your Task: You will design and construct series and parallel circuits to light your “home”

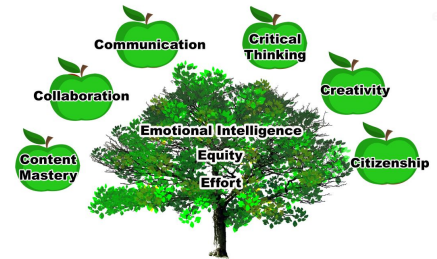
Requirements:

- Your project must have at least (4) rooms, or definitive spaces, connected by a doorway or hallway
- Your project must be close to the size of the cardboard given to you
- You must show at least (2) examples of a series circuit
- You must show at least (2) examples of a parallel circuit
- 3D objects must be added to your rooms to add interest

Construction:

- Cardboard, foamboard, shoeboxes, insulated wire, paper clips, pins, and aluminum foil
 - Switches can be made from pins and paper clips
- Your project house will be powered by a 9V battery
- Each circuit must be able to work independently from the other as well as both circuits on at the same time without moving the battery
- Furniture may **not** be premade toys. Everything must be made for this project. Furniture can include, but not limited to, origami, modeling clay, plastic, wood, etc.

Southington Public Schools Vision of a Graduate



**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 g.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated General Chemistry – Unit #3 – Matter & Energy Changes – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated General Chemistry – Unit #3 – Matter & Energy Changes.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated General Chemistry – Unit #3 – Matter & Energy Changes as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

Unit Overview	
Unit Title:	Bundle 3: Matter and Energy Changes
Teacher:	Lisa Daigle
Grade Level/Course:	9-12/Accelerated General Chemistry
Length/Dates:	6 Weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students learn about fuels in cars and explore hydrogen as a possible fuel source. Throughout the unit, students discover the different types of chemical reactions and apply one to the chemical reaction of fuels as well as understanding that mass is conserved in a reaction through balancing equations. Students will be able to calculate their carbon footprints using stoichiometry. Finally, students will compare and contrast exothermic and endothermic reactions and apply thermochemistry to the chemical reactions of the different fuel sources for cars.

Performance Expectations
<ul style="list-style-type: none"> ● HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. [Clarification Statement: Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques.] [Assessment Boundary: Assessment does not include complex chemical reactions.] ● HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. [Clarification Statement: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved.] [Assessment Boundary: Assessment does not include calculating the total bond energy changes during a chemical reaction from the bond energies of reactants and products.] ● HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy

distribution among the components in the system (second law of thermodynamics). [Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water.] [Assessment Boundary: Assessment is limited to investigations based on materials and tools provided to students.]

SEP Implications	DCI Implications	CCC Implications
<p>Using Mathematics and Computational Thinking Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.</p> <ul style="list-style-type: none"> Use mathematical representations of phenomena to support claims. <p>Developing and Using Models Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.</p> <ul style="list-style-type: none"> Develop a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.</p> <ul style="list-style-type: none"> Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. 	<p>PS1.A: Structure and Properties of Matter The periodic table orders elements horizontally by the number of protons in the atom’s nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states.</p> <p>PS1.B: Chemical Reactions The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.</p> <p>PS1.A: Structure and Properties of Matter A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart.</p> <p>PS1.B: Chemical Reactions Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy.</p> <p>PS3.B: Conservation of Energy and Energy Transfer Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. Uncontrolled systems always evolve toward more stable states—that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down).</p> <p>PS3.D: Energy in Chemical Processes Although</p>	<p>Energy and Matter The total amount of energy and matter in closed systems is conserved.</p> <p>Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.</p> <p>Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems Science assumes the universe is a vast single system in which basic laws</p> <p>Systems and System Models When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.</p>

	<p>energy cannot be destroyed, it can be converted to less useful forms — for example, to thermal energy in the surrounding environment.</p> <p>PS1.B: Chemical Reactions Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy.</p>	
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Transfer Goals (Vision of the Graduate)
 List the long-term and/or school-wide independent student behaviors that this unit will address.

Critical Thinking Transdisciplinary Goal:
 Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s).

Communication Transdisciplinary Goal:
 Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

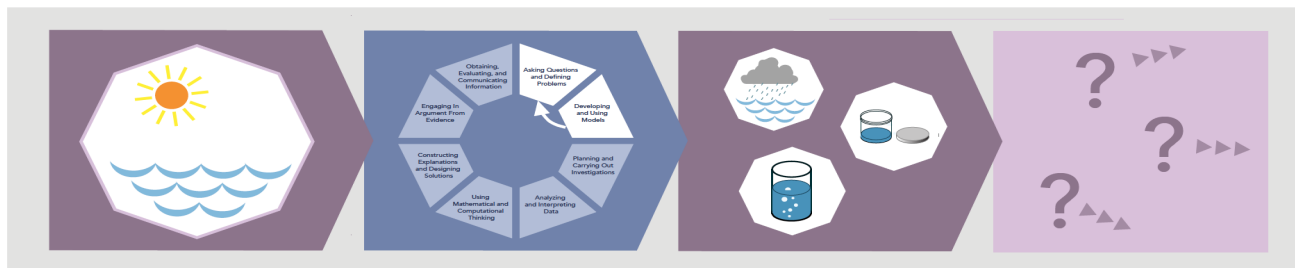
Phenomenon

Explore Anchoring Phenomenon

Attempt to Make Sense

Identify Related Phenomena

Develop Questions & Next Steps



TIMING: 5-6 weeks (25-30 days)

July 2023

Explore Anchoring Phenomenon: Why do we use gasoline as fuel instead of liquid hydrogen in cars?

Attempt to Make Sense: Students will create a model to define the system and begin to construct an explanation.

Identify Related Phenomena: Rocket fuel, campfires, airplane fuel, natural gas vs. coal

Develop Potential Student Questions

- Why does gasoline catch on fire?
- What reaction happens when gas is used as fuel?
- When you put it on a fire, why do the flames get bigger?
- Why don't we fuel cars with methane?

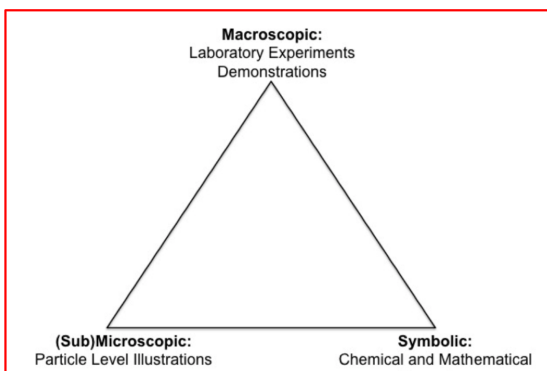
Possible Unit Level Phenomena: Students should be able to create an explanation using chemistry and real world hindrances to explain why we use gasoline instead of liquid hydrogen. Chemical reactions, using the mole and stoichiometry, and thermochemistry will be the key components to their final explanation. At the end of the entire bundle, students will write a CER to construct a researched and well thought out explanation to decide what our best alternative to gasoline would be in the real world.

Sample Explanation: A wax candle is first looked at with the conservation of mass and is our example of a combustion reaction. Next, Gasoline is a hydrocarbon that reacts with oxygen, producing water and carbon dioxide. Carbon dioxide is a greenhouse gas contributing to global warming, and students calculate their approximate carbon footprint using stoichiometry. On the other hand, hydrogen combusts with oxygen to make just water. Burning hydrogen fuel results in no carbon emissions, which makes it "green". The balanced chemical equations ($2C_8H_{18} + 25O_2 \rightarrow 16H_2O + 18CO_2$) and ($2H_2 + O_2 \rightarrow 2H_2O$) can be used to calculate how much product is formed or how much reactant is needed using stoichiometry. The mass of a mole of hydrogen is calculated to be 2 g/mol, which is a lot less than C_8H_{18} which is calculated to be 114.23 g/mol. This means we probably need a lot more hydrogen to fuel our cars than octane because of its much lower molar mass. However, when stoichiometry is used to calculate our carbon footprints, we find that each individual person contributes to CO_2 emissions, which is a greenhouse gas contributing to global climate change. Because of this, it looks like hydrogen fuel can be a good alternative. Unfortunately, when calculating the bond energies and evaluating the thermodynamics of the chemical equations, we find that the chemical reaction using hydrogen produces significantly less energy than octane. $2C_8H_{18} + 25O_2 \rightarrow 16H_2O + 18CO_2$ ΔH is about -8,554 kJ/mol while the $2H_2 + O_2 \rightarrow 2H_2O$ ΔH is about -498 kJ/mol. Therefore, using octane produces about 17 times more energy in our balanced chemical equations. Therefore, we use gasoline instead of hydrogen. There is also not a lot of hydrogen in our environment, so we don't have enough of it to power everything. This means we probably need an alternative fuel source that is not hydrogen to be more efficient and to stop using gasoline to help our environment.

General Resources:

- [Driving Question Board](#)
- [Question Formulation Technique \(QFT\)](#)
- [KOL](#)
- [Talk Activities](#)
- [Summary Table](#)
- [Final Scientific Modeling](#)
- [Final Scientific Modeling](#)
- [CCC Discussion Cards](#)

July 2023



- [321 Strategy active viewing](#)
- [60 Formative Assessment Ideas](#)
- [CER](#)

General Resources:

- <https://www.rechargenews.com/energy-transition/hydrogen-car-sales-almost-doubled-last-year-after-drivers-were-offered-50-65-discounts/2-1-1168221>

POSSIBLE RESOURCES:

- Hub: Fuels Unit: https://docs.google.com/document/d/1EMElxY7eY1rHQjSy1UCNZA0l6K_OXA-SnzlfNZj1tHM/view
- <https://www.nextgenscience.org/resources/high-school-interactions-unit-2-how-does-small-spark-trigger-huge-explosion>
- NGSS Integrated Bundle 2: (Chemistry and Earth & Space Science: https://www.nextgenscience.org/sites/default/files/HS%20Domains%20Course%201%20Bundle%202_0.pdf
- OLD STORYLINE: [Counting things that we can't see: Mole and Basic Stoichiometry](#)

Learning Sequence 1: Why do substances react?			
Driving Questions	Lesson Level Phenomena	Activity	What Should They Learn/Expected Outcome
<p>EXPLORE <i>What happens to the candle when it burns?</i></p>	Burning Candle (Fuel)	<ul style="list-style-type: none"> • Candle Experiment 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Plan and carry out an investigation to describe any patterns noticed when burning a candle. <p>Learning Target: I can plan and carry out an investigation to describe any patterns I notice during the experiment.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Develop a procedure • Collect quantitative and qualitative data • Differentiate between quantitative and qualitative data • Ask questions

			<p>What's next? <i>Students are wondering why the candle shrunk in size and what the smoke is that formed. They understand the differences between quantitative and qualitative data when observing a chemical reaction. They may be wondering what happened to the candle they started with.</i></p>
<p><i>What happens when something seems to lose mass like when the candle gets smaller?</i></p>	<p>Candle (Fuel)</p>	<ul style="list-style-type: none"> • Law of Conservation of Mass 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Analyze and interpret data to find patterns in the simulation to determine that mass is always conserved. <p>Learning Target: I can analyze and interpret data and find patterns to describe the Law of Conservation of Mass.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Explain the Law of Conservation of Mass • Apply this law to the burning candle <p>What's Next? <i>Students now know that the law of conservation of mass explains that mass was never lost. Students are now wondering what the differences between melting the candle and the appearance of smoke.</i></p>

EXPLORE

What's the difference between melting and the smoke that was made when the candle burned?

Candle (fuel)

- [Chemical Reactions in a Bag](#)
 - Adapted from: [Chemical reactions in a bag](#)
 - Takes about 45 mins)

Resources

- [Chemical Reactions Summary Table](#)
 - Ongoing assignment through learning sequence 1

DCI/SEP/CCC: SWBAT...

- **HS-PS-1-7**
- **Plan and carry out an investigation** to describe the difference in **patterns** between a chemical change and a physical change.

Learning Target

- I can plan and carry out an investigation to find patterns and describe physical and chemical changes.

Success Criteria

- Carry out an investigation to differentiate between physical and chemical changes
- Be able to describe a chemical reaction

What's next?

Students now know that the production of heat or light, formation of a gas, formation of a precipitate, and/or color change are possible evidence of a chemical reaction. A chemical change transforms substances into new substances with different chemical and physical properties and compositions (smoke formation from the candle). A physical change causes a substance to undergo a change in

			<p><i>properties, but not a change in composition (wax of the candle melting). Next, Students will investigate how matter/atoms change during chemical changes.</i></p>
<p>EXPLAIN <i>Are there different kinds of chemical reactions or similar ones to the candle burning?</i></p>	<p>Candle (fuel)</p>	<ul style="list-style-type: none"> ● Classifying chemical reactions POGIL <ul style="list-style-type: none"> ○ Answers ● Practice classifying <p>Resources</p> <ul style="list-style-type: none"> ● Class Notes 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS-1-7 ● Analyze and interpret data to find patterns in chemical reactions in order to classify the type of chemical reaction. <p>Learning Target</p> <ul style="list-style-type: none"> ● I can classify chemical reactions by analyzing and interpreting chemical equations by finding patterns in chemical equations. <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Be able to identify synthesis, decomposition, single replacement, double replacement, and combustion reactions when given a chemical equation. <p>What's next? <i>Students learn how to classify the 5 major types of reactions by comparing the reactants and products. They are able to classify the candle burning as a combustion reaction. Students will now be wondering how those superscripts and subscripts play a</i></p>

			<p>role in the balanced chemical equation.</p>
<p>EXPLAIN How do we show our inputs and outputs in a chemical change like when the candle makes smoke?</p>	<p>Candle (Fuel)</p>	<ul style="list-style-type: none"> • Balancing Equations Phet Simulation • Balancing Equations Practice Worksheet • Balancing and Classifying Practice Worksheet • Balancing Combustion Equations <p>OpenStax</p> <ul style="list-style-type: none"> • 7.1 Writing and Balancing Chemical Reactions <p>Resources:</p> <ul style="list-style-type: none"> • Class Notes 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Develop and use models to develop a microscale view of matter flow in chemical reactions to find patterns to balance equations demonstrating the conservation of matter. <p>Learning Target</p> <ul style="list-style-type: none"> • I can balance chemical reactions by using models to find patterns in chemical equations. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Understand that matter is conserved in a chemical reaction • Be able to make sure the different elements are balanced on each side of the chemical equation by changing the coefficients <p>What's next? <i>Students learn to balance chemical equations at the atom/molecule/compound scale to demonstrate the conservation of matter. Students will be able to balance the chemical equation of the candle burning. Next, students will be wondering how we can predict what products form if only</i></p>

			<p><i>the reactants are given in different chemical reactions.</i></p>
<p>ELABORATE <i>How can we figure out all of the outputs in a chemical reaction?</i></p>	<p>Candle (Fuel)</p>	<ul style="list-style-type: none"> • Predicting Products Practice Worksheet <p>Lab Choices:</p> <ul style="list-style-type: none"> • Predicting Products Demo (1 of each type of reaction) OR • Predicting Products Lab <ul style="list-style-type: none"> ◦ <i>Adapted from:</i> Exploring Chemical Reactions Lab <p>OpenStax</p> <ul style="list-style-type: none"> • 7.1 Writing and Balancing Chemical Reactions 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Analyze and interpret data (reactants) to determine patterns in what products form based on the type of chemical reaction. <p>Learning Target</p> <ul style="list-style-type: none"> • I can analyze and interpret reactants and predict products of chemical reactions by recognizing patterns. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Predict the products by determining the type of chemical reaction occurring and balance that equation <p>What's next? <i>Students learn that the type of reaction and the available reactants determine the products that are formed in a chemical reaction. Students may be wondering what happens if we have larger quantities. In other words, we focused here on the atoms/molecules/compounds level, but scientists don't work with singular compounds- we can't even really see that!</i></p>

EVALUATE

LS1 Assessments

- [HS-PS1-7](#)

Chemical Reactions Quiz [version-A](#)

Chemical Reactions Quiz [version B](#) (same as A, but some different compounds to balance)

[Study Guide](#)

Learning Sequence 2: How is matter conserved in a chemical reaction and how do we represent this conservation?

Driving Questions

Lesson Level Phenomena

Activity

What Should They Learn/Expected Outcome

ENGAGE

What is my carbon footprint?

Video Clip: Watch "[New York City's Greenhouse Gas Emissions as One-Ton Spheres of Carbon Dioxide Gas](#)" until minute 2:35.

Watch video

Presentation on Fuel Sources (see activities)

[Adapted from iHub: Fuels](#)

- [Slides Lesson 1 Fuels](#)
 - [Lesson 1 Fuels Student Activity Sheet](#)

Engage

- Show video clip
- **What do we notice?** Students should write down any observations that they have. It is recommended to play the video a second time for students to write down observations.
- Have students work through the activity sheet and look at [these graphs](#) in small groups.
- Have students make sense of what happens during a chemical reaction.
- **Identify related phenomena:**
- Campfires
- Any kind of combustion reactions (answers may vary)

DCI/SEP/CCC: SWBAT...

- **HS-PS-1-7**
- **Ask questions** to find **patterns** to understand what a carbon footprint is.

Learning Target: I can ask questions about a carbon footprint after looking at patterns of different graphs and figures.

Success Criteria:

- Analyze graphs
- Make sense of a carbon footprint
- Understand greenhouse gasses are not good for the environment
- Asking questions about how to find out your carbon footprint

What's next?

			<p>Students wonder how we can figure out our own carbon footprints. If molecules like CO_2 are really small, how can we even count these molecules?</p>
<p>EXPLORE <i>Since molecules like carbon dioxide are so small, how do we count them?</i></p>	Fuel	<ul style="list-style-type: none"> • The mole TedTalk <p>Pick 1 Activity:</p> <ul style="list-style-type: none"> • Mole Lesson Activity • POGIL: Relative Mass and the Mole <ul style="list-style-type: none"> ◦ Answers <p>Notes</p> <ul style="list-style-type: none"> • Mole Class notes • Stoichiometry Summary Table <ul style="list-style-type: none"> ◦ Ongoing assignment throughout learning sequence 2 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Using mathematics and computational thinking to find patterns to understand what the mole is and why it's used. <p>Learning Target</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking to use a mole as a counting unit. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Be able to define a mole of objects <p>What's next? <i>Students are introduced to the new unit, the mole. They now know how to count very small molecules like CO_2. Students are now wondering how to use the mole in chemistry.</i></p>
<p>EXPLAIN <i>How does the mole relate to figuring out how much carbon dioxide we produce?</i></p>	Fuel	<ul style="list-style-type: none"> • Calculating Molar Mass Student Version <ul style="list-style-type: none"> ◦ With Answers • Moles Conversion 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Using mathematics and computational thinking to use the mole to make

		<p>Worksheet</p> <ul style="list-style-type: none"> • Mole Roadmap Worksheet CK-12 • More 2 step calculations practice • Lab: Calculating Moles in Daily Life <p>Optional:</p> <ul style="list-style-type: none"> • Mass to Moles Carousel (AW) • Calculating Moles Lab • Conversions Between Moles and Mass CK-12 (Homework) • The Mole and Mole Conversions- Chapter 10 on CK-12 • Molar Mass "March" madness <p>OpenStax</p> <ul style="list-style-type: none"> • 7.3 Reaction Stoichiometry 	<p>conversions to grams, liters, and particles of the same substance by observing patterns in these calculations.</p> <p>Learning Target</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking to calculate the molar mass of a compound using the periodic table. • I can convert between moles, grams, particles, or liters. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Calculate molar mass • Use molar mass to convert from mass to moles or moles to mass • Use Avogadro's number to calculate the number of moles or particles when given the other value • Use the Liter conversion to convert from moles to liters or liters to moles <p>What's next? <i>Students learn basic mole conversions. They can now convert between essential units and understand how they relate to the mole. For example, students can know the number of moles of CO₂ and use that to convert to grams. Students may be wondering how this relates to</i></p>
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			<p>chemical reactions, like the chemical reactions we saw with the different fuels.</p>
<p>EXPLAIN How do we compare the amount of carbon (or hydrogen) in a fuel?</p>	<p>Fuel</p>	<p>Optional Introduction Activity:</p> <ul style="list-style-type: none"> • Optional intro activity <p>Activities:</p> <ul style="list-style-type: none"> • POGIL: Percent Composition and Empirical & Molecular Formula <ul style="list-style-type: none"> ◦ Practice WS <p>Elaborate: Hydrates Lab</p> <ul style="list-style-type: none"> • Hydrates Lab CuSO₄ <ul style="list-style-type: none"> ◦ Calculations Intro • Another hydrate lab CuSO₄ • Alternate hydrate lab MgSO₄ <p>Optional support activity for weaker math groups:</p> <ul style="list-style-type: none"> • POGIL: Percent Composition <p>OpenStax</p> <ul style="list-style-type: none"> • 7.3 Reaction Stoichiometry • 6.2 Determining Empirical and Molecular Formulas <p>Resources</p> <ul style="list-style-type: none"> • Percent composition CK-12 • Stoich Notes 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Using mathematical and computational thinking to find patterns in order to calculate percent composition and use that to find an empirical formula of a chemical reaction. • Carrying out an investigation to calculate the proportion of water in a hydrate using stoichiometry. <p>Learning Target</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking to determine the percent composition and empirical formulas of chemical reactions. • I can carry out an investigation to calculate the percent composition of water in a hydrate by using mole conversions. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Determine the percent composition of different elements/compounds in a chemical formula • Use percent composition to determine the empirical

			<p>formula of a chemical reaction</p> <ul style="list-style-type: none"> Carry out an investigation using mole conversions and other lab techniques to figure out the percent composition of water in a hydrate <p>What's next? <i>Students learn to calculate percent composition of different substances that make up a chemical reaction and apply it to making an empirical formula of a chemical equation like the burning of fuels. Students may be wondering how the empirical formula relates to the mole calculations.</i></p>
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LS2 Mid Assessment

- [Mid Assessment](#)
 - HS-PS1-7**
 - [Make-Up Assessment](#)
 - [Study guide](#)
 - [Study guide w/practice problems and answer key](#)

<p>EXPLAIN <i>How do we incorporate conservation of matter into our models of chemical reactions?</i></p>	Fuels	<ul style="list-style-type: none"> Mole Ratios POGIL <ul style="list-style-type: none"> POGIL answer key Mole Ratio Worksheet Mass to Moles Worksheet <ul style="list-style-type: none"> Another Mass to Moles Worksheet Elaborate: Analyzing the reaction between baking soda and citric acid lab 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> HS-PS-1-7 Using mathematical and computational thinking by finding patterns in the process to make stoichiometry calculations. Carry out an investigation to figure out the proportion needed of
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		<ul style="list-style-type: none"> • Stoichiometry Worksheet • Elaborate: Stoichiometry Lab with baking soda and amount of gas to predict <ul style="list-style-type: none"> ◦ Airbag Worksheet <p>Optional extension:</p> <ul style="list-style-type: none"> • Real World Stoichiometry <p>OpenStax</p> <ul style="list-style-type: none"> • 7.3 Reaction Stoichiometry 	<p>baking soda and citric acid using stoichiometry in the chemical equation</p> <p>Learning Target</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking stoichiometry to calculate quantities in chemical reactions. • I can carry out an investigation to analyze a chemical reaction to determine the amount of baking soda and citric acid needed using stoichiometry <p>What's next? <i>Students learn how to use a chemical reaction to make conversions between different substances in a chemical reaction. Students will now be able to calculate their carbon footprints based on the amount of fuel they use. Students are probably wondering how much product can be made when both reactants have given amounts. In terms of our fuel equations, students may be wondering why we have to keep filling up our cars with fuel.</i></p>
<p>EXPLAIN PERFORMANCE TASK</p>	<p>Carbon Footprint</p>	<ul style="list-style-type: none"> • Calculating your Carbon Footprint <ul style="list-style-type: none"> ◦ Open notes ◦ rubric ◦ Only parts 4 and 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-7 • Using mathematical and computational thinking and constructing an

		<p>analysis questions are graded</p> <ul style="list-style-type: none"> ○ Critical thinking assignment 	<p>explanation for personal fossil fuel use by finding patterns in the calculations and provided data.</p> <p>Learning Target: I can use mathematical and computational thinking to determine my carbon footprint using stoichiometry.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Use stoichiometry to calculate your carbon footprint <p>What's next? <i>Students learn how to use stoichiometry in a real world calculation, which is calculating their carbon footprint. Students are wondering what happens in a chemical reaction when a reactant runs out, like gas in cars.</i></p>
<p>ELABORATE <i>Why do we need to keep adding gas to our cars, but we don't have to add oxygen?</i></p>	<p>Fuels</p>	<ul style="list-style-type: none"> ● Limiting Reactants Worksheet ● POGIL: Limiting Reactants <ul style="list-style-type: none"> ○ Answers ● Elaborate: Percent yield ● Limiting Reactant and Percent Yield (homework or exit ticket suggestion) ● Elaborate: The determination of mass of a product of a chemical reaction Lab <p>Optional extension:</p>	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS-1-7 ● Using mathematical and computational thinking to find patterns in limiting reactant problems and how to calculate percent yield in a lab (apply theory to experimental data). <p>Learning Target</p> <ul style="list-style-type: none"> ● I can use mathematical and computational thinking to determine the limiting

		<ul style="list-style-type: none"> • Incomplete combustion <p>OpenStax</p> <ul style="list-style-type: none"> • 7.4 Reaction Yields 	<p>reactant by using stoichiometry.</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking determine the percent yield produced in a lab experiment. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Be able to determine the limiting reactant with stoichiometry • Be able to determine the percent yield of a product <p>What's next? <i>Students learn to calculate limiting reactants and percent yield. They can now determine that the excess reactant is oxygen while the limiting reactant is gas. Now that they learned all about the matter, they are probably wondering about the energy that actually makes the cars move.</i></p>
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EVALUATE

LS2 Assessment:

- [Chemical Reactions and Stoichiometry](#) (without answer key)
- [Chemical Reactions and Stoichiometry](#) (w/ Answer Key)
 - HS-PS1-7

Learning Sequence 3: Why is energy released or absorbed from a chemical process?

Driving Questions	Lesson Level Phenomena	Activity	What Should They Learn/Expected Outcome
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<p>ENGAGE <i>Why don't we use a different fuel in our cars?</i></p>	<p>Hydrogen and gasoline</p>	<ul style="list-style-type: none"> ● Hydrogen vs. Gasoline <ul style="list-style-type: none"> ○ Liquid Hydrogen Article ○ Activity sheet 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS-1-4 ● HS-PS-3-4 ● Attempt to construct an explanation to describe energy flow for a chemical reaction <p>Learning Target</p> <ul style="list-style-type: none"> ● I can ask questions and try to make sense of the energy produced in two chemical reactions. <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Describe similarities and differences between octane and hydrogen combustion reactions ● Make an attempt to explain heat flow <p>What's next? <i>Students are able to compare and contrast the similarities and differences of the two combustion reactions and fuel types. Students will be wondering why hydrogen produces more energy and why we can't use it instead of gasoline.</i></p>
<p>ENGAGE <i>Why do combustion reactions make heat?</i></p>	<p>Hot and cold packs</p>	<ul style="list-style-type: none"> ● Hot and Cold Packs Simulation OR ● Barium Hydroxide and ammonium chloride <ul style="list-style-type: none"> ○ Demo 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS-1-4 ● HS-PS-3-4 ● Constructing an explanation to describe energy flow for endothermic and

		<p>Resource:</p> <ul style="list-style-type: none"> • Thermochemistry Summary Table 	<p>exothermic reactions.</p> <p>Learning Target</p> <ul style="list-style-type: none"> • I can construct an explanation to describe the energy flow between two objects. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Describe the differences between hot and cold packs with a focus on energy <p>What's next? <i>Students learn that in terms of heat energy, there are endothermic and exothermic reactions. They are thinking about why the reactions produce energy (heat).</i></p>
<p>EXPLORE <i>Do bonds have something to do with it?</i></p>	<p>Fuel</p>	<ul style="list-style-type: none"> • POGIL: Bond Energy <ul style="list-style-type: none"> ◦ Answer Key • Bond Energy Practice • Energy Changes in Chemical Reactions Simulation <p>Option:</p> <ul style="list-style-type: none"> • Magnets Activity (iHub) • Magnets Presentation (iHub) <p>Notes:</p> <ul style="list-style-type: none"> • Bond Energy <p>OpenStacks</p> <ul style="list-style-type: none"> • 9.4 Strengths of Ionic and 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-4 • Using mathematics and computational thinking to describe the energy flow of endothermic and exothermic reactions in a chemical reaction. <p>Learning Target</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking to calculate bond energy in a chemical reaction • I can explain energy flow changes in chemical

		<p>Covalent Bonds</p> <ul style="list-style-type: none"> ○ Covers bond energy 	<p>reactions.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Calculate bond energy ● Describe energy changes in chemical reactions ● Analyze endothermic and exothermic graphs and note the differences between them <p>What's next? <i>Students learn how to calculate bond energy in a chemical reaction to determine the flow of heat energy and classify it as an endothermic or exothermic reaction. Students will now need to understand how temperature relates to heat in a system.</i></p>
<p>EXPLAIN <i>Why do some things get hotter faster?</i></p>	<p>Fuel</p>	<ul style="list-style-type: none"> ● Exothermic and Endothermic Lab ● Elaborate: Vegetable Oil and Water lab comparison OR Heat Capacity Stations OR Specific Heat Simulation <ul style="list-style-type: none"> ○ Asks students to use significant figures. (one decimal place) ○ Answers ● Specific Heat Calculations WS ● Thermochemistry Notes 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS-1-4 ● HS-PS-3-4 ● Using mathematics and computational thinking to describe system and system models of energy flow in a chemical reaction. ● Carry out an investigation to describe system and system modes of energy flow in chemical reactions. <p>Learning Target:</p> <ul style="list-style-type: none"> ● I can conduct an experiment to show energy

		<p>OpenStax</p> <ul style="list-style-type: none"> • 9.1 Energy Basics • 12.3 The Second and Third Laws of Thermodynamics <ul style="list-style-type: none"> ○ Focus only on second law 	<p>flow in a system.</p> <ul style="list-style-type: none"> • I can use mathematical and computational thinking to calculate the specific heat capacity of an object. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Understand how temperature relates to heat energy • Be able to conduct a lab experiment to determine the heat flow • Use the formula to calculate specific heat of an object. <p>What's next? <i>Students learn about specific heat capacity and how it applies to how quickly or slowly substances can heat up. They also learn how temperature is related to heat energy. Students learn how to use math to illustrate endothermic and exothermic reactions. They will be able to fully explain exothermic reactions like fuels combusting and back them up with mathematical calculations. Students may be wondering what happens during a phase change because we have only seen one state of matter up until now.</i></p>
<p>EXPLAIN How can we figure out if a physical change is making or absorbing energy?</p>	<p>Fuel</p>	<ul style="list-style-type: none"> • Phase change diagrams <ul style="list-style-type: none"> ○ Answers • Heat of Fusion of Ice Lab <ul style="list-style-type: none"> ○ Adapted from: Heat 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-4 • HS-PS-3-4 • Analyzing and

		<p style="text-align: center;"><u>of Fusion of Ice</u></p> <p>Notes: <u>Phase change notes</u></p> <p>OpenStax</p> <ul style="list-style-type: none"> • <u>10.3 Phase Changes</u> • <u>10.4 Phase Diagrams</u> <p>Resource:</p> <ul style="list-style-type: none"> • <u>More phase change diagram practice</u> 	<p>interpreting data to determine the energy flow between phase changes of substances.</p> <ul style="list-style-type: none"> • Use computational thinking to determine the energy flow and calculate the heat of fusion of ice. <p>Learning Target:</p> <ul style="list-style-type: none"> • I can analyze and interpret a phase change diagram • I can carry out an experiment to determine the heat of fusion of ice using a phase change diagram. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Interpret phase change diagrams • Determine the heat of fusion of ice in a lab <p>What's next? <i>Students learn how to interpret phase change graphs and understand that heat energy and pressure helps determine what phase a substance is in. Students may be wondering how we can directly measure energy with more than one substance.</i></p>
<p>ELABORATE <i>How do we measure energy changes between two substances?</i></p>	<p>Fuel</p>	<ul style="list-style-type: none"> • <u>Calorimetry Math Worksheet</u> <ul style="list-style-type: none"> ◦ <u>Answers</u> <p>Choose 1:</p> <ul style="list-style-type: none"> • <u>Specific Heat of a Metal</u> 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS-1-4 • HS-PS-3-4 • Using mathematical and computational thinking to

		<p>Lab: Calorimetry</p> <ul style="list-style-type: none"> Adapted from: Calorimetry Lab <p>OR</p> <ul style="list-style-type: none"> Calorimetry Lab Simulation Heat of Solution <p>OpenStax</p> <ul style="list-style-type: none"> Calorimetry 	<p>mathematically determine the energy flow between two substances in a system.</p> <p>Learning Target:</p> <ul style="list-style-type: none"> I can use calorimetry (use mathematical and computational thinking) to determine the specific heat of a substance with heat transfer between two objects. <p>Success Criteria:</p> <ul style="list-style-type: none"> Use calorimetry to perform calculations of specific heat, temperature change, or mass of an object <p>What's next? <i>Students learn to calculate variables between two different substances understanding that $q = -q$. They see that within a system, there is an endothermic process and an exothermic process. Students may now want to use what they learned to apply energy as to why we can't use liquid hydrogen as a fuel source.</i></p>
<p>EVALUATE Performance Task CER: How can we reduce our transportation carbon footprint?</p>	<p>Reducing carbon footprint (fuel)</p>	<p>Performance Task</p> <ul style="list-style-type: none"> Link to Supplements for Research Research Final CER 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> HS-PS-1-4 HS-PS-3-4 Obtaining, evaluating,

- [CER document if having students type](#)
- Enrichment: [Why can't we use hydrogen as our fuel source PearDeck](#)

and communicating information and engaging in argument from evidence to find **patterns** to explain an alternative fuel to reduce our carbon footprint.

What's next?

Based on evidence, students write a CER explaining how we can reduce our transportation carbon footprint.

EVALUATE

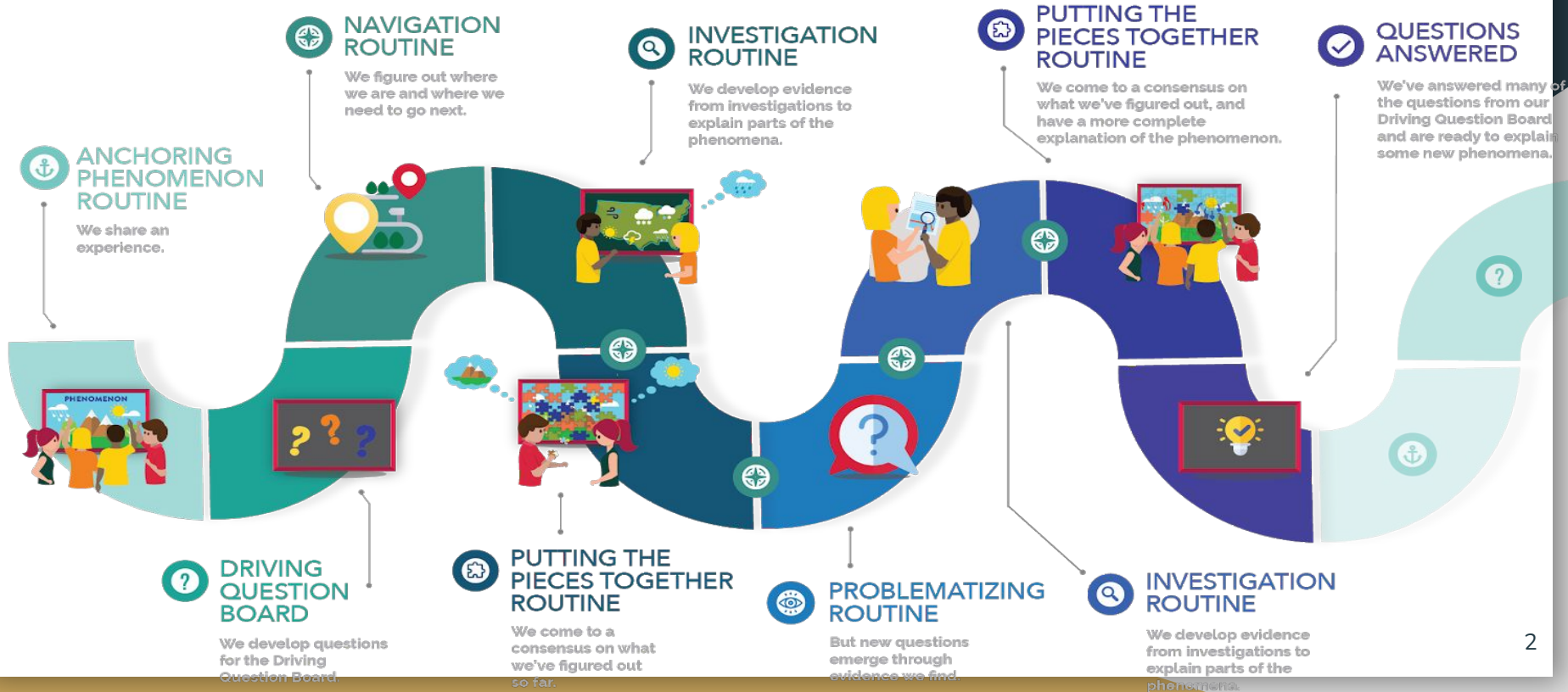
LS3 Assessments -

- [Paper & Pencil Test](#) ; [Answer Key](#)
 - **HS-PS1-4**
 - **HS-PS3-4**
 - [Study Guide](#)

Accelerated General Chemistry

Bundle 3
Lisa Daigle

Curricular Sequence for Each Bundle



Bundle 3: Matter and Energy Changes

Composed of 3 Learning Sequences:

Burning a Candle

What happens to a candle when it burns?

Focus on classifying and balancing chemical equations and predicting products with known reactants

Carbon Footprint

What is my carbon footprint?

Focus on mole conversions and stoichiometry

Liquid Hydrogen

Why don't we use a different fuel in our cars?

Focus on endothermic and exothermic reactions, bond energy, thermochemistry, and calorimetry.

What happens to a candle when it burns? First Steps

What do we notice?

Students burn a candle and take the mass before and after 10-15 minutes

Students write down observations

Attempt to Make Sense

Students attempt to explain why the candle shrinks, why it seems to lose mass, and figure out what molecules/elements are in the smoke

Identify Related Phenomenon

Campfires
Roasting Marshmallows
Anything with fire/flames or smoke

Ask Questions



What is my Carbon Footprint? First Steps

What do we notice?

Students analyze graphs of carbon dioxide emissions and watch a video that conceptualized the amount of CO_2 emitted on a block in NYC

Attempt to Make Sense

Students attempt to explain how there are so much CO_2 emissions

Identify Related Phenomenon

Fires
Combustion Reactions

Ask Questions



Why don't we use a different fuel in our cars?

First Steps

What do we notice?

Read and annotate a liquid hydrogen article
Compare and contrast gasoline to liquid nitrogen

Attempt to Make Sense

Students attempt to explain why we don't use liquid hydrogen since it releases energy like gasoline when it's used

Identify Related Phenomenon

Fires
Combustion Reactions
Other fuel sources like propane



Ask Questions



CR18

4C Activities: Performance Tasks



Critical Thinking

Calculating your Carbon Footprint

Students use a variety of balanced equations, unit conversions, and stoichiometry to calculate their carbon footprints

Communication

Find an Alternative Fuel Source

Students write a CER and research other fuel sources and back up why their choice is better than gasoline using thermochemistry to explain their choices

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 h.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated General Chemistry – Unit #4 – Gas Law & Kinetics – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated General Chemistry – Unit #4 – Gas Law & Kinetics.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated General Chemistry – Unit #4 – Gas Law & Kinetics as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

HS-PS1 Gas Laws and Kinetic Molecular Theory

Unit Overview	
Unit Title:	Bundle 4: Gas Laws and Kinetics
Teacher:	Lisa Daigle
Grade Level/Course:	9-12/Accelerated General Chemistry
Length/Dates:	4 Weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students learn about kinetic molecular theory and how it relates to the behavior of gasses. Students learn the relationships between different variables that affect gas particles. Finally, students learn how the temperature or concentration affects the rate at which a chemical reaction occurs. Students will explore the phenomena of a tanker car implosion and elephant toothpaste.

Performance Expectations

PE(s) to be addressed (include assessment boundaries and clarification statements).

Bundle

- [HS-PS1-5](#). Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. *[Clarification Statement: Emphasis is on student reasoning that focuses on the number and energy of collisions between molecules.] [Assessment Boundary: Assessment is limited to simple reactions in which there are only two reactants; evidence from temperature, concentration, and rate data; and qualitative relationships between rate and temperature.]*

SEP Implications	DCI Implications	CCC Implications
<p>Science and Engineering Practices</p> <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. 	<p>Disciplinary Core Ideas</p> <p>PS1.B: Chemical Reactions</p> <ul style="list-style-type: none"> Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. 	<p>Crosscutting Concepts</p> <p>Patterns</p> <ul style="list-style-type: none"> Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

Transfer Goals (Vision of the Graduate)

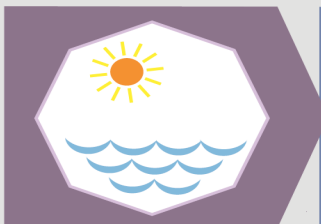
List the long-term and/or school-wide independent student behaviors that this unit will address.

Creativity/Innovation Transdisciplinary Goal:

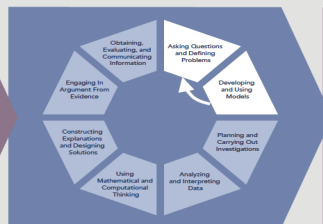
Students work creatively to design and refine implementation of ideas by taking risks, persevering, and exploring possibilities.

Phenomenon

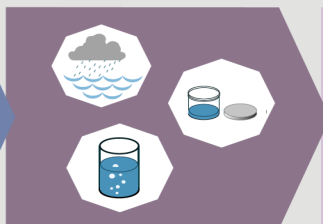
Explore Anchoring Phenomenon



Attempt to Make Sense



Identify Related Phenomena



Develop Questions & Next Steps



TIMING: 4 weeks

Explore Anchoring Phenomenon: [Tanker Car Implosion](#)

Attempt to Make Sense: Students will create a model to create an explanation on how the tanker car imploded.

Identify Related Phenomena: [Crushing the Can Experiment](#)

Develop Potential Student Questions

- Does the weather play a role in making this happen?
- Does the pressure increase or decrease?
- Is the temperature something that causes the implosion?
- Why does it implode instead of explode?

Possible Unit Level Phenomena: Students should be able to create an explanation of the tanker car implosion by using gas laws. Students use the different gas laws in their explanation for the tanker car. Students only learn about ideal gasses, not real gasses in this learning sequence.

Sample Explanation: The conditions had to be just right for the implosion to happen. The temperature affects the pressure directly while the volume is affected indirectly. The pressure inside and outside of the tanker car also wants to be equal, but since the tanker car is not a flexible container, the implosion occurs to allow the pressures to be equal when the tanker car cannot withstand the difference in pressures. Inside the tanker car, the temperature of the water vapor decreased rapidly, which decreased the pressure but only in the tanker car. The external pressure was left unaffected. The tanker car collapses in on itself to make the volume smaller to accommodate the higher external pressure so that the internal pressure increases and can be equal to the external pressure.

Explore Anchoring Phenomenon: [Elephant Toothpaste](#) (decomposition of hydrogen peroxide)

Attempt to Make Sense: Students contribute to a discussion board on Canvas to synthesize their thinking to come up with an idea of what they think is happening.

Identify Related Phenomena: [Decomposition reactions, reactions that produce a gas](#)

Develop Potential Student Questions

- What makes the elephant toothpaste thick?
- What happens when we use less reactants?
- How can we make it faster?

Possible Unit Level Phenomena: Students learn gas stoichiometry to incorporate gas laws into chemical reactions. Chemical reactions are discussed further with different variables like temperature and catalysts can affect the rate of reaction. Finally, collision theory is discussed to figure out why elephant toothpaste is possible to make. At the end, students should be able to apply this knowledge to not only the elephant toothpaste reaction, but also the iodine clock reaction to make the reaction happen as quickly as possible.

Sample Explanation: Elephant toothpaste is possible because a chemical reaction happens, the decomposition of hydrogen peroxide. We can use the equation, $2 \text{H}_2\text{O}_2(\text{l}) \rightarrow 2 \text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$. Because of the oxygen, it makes the elephant toothpaste expand. Since oxygen is a gas, gas stoichiometry can be used to help us calculate the volume or pressure of the gas as well as the amount of oxygen gas that is produced when the conditions of the oxygen gas change. The reaction is possible because of the catalyst, which can be potassium iodide (KI) to speed up the chemical reaction. Yeast can also be used as a catalyst. The catalyst causes the rapid decomposition of hydrogen peroxide. Collision theory states that there needs to be sufficient energy to break bonds, so the activation energy is lowered by the catalyst. This all makes elephant toothpaste's chemical reaction possible.

General Resources:

- [Driving Question Board](#)
- [Question Formulation Technique \(QFT\)](#)
- [KOL](#)
- [Talk Activities](#)
- [Summary Table](#)
- [Final Scientific Modeling](#)
- [Final Scientific Modeling](#)
- [CCC Discussion Cards](#)
- [321 Strategy active viewing](#)
- [60 Formative Assessment Ideas](#)
- [CER](#)

Learning Sequence 1: How did the Tanker Car Implode? Gas Laws (2 Weeks)				
Driving Questions	Lesson Level Phenomena	Activity	???	What Should They Learn/Expected Outcome
<p>ENGAGE How did the tanker car implode?</p>	<p>Video Clip: Tanker Car Implosion</p>	<p>Engage</p> <ul style="list-style-type: none"> • Show video clip <ul style="list-style-type: none"> ◦ Tanker car slides • What do we notice? Students write down observations that they see. 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Developing a model to determine the cause and effect of the implosion. <p>Learning Target: I can formulate an explanation by developing a</p>

		<ul style="list-style-type: none"> • Attempt to make sense: Students will create a model to show why and how they think the tanker car implodes OR create a discussion board. • Identify related phenomena: Demo crushing the can • Develop questions and next steps Students will ask questions related to both phenomena. • This is a great time to introduce the tanker car summary table. As topics and questions are answered, have students complete that particular section of the summary table. Can be done for homework with periodic check-ins. <p>General Resources:</p> <ul style="list-style-type: none"> • Driving Question Board <ul style="list-style-type: none"> ◦ Question Formulation Technique (QFT) 		<p>model about the tanker car implosion to illustrate the cause and effect.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Ask questions about the tanker car • Create an explanation about the implosion • Think of related phenomena to make sense of the implosion <p>What's next? <i>Students know that matter is made up of particles and know the properties of gasses. However, they are wondering how and why gasses can cause an implosion and what external and internal factors play a role in the phenomenon. They may wonder if this is a chemical reaction inside the tanker car or if it is just a physical change.</i></p>
<p>EXPLORE & EXPLAIN <i>What factors caused the tanker car to collapse on itself in that manner?</i></p>	<p>Tanker car</p>	<ul style="list-style-type: none"> • POGIL Kinetic Molecular Theory <ul style="list-style-type: none"> ◦ Answers <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Tanker car summary 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Constructing explanations to recognize patterns with gas molecules using kinetic molecular theory.

		<p>table</p> <p>OpenStax</p> <ul style="list-style-type: none"> • 8.5 Kinetic Molecular Theory <p>Resources:</p> <ul style="list-style-type: none"> • Gas Laws PhET • Kinetic Molecular Theory Notes • Kinetic molecular theory google slides • CK-12 Kinetic Molecular Theory 		<p>Learning Target: I can use kinetic molecular theory to construct an explanation of the behavior of gasses.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Describe the 5 components of kinetic molecular theory • Be able to use kinetic molecular theory to explain the behavior of gasses when a variable changes <p>What's next? <i>Students learn the 5 components of kinetic molecular theory. They also learned that catalysts can speed up the rate of reactions. They may be wondering whether or not to classify the implosion as a chemical reaction or just the gasses being affected by internal/external factors. Is the implosion a chemical reaction or something else?</i></p>
<p>EXPLORE & EXPLAIN <i>Why did it implode instead of explode?</i></p>	<p>Tanker car</p>	<p>(Pick 1 activity)</p> <ul style="list-style-type: none"> • Understanding gas laws animation <ul style="list-style-type: none"> ○ Requires AACT membership • Understanding gas 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Constructing explanations and recognizing patterns between manipulating different variables to

		<ul style="list-style-type: none"> • laws pHet simulation • Gas variables POGIL <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Tanker car summary table 		<p>determine what happens within a system containing gas particles.</p> <p>Learning Target: I can use gas laws to construct an explanation for the behavior of gasses when different variables are changed.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Describe Boyle’s Law, Charles’s Law, and Gay-Lussac’s Law conceptually and mathematically (does not include calculations) <p>What’s next? <i>Students learn that there are multiple variables that can affect the gas’s behavior. They learn the basic relationships between volume, pressure, moles (amount), and temperature and how they are all related. Now they know that there are multiple variables that are associated with the implosion of the tanker car. They may be wondering if these relationships can be mathematically proven, which will then bring them to the different gas law calculations.</i></p>
<p>EXPLAIN <i>Did the pressure make it</i></p>	<p>Tanker car</p>	<ul style="list-style-type: none"> • Boyle’s Law Lab <ul style="list-style-type: none"> ◦ Version II 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5

collapse?		<ul style="list-style-type: none"> • Pressure Conversions • Boyle's Law Calculations <ul style="list-style-type: none"> ◦ More practice (optional) <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Tanker car summary table <p>OpenStax</p> <ul style="list-style-type: none"> • 8.1 Gas Pressure • 8.2 Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law <p>Resources</p> <ul style="list-style-type: none"> • Boyle's Law Notes • Boyle's Law CK-12 Chapter 		<ul style="list-style-type: none"> • Using mathematics and computational thinking to find the patterns between two systems when pressure or volume is changed. <p>Learning Target: I can use mathematics and computational thinking with Boyle's Law to calculate an unknown volume or pressure when temperature remains constant.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Use Boyle's Law to solve for an unknown variable (pressure or volume) <p>What's next? <i>Students learn the mathematical relationship between pressure and volume when temperature and the amount of particles is held constant. They learned how the volume and pressure can play a role in an implosion: If the pressure increases, the volume decreases which is what happened in the tanker car. Students are probably wondering where temperature plays a role with gasses.</i></p>
EXPLAIN Was there a temperature change that made the	Tanker car	<ul style="list-style-type: none"> • Charles's Law Calculations 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Using mathematics and

<p>metal (tanker car) compress?</p>		<p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Tanker car summary table • Tanker car final model <p>OpenStax</p> <ul style="list-style-type: none"> • 8.2 Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law <p>Resources</p> <ul style="list-style-type: none"> • Charles's Law Notes • Charles's Law CK-12 		<p>computational thinking to find patterns between two systems when temperature or volume is changed.</p> <p>Learning Target: I can use mathematics and computational thinking with Charles's Law to calculate an unknown volume or temperature when pressure remains constant.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Use Charles's Law to solve for an unknown variable (temperature or volume) <p>What's next? <i>Students learn the mathematical relationship between temperature and volume when pressure and the amount of particles are held constant. Students can make the connection that the weather, specifically the temperature, played a role with the change in volume of the tanker car. Students are probably wondering how temperature affects the other learned variable, pressure.</i></p>
<p>EXPLAIN <i>Did the temperature change cause the gas</i></p>	<p>Tanker car</p>	<ul style="list-style-type: none"> • Gay-Lussac's Law Calculations 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Using mathematics and

inside the tank to compress?

Ongoing Assignment (homework)

- [Tanker car summary table](#)

OpenStax

- [8.2 Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law](#)

Resources

- [Notes](#)
- [Gay-Lussac's Law CK-12](#)

computational thinking to find **patterns** between two systems when pressure or temperature is changed.

Learning Target: I can use mathematics and computational thinking with Gay-Lussac's Law to calculate an unknown temperature or pressure when volume remains constant.

Success Criteria:

- Use Gay-Lussac's Law to solve for an unknown variable (pressure or temperature)

What's next? *Students learn the mathematical relationship between pressure and temperature when volume and amount of particles are held constant. Students can now connect back to the tanker car and claim that pressure is also affected by temperature. They are now wondering what happens if all 3 variables (temperature, pressure, and volume) are not held constant. They may also wonder how chemical reactions are affected by these gas laws or even if gas laws applies to them.*

<p>EXPLAIN Performance Task</p>	<ul style="list-style-type: none"> Students choose a real world phenomenon Relate to Tanker Car 	<ul style="list-style-type: none"> Gas Laws One-Pager- can be assigned for homework or give time in class to complete 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> HS-PS1-5 Develop and use a model to explain gas law patterns in a real world example. <p>Learning Target: I can research a real world phenomenon and apply one of the 3 gas laws to describe the behavior of gasses by developing and using a model to find patterns between my real world phenomenon and the tanker car.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> See One-Pager directions
<p>ELABORATE <i>What environmental factors made the tanker car collapse?</i></p>	<p>Tanker car</p>	<ul style="list-style-type: none"> Combined Gas Laws Calculations <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> Tanker car summary table Homework worksheet <p>Resources</p> <ul style="list-style-type: none"> Notes Combined Gas Laws CK-12 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> HS-PS1-5 Using mathematics and computational thinking to find the patterns between two systems when pressure, temperature, or volume is changed. <p>Learning Target: I can use mathematics and computational thinking combined with the combined gas law to solve for a variable when all 3 variables change.</p>

Success Criteria:

- Use the combined gas law to solve for a variable (temperature, pressure, or volume)

What's next? *Students learn how to calculate any of the three variables (pressure, temperature, volume) when comparing a "before" and "after" scenario when the amount of moles (n) are held constant. They see the mathematical relationship between each variable is still held true despite pressure, volume, and temperature not being held constant. Students can now use the combined gas law to explain the tanker car's volume (the crushing) is affected by the pressure (internal and external) and temperature. Students are now wondering what if the amount of particles or n is not held constant.*

ELABORATE

How does the amount of particles affect the other variables we talked about?

Tanker car

- [Ideal Gas Laws Calculations](#)
 - [Ideal Gas Law Lab](#)
- OR
- [Deriving the gas laws lab](#)

Ongoing Assignment (homework)

- [Tanker car summary](#)

DCI/SEP/CCC: SWBAT...

- **HS-PS1-5**
- **Using mathematics and computational thinking** to find **patterns** between two systems when pressure, temperature, volume, or moles (amount) is changed.

Learning Target: I can use

		<p>table</p> <p>OpenStax</p> <ul style="list-style-type: none"> • 8.2 Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law <p>Resources</p> <ul style="list-style-type: none"> • Notes • Ideal Gas Law CK-12 		<p>mathematics and computational thinking with the ideal gas law to calculate an unknown variable.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Use the ideal gas law to calculate pressure, temperature, volume, or moles of gas. <p><i>What's next? Students learn how to calculate an unknown between two comparable scenarios when all four variables are not held constant. They learn the constant, R, which allows for the mathematical calculations to take place when all 4 variables are different. Students can utilize the ideal gas law to show that the amount of gas in the tanker car contributed to the implosion. Students may be wondering what happens to the pressure if there are more gasses in a mixture.</i></p>
<p>ELABORATE</p> <p><i>What happens to the pressure of a gas when gasses in a mixture have different pressures?</i></p>	<p>Tanker car</p>	<ul style="list-style-type: none"> • Partial Pressures Calculations (Dalton's Law) <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Tanker car summary table <p>OpenStax</p>		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Using mathematics and computational thinking to determine patterns of adding gasses to a gas mixture. <p>Learning Target: I can use mathematics and computational</p>

- [8.3 Stoichiometry of Gaseous Substances, Mixtures, and Reactions](#)
 - Dalton's Law

Resources

- [Notes](#)
- [Partial Pressure CK-12](#)

thinking with Dalton's Law of Partial Pressure to calculate the total pressure of a mixture of gasses.

Success Criteria:

- Use Dalton's Law to calculate the total pressure of a mixture of gasses

***What's next?** Students learn Dalton's Law of partial pressures and find out that each gas exerts a unique pressure, and when added together, they make the total pressure of the gas mixture. Students learned that there is a mixture of gasses contributing to the external pressure, which has an effect on the tanker car when other conditions are met. They now wonder what happens when there are chemical reactions involving gasses- do gas variables also affect chemical reactions with gasses?*

EVALUATE

[Quiz on Gas Laws through Ideal Gas Laws](#)

[Study guide](#)

Learning Sequence 2: Hydrogen Peroxide Decomposition $2 \text{H}_2\text{O}_2(\text{l}) \rightarrow 2 \text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$ Kinetics (1 Week)

Driving Questions	Lesson Level Phenomena	Activity		What Should They Learn/Expected Outcome
<p>ENGAGE <i>How does elephant toothpaste work?</i></p>	<p>Hydrogen peroxide</p>	<p>Engage</p> <ul style="list-style-type: none"> • Demo: Teacher Directions • Student worksheet for Demo and Video • What do we notice? Students write down observations that they see. • Attempt to make sense: Discussion board on Canvas: Based on your knowledge of chemical reactions, what do you think is happening here? <ul style="list-style-type: none"> ○ Have students make a comment of what they think and have them reply to other students. • Identify related phenomena: Class discussion • Develop questions and next steps Students will ask questions related to the demo. <p>General Resources:</p> <ul style="list-style-type: none"> • Driving Question Board <ul style="list-style-type: none"> ○ Question Formulation Technique (QFT) 		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Asking questions to determine the cause and effect of the overall chemical reaction. <p>Learning Target: I can attempt to make sense and ask questions about the elephant toothpaste chemical reaction.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Ask questions about how elephant toothpaste works • Attempt to make sense of the chemical reaction at the particle level <p>What's next? <i>Students understand the gas laws and how they apply to gas particles in general. Now they are wondering how they apply to chemical reactions.</i></p>

<p>EXPLORE <i>Why is the reaction so fast?</i></p>	<p>Hydrogen peroxide</p>	<p>(Pick one lab or simulation)</p> <ul style="list-style-type: none"> • Rate of Chemical Reaction Lab • Updated above lab to allow Google sheets graphs <p>OR</p> <ul style="list-style-type: none"> • Rate of Chemical Reaction Simulation <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Elephant toothpaste summary table <p>Optional Demo</p> <ul style="list-style-type: none"> • Catalyst in motion demo <p>OpenStax</p> <ul style="list-style-type: none"> • 17.2 Factors Affecting Reaction Rates <p>Class Notes</p>		<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Analyzing and interpreting data with a simulation to determine the cause and effect of increasing/decreasing temperature, concentration, surface area or adding a catalyst. • Planning and carrying out investigations to find patterns with changing different variables (temperature, concentration, etc.) in a chemical reaction to qualitatively determine the speed of the reaction. <p>Learning Target: I can analyze and interpret data to determine if a reaction speeds up or slows down when temperature, concentration, or surface area increases or decreases.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • When temperature, surface area, or concentration increase, describe what happens to the rate of reaction • When temperature, surface area, or concentration decrease,
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				<p>describe what happens to the rate of reaction</p> <ul style="list-style-type: none"> • Adding a catalysts speeds up the reaction rate <p>What's next? <i>Students learn how temperature, catalysts, concentration, and surface area can play a role in how quickly or slowly chemical reactions occur. They figure out that a catalyst plays a role (the yeast) is why the chemical reaction occurs so quickly. They are now wondering how collisions play a role in how chemical reactions occur based on what they learned about kinetic molecular theory.</i></p>
<p>EXPLAIN <i>How does the catalyst (yeast) make it so a lot more gas is produced?</i></p>	Hydrogen peroxide	<ul style="list-style-type: none"> • POGIL: Collision Theory OR • Collision Theory (with Key) <p>OpenStax</p> <ul style="list-style-type: none"> • 17.5 Collision Theory <p>Ongoing Assignment (homework)</p> <ul style="list-style-type: none"> • Elephant toothpaste summary table <p>Class Notes</p>		<p>DCI/SEP/CC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-5 • Developing and using models to find patterns to predict the behavior of gas molecules in terms of reaction rate. <p>Learning Target: I can develop and use models to find patterns to identify the requirements needed for a successful reaction to occur between reactant particles.</p> <p>Success Criteria:</p>

- Explain the meaning of an effective collision.
- Explain the requirements needed for a reaction to occur between reactant particles.

What's next?

Students are able to apply what they learned in thermochemistry and apply the graphs to collision theory. Students now know that...

1. *Sufficient energy to break bonds*
 - a. *Activation energy is at a higher temperature and **catalysts** lower activation energy*
2. *Proper orientation*
 - a. *More effective collisions means a faster reaction. So, more reactants/concentration = faster reaction*

Students may be wondering how we can mathematically figure out how much elephant toothpaste is made based on how much hydrogen peroxide we used.

ELABORATE

Can I mathematically calculate these gas variables when given a balanced chemical equation?

How does the rate of gas formation (or removal) by a chemical reaction affect the pressure and volume?

Hydrogen peroxide

- [Gas Stoichiometry](#)
- [Mg and HCl Lab](#)

Ongoing Assignment
(homework)

- [Elephant toothpaste summary table](#)

OpenStax

- [8.3 Stoichiometry of Gaseous Substances, Mixtures, and Reactions](#)

Resources

- [Gas Stoichiometry CK-12](#)

DCI/SEP/CCC: SWBAT...

- **HS-PS1-5**
- **Using mathematics and computational thinking** to find **patterns** of a chemical reaction affected by gas laws.
- **Analyzing and interpreting data** to determine **patterns** to determine the rate of gas formation.

Learning Target: I can use mathematics and computational thinking using stoichiometry and the ideal gas law to apply to chemical reactions and calculate the amount of gas produced.

Success Criteria:

- Use stoichiometry for conversions in a chemical reaction
- Use the ideal gas law to calculate an unknown variable

What's next?

Students learn how to apply gas laws to stoichiometry and are able to make calculations using gas laws equations and balanced chemical reactions to show that the rules can apply to chemical reactions as well.

Students can now confidently explain the chemical reaction of elephant toothpaste and how it relates to gas laws and kinetics.

EVALUATE
Performance Task
(Lab)

- [HS-PS1-5](#)

Dissolving Sugar Lab

*Kinetics Assessment -
Performance Task (Lab)*

- Creativity
Assignment

DCI/SEP/CCC: SWBAT...

- **HS-PS1-5**
- **Constructing explanations and designing solutions** by using **patterns** related to the rate of reaction of gasses by designing their experiment.

EVALUATE

- [HS-PS1-5](#)

Gas Laws and Kinetics Assessment

Resources:

Possible Assessment Questions

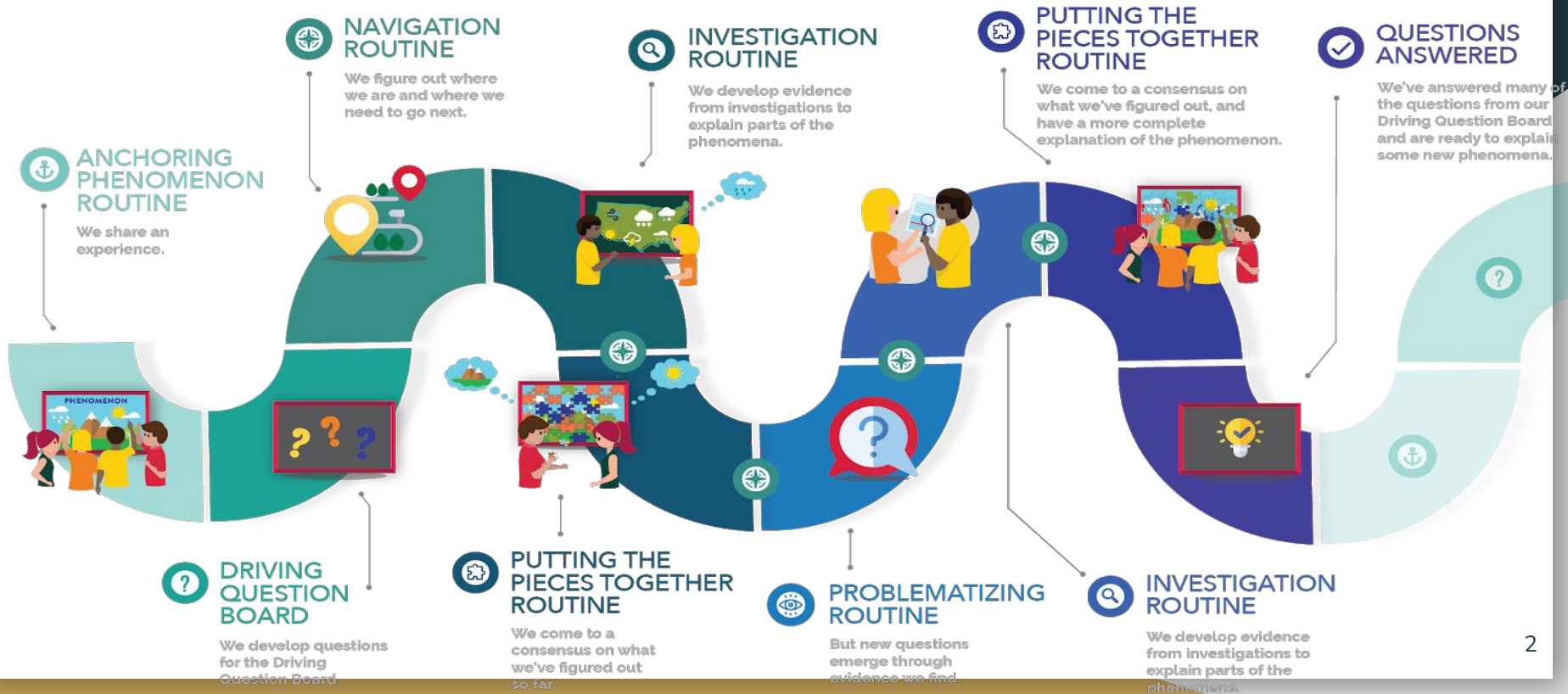
Study guide

- [Review gasses](#) WS
- [Gasses google slides](#)

Accelerated General Chemistry

Bundle 4
Lisa Daigle

Curricular Sequence for Each Bundle



Bundle 4: Gas Laws and Kinetics

Composed of 2 Learning Sequences:

Tanker Car

How did the tanker car implode?

Focus on Kinetic Molecular Theory and Gas Laws (includes Ideal Gas Law)

Elephant Toothpaste

How does elephant toothpaste work?

Focus on gas stoichiometry, reaction rate of chemical reactions, and collision theory

How did the tanker car implode? First Steps

What do we notice?

Students watch a video of a tanker car implosion and make observations based on what they saw.



Attempt to Make Sense

Students use what they know to make a scientific explanation by making a model or contributing to a class discussion board with their ideas (focus on molecular level)

Identify Related Phenomenon

Crushing the can experiment (implosion)

Ask Questions

How does elephant toothpaste work? First Steps

What do we notice?

Students observe the elephant toothpaste demonstration and make observations.

Attempt to Make Sense

Students may explain the chemical reaction, but they need to be able to explain what is happening at the molecular level and why it happens so quickly.

Identify Related Phenomenon

Another chemical reaction that happens quickly



Ask Questions



4C Activity: Performance Task

Creativity

Kinetics Performance Task

In a lab where students design a procedure, students connect the rate of dissolving sugar to what they know about reaction rates in a chemical reaction. Students then apply the kinetics of reactions to elephant toothpaste.

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 i.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated General Chemistry – Unit #5 – Flint Water Crisis – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Accelerated General Chemistry – Unit #5 – Flint Water Crisis.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the SHS – Accelerated General Chemistry – Unit #5 – Flint Water Crisis as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

HS-PS1 Flint Water Crisis

Unit Overview	
Unit Title:	Bundle 5: Flint Water Crisis
Teacher:	Lisa Daigle
Grade Level/Course:	9-12/Accelerated General Chemistry
Length/Dates:	5 Weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	By exploring the Flint Water Crisis in Flint, Michigan, students learn about solutions, equilibrium, and acids and bases in chemistry. Students will be able to describe how the water was contaminated in Flint, Michigan and why people can't drink it by describing the chemistry behind it.

Explanation

Select PEs that work together (bundle) to promote proficiency in using ideas expressed. Often a bundle will include PEs from a single NGSS topic or DCI, but a bundle could draw in PEs from other topics or DCIs.

PE(s) to be addressed (include assessment boundaries and clarification statements).

Bundle

- [HS-PS1-6](#). Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.* [Clarification Statement: Emphasis is on the application of Le Chatelier's Principle and on refining designs of chemical reaction systems, including descriptions of the connection between changes made at the macroscopic level and what happens at the molecular level. Examples of designs could include different ways to increase product formation including adding reactants or removing products.] [Assessment Boundary: Assessment is limited to specifying the change in only one variable at a time. Assessment does not include calculating equilibrium constants and concentrations.]

Unpack DCI(s), SEPs, and CCCs coded to the PEs to identify implications for instruction.

SEP Implications	DCI Implications	CCC Implications
<p>Science and Engineering Practices</p> <p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. 	<p>Disciplinary Core Ideas</p> <p>PS1.B: Chemical Reactions</p> <ul style="list-style-type: none"> In many situations, a dynamic and condition-dependent balance between a reaction and the reverse reaction determines the numbers of all types of molecules present. <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (<i>secondary</i>) 	<p>Crosscutting Concepts</p> <p>Stability and Change</p> <ul style="list-style-type: none"> Much of science deals with constructing explanations of how things change and how they remain stable.

Transfer Goals (Vision of the Graduate)

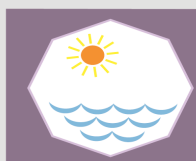
List the long-term and/or school-wide independent student behaviors that this unit will address.

Communication Transdisciplinary Goal:

Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Phenomenon

Explore Anchoring Phenomenon



Attempt to Make Sense



Identify Related Phenomena



Develop Questions & Next Steps



Explore Anchoring Phenomenon: [Flint Water Crisis](#)

Attempt to Make Sense: Explore through the Google Slides presentation to make sense of how the water became so toxic.

Identify Related Phenomena: Pollution

Develop Potential Student Questions

- How did Pb (lead) get in the water?
- Why is the water so toxic to people?
- What's in the water?
- How much lead is in the water?

Possible Unit Level Phenomena: Students should be able to determine why the Flint water is so deadly based on understanding solutions, chemical equilibrium, and acids and bases. They will be able to construct an explanation at the chemical level on how this unfortunate phenomenon was able to occur.

Sample Explanation: The Flint water is made up of a solution of water and toxic lead (Pb) ions. This means that Pb is uniform throughout the water available to Flint residents and they can't really see the Pb because of this homogenous mixture. The solution was created due to the corrosion of the lead pipes. Oxygen, an oxidizing agent present in water, reacts with exposed lead, which makes the Pb^{2+} ions in the water. The full reaction is $2\text{Pb} + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow \text{Pb}(\text{OH})_2$. To stop the lead ions from being present in the water, the city should add in PO_4^{3-} (phosphate) to stop the lead from leaching into the water and create lead II phosphate. Theoretically over time, this should stop the lead from leaching into the water and stop the previous chemical reaction from happening. When the water source was switched to the Flint river, it was not treated with phosphate ions! This allowed the other reaction to happen, which means that lead would always be in the water. Another protective layer, PbCO_3 , is also breaking down due to the poor pH of the water. The chemical equilibrium equation is as follows: $\text{PbCO}_3 \rightleftharpoons \text{Pb}^{2+} + \text{CO}_3^{2-}$. The pH should be around 10, but the Flint water is around 7 or 8, so the solubility of the PbCO_3 decreases. Also, because the water has a lower pH than it should, this means there are more H^+ ions for the CO_3^{2-} to react with, which means our equilibrium equation would be out of balance. The negligence of the correct authorities to treat the water with phosphate ions as well as not maintain the pH made both protective layers break down over time, and therefore, the water became toxic with lead.

Background Research

- <https://www.acs.org/content/acs/en/education/resources/highschool/chemmatters/past-issues/2016-2017/december-2016/flint-water-crisis.html#:~:text=A%20few%20months%20later%2C%20Flint,chlorine%2C%20bromine%2C%20or%20iodine.>
- <https://cen.acs.org/articles/94/i7/Lead-Ended-Flints-Tap-Water.html>
- <https://cen.acs.org/search.html?q=flint&sortBy=relevance&rpp=10&startYear=1998&startMonth=08&startDay=01&endYear=2022&endMonth=05&endDay=26&topics=all>
- <https://www.materialsperformance.com/articles/material-selection-design/2016/06/the-science-behind-it-corrosion-caused-lead-tainted-water-in-flint-michigan>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5353852/>

- <https://engagedscholarship.csuohio.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1044&context=tdr>
- <https://www.chemistryworld.com/opinion/inside-flints-water-crisis/4011316.article>
- <https://www.pbs.org/newshour/science/study-confirms-lead-got-flints-water>
- <https://www.nrdc.org/stories/flint-water-crisis-everything-you-need-know>
- <https://www.acsh.org/news/2022/01/04/flint-water-dept-failed-its-chemistry-test-16034>
- <https://www.acs.org/content/dam/acsorg/education/resources/highschool/chemmatters/issues/2016-2017/December%202016/chemmatters-dec2016-flint-water-crisis.pdf>

POPULAR MEDIA

- <https://www.npr.org/sections/thetwo-way/2016/04/20/465545378/lead-laced-water-in-flint-a-step-by-step-look-at-the-makings-of-a-crisis>
- <https://apnews.com/article/us-news-health-michigan-rick-snyder-flint-7295d05da09d7d5b1184b0e349545897>
- <https://www.consumernotice.org/environmental/water-contamination/flint-michigan/>
- <https://www.vox.com/2016/2/15/10991626/flint-water-crisis>

Bundle 5: Flint Water Crisis

Driving Questions	Lesson Level Phenomena	Activity	What Should They Learn/Expected Outcome
<p>ENGAGE <i>What is the issue with Flint's water?</i></p>	<p>Presentation</p>	<p>Engage</p> <ul style="list-style-type: none"> • <i>What do we notice?</i> Show this: Flint Google Slides • <i>Attempt to make sense:</i> Have students write down observations of the google slides and try to answer the initial question. • <i>Identify related phenomena:</i> Pollution • <i>Develop questions and next steps</i> <p>General Resources:</p> <ul style="list-style-type: none"> • Driving Question Board <ul style="list-style-type: none"> ◦ Question Formulation Technique (QFT) 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Asking questions and determining the cause and effect of the Flint Water Crisis <p>Learning Target: I can ask questions about the chemistry behind the Flint Water.</p> <p>Success Criteria</p> <ul style="list-style-type: none"> • Ask questions about Flint Water at the particle level <p><i>What's next? Students already know the different properties of water, but what they don't know is how it can become so toxic.</i></p>

Students will explore solutions, equilibrium, and acids and bases in order to figure out why the Flint water is so toxic.

Learning Sequence 1: Solutions

Driving Questions	Lesson Level Phenomena	Activity	What Should They Learn/Expected Outcome
<p>EXPLORE How did the lead dissolve in the water?</p>	<p>Flint Water</p>	<ul style="list-style-type: none"> • Solutions Basics • Solutions Lab <p>OpenStax</p> <ul style="list-style-type: none"> • 11.3 Solubility • 6.3 Molarity • 6.4 Other Units for Solutions <p>Resources</p> <ul style="list-style-type: none"> • Solutions CK-12 • Class Notes 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Constructing an explanation of the basics of solutions by understanding the structure and function of solutions. • Planning and carrying out an investigation to determine the cause and effect of dissolving a solute in a solvent. <p>Learning Target:</p> <ul style="list-style-type: none"> • I can construct an explanation by naming the solute and solvent in the Flint Water Crisis to describe the solution. • I can carry out an investigation to see the cause and effect of dissolving salt in a solution. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Define and name the solute and solvent in the solution • Make a saltwater solution and follow the directions on calculating mole fraction, molarity, molality, and density.

			<p>What's next? Students learn the components of a solution. They learn that the Flint water must be a solution, identifying the solute and solvent. Students then explore through a lab and create a saltwater solution. They are exposed to the math behind solutions, but don't have a full understanding yet that will be explained later in the unit. They may be wondering how the Flint water became a solution in the first place.</p>
<p>EXPLAIN How much lead can "fit" in the water?</p>	<p>Flint Water</p>	<ul style="list-style-type: none"> ● POGIL: Solubility OR POGIL: Saturated and Unsaturated 1. Solubility Curve or 2. Solubility Curve ● KNO3 solubility curve lab <p>OpenStax</p> <ul style="list-style-type: none"> ● 11.3 Solubility ● 6.3 Molarity ● 6.4 Other Units for Solutions <p>Resources</p> <ul style="list-style-type: none"> ● Notes ● Class Notes ● Saturated and Unsaturated Solutions CK-12 ● Supersaturated Solutions CK-12 ● Solubility Curves CK-12 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS1-6 ● Analyzing and interpreting data to determine the stability and change (unsaturated, saturated or supersaturated) of solutions. <p>Learning Target: I can analyze and interpret data to determine unsaturated, saturated, and supersaturated solutions.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Use a solubility curve to determine an unsaturated, saturated, or supersaturated solution. <p>What's next? Students learn how much solute can be dissolved in a solution. They learn what saturated, unsaturated, and supersaturated solutions are and can classify solutions based on a solubility curve graph. But they may be wondering if we can actually measure solute that's in a</p>

			<i>solution and how we can figure that out.</i>
<p>EXPLAIN <i>How much lead is in the water?</i></p>	Flint Water	<ul style="list-style-type: none"> • Molarity Worksheet • Molarity/molality Calculations worksheet <ul style="list-style-type: none"> ◦ Answer Key • Molarity Lab <p>OpenStax</p> <ul style="list-style-type: none"> • 11.3 Solubility • 6.3 Molarity • 6.4 Other Units for Solutions <p>Resources</p> <ul style="list-style-type: none"> • Molarity CK-12 • Class Notes • POGIL: Molarity 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Using mathematical and computational thinking to mathematically explain the structure and function of solutions. <p>Learning Target: I can use mathematical and computational thinking to calculate molarity and molality of a solution.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Calculate molarity • Calculate molality <p>What's next? <i>Students learn how to measure solute in a solution by doing molarity and molality calculations. They will need to figure out the solution chemistry behind Flint's water.</i></p>
<p>ELABORATE <i>What is the solution chemistry behind Flint Water Crisis?</i></p>	Flint Water	<p>Flint Water Crisis Connection 1 ENRICHMENT: 11 Year old girl invents lead detecting device</p>	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Constructing explanations to explain the stability and change of the Flint water solution. <p>Learning Target: I can construct an explanation for Flint's water using solution chemistry.</p> <p>Success Criteria</p> <ul style="list-style-type: none"> • Analyze the solution chemistry

behind the crisis

What's next? Solutions are now understood, but now students may be wondering what chemical reaction may be happening with the Flint water.

EVALUATE

LS1 Assessment: [Quiz on Solutions](#)

[Study guide](#)

- HS-PS1-6

Learning Sequence 2: Equilibrium

Driving Questions

Lesson Level Phenomena

Activity

What Should They Learn/Expected Outcome

ENGAGE

What does it mean when a solution reaches equilibrium?

Flint Water

- [Dynamic Equilibrium Introduction](#)
- [Soda Straw Lab](#)
 - [Analysis questions for electronic submission](#)

DCI/SEP/CCC: SWBAT...

- **HS-PS1-6**
- **Analyzing and interpreting data** to determine the **stability and change** when a solution is in equilibrium.

Learning Target: I can analyze and interpret data to figure out what equilibrium means.

Success Criteria

- Describe what equilibrium means

What's next? Students learn that equilibrium does not mean that both sides are equal but rather the amounts removed or added are the same when something reaches equilibrium. Now that they know what equilibrium means, they are ready to

			<p>explore chemical reactions. They may be wondering how this applies to the lead pipes.</p>
<p>EXPLORE Is there a chemical reaction?</p>	Flint Water	<ul style="list-style-type: none"> • POGIL: Equilibrium <ul style="list-style-type: none"> ◦ Answers • Graphing Equilibrium <p>OpenStax</p> <ul style="list-style-type: none"> • 13.1 Chemical Equilibria <p>Resources:</p> <ul style="list-style-type: none"> • Chemical Equilibrium CK-12 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Analyzing and interpreting data to determine the stability and change of chemical equilibrium. <p>Learning Target: I can analyze and interpret data to quantify equilibrium.</p> <p>Success Criteria</p> <ul style="list-style-type: none"> • Determine what equilibrium means mathematically <p>What's next? Students learn that some chemical reactions are in equilibrium and dynamic. They also learn how to quantify equilibrium. Students are probably wondering what different factors affect the chemical reaction.</p>
<p>EXPLAIN What factors can affect equilibrium?</p>	Flint Water	<ul style="list-style-type: none"> • Le Chatelier's POGIL OR Influencing Reaction Equilibrium <ul style="list-style-type: none"> ◦ Le Chatelier's Principle POGIL answers • Pick a couple for practice: <ul style="list-style-type: none"> ◦ Practice worksheet ◦ Equilibrium and Breathing • Le Chatelier's Principle Worksheet with answers <ul style="list-style-type: none"> ◦ Same worksheet without answers 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Analyzing and interpreting data to find the stability and change in a chemical reaction when variables are manipulated. <p>Learning Target: I can analyze and interpret data to describe shifts in equilibrium using Le Chatelier's Principle.</p>

		<ul style="list-style-type: none"> • Le Chatelier's Principle Lab <p>OpenStax 13.3 Shifting Equilibria: Le Chatalier's Principle</p> <p>Resources</p> <ul style="list-style-type: none"> • Notes • Notes Google slides • Le Chatelier's Principle CK-12 • Effect of Concentration CK-12 • Effect of Temperature CK-12 • Effect of Pressure CK-12 	<p>Success Criteria</p> <ul style="list-style-type: none"> • Use Le Chatelier's Principle to describe shifts in equilibrium with changes to pressure/volume, concentration, and temperature. <p><i>What's next? Students learn Le Chatelier's Principle describes changes in a chemical reaction when there is a disturbance. Students understand that there are different factors that can affect equilibrium. They are now wondering what the reversible reaction is inside the lead pipes and how it plays a role in the toxic lead levels in the water.</i></p>
<p>ELABORATE</p> <p>Why is there a lot of lead in the water?</p>	<p>Flint Water</p>	<ul style="list-style-type: none"> • Equilibrium expressions packet • Equilibrium Expressions practice problems <p>OpenStax 13.4 Equilibrium Calculations</p>	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Use mathematical and computational thinking to find the stability and change in a chemical reaction. <p>Learning Target: I can use mathematical and computational thinking to calculate K_{eq} in a reversible chemical reaction to determine if reactants or products are favored.</p> <p>Success Criteria</p> <ul style="list-style-type: none"> • Calculate the K_{eq} of a balanced chemical equation. <p><i>What's next? Students learn how to mathematically calculate if more products or reactants are made in a reversible reaction. They can now apply this to the Flint Water chemical equation to see if the</i></p>

reactants or products are favored in the reversible reaction.

ELABORATE

What is solubility equilibrium and how does it relate to the Flint Water crisis?

Flint Water

- [Flint Water Crisis Connection 2](#)
 - Teacher Resource: [From this article](#)

DCI/SEP/CCC: SWBAT...

- **HS-PS1-6**
- **Constructing an explanation** by looking at the **stability and change** of the contaminated water in Flint.

Learning Target: I can construct an explanation for the equilibrium chemistry behind the Flint Water Crisis.

Success Criteria

- Apply equilibrium chemistry to Flint Water Crisis

What's next? Students learn that solubility equilibrium relates to the Flint water crisis because of the lead corrosion in the pipes. Next, students will be introduced to acids and bases.

EVALUATE

[Quiz on Equilibrium](#)

- **HS-PS1-6**

Learning Sequence 3: Acidity in the Water: Acids and Bases

Driving Questions	Lesson Level Phenomena	Activity	What Should They Learn/Expected Outcome
<p>ENGAGE</p> <p>What makes a solution acidic or basic?</p>	Flint Water	<ul style="list-style-type: none"> • Determining acids and bases lab OR pH of Soil Lab 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Analyzing and interpreting data

		<ul style="list-style-type: none"> ○ For pH of Soil lab, use the pH sensors we have and be sure to charge them up a day or so before you use them. <p>OpenStax</p> <ul style="list-style-type: none"> ● 14.1 Bronsted-Lowry Acids and bases <p>Resources</p> <ul style="list-style-type: none"> ● Acids CK-12 ● Bases CK-12 	<p>to find patterns with acids and bases.</p> <p>Learning Target: I can analyze and interpret data to classify a base and an acid.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Find the pH of soil OR different substances ● Analyze the data to draw conclusions <p><i>What's next? Students learn the differences between acids and bases. They may be wondering what makes something acidic or basic.</i></p>
<p>EXPLAIN & EXPLORE <i>What's happening at the molecular level?</i></p>	<p>Flint Water</p>	<ul style="list-style-type: none"> ● POGIL: Acids & Bases ● Equations for Acids and Bases ● Conjugate acid-base pairs <p>Extension</p> <ul style="list-style-type: none"> ● Naming Acids 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> ● HS-PS1-6 ● Analyzing and interpreting data to find patterns with acids and bases. <p>Learning Target: I can analyze and interpret data to classify a base and an acid.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> ● Determine an acid or a base ● Describe and explain a Bronsted-Lowry acid/base ● Describe and explain an Arrhenius acid ● Figure out the conjugate acid and base in a chemical equation

EXPAIN

How do we describe the acidity (or basicity) of a solution?

Flint Water

- [Calculations for acids and bases](#)

Extension:

- [Hydrolysis of Salts Lab](#)
- [Strong vs Weak Acid Calculations](#)

For students who may need more support with math:

- [POGIL: pH](#)
 - [Answers](#)

OpenStax

- [14.2 pH and pOH](#)

Resources

- [Notes](#)
- [Calculation pH CK-12](#)
- [pOH Scale and Calculations](#)

DCI/SEP/CCC: SWBAT...

- **HS-PS1-6**
- **Using mathematical and computational thinking** to find **patterns** when calculating pH.

Learning Target: I can use mathematical and computational thinking to determine the pH and pOH or concentration H_3O^+ or OH^- in an acid and a base.

Success Criteria

- Determine the concentration of H_3O^+ or OH^- in an acid or a base
- Determine the pH or pOH when given the concentration of H_3O^+ or OH^-
- Determine the pH or pOH when given the other value
- Determine the pH or pOH when provided the concentration of H_3O^+ or OH^-

What's next? Students get a better understanding of acids and bases and it has to do with H^+ and OH^- ions in solution. They may be wondering how we measure how acidic or basic something is in a solution.

<p>EXPLAIN <i>How do we accurately determine the amount of acid (or base) in a solution?</i></p>	<p>Flint Water</p>	<ul style="list-style-type: none"> • Titration Lab • Titration calculations <p>OpenStax</p> <ul style="list-style-type: none"> • 14.7 Acid-Base Titrations <p>Resources</p> <ul style="list-style-type: none"> • Notes • Titration Experiment CK-12 • Titration Calculations CK-12 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Planning and carrying out an investigation to determine the stability and change of a solution through a titration experiment. <p>Learning Target: I can plan and carry out an investigation to perform a titration.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Be able to successfully perform a titration experiment • Use the dilution equation to calculate the molarity of a solution <p><i>What's next? Students learn how to measure the amount of acid or base in a solution through a titration. The next step would be to apply what we learned about acids and bases to the Flint water crisis because the water is acidic.</i></p>
<p>ELABORATE <i>How does the pH affect the water quality?</i></p>	<p>Flint Water</p>	<ul style="list-style-type: none"> • Flint Water Crisis Connection 3 <ul style="list-style-type: none"> ○ Teacher Resource: From this article 	<p>DCI/SEP/CCC: SWBAT...</p> <ul style="list-style-type: none"> • HS-PS1-6 • Constructing an explanation of how the basic water affects the chemistry of Flint by looking at the patterns of acids and applying it to acidic water. <p>Learning Target: I can construct an explanation behind the acid/base chemistry in the Flint Water.</p> <p>Success Criteria:</p>

- Gather information to describe the acid/base chemistry of the Flint water.

What's next? The students learn how acidic the water in Flint is and are able to apply what they learned about acids to the Flint water.

EVALUATE

[Quiz on Acids-Bases](#)

- HS-PS1-6

EVALUATE

SOCIAL JUSTICE

Flint Water

- ["Social Media" Post](#)
 - Students are not required to post on actual social media but rather to make a social media-like post
 - [Social Media Tips](#)
 - Students can have access as a guide.
 - Teachers can also use as a guide to make sure students use their chosen platform correctly
 - 4C assignment: Communication

DCI/SEP/CCC: SWBAT...

- **HS-PS1-6**
- **Obtaining, evaluating, and communicating information** by discussing the **stability and change** of the Flint water.

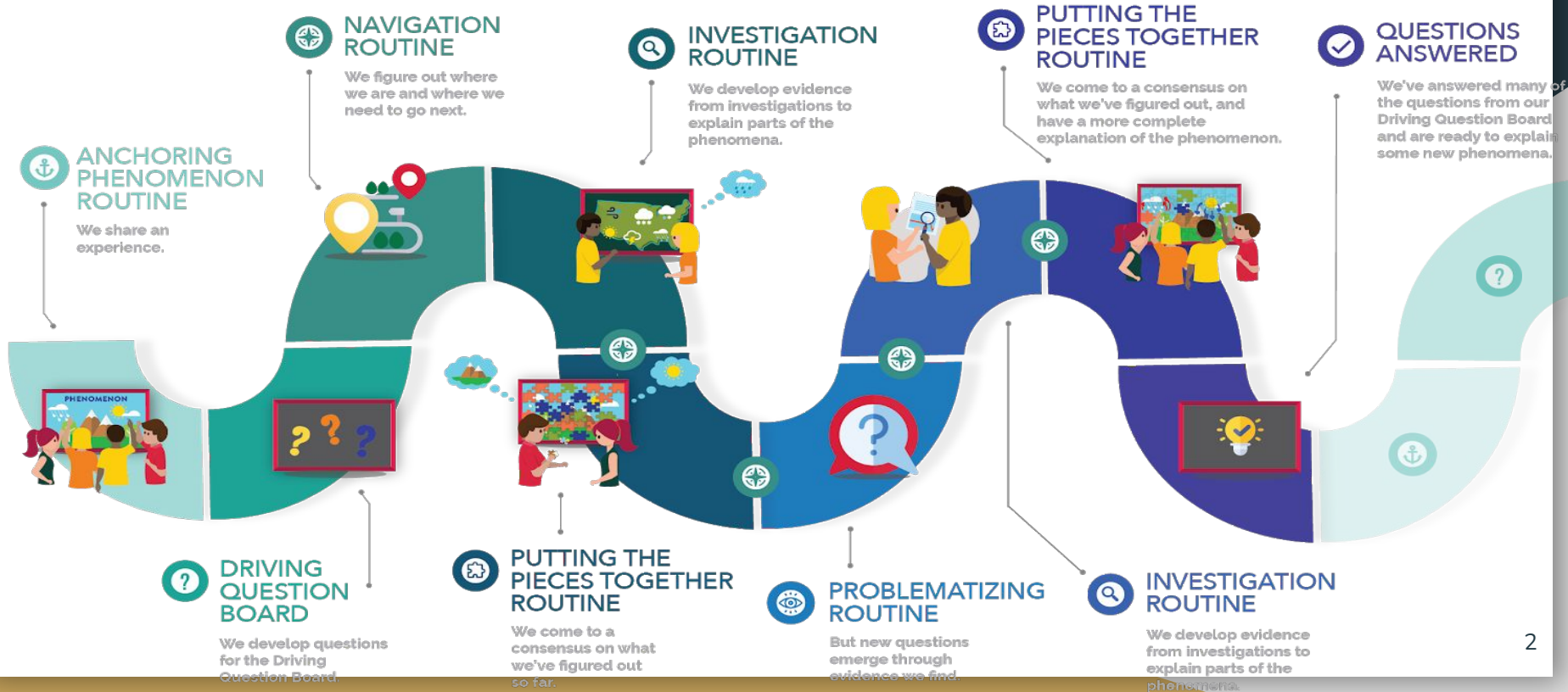
Learning Target: I can obtain, evaluate, and communicate information to describe the chemistry behind the Flint Water Crisis.

Success Criteria: See Rubric

Accelerated General Chemistry

Bundle 5
Lisa Daigle

Curricular Sequence for Each Bundle



Bundle 5: Flint Water Crisis

Composed of 3 Learning Sequences:

Solutions

What's in the Flint Water?

Focus on components of a solution, solubility curves, molarity and molality calculations

Chemical Equilibrium

What does it mean when solutions reach equilibrium?

Focus on chemical equilibrium, Le Chatelier's Principle, and equilibrium expressions

Acids and Bases

What makes a solution acidic or basic?

Focus on acids and bases including pH and concentration calculations and titrations

What's in the Flint Water? First Steps

What do we notice?

Students read about what's in the Flint Water and write down observations from the interactive google slides

Attempt to Make Sense

Students try to explain why there is lead in the water at the molecular/atomic level

Identify Related Phenomenon

Pollution

Ask Questions



What does it mean when solutions reach equilibrium? First Steps

What do we notice?

Students know about solutions and what is in the water, but now they notice there must be something going on to make this solution possible

Attempt to Make Sense

Students try to explain why the lead water is soluble in the water sample

Identify Related Phenomenon

Pollution, potential chemical reactions that cause pollution



Ask Questions

What makes a solution acidic or basic? First Steps

What do we notice?

Students understand that the chemical equilibrium plays a role, but now they need to further explain the solubility of lead in the water beyond the chemical reaction

Attempt to Make Sense

Students make an explanation at the molecular/atomic level to describe why lead is soluble in the water and add to their explanation

Identify Related Phenomenon

Acids and bases

Ask Questions





4C Activity: Performance Task

Communication

Create A Social Media Post

Students create a fake social media post in their groups in any format they choose to communicate the information appropriately about the chemistry behind the Flint Water.

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 8 j.

AGENDA REPORTING FORM

Agenda Topic: Middle School Needs Assessment – Second Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the Middle School Needs Assessment.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the Middle School Needs Assessment as presented by the Curriculum & Instruction Committee.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

You are viewing Naviance Student as [redacted]



6th Grade Needs Survey

▲ Note: You will be logged out of the survey after one hour if you have not changed the page.

This is a short questionnaire about you and what you need. Please take it seriously and answer honestly. This information will be used by your school counselor to determine the programs that are necessary and will be available for 6th grade. Thank you!

* 1.

I need help/to talk about making friends/fitting in

Yes

No

▲ Please provide an answer

* 2.

I need help/to talk about dealing with peer pressure

Yes

No

▲ Please provide an answer

* 3.

I need help/to talk about getting involved with school activities

Yes

No

▲ Please provide an answer

* 4.

I need help/to talk about anxiety/worrying about school

Yes

No

▲ Please provide an answer

* 5.

I need help/to talk about anxiety/worrying about home

Yes

No

▲ Please provide an answer

* 6.

I need help/to talk about concerns with drug/alcohol use (me or someone else)

Yes

No

▲ Please provide an answer

* 7.

I need help/to talk about concerns with helping myself (gaining more self confidence, feeling better about myself, expressing my thoughts/feelings)

Yes

No

▲ Please provide an answer

* 8.

I need help/to talk about concerns with feeling sad or depressed

Yes

No

▲ Please provide an answer

* 9.

I need help/to talk about wanting to hurt myself (self harm) in some way

Yes

No

▲ Please provide an answer

* 10.

I need help/to talk about concerns with handling teasing, mean-spirited or bullying behaviors

Yes

No

▲ Please provide an answer

* 11.

I need help/to talk about concerns with sadness over the loss of a loved one or pet

Yes

No

▲ Please provide an answer

* 12.

I need help/to talk about concerns with dealing with anger

Yes

No

▲ Please provide an answer

* 13.

I need help/to talk about concerns with parent divorce or separation

Yes

No

▲ Please provide an answer

* 14.

I need help/to talk about concerns with feeling stressed (from home or school)

Yes

No

▲ Please provide an answer

*** 15.**

I need help/to talk about concerns with skills for resolving conflicts/problems with others

Yes

No

▲ Please provide an answer

*** 16.**

I need help with something not listed. Please write what you need help with below.

▲ Please provide at least one answer.

Quick Links

INTERESTING THINGS ABOUT ME

Resume

Documents

Journal

Survey history

OFFICIAL THINGS

Profile

Inbox

Account

Test scores

SURVEYS

Surveys In progress

Surveys Completed

Surveys Not Started



Logged in as

LOG OUT



John F. Kennedy Middle School

1071 SOUTH MAIN ST.
PLANTSVILLE , CT 06479
p: 8606283275



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Summative Assessment Results *2022-2023*

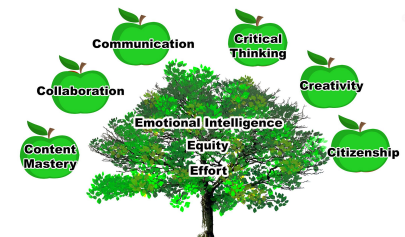
Southington Public Schools

October 2023

District Performance Indicators

- Connecticut's Next Generation Accountability System is a broad set of 12 indicators that demonstrate how well a school/district prepares its students for success in college, career, and life.
- The system moves beyond test scores and graduation rates and provides a more holistic, multifactor perspective of district and school performance and incorporates student growth over time.
- As a district, we track the CT indicators and other indicators that monitor different aspects of educational programming, connected to our Vision of the Graduate.

Southington Public Schools
Vision of a Graduate



District Performance Indicators

1. Percentage of students demonstrating mastery of grade level standards in ELA, Math and Science*

*This is a state-mandated performance indicator. * Science performance will be measured by an NGSS based assessment, est. 2019.*

2. Percentage of students exceeding mastery of grade level standards in ELA, Math and Science*.

*This is a state-mandated performance indicator. *Science performance will be measured by an NGSS based assessment, est. 2019.*



Smarter Balanced Summative Performance Overview ELA Achievement 22-23

	District Average	State Average
Percent Level 3 or 4	63%	48.5%

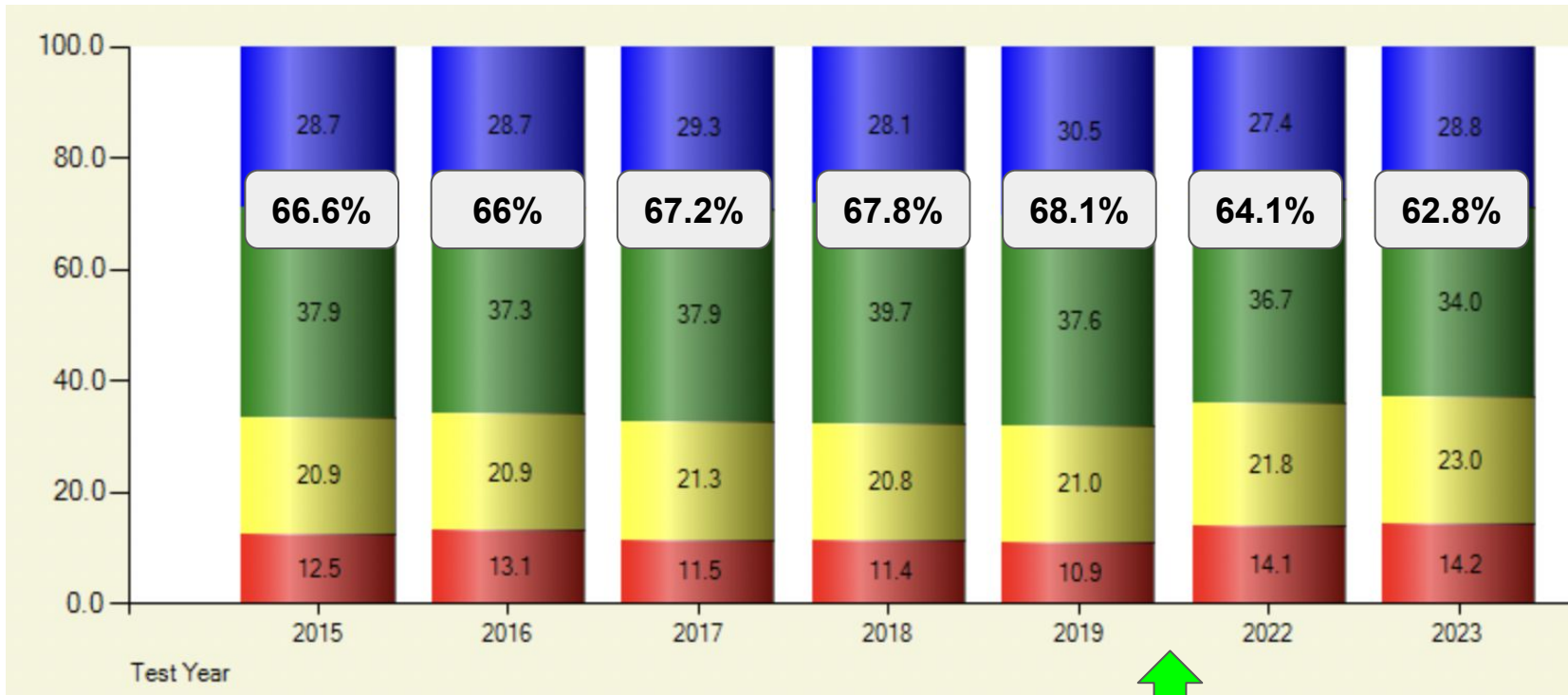
Grade	3	4	5	6	7	8
Percent Level 3 or 4	64%	64%	65%	64%	65%	56%



ELA Summative Performance Overview

ELA Achievement 22-23

Percent Level 3/Level 4



COVID
2020-
2021



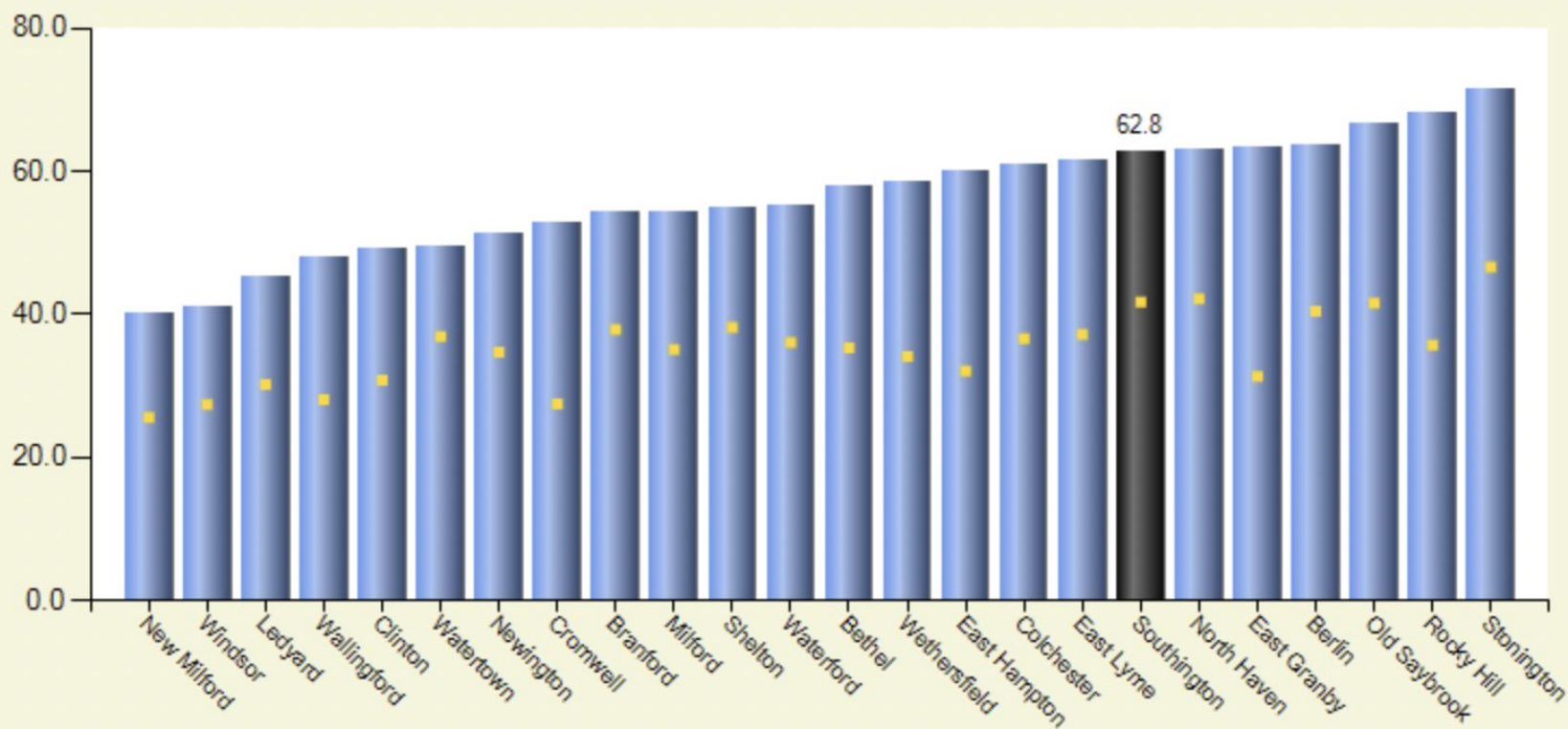


ELA Smarter Balanced: 2022

% Students Meeting Level 3/Level 4

DRG D

All Students High-Needs Students





Smarter Balanced Growth Data-ELA

State Growth Data

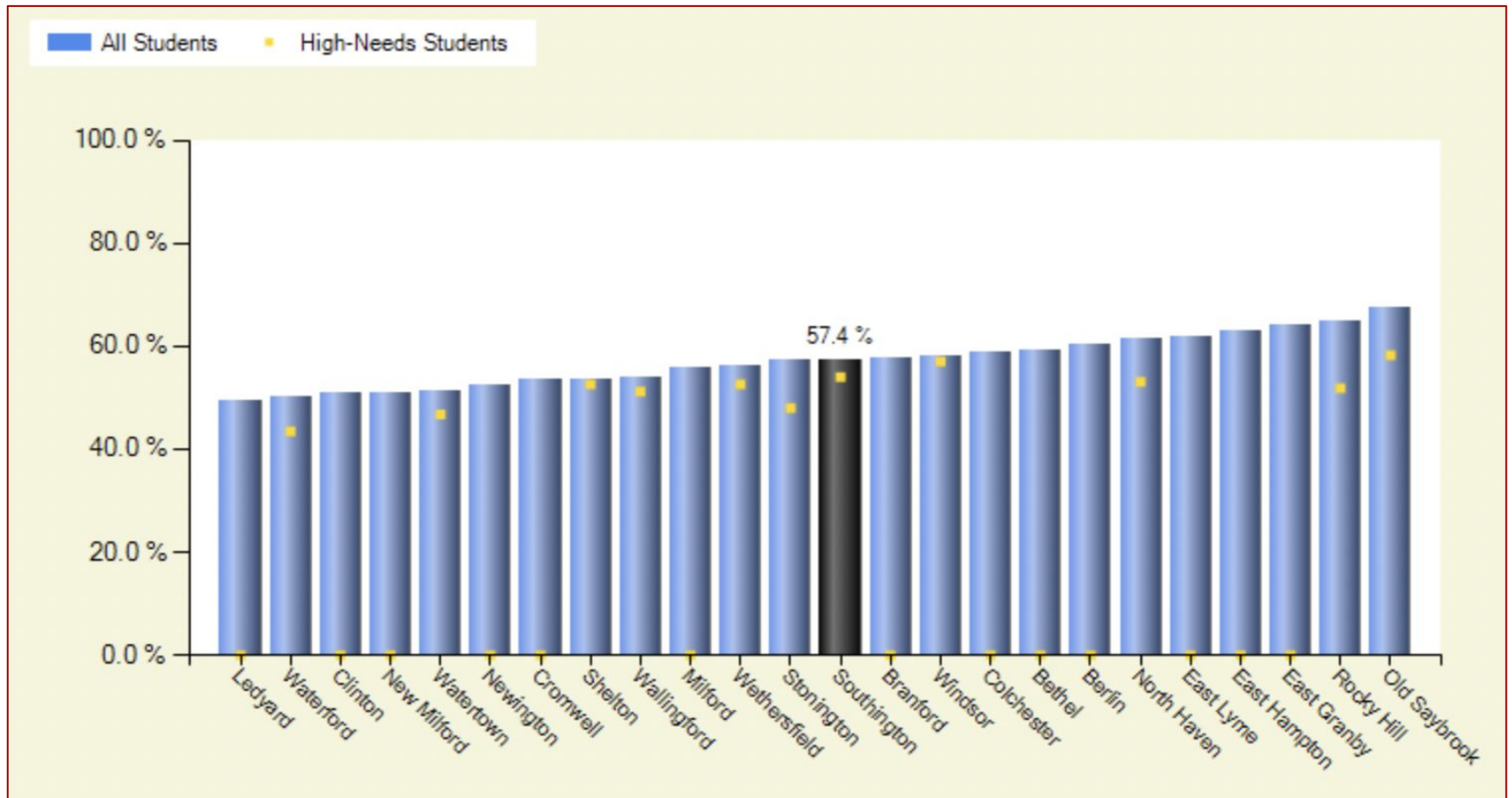
Growth Rate						Average Percentage of Target Achieved					
School Year						School Year					
2015-16	2016-17	2017-18	2018-19	2021-22	2022-23	2015-16	2016-17	2017-18	2018-19	2021-22	2022-23
43.1%	35.9%	40.3%	39.9%	40.2%	37.2%	63.8%	55.4%	60.7%	59.9%	60.4%	57.2%

District Growth Data

Growth Rate						Average Percentage of Target Achieved					
School Year						School Year					
2015-16	2016-17	2017-18	2018-19	2021-22	2022-23	2015-16	2016-17	2017-18	2018-19	2021-22	2022-23
39.6%	40.3%	38.4%	40.8%	38.4%	37.7%	59.6%	60.2%	58.9%	60.6%	58.4%	57.4%



ELA Smarter Balanced: 2023 Growth Data Comparison-DRG D Percent of Target Achieved





Smarter Balanced Summative Performance Overview Math Achievement 22-23

	District Average	State Average
Percent Level 3 or 4	61.2%	42.5%

Grade	3	4	5	6	7	8
Percent Level 3 or 4	67.7%	72%	58.6%	56.2%	61.1%	52.2%



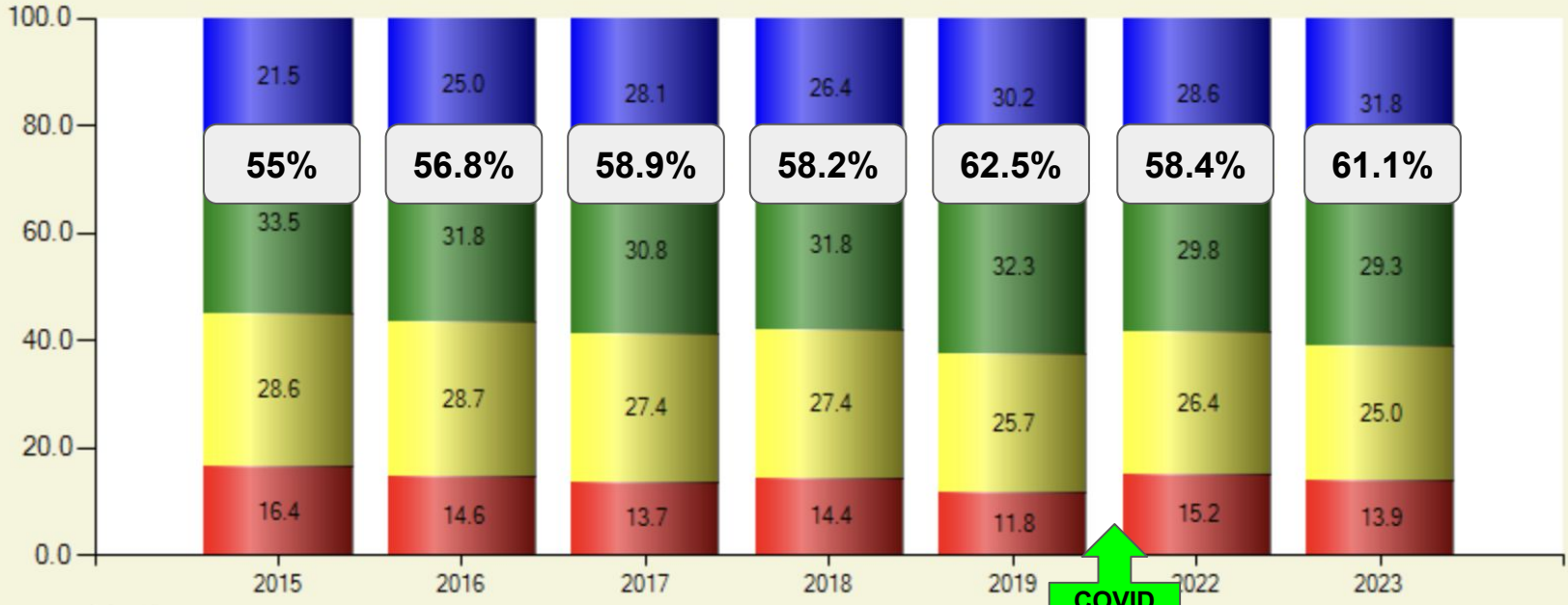
Math Summative Performance Overview

Math Achievement 22-23

Percent Level 3/Level 4

Smarter Balanced: District Performance History
% Students by Level: Math

Exceeds Meets Approaching Does Not Meet



Test Year

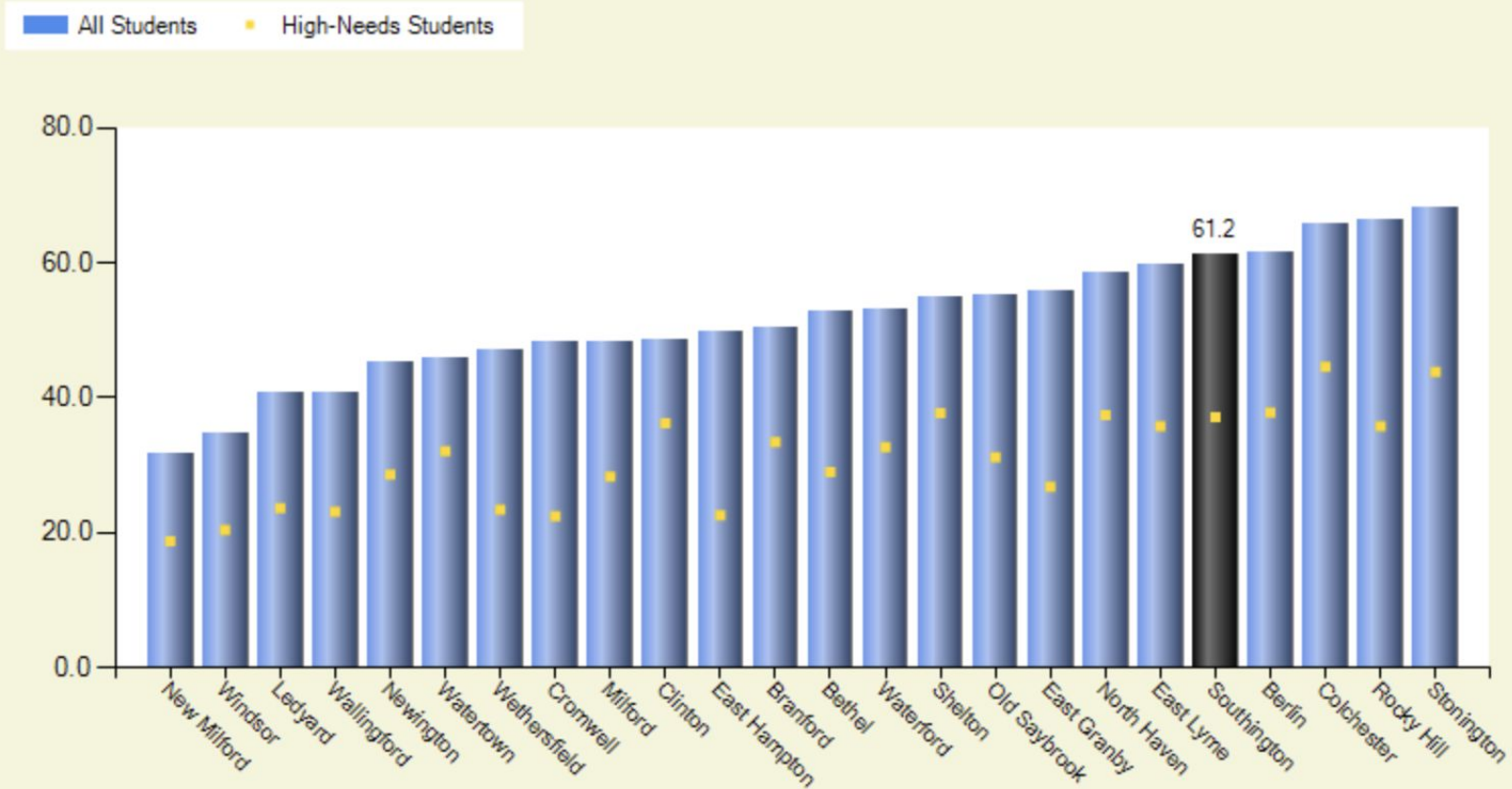
COVID
2020-
2021

Exceeds Meets Approaching Does Not Meet



Math Smarter Balanced: 2023 % Students At/Above Goal DRG D Comparison

Math Smarter Balanced, 2023: % Students At/Above Goal
DRG D





Smarter Balanced Growth Data-Math

State Growth Data

Growth Rate						Average Percentage of Target Achieved					
School Year						School Year					
2015-16	2016-17	2017-18	2018-19	2021-22	2022-23	2015-16	2016-17	2017-18	2018-19	2021-22	2022-23
43.9%	41.5%	42.1%	42.9%	45.8%	42.4%	65.0%	61.7%	61.9%	62.5%	65.2%	61.8%

District Growth Data

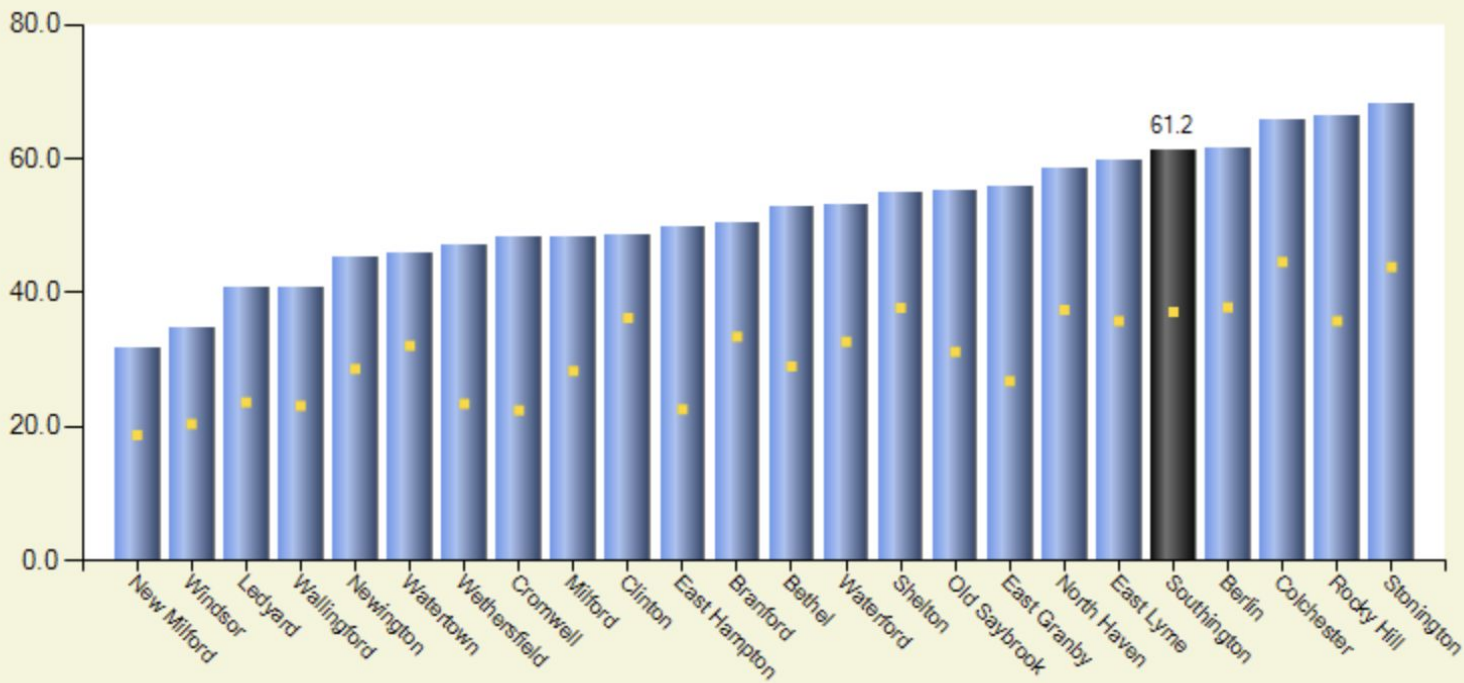
Growth Rate						Average Percentage of Target Achieved					
School Year						School Year					
2015-16	2016-17	2017-18	2018-19	2021-22	2022-23	2015-16	2016-17	2017-18	2018-19	2021-22	2022-23
39.2%	44.2%	35.3%	45.8%	49.9%	45.9%	60.9%	65.3%	56.3%	66.7%	71.6%	66.0%



Math Smarter Balance: 2023 Growth Data Comparison-DRG D Percent of Target Achieved

Math Smarter Balanced, 2023: % Students At/Above Goal
DRG D

All Students High-Needs Students





SAT ELA & Math Achievement Data

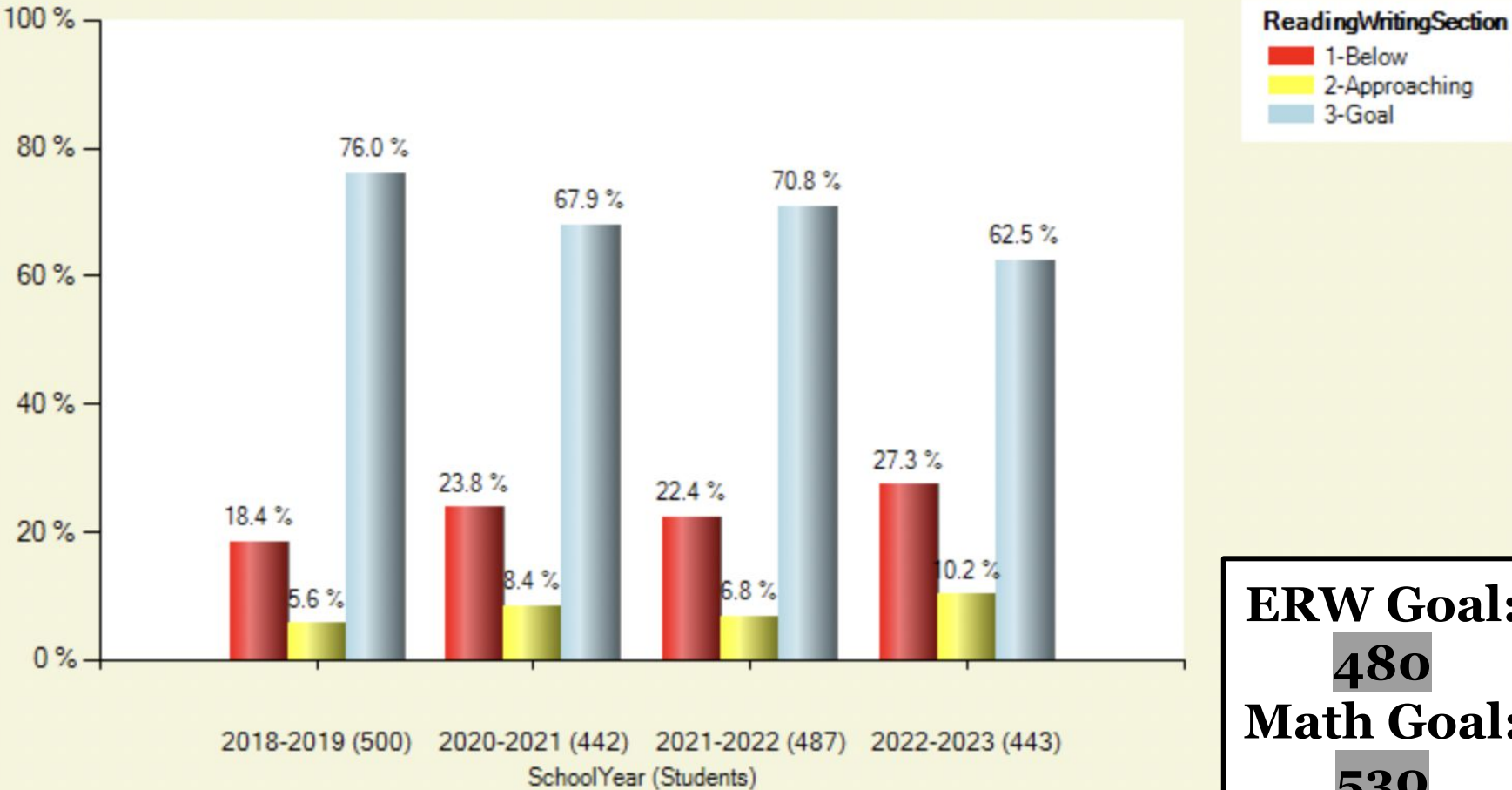
Evidence-Based Reading and Writing Goal: 480
Math Goal: 530

	ERW % Met	Math % Met
State	52%	34%
Southington High School	62.5%	44.5%



SAT ELA : Percent Meeting Goal

SAT (CT Test Day): Reading and Writing Section Score



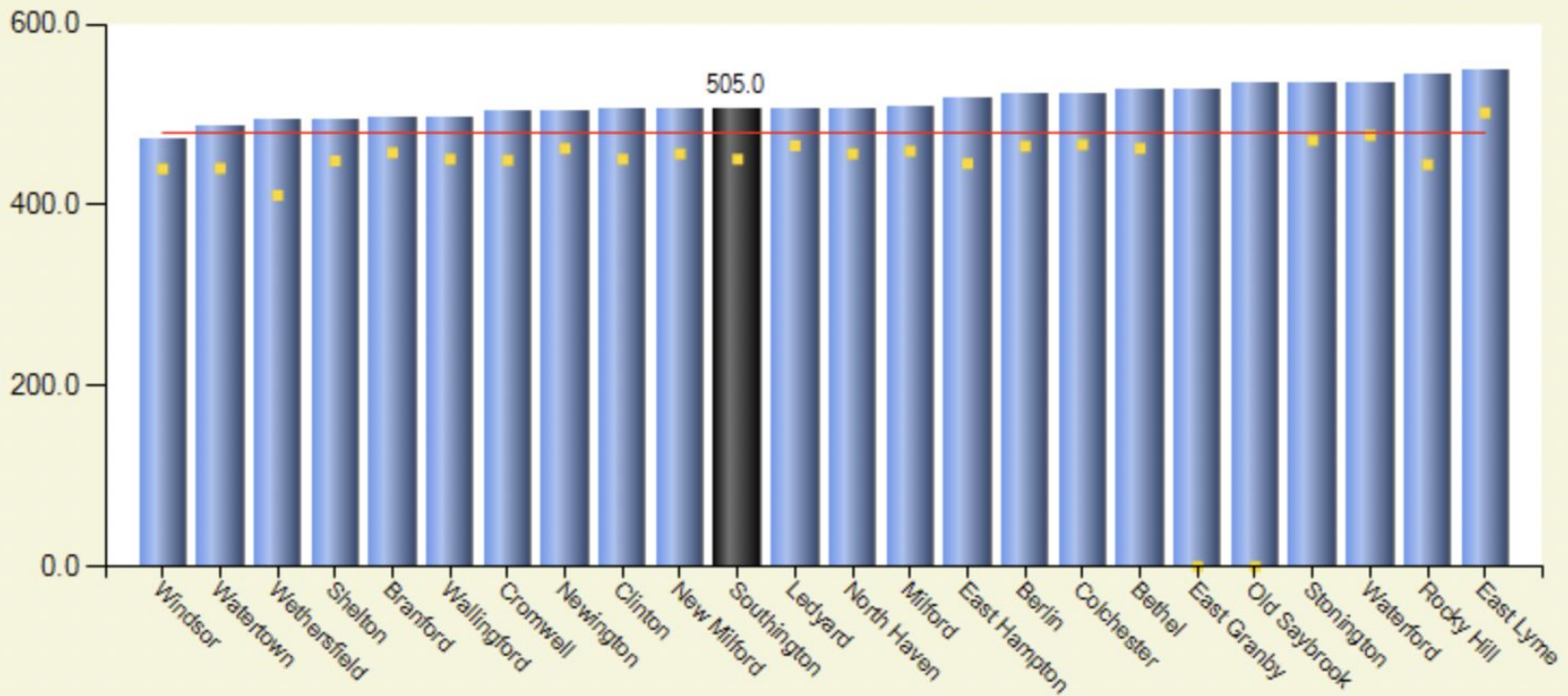
ERW Goal:
480
Math Goal:
530



SAT ELA Achievement DRG Comparison

ELA SAT, 2023: Average Score
DRG D

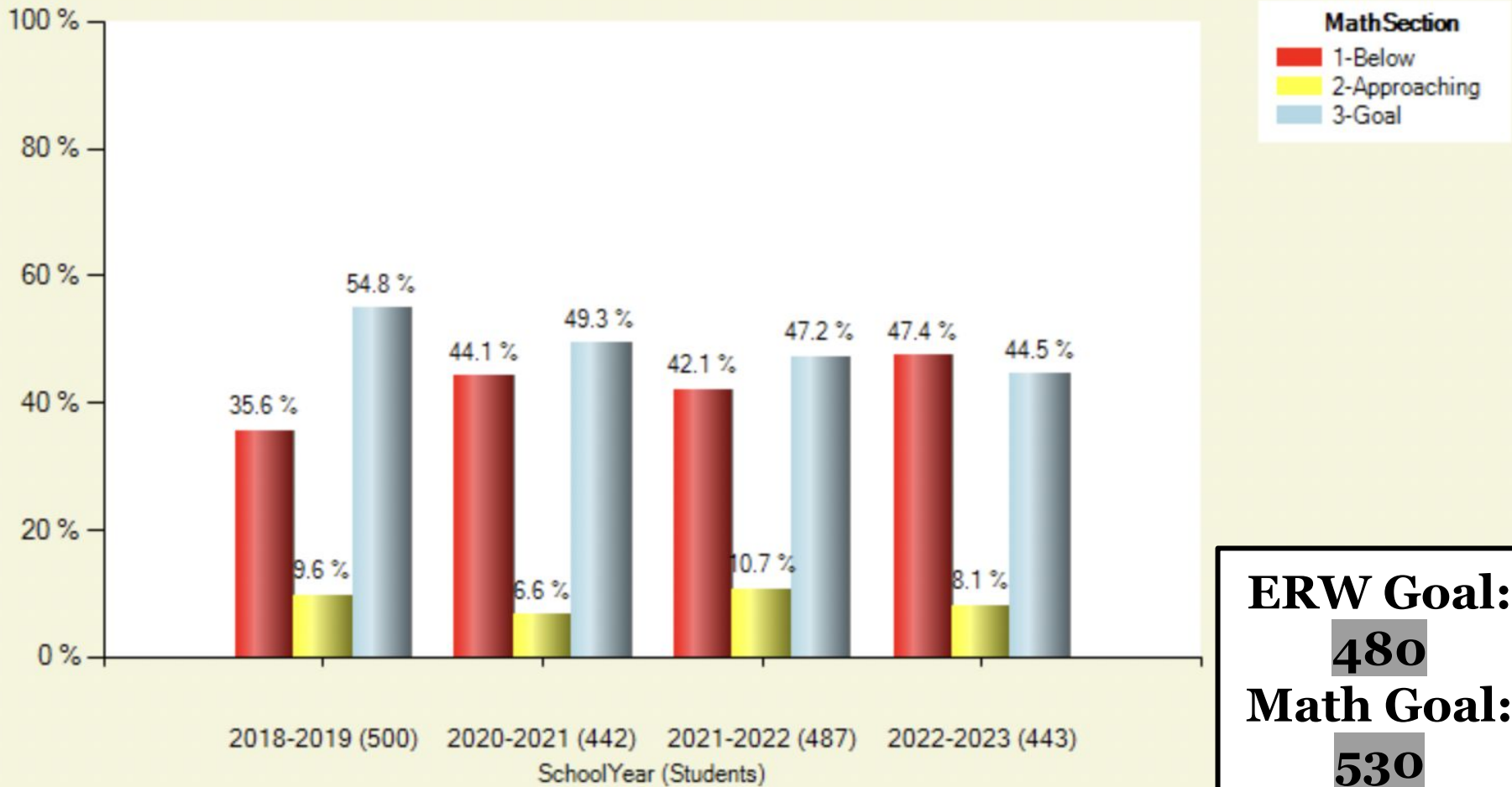
All Students High-Needs Students Goal=480





SAT Math : Percent Meeting Goal

SAT (CT Test Day): Math Section Score

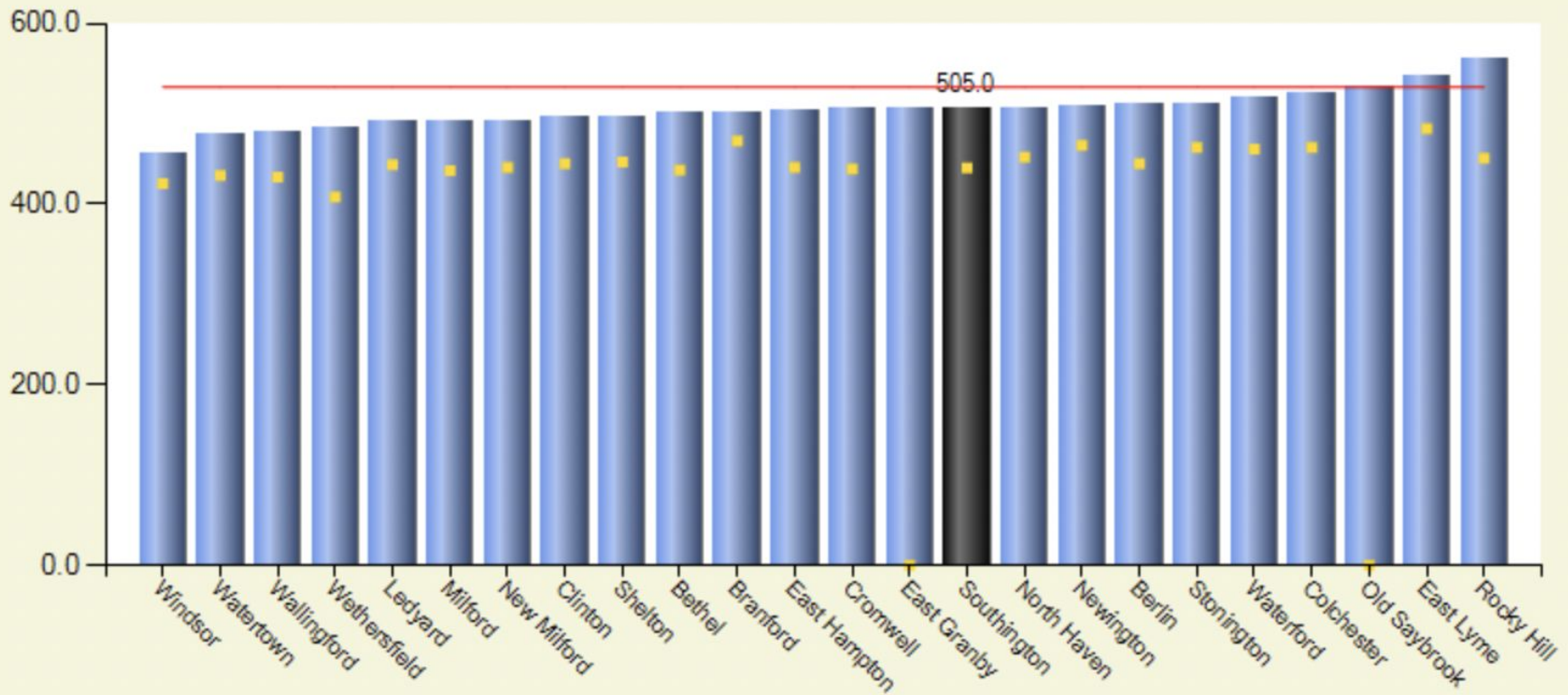




SAT Math Achievement -DRG Comparison

Math SAT, 2023: Average Score
DRG D

■ All Students ● High-Needs Students — Goal=530





NGSS Summative (Science) Overview 2022-23 % of Students Proficient

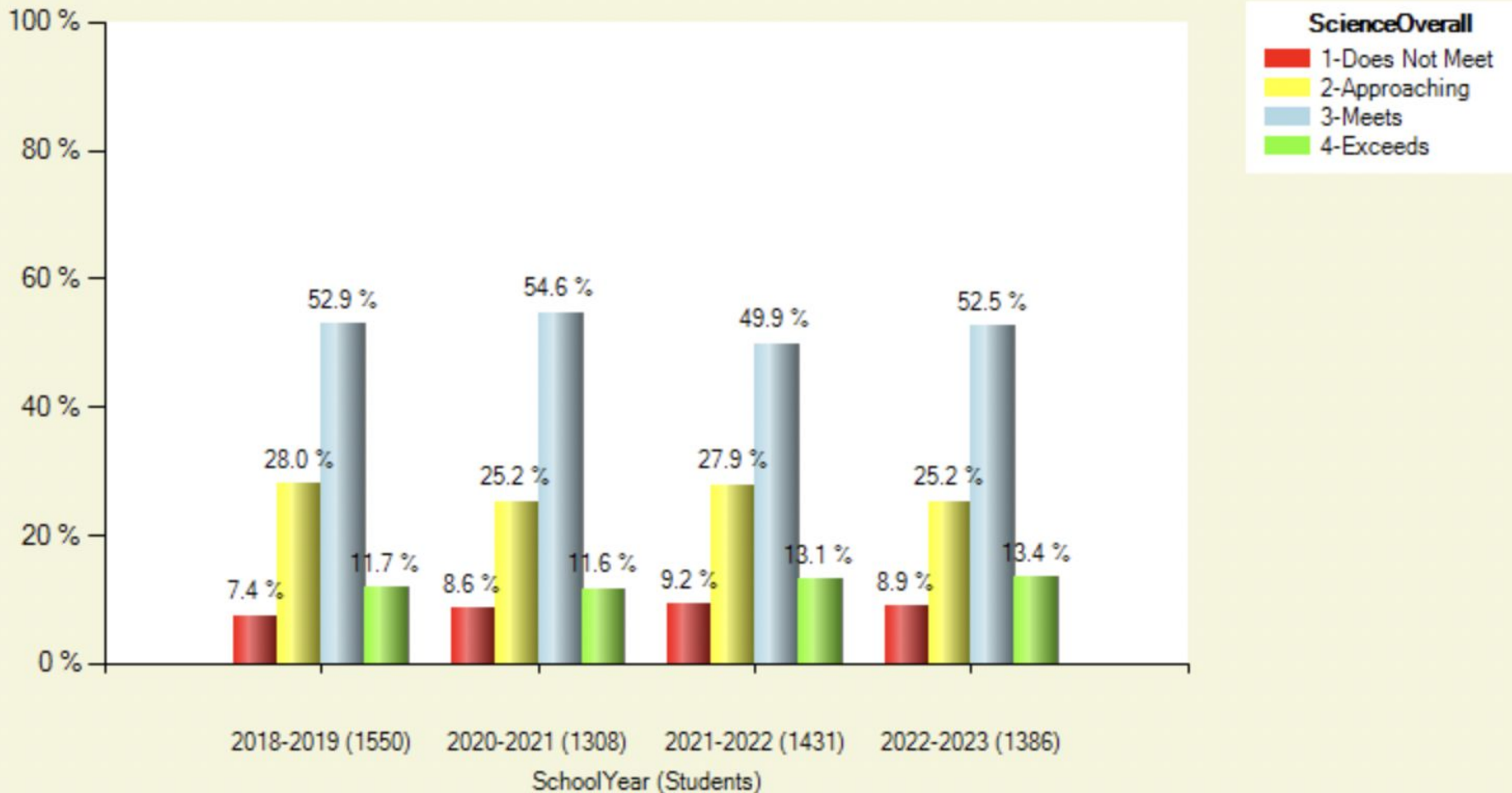
	District Average	State Average
Percent Level 3 or 4	65.9%	48.5%

District by Grade			
	5	8	11
Percent Level 3 or 4	67.3%	67.1%	63.5%



NGSS Summative (Science) Overview 2022-23 % at Level 3/Level 4

NGSS Science Score Distribution: Science Overall

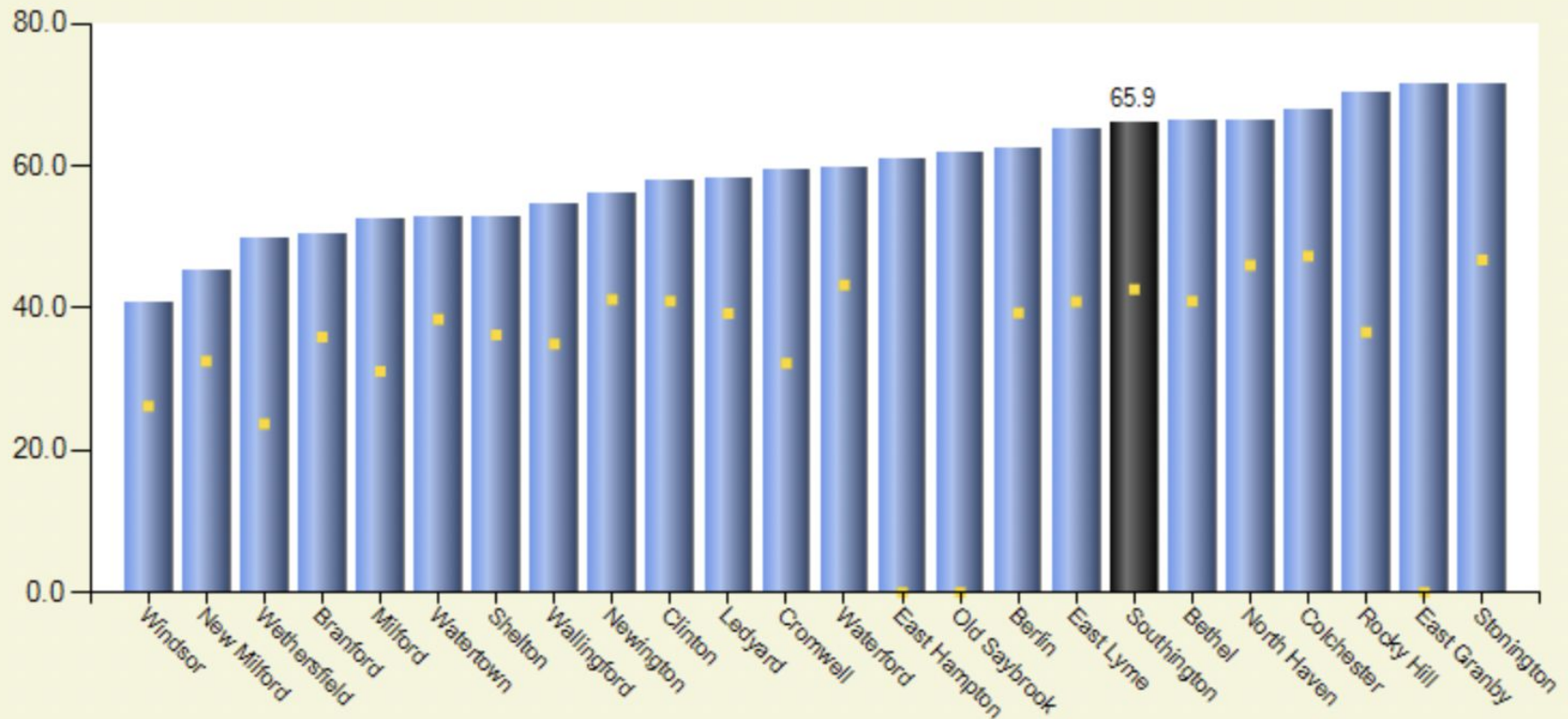




Next Generation Science Summative % students Level 3/Level 4 DRG D Comparison

Next Generation Science, 2023: % Students At/Above Goal
DRG D

All Students High-Needs Students



District Performance Indicators

3. Percentage of students demonstrating mastery of grade level standards in ELA , Math and Science * in subgroups of: Special Ed, EL, Free/Reduced

*This is a state-mandated performance indicator. *Science performance will be measured by an NGSS based assessment, est. 2019.*

4. Percentage of students exceeding mastery of grade level standards in ELA, Math and Science * in subgroups of: Special Ed, EL, Free/Reduced

This is a state-mandated performance indicator.



ELA Smarter Balanced

High Needs/Non-High Needs/All

% students Level 3/Level 4

Percents of Students Meeting Level 3 or 4						
	15-16	16-17	17-18	18-19	21-22	22-23
Non-High Needs	75	76.9	78.7	78.9	75.2	73.6
High Needs	39.7	38.5	43.1	45.5	39.9	41.7
All Students	66.1	67.2	67.8	68.1	64.1	62.8



Math Smarter Balanced

High Needs/Non-High Need/All % students Level 3/Level 4

Percents of Students Level 3 or 4						
	15-16	16-17	17-18	18-19	21-22	22-23
Non-High Needs	66.5	69.1	69.9	73.9	70.1	73.4
High Needs	28.2	28.8	31.9	38.5	32.9	37.1
All Students	56.8	59	58.2	62.5	58.4	61.2



Next Generation Science Summative

Districts with High Needs - DRG D
% students Level 3/Level 4

Percents of Students Level 3 or 4			
	18-19	21-22	22-23
Non-High Needs	73%	74%	77.5%
High Needs	45%	38%	42.6%
All Students	65%	63%	65.9%

Supporting Student Growth and Achievement

- Ensure high-quality curriculum and resources in all content areas across K-12.
- Systematic use of interim assessment from Cambium to monitor progress and inform curriculum and instruction.
- Provide ongoing and embedded professional learning to support curriculum, instruction and assessment.

Thank You



Policy 3542.1
Purposes and Facilities: Food Service
– Revised Policy
Draft

Purposes and Facilities: Food Service

The goal of the District's food services program is to provide students with nutritious and healthy foods that enhance learning.

The Southington Board of Education (Board) has an agreement with the Connecticut State Department of Education to participate in one or more school Child Nutrition Programs and accepts full responsibility for adhering to the federal and state guidelines and regulations pertaining to these school Child Nutrition Programs. The Board also accepts full responsibility for providing free or reduced-price meals to eligible elementary and secondary students enrolled in the District's schools. Applicants for such meals are responsible to pay for meals until the application for the free or reduced-price meals is completed and approved. All applications for free and reduced-price lunch and any related information is considered strictly confidential and not to be shared outside of the District's food services program.

Meals are planned to meet the specified nutrient standards outlined by the United States Department of Agriculture for children based on their age or grade group.

~~Although not required by law~~, because of the District's participation in the Child Nutrition Programs, the Board approves the establishment of a system to allow a student to charge a meal.

The Board realizes that funds from the nonprofit school food service account, according to federal regulations, cannot be used to cover the cost of charged meals that have not been paid.

Moreover, federal funds are intended to subsidize the meals of children and may not be used to subsidize meals for adults (teachers, staff and visitors). Adults are not allowed to charge meals and shall pay for such meals at the time of service or through prepaid accounts.

The Board prohibits the public identification or shaming of a child/student for any unpaid charges, including, but not limited to, the following:

- Delaying or refusing to serve a meal to such student,
- Designating a specific meal option for such student or otherwise taking any disciplinary action against such student.

Purposes and Facilities: Food Service

Charging

A student needing to charge a meal will be informed of his/her right to purchase a meal, which may exclude a la carte items, for any school breakfast, lunch or other feeding.

To sustain the District's food services program, the District cannot permit the excessive charging of student meals. Therefore, any charging of meals must be consistent with this policy and any accompanying regulations. The Superintendent or his/her designee shall develop regulations designed to effectively and respectfully address family responsibility for unpaid meals.

Any parent/guardian who anticipates a problem with paying for meals is encouraged to contact the Food Services Manager/Director and/or the applicable school Principal for assistance. The Board encourages all families who may have a child eligible for free or reduced-price lunch to apply.

Elementary and Secondary Students

1. The District uses an automated prepayment system, which allows parents/guardians to view their child's meal account balance and purchases, receive low-balance notifications, as well as, make deposits, to their child's school meal account. Any student whose account has insufficient funds (i.e., is at the charging limit) and does not bring a meal from home may charge any combination of meals up to ~~an amount not to exceed the cost of thirty (30) meals~~. Negative balance status can be avoided by making a payment in the form of cash, check, or by credit card to the automated prepayment website.
2. ~~Students shall be allowed up to thirty (30) reimbursable meal charges.~~ All other a-la-carte items shall not be charged. After thirty charges, the parents/guardians of such child will be referred to the District's homeless education liaison. When a charge is incurred, a written notification shall be sent home to parents. All credited meals must be repaid.

Purposes and Facilities: Food Service

Charging (continued)

3. No student shall be deprived of a reimbursable meal due to forgotten or lost meal money. ~~The school Principal is responsible for maintaining a fund of money to loan to students without meal money.~~ The Principal or his/her designee is responsible for collecting money loaned to students. Students will be responsible for repaying all loaned money within an established timeframe. A note shall be given to the student to take home or mailed to the student's home to inform parents of the loan obligation. In situations in which a student is consistently without meal money, the Principal or his/her designee should encourage the parent/guardian to apply for free or reduced price meals.
4. All charges must be paid in 10 days. Parents will be notified and asked for prompt payment after 3 charges.
5. Communications with parents/guardians regarding collection of a child's unpaid meal charges shall include information on local food pantries, application for free or reduced-price meals and the Department of Social Services' supplemental nutrition assistance program and a link to the District's website that lists any community services available to town/city residents.

Secondary Students

- ~~1. Students may charge up to two meals at the middle school level and two meals at the high school level and be subtracted from the Food Service House Account.~~
- ~~2. Students shall be allowed to charge up to two meals. The student will be given the same reimbursable meal that other children are provided. Parents of students who charge shall be notified by phone, after their child has received the meal. After charging four meals, the parents shall receive written notification. If a pattern of charging continues, attempts will be made to discuss the issue with the parents/guardians and encourage them to complete a free and reduced meal application.~~

Purposes and Facilities: Food Service

Charging (continued)

Delinquent Debt and Bad Debt

The District's efforts to recover from households money owed due to the charging of meals must not have a negative impact on the children involved and shall focus primarily on the adults in the household responsible for

providing funds for meal purchases. The school food authority is encouraged to consider whether the benefits of potential collections outweigh the costs which would be incurred to achieve those collections. Money owed because of unpaid meal charges shall be considered "delinquent debt," as defined, as long as it is considered collectable and reasonable efforts are being made to collect it. Such debt must be paid by June 30, effective within the current school year.

After reasonable attempts are made to collect the delinquent debt, and it is determined that further collection efforts are useless or too costly, the debt must be reclassified as "bad debt." Such debt shall be written off as an operating loss not to be absorbed by the nonprofit school food service account but must be restored using non-federal funds.

Definitions

"Delinquent Debt" are unpaid meal charges, like any other money owed to the nonprofit school food service account when payment is overdue, as defined by state or local policies.

"Bad Debt" are when unpaid meal charges are not collected and are considered a loss. Such debt must be written off as an operating loss, which cannot be absorbed by the nonprofit school food service account, but must be restored using nonfederal funds.

The Board will accept gifts, donations, or grants from any public or private sources for the purpose of paying off any unpaid charges for school meals.

Purposes and Facilities: Food Service

Dissemination of Policy

This policy shall be disseminated via an electronic post on each school's web page.

This policy shall be available to all households at all times via student/parent handbooks, on online portals that households use to access student accounts, placed on the District's website, on the website of each school, and published at the beginning of each school year at the time information is distributed regarding free and reduced price meals and again to the household the first time the policy is applied to a specific child.

This policy shall be provided to all school staff and/or school food authority staff responsible for its enforcement. In addition, school social workers, nurses, the homeless liaison, and other staff members assisting children in need or who may be contacted by families with unpaid meal charges also should be informed of this policy.

The District's school food authority shall maintain, as required, documentation of the methods used to communicate this policy to households and school or school food authority-level staff responsible for policy enforcement.

Legal Reference: Connecticut General Statutes

10-215 Lunches, breakfasts and other feeding programs for public school children and employees. (as amended by PA 21-46)

10-215a Nonpublic school and nonprofit agency participation in feeding programs.

10-215b Duties of State Board of Education re feeding

programs. State Board of Education Regulations:

State of Connecticut, Bureau of Health/Nutrition, Family Services and Adult Education Operational Memorandum No. 4-17, "Guidance on Unpaid Meal Charges and Collection of Delinquent Meal Payments," Nov. 2, 2016

Operational Memorandum #19-10, State of Connecticut, Bureau of Health/Nutrition, Family Services and Adult Education "Unallowable Charges to No-profit School Food Service Accounts and the Serving of Meals to No paying Full and Reduced Price Students"
National School Lunch Program and School Breakfast Program; Competitive

Foods. (7 CFR Parts 210 and 220, Federal Register, Vol 45 No. 20, Tuesday, January 29, 1980, pp 6758-6772

USDA Guidance:

SP 46-2016, "Unpaid Meal Charges: Local Meal Charge Policies"

SP 47-2016, "Unpaid Meal Charges: Clarification on Collection of Delinquent Meal Payment"

SP 57-2016 "Unpaid Meal Charges: Guidance and Q and A"

SP 58-2016 "2016 Edition: Overcoming the Unpaid Meal Challenge: Proven Strategies from Our Nation's Schools"

Policy adopted: October 1988

Policy reviewed: April 2003

Policy revised: February 2022

Policy revised: **September 2023**

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ X _____ Board Meeting Date October 26, 2023

Decision Requested _____ Agenda Code 9 c. _____

AGENDA REPORTING FORM

Agenda Topic: SHS – Comprehensive Learning Center (formerly ACHIEVE) Artshop Curriculum – First Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Comprehensive Learning Center (formerly ACHIEVE) Artshop Curriculum.

Background: _____

Alternative Strategies: N/A _____

Cost (if applicable): N/A _____ **Funding Source:** N/A _____

Beginning Date of Program or Project: N/A _____

Ending Date of Program or Project: N/A _____

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – Comprehensive Learning Center (formerly ACHIEVE) Artshop Curriculum to the full Board for a First Reading.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

ACHIEVE ARTSHOP UNIT PLANNING

Unit: Achieve ArtShop AM #1 - Elements and Principles of Design

Number of Weeks: 10

Class Periods: 10

UNIT LEVEL (Overarching-Big Picture)

Overarching Goals (*What you want students to learn/be able to do by the end of the unit*)

Unit Goal:

Students will understand how each art element and design principle applies to each lesson and unit of study.

Students will apply the art elements and the principles of design to their artwork.

Standards:

VA:Cr1.2.1a Shape an artistic investigation of an aspect of present day life using a contemporary practice of art or design.

Unit Materials:

Line:

11X14" white paper, Sharpie markers, colored pencils

Shape & Contrast:

11X14" black board, colored paper, light & dark paper, textures & patterned paper, scissors, glue sticks

Value:

11x14" white board, acrylic paint, brushes, water cups, palettes, value scale template

Form & Space:

Basic shapes to build with, acrylic paint, palettes, water cups, modeling clay, Sharpie markers, paintbrushes, hot glue, tacky glue, possibly armature wire

Color & Color Mixing:

Cake watercolor sets, cup of water, brushes, palettes, mixing chart, color wheel template, dragon fly or chameleon template

Texture:

Bins of textured items, school glue/glue sticks, foam brushes, corrugated cardboard, pasta, white rice, crumpled tissue, colored paper, yarn, fabric, brown craft paper

Pattern, Repetition & Balance:

Manipulatives, 12" disks, tacky glue, colorful craft objects like buttons, stones, beads, mosaic tiles or glass, dowel pieces, etc., yarn/string for hanging

Movement & Rhythm:

Glue sticks, scissors, 11X14" white board, 5X5" cardboard, colored papers, markers, pencil

Emphasis:


8X10" white paper, pencil, black Sharpie markers, colored markers, colored pencils

Unity & Harmony:

12x12" gray paper, oil pastels, blending stumps, heart template, pencil

Lesson Level

(Progression of Learning that Leads to Unit Goal)

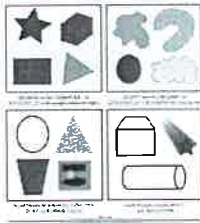
<p>Learning Target: (For each class)</p>	<p>Learning Activities/Task: (What student are doing)</p>	<p>Assessment: (Formal and Informal)</p>
<p>Class #1 Line</p> <p>Students will learn that line is a path created by a moving point, mark or object.</p> <p>Students will learn that there are many types of line: thick, thin, horizontal, vertical, zigzag, diagonal, curly, curved, spiral, etc. and are often very expressive.</p> <p>Students will learn how to create a landscape using defining and decorative lines.</p> 	<ul style="list-style-type: none"> • Discuss and practice making different qualities of line • Create a landscape that uses line to separate the foreground, middle ground and background • Use lines to add defining features like mountains, rolling hills, lake, natural vegetation, sun, etc. • Insert decorative lines within all of the landscape features (thick, thin, horizontal, vertical, zigzag, diagonal, curly, curved, spiral, etc.) • Shade the landscape using color media • Locate and share the different qualities of line within the artwork • Put away all art materials and clean the working space 	<p>Teacher observation Completed learning task/artwork Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #2 Shape & Contrast</p> <p>Students will learn that shape is the outward form of an object defined by a line.</p> <ul style="list-style-type: none"> • Shapes can be geometric or rectilinear with straight sides and angles. • Shapes can be organic and curvilinear with rounded lines and curves. • Shapes can be defined by line, texture, color or value. • Shapes can enclose space and define form. 	<ul style="list-style-type: none"> • Discuss shape and make comparisons • Make piles of contrasting geometric and organic shapes of distinctly different size, color, pattern, and texture • Create a unique collage using the contrasting shapes making sure to have flat and secure connections • Identify the different and contrasting shapes within one's collage • Put away all art materials 	<p>Teacher observation Completed learning task/artwork Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

Students will learn that contrast is the strong difference between art elements.

Students will learn how to make a collage using a variety of contrasting shapes.

- Small and large
- Geometric and organic
- Solid and patterned
- Light and dark
- Smooth and rough
- Shiny and dull

ART ELEMENTS - SHAPE



and clean the working space

**Class #3
Value**

Students will learn that value defines how light or dark a given color or hue can be. Values are best understood when visualized as a scale from light to dark.

Students will learn that a monochromatic color scheme uses the tints, tones and shades of one color.

Students will learn that highlights are the areas on an object where light is hitting the object. Highlights are generally created by using the tint of the color. The opposite of highlights are shadows. Shadows are the areas on the object where light is not hitting. They are created by using the shade of a

- Practice creating a tint of a color by adding white and practice making a shade of a color by adding black
- Create a value scale using acrylic paint by mixing tints, tones and shades of one color
- Create a monochromatic painting that demonstrates knowledge of value by adding highlights and shadows
- Identify the differences in value within the painting
- Put away all art materials and clean the working space

Teacher observation
Completed learning task/artwork
Project sharing
[Achieve ArtShop Unit Rubric](#)

color.



Class #4
Form & Space

Students will learn that forms are 3 dimensional, freestanding and interesting in the round.

Students will learn the four basic forms: sphere, cylinder, cone, cube.

Students will learn to make connections between the four basic forms and real life objects.

Students will learn how to make a free standing sculpture using the four basic forms.

Students will learn that positive space refers to space occupied by the forms and sculpture.

Students will learn that negative space refers to the unoccupied space that can be found around or in between an object in an artwork.



- Identify the four basic forms and find real life examples within the classroom
- Debate freestanding vs. attached and "in the round" vs. attached
- Determine what is positive and negative space in and around a form or sculpture
- Choose from a variety of materials that represent basic forms such as toilet paper roll, wood block, foam ball, etc and color them with marker or paint
- Create basic forms using colored modeling clay
- Combine basic forms to build a sculpture that is aesthetically pleasing and has secure attachments
- Review unit terms as they pertain to their individual sculptures
- Put away all art materials and clean the working space

Teacher observation
Completed learning task/artwork
Project sharing
Achieve ArtShop Unit Rubric

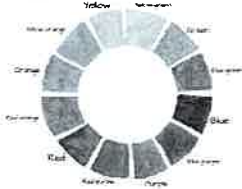


**Class #5
Color & Color Mixing**

Students will learn that color is what we see because of reflected light. Light contains different wavelengths of energy that our eyes and brain "see" as different colors.

Students will learn the primary, secondary and tertiary colors through color mixing and painting with watercolors.

Students will learn that colors exude temperature. Some are warm and some are cool.



- Watch the introductory color video [Basic Color Theory](#)
- Use watercolor materials and practice control of the medium
- Complete the color mixing chart
- Discuss the results of the color mixing exploration and the temperature of color
- Fill in the color wheel by first adding Primary colors, and then mixing Secondary and Tertiary colors
- Using basic color theory and animal templates, paint with learned color mixing strategies and control of the medium
- Point out the primary and secondary colors within the artwork and determine the overall temperature within the piece
- Put away all art materials and clean the working space

Teacher observation
Completed learning task/artwork
Project sharing
[Achieve ArtShop Unit Rubric](#)

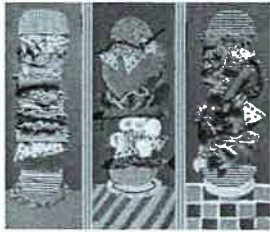
**Class #6
Texture**

- Discuss, compare and contrast the surface quality of particular objects from a

Teacher observation
Completed learning task/artwork
Project sharing

Students will learn that texture is the surface quality of an object or environment. It defines how something feels when touched. (hard, soft, smooth, rough, slimy, gritty, etc.)

Students will learn to create visual impact in their art by using materials with distinctly different textures.



- bin of items
- Create a work of art using materials that have distinctly different textures such as corrugated cardboard, crumpled tissue, yarn, fabric, pasta, rice, etc.
- Check for sturdy connections
- Describe how various parts of the artwork feel
- Put away all art materials and clean the working space

Achieve ArtShop Unit Rubric

**Class #7
Pattern, Repetition & Balance**

Students will learn that a pattern is a design that repeats and can be found anywhere. They can be made by repeating shape, line, or color.

Balance is the distribution of the visual weight of objects, colors, texture, and space.

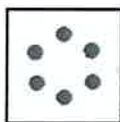
- Symmetrical - visual elements are arranged on both sides of a center line in equal weight
- Asymmetrical - using differing visual elements of unequal weight on both sides of a composition to achieve a sense of balance
- Radial - the arrangement of visual elements around a central point. Radial balance is often a type of symmetrical balance that is circular in nature as visual elements radiate from a central point.



Symmetric



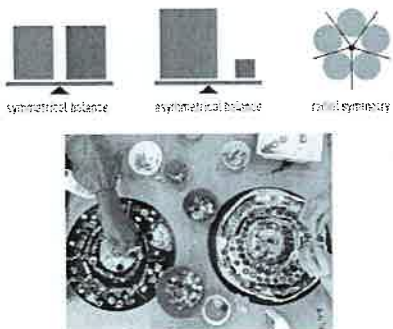
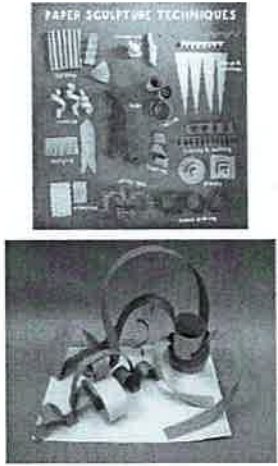
Asymmetric



Radial

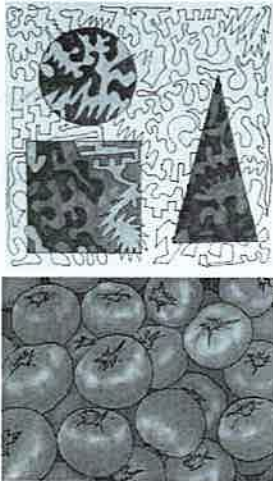
- Use manipulative to practice creating symmetrical, asymmetrical and radial balance
- Make connections by Identifying types of balance within famous works of art
- Use manipulatives to practice creating patterns
- Use a combination of radial balance and pattern to create a mandala-like work of art with materials such as buttons, stones, beads, mosaic tiles or glass, dowel pieces, etc.
- Identify the balance and different pattern combinations within the artwork
- Put away all art materials and clean the working space

Teacher observation
Completed learning task/artwork
Project sharing
Achieve ArtShop Unit Rubric

 <p>symmetrical balance asymmetrical balance radial symmetry</p>		
<p>Class #8 Movement & Rhythm</p> <p>Students will learn that movement is the path the viewer's eye takes through a work of art.</p> <p>Students will learn that rhythm is created when one or more elements are used repeatedly to create a feeling of movement.</p> <p>Students will learn paper building techniques and how to attach them to create a sculpture.</p> <p>Students will learn to make connections between the paper sculpture techniques and the feeling of movement and rhythm</p> <p>Students will learn the importance of solid attachments to create a secure structure.</p> 	<ul style="list-style-type: none"> • Study the sample "Paper Technique Board". Talk about all the different techniques, their names, what they look like and how they are made • Create a paper technique board with all the identifying labels • Discuss movement and rhythm • Share how the paper sculpture techniques can represent movement and rhythm (possibly make connections to a roller coaster and theme park rides) • Build an abstract paper sculpture using the paper sculpture techniques that causes the viewer to travel through the piece and create a feeling of movement • Check for sturdy connections • Share the path of movement within and around the artwork • Put away all art materials and clean the working space 	<p>Teacher observation Completed learning task/artwork Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #9 Emphasis</p> <p>Students will learn that emphasis is the part of the design that catches the viewer's attention.</p>	<ul style="list-style-type: none"> • Create an abstract composition using lines similar to doodling • Insert geometric or organic shapes spaced out on top 	<p>Teacher observation Completed learning task/artwork Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

Usually the artist will make one area stand out by contrasting it with other areas. The area could be different in size, color, texture, shape, etc.

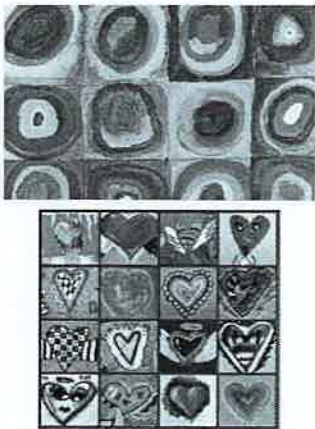
Students will learn that a focal point is the area of a picture that attracts the eye.



- To show emphasis and direct the viewer's eye, add color only to the defined shapes
- Separately, create a composition of an overlapping and repeated object that fills the page.
- To create an obvious focal point, shade only one a complimentary or different color than the others
- Identify the focal point or emphasis within the artwork
- Put away all art materials and clean the working space

**Class #10
Unity & Harmony**

Students will learn that unity is about separate parts working together in a composition. In an artwork, unity creates a sense of harmony and wholeness by using similar elements and placing them in a way that creates a feeling of "oneness."



- Discuss how different parts of a composition can work together to create unity and harmony
- Discuss how different parts of a composition can cause chaos and tension
- Using sample works of art, debate the difference
- As individuals, create a single part of a work of art that will ultimately become part of a whole class unified piece with common elements
- As a class, decide the success of creating a unified and harmonious piece and share evidence of the elements included to support this
- Put away all art materials and clean the working space

Teacher observation
Completed learning task/artwork
Project sharing
[Achieve ArtShop Unit Rubric](#)

Unit: Achieve ArtShop AM#2 - Drawing & Painting

Number of Weeks: 6

Class Periods: 6

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (*What you want students to learn/be able to do by the end of the unit*)

Unit Goal:

To explore the use of multiple drawing and paint mediums, their associated skills and techniques and create a compelling and unique visual statement.

Standards:

VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.

VA:Cr2.2.1a Explain how traditional and nontraditional materials may impact human health and the environment and demonstrate safe handling of materials, tools, and equipment.

VA:Pr4.1.1a Analyze, select, and curate artifacts and/or artworks for presentation and preservation.

VA:Re.7.2.1a Analyze how one's understanding of the world is affected by experiencing visual imagery.

VA:Re8.1.1a Interpret an artwork or collection of works, supported by relevant and sufficient evidence found in the work and its various contexts.

Unit Materials:

Name Design:

4X10" Oaktag, pencils, rulers, letter stencils, markers, colored pencils

Abstract Non Objective Color Burst:

12X18" gray drawing paper, pencil, oil pastels, blending stumps, rulers, drawing compass, newspaper

Figure Drawing with ForeShortening:

16X20" white drawing paper, pencil, colored pencils, markers

Animal in its environment:

12X18" white drawing paper, pencil, black ultra fine point sharpie, color media

Crayon/Salt Resist Painting:

11X14" watercolor paper, cake watercolor paint, brushes, palettes, water cups, pencil, white crayons, salt, sea animal templates

Splatter Painting:

11X14" canvas paper, containment cardboard boxes, acrylic paint, waterdown acrylic paint in squirt bottles, toothbrushes, paint brushes

**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: (For each class)	Learning Activities/Task: (What student are doing)	Assessment: (Formal and Informal)
Class #1 Name Design Students will learn that lettering is an art form where each letter in a	<ul style="list-style-type: none">View samples of name designs and discuss ways in which you can design lettering	Teacher observation Completed drawing Project sharing <u>Achieve ArtShop Unit Rubric</u>

word, phrase or quote acts as an illustration. Each letter is created with attention to detail and has a unique role within a composition.

Students will learn to design the letters of their name in a unified artistic manner.



- Identify materials and basic tools, their uses and handle them effectively
- Practice designing letters that have thickness
- Create a 4X10" name design on oaktag using all of the letters of your first name that reveals one's personality and likes
- Expand on the design by adding defining symbols or objects
- Shade in the design using colored pencil and/or marker
- Share the personal meaning or characteristics of the name design
- Put away all drawing materials and clean the working space

**Class #2
Abstract Non-Objective Color Burst**

Students will learn that non-objective art defines a type of abstract art that is usually, but not always, geometric and aims to convey a sense of simplicity and purity.

Students will learn to create an abstract non-objective design.



- Prepare the workspace for art making
- Identify materials and basic tools, their uses and handle them effectively
- Use several approaches to create a 12x18" abstract non-objective design: free flowing lines, ruler made rigid lines and shapes, a compass for circles, tracing objects, etc.
- Consider using curved lines, zigzags, bumpy lines, overlapping lines and shapes, geometric and organic shapes, etc.
- Shade the drawing using oil pastel with flat colors, color blending and color mixing
- Express how the drawing makes one feel
- Put away all drawing materials and clean the working space

Teacher observation
Completed drawing
Project sharing
[Achieve ArtShop Unit Rubric](#)

Class#3
Figure Drawing with
Foreshortening

Students will learn that figure drawing entails drawing someone who is standing or sitting in a pose that emphasizes the figure.

Students will learn to draw the human figure in an expressive manner, with desired mood or emotional nuance.

Students will learn that foreshortening in art means: Objects that go back in space get small. Objects that project closer to us get larger.



- List the different parts of our bodies that can be seen with clothes on and how they are connected
- Discuss different size comparisons (size of our hand spread out is similar to the size of our head, etc.)
- Realize how we can distort the proportions for visual effect (dramatic foreshortening)
- Identify materials and basic tools, their uses and handle them effectively
- On 16X20" white drawing paper, draw one's head and body
- Trace one's hands and shoes so that they overlap the face and body and appear extra large and up front
- Add defining detail to all parts of the composition (hair, face, clothes, hands, shoes, background) and then trace everything with black sharpie marker
- Shade in the drawing using colored pencils and/or colored markers
- Disclose where you are floating
- Put away all drawing materials and clean the working space

Teacher observation
Completed drawing
Project sharing
[Achieve ArtShop Unit Rubric](#)

Class #4
Animal in its Environment

Students will learn that animal drawing emphasizes developing an understanding of the anatomy of wildlife and domestic animals.

Students will learn to use line shading techniques such as stippling(dotting or dashing), hatching, cross hatching, and scribbling to add texture to their animal drawing.

- Research and find a reference of an animal in its environment
- Identify materials and basic tools, their uses and handle them effectively
- On 12x18" white drawing paper, using the reference, draw the animal in its environment so that it fills the page
- Make edits to correct the anatomy or proportions and detail of the animal
- On a separate drawing paper, practice using line shading techniques to create texture

Teacher observation
Completed drawing
Project sharing
[Achieve ArtShop Unit Rubric](#)



- Add texture to the animal drawing using pencil first and then ultra fine black Sharpie marker
- Add color to the drawing using a medium of choice
- Explain 2 characteristics of your animal
- Put away all drawing materials and clean the working space

**Class #5
Crayon/Salt Resist Painting**

Students will learn that crayon resist in a painting is made with crayons, where watercolor is applied over the crayons. The crayons resist the paint.

Students will learn that salt resistance happens when the area where the salt touches the paper the watercolor will be lighter in color. The salt will push the watercolor pigment away and thus the lighter spot will be surrounded by a darker shade.

Students will learn to make a sea animal painting using both crayon and salt resist methods.



- Prepare the workspace for art making
- Identify materials and basic tools, their uses and handle them effectively
- Using pencil lightly, on 11x14" watercolor paper, draw a sea animal that fills the page (jellyfish, crab, seahorse, etc.)
- Trace the sea animal and all of the defining detail with white crayon making sure it is thick and able to resist
- Paint the sea animal using warm colors
- Paint the background water using contrasting cool colors
- Add salt to the background water while the paint is wet in a thick manner so it will resist or soak up watercolor
- Once dry, brush off the salt to see the faux bubble effect
- Describe 2 way in which the resist process works
- Put away all painting materials and clean the working space

Teacher observation
Completed painting
Project sharing
Achieve ArtShop Unit Rubric

**Class #6
Splatter Painting**

Students will learn that Splattering is a painting technique in which paint is flung, sprayed, dripped or squirted onto the painting surface instead of brushing it on with a paintbrush.

- View and discuss the work of artist Jackson Pollock
- Prepare the workspace for art making
- Identify materials and basic tools, their uses and handle them effectively
- Tape the 11X14" canvas paper to the base of a cardboard box

Teacher observation
Completed painting
Project sharing
Achieve ArtShop Unit Rubric

Students will learn that splatter painting celebrates spontaneity, improvisation and is a highly physical approach to art.



- Apply acrylic paint to the entire canvas using only one color
- Using a variety of application methods and water thinned acrylic paint to create a splatter painting (fling, spray, drip, squirt) while also continuously layering different colors
- Repeat the process to reach a personal desired effect
- Share your favorite part of the splattering process
- Put away all painting materials and clean the working space

Unit: Achieve ArtShop AM#3 - Crafts

Number of Weeks: 8 **Class Periods: 8**

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (What you want students to learn/be able to do by the end of the unit)

Unit Goal:
To enhance craftsmanship through exposure to various types of craft media.

Standards:
VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.
VA:Cr2.2.1a Explain how traditional and nontraditional materials may impact human health and the environment and demonstrate safe handling of materials, tools, and equipment.
VA:Pr4.1.1a Analyze, select, and curate artifacts and/or artworks for presentation and preservation.
VA:Re.7.2.1a Analyze how one's understanding of the world is affected by experiencing visual imagery.
VA:Re8.1.1a Interpret an artwork or collection of works, supported by relevant and sufficient evidence found in the work and its various contexts.

Unit Materials:

Tie Dye:
Shirts/fabric, smocks, containment bins, gloves, rubber bands or string, tie dye patterns, dye packets, water, squirt bottles, drying rack, iron

Mosaic:
8x10" wood backings, mosaic adhesive, grout, mosaic tile, glass and beads, nippers and cutters, application sticks, palette knives, cleaning rags, cleaner

Basketry & Weaving:
Reeds, beads, wooden bases or paper plates, masking tape, scissors, yarn or variety of papers and images or other weaving materials

Mask Making:
Mask forms, acrylic paint, glue gun and glue sticks, tacky glue, paintbrushes, palettes, water cups, scissors, planning templates, picture references

**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
Class #1 Tie Dye Students will learn that tie-dye describes a pattern of color made by preventing the dye from reaching some areas of the fabric while dyeing others. Students will learn how to make	<ul style="list-style-type: none">• Set up themselves and their workspace to protect and contain the dye (smock, gloves, table covering and containment bin)• Prepare the shirt/fabric by wetting and wringing out the excess water• Choose a favorite pattern	Teacher observation Completed craft Project sharing <u>Achieve ArtShop Unit Rubric</u>

patterns by folding, tying, crumpling or otherwise preparing the fabric to inhibit the flow of the dye to some areas.

Students will learn that analogous colors are colors next to each other on the color wheel



and with rubber bands or string fold and tie the shirt/fabric according to the pattern

- Choose 3 analogous colors to avoid muddy color mixing
- Identify materials and basic tools, their uses and handle them effectively.
- Apply die to the shirt/fabric according to the pattern
- Once it has sat for at least 8 hours, thoroughly wash out the dye and when dry iron the material
- Model the completed fashion item, identify the pattern and refer to the materials and tools used
- Put away all craft materials and clean the working space

Class # 2 Mosaic Part 1

Students will learn that mosaic art is the decoration of a surface with small, variously colored pieces of material, called tesserae. Various materials can be used for tesserae, but stone, glass, and ceramic tile are the most common.




Students will learn the function of a mosaic is often floor and wall decoration.

Students will learn about shapes and how they fit together.



- Research and find images of mosaics and identify the varied locations in which they are typically found
- Identify materials and basic tools, their uses and handle them effectively
- Draw or choose a template suitable for the mosaic process
- Adhere the drawing or template to the wood backing
- Choose tesserae (tile, glass or beads) that color match the drawing or template
- Practice fitting the shapes tightly together within a particular space so as to maintain a clear identifiable area and edge
- Prepare the work space
- Start applying the tessera to the backing using the adhesive while also carefully preserving the design
- Put away all craft materials and clean the working space

Teacher observation
[Achieve ArtShop Unit Rubric](#)

<p>Class #3 Mosaic Part 2</p> <p>Students will learn about shapes and how they fit together.</p>	<ul style="list-style-type: none"> • Prepare the workspace • Finish applying the tessera to the backing using the adhesive while also carefully preserving the design • Put away all craft materials and clean the working space 	<p>Teacher observation <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #4 Mosaic Part 3</p> <p>Students will learn the finishing process to complete their mosaic.</p>	<ul style="list-style-type: none"> • Prepare the workspace • Once the adhesive has set, cleanly and precisely fill in the mosaic design with grout • When dry, refine the mosaic by scraping and cleaning the tile, glass or beads • Review the steps, materials and tools used • Put away all craft materials and clean the working space 	<p>Teacher observation Completed craft Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #5 Basketry & Weaving Part 1</p> <p>Students will learn that weaving baskets usually combine both functional and aesthetic qualities. Baskets are made for a variety of purposes, including food gathering and storage, furnishings, garments and ceremonial uses.</p> <p>Students will strengthen their understanding of overlapping and over/under as it applies to weaving.</p>   	<ul style="list-style-type: none"> • Prepare the workspace • Soak the spokes and reeds in bins of water and place them near the workspace • Attach the spokes securely to the base by poking them through the holes at 3" and then bend, overlap and tuck the underneath coils while trimming off any excess • Starting at the base, weave the reeds under and over the spokes • Alternatively add beads onto the spokes every so many rows of reed • Identify materials and basic tools, their uses and handle them effectively. 	<p>Teacher observation <u>Achieve ArtShop Unit Rubric</u></p>

<p>Class #6 Basketry & Weaving Part 2</p> <p>Students will strengthen their understanding of overlapping and over/under as it applies to weaving.</p>	<ul style="list-style-type: none"> • Continue weaving the reeds under and over the spokes • Alternatively add beads onto the spokes every so many rows of reed • Put away all craft materials and clean the working space 	<p>Teacher observation <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #7 Basketry & Weaving Part 3</p> <p>Students will strengthen their understanding of overlapping and over/under as it applies to weaving.</p>	<ul style="list-style-type: none"> • Finish weaving the reeds under and over the spokes until the desired height is reached • Tuck in any reed ends that are poking out • Soak the top unused spokes and then wrap them through to create the rim • Trim to finish • Alternatively add beads onto the spokes every so many rows of reed • Share the proposed function of the basket • Put away all craft materials and clean the working space 	<p>Teacher observation Completed craft Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #8 Mask Making</p> <p>Students will learn that a mask is a form of disguise or concealment usually worn over or in front of the face to hide the identity of a person and by its own features to establish another being.</p> <p>Students will learn the cultural role of masks was usually to represent supernatural beings, ancestors, and fanciful or imagined figures, and they can also be portraits. The localization of a particular spirit in a specific mask must be considered a highly significant reason for its existence.</p> <p>Students will learn the process of making a mask.</p>	<ul style="list-style-type: none"> • View and discuss masks of many cultures • Research and find reference images for a particular mask form • Identify materials and basic tools, their uses and handle them effectively. • Paint and apply craft materials (faux fur, feathers, sequins, beads and gems, yarn, straw, etc.) to define the features of the mask • Make sure connections are neat and secure • Once dry, demonstrate the role of the mask • Put away all craft materials and clean the working space 	<p>Teacher observation Completed craft Project sharing <u>Achieve ArtShop Unit Rubric</u></p>



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Unit: Achieve ArtShop AM#4 - 3D Design

Number of Weeks: 4

Class Periods: 4

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (*What you want students to learn/be able to do by the end of the unit*)

Unit Goal:

To use sculptural techniques to build forms that are aesthetically pleasing, free standing, and interesting in the round that are solidly constructed.

Standards:

VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.

VA:Cr2.2.1a Explain how traditional and nontraditional materials may impact human health and the environment and demonstrate safe handling of materials, tools, and equipment.

VA:Pr4.1.1a Analyze, select, and curate artifacts and/or artworks for presentation and preservation.

VA:Re.7.2.1a Analyze how one's understanding of the world is affected by experiencing visual imagery.

VA:Re8.1.1a Interpret an artwork or collection of works, supported by relevant and sufficient evidence found in the work and its various contexts.

Unit Materials:

Modeling Clay:

Modeling clay, felting knives, pin tools, sgraffito tools, rolling pins, loop tools

Found Object:

Form: cans, containers, bottles, boxes, egg cartons, paper towel rolls, clothes pins, popsicle sticks, wooden blocks, plastic light bulbs, plastic cups, pool noodles, tubing, etc.

Decorative: paint, paint brushes, water cups, palettes, feathers, fabric, paper clips, puzzle pieces, game pieces, legos, twisties, pebbles, old silverware, compact discs, bottle caps, bubble wrap, etc.

general: glue guns and glue, tacky glue, scissors

Vessel - Draped Plaster of Paris Craft Bandage

Containers, plaster of paris craft bandage, water, plastic tubing, vaseline, acrylic medium, glue guns and glue

**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: (For each class)	Learning Activities/Task: (What student are doing)	Assessment: (Formal and Informal)
<p>Class #1 Modeling Clay</p> <p>Students will learn "Handbuilding" is working with clay by hand using only simple tools.</p> <p>Students will learn that 3-dimensional art forms can be both functional and sculptural.</p>	<ul style="list-style-type: none"> Identify materials and basic tools, their uses and handle them effectively Practice manipulating clay by pushing, pulling, rolling, rubbing, squeezing and smearing. Mold a functional pinch pot using only their hands to create the form 	<p>Teacher observation Completed pot or sculpture Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

Students will learn that the three methods of handbuilding are pinching, coiling and slab building.

Students will learn the clay processes of pushing, pulling, rolling, rubbing, squeezing and smearing.

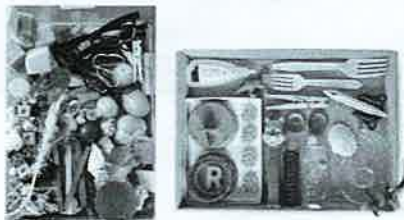


- Build a functional coil pot with a slab base and coil walls that are pinched or smeared together to maintain a sturdy structure
- Make a sculptural 3-dimensional form like an animal or food
- Distinguish which hand building techniques were used to make each 3-dimensional form
- Put away all clay building materials and clean the working space

**Class #2
Found Object Part 1**

Students will learn that a found object sculpture is art created from undisguised, but often modified, items or products that are not normally considered materials from which art is made, often because they already have a non-art function.

Students will learn how to modify and embellish found object materials.



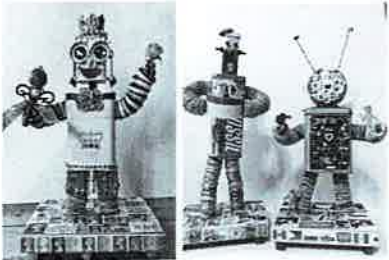
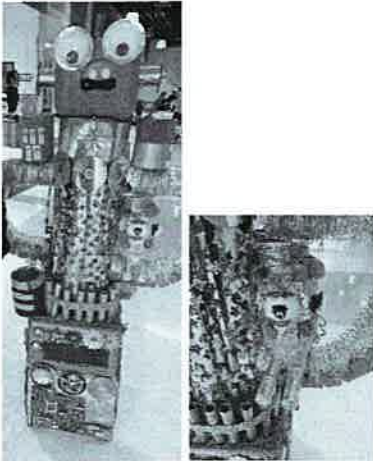
- As a whole class, plan out the parts needed to create a collective 3-dimensional sculpture of a robot (head, body, arms, legs, etc.)
- As a whole class, brainstorm and make a list of possible found objects
- Gather found objects for building
- Identify materials and basic tools, their uses and handle them effectively
- Paint some or all the main structural elements (boxes, containers, tubing, etc.)
- Use decorative found object materials to embellish the main structural elements
- Put away all found object building materials and clean the working space

Teacher observation
Achieve ArtShop Unit Rubric

**Class #3
Found Object Part 2**

- Continue to use decorative found object materials to embellish the main

Teacher observation
Achieve ArtShop Unit Rubric

<p>Students will reinforce learning on how to modify and embellish found object materials.</p> <p>Students will learn to construct and build a 3 dimensional form that is free standing, interesting in the round and built with secure attachments.</p> <p>Students will learn to work together to make one whole class sculpture.</p> 	<ul style="list-style-type: none"> structural elements ● Begin assembling the main structure of the robot ● Assess where more structural elements need to be added to complete and balance the robot form so that it is free standing ● Put away all found object building materials and clean the working space 	
<p>Class #4 Found Object Part 3</p> <p>Students will reinforce learning on how to modify and embellish found object materials.</p> <p>Students will reinforce learning on how to construct and build a 3 dimensional form that is free standing, interesting in the round and built with secure attachments.</p> <p>Students will learn to work together to make one whole class sculpture.</p> 	<ul style="list-style-type: none"> ● Continue assembling the main structure of the robot ● Assess where more structural and decorative elements need to be added so that the robot is interesting in the round ● Make adjustments to the robot form ● Put away all found object building materials and clean the working space ● Collectively name the robot and prepare an area for its display ● Individually share which parts of the robot one contributed to 	<p>Teacher observation Completed sculpture Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Extra Assignment Class #5</p>	<ul style="list-style-type: none"> ● Research and view many draped vessel forms 	<p>Teacher observation Completed vessel</p>

Vessel - Draped Plaster of Paris Craft Bandage

Students will learn that a vessel is a hollow container, it can take many forms, and can be constructed from a wide variety of materials.

Students will learn that vessels can be both functional and sculptural.

Students will learn that draping is a decorative piece of material usually hung in loose folds and arranged in a graceful design.


Students will learn the process of making a draped fabric vessel that is both functional and aesthetically pleasing.



- Prepare work area for art creation
- Identify materials and basic tools, their uses and handle them effectively
- Create a draped vessel form using plaster of paris craft bandage
- Use a modified bottle, bowl or container as a mold that is upside down and free standing
- Add tubelike structures to the sides to create a ripple effect all the way around the mold
- Prepare the surface of the mold with vaseline
- Drape layers of wet circle or square plaster of paris craft bandage over the top
- Using hands and fingers, manipulate the draping to one's liking.
- Carefully massage the bandage smooth
- Once dry, pop it off the mold and seal with acrylic medium
- Share ways in which the vessel could be used as a functional work of art
- Consider adding a plant to it
- Put away all art materials and clean the working space

Project sharing
Achieve ArtShop Unit Rubric

Unit: Achieve ArtShop AM#5 - Mixed Media		
Number of Weeks: 4	Class Periods: 4	
UNIT LEVEL (Overarching-Big Picture)		
Overarching Goals <i>(What you want students to learn/be able to do by the end of the unit)</i>		
<p>Unit Goal: To go beyond the limits between different art forms, and expand the possibilities of the artwork by combining different mediums and materials to create powerful works.</p> <p>Standards: VA:Cr1.1.1a Use multiple approaches to begin creative endeavors. VA:Cr2.2.1a Explain how traditional and nontraditional materials may impact human health and the environment and demonstrate safe handling of materials, tools, and equipment. VA:Pr4.1.1a Analyze, select, and curate artifacts and/or artworks for presentation and preservation. VA:Re.7.2.1a Analyze how one's understanding of the world is affected by experiencing visual imagery. VA:Re8.1.1a Interpret an artwork or collection of works, supported by relevant and sufficient evidence found in the work and its various contexts.</p>		
<p>Unit Materials:</p> <p>Botanical Garden: Watercolor paint, 11X14" watercolor paper, brushes, palettes, water cups, colored tissue, plastic water bottles, scissors, colored Sharpie Markers, glue guns and glue, tacky glue, buttons, beads, gems</p> <p>Expressive Self-Portrait: Watercolor paint, 16X20" watercolor paper, brushes, palettes, water cups, oil pastels, printed portraits, list of open ended statements, printed personal likes and traits, scissors, school glue, glue sticks</p> <p>City & Town: Acrylic paint, 11X14" canvas paper, brushes, palettes, cups of water, patterned or colored paper, chalk or oil pastels, magazine or newsprint images, scissors, school glue or glue sticks</p> <p>Trees in Season: Acrylic Paint, 11X14" canvas paper, brushes, palettes, cups of water, colored tissue, brown paper, black Sharpie marker, yarn, school or tacky glue</p>		
Lesson Level (Progression of Learning that Leads to Unit Goal)		
Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
Class #1 Botanical Garden Students will learn mixed media art involves mixing different creative mediums to make works of art that incorporate two or more	<ul style="list-style-type: none"> ● View Claude Monet's garden paintings ● Research and save images of flowers, plants, and gardens to use as references ● Prepare work area for art 	Teacher observation Completed mixed media artwork Project sharing <u>Achieve ArtShop Unit Rubric</u>

<p>art forms.</p> <p>Students will learn that mixed media is all about breaking the boundaries between different art forms.</p> <p>Students will learn to add layers of different media that work together in a unified manner.</p> 	<p>creation</p> <ul style="list-style-type: none"> ● Identify materials and basic tools, their uses and handle them effectively ● Create a botanical garden scene using a variety of layered materials ● Use watercolors to paint a garden-like background on 11X14" watercolor paper ● Add ripped colored pieces of tissue paper to enhance the texture of the background ● Cut off tops and bottoms of plastic water bottles and shade them with bright colored Sharpie markers ● Layer the water bottle pieces to create 3-dimensional flowers and plants ● Attach the flowers and plants to the backing so that they are balanced throughout the piece ● Add defining details to the flowers and plants with buttons, beads, gems, etc. ● Describe what it would feel like to be in this work of art ● Put away all art materials and clean the working space 	
<p>Class #2 Expressive Self-Portrait</p> <p>Students will learn that Self-portraiture refers to a genre of art in which the artist depicts his or her self-image.</p> <p>Students will learn to add expressive qualities or depict their subject matter in terms of emotions.</p> <p>Students will reinforce their ability to add layers of different media that work together in a unified manner.</p> <p>Students will learn the process of creating a mixed media self-portrait using at least 2 media options.</p>	<ul style="list-style-type: none"> ● Discuss what makes for a compelling and descriptive self-portrait ● Prepare work area for art creation ● Identify materials and basic tools, their uses and handle them effectively. ● Create a mixed media art piece that includes a painted modeled background, expressive self-portrait print and defining text. ● Use watercolor to paint a 16X20" background on watercolor paper that utilizes colors that represent one's personality and likes ● Once dry, enhance the colors with oil pastel shades and detail 	<p>Teacher observation Completed mixed media artwork Project sharing Achieve ArtShop Unit Rubric</p>



- Choose a self-portrait photographic image that is very expressive (from photography unit on people and portraits) and print a black and white copy that is 11X14" in size
- Cut out the contour of the self-portrait photographic image
- Complete the questionnaire Expressive Self-Portrait Writing Prompts
- Print and cut out text
- Practice arranging the layout of the image and text pieces to create a thought provoking composition
- Glue everything down so that the attachments are clean and secure
- Describe how the artwork reflects one's personality
- Put away all art materials and clean the working space

**Class #3
City & Town**

Students will learn that in art a cityscape (urban landscape) or town scape is an artistic representation of the physical aspects of a city, urban or town area.

Students will learn that architectural expression is the design of a structure or the decision of its form, and it covers all of the characteristics of a building, such as its size, shape, materials, texture, color, decoration, etc.

Students will reinforce their ability to add layers of different media that work together in a unified manner.

Students will learn the process of creating a cityscape or townscape using a combination of 2 or more media.

- Discuss the characteristics of a city or town and even individual buildings
What do we see?
- Prepare work area for art creation
- Identify materials and basic tools, their uses and handle them effectively
- Create a cityscape or townscape that has a foreground, middleground, and background using a variety of layered materials
- Use acrylic to paint a sky and ground surface on 11X14" canvas paper
- Use colored, patterned, newsprint and magazine papers to cut out a variety of buildings and structures
- Attach them securely to the backing
- Using chalk or oil pastel, add defining features to the buildings, structures and background (windows,

Teacher observation
Completed mixed media artwork
Project sharing
Achieve ArtShop Unit Rubric



doors, awnings, columns, marquees, etc.)

- Share an experience going into town or a city
- Put away all art materials and clean the working space

Class #4 Trees in Season

Students will learn that colors represent the seasons. For instance, we think of oranges and red for autumn, icy white and pale blue for winter, lush green for spring, and light, airy colors for summer.

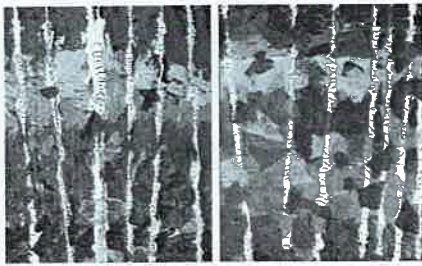
Students will learn that the seasons are represented by different moods. Although all emotions occur in all seasons, we tend to connect spring with hope/renewal; summer with joy/exuberance; autumn with melancholy/acceptance, and winter with sadness/loneliness.

Students will reinforce their ability to add layers of different media that work together in a unified manner.

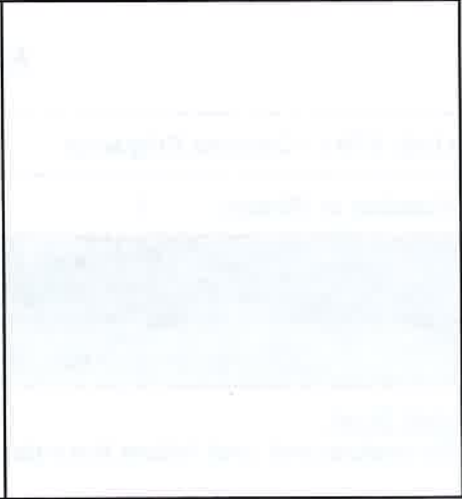
Students will learn the process of creating a mixed media seasonal landscape using a variety of media combinations.

- Compare the four seasons as it pertains to a tree
What do you see?
How does it make you feel?
- Prepare work area for art creation
- Identify materials and basic tools, their uses and handle them effectively
- Create an art piece of a tree that represents a particular season using a variety of layered materials
- Using acrylic paint the background 11X 14" canvas with colors that represent the chosen season
- Add tissue pieces using similar colors to add texture and detail to the background
- On brown paper draw and cut out a tree trunk with branches and glue it to the background securely
- Add additional pieces of tissue or yarn on top or defining details with a black Sharpie marker (falling snow or leaves, apples, cherries, flowers, bark texture, etc.)

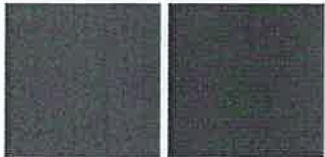

Teacher observation
Completed mixed media artwork
Project sharing
[Achieve ArtShop Unit Rubric](#)



- Share what you like to do best in your favorite season
- Put away all art materials and clean the working space



ACHIEVE ARTSHOP UNIT PLANNING

Unit: FF#1 - Camera Etiquette		
Number of Weeks: 1	Class Periods: 1	
UNIT LEVEL (Overarching-Big Picture)		
Overarching Goals <i>(What you want students to learn/be able to do by the end of the unit)</i>		
<p>Unit Goal: To understand and follow the rules and procedures for using a digital camera.</p> <p>Standards: VA:Cr2.2.1a Explain how traditional and nontraditional materials may impact human health and the environment and demonstrate safe handling of materials, tools, and equipment.</p>		
<p>Unit Materials: Digital cameras, neck straps, SD cards, camera chargers, photography subjects, stop and start red and green cards</p>		
Lesson Level (Progression of Learning that Leads to Unit Goal)		
Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
<p>Class #1 Students will follow proper camera etiquette for when they can and cannot use and/or touch their camera.</p> <p>I can handle the camera when...</p> <div style="text-align: center;">  </div>	<ul style="list-style-type: none"> Understanding the use of red card vs. green card 	<p>Teacher Observation <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #1 Students will follow proper camera etiquette for holding a camera safe and steady.</p> <div style="text-align: center;">  </div>	<p>Camera Rules:</p> <ul style="list-style-type: none"> Class discussion on cameras are fragile Practice using the neck strap Practice placing hands correctly on the camera body and lens Practice holding the camera steady vs. letting it swing and bump 	<p>Teacher Observation <u>Achieve ArtShop Unit Rubric</u></p>

Unit: FF#2 - Camera Parts & Functions

Number of Weeks: 1

Class Periods: 1

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals *(What you want students to learn/be able to do by the end of the unit)*

Unit Goal:

To use a digital camera to take images effectively.



Standards:

VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.

Unit Materials:

Digital cameras, neck straps, SD cards, camera chargers, photography subjects, stop and start red and green cards, camera map hand out/supplies

**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
<p>Class #1 Students will learn the basic parts & functions of a digital camera.</p> 	<p>Locate and Use:</p> <ul style="list-style-type: none"> • On/Off • Camera Body • Lens • Shutter Release • Mode Dial • Zoom Lever • Touch Focus • Viewing Screen • Image Playback <p>Create Camera Map</p>	<p>Teacher Observation Camera Map <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #1 Students will use the parts and functions of a digital camera to successfully take and evaluate an image.</p> 	<ul style="list-style-type: none"> • Practice taking sample images • Practice viewing images through image playback 	<p>Teacher Observation <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #1</p>	<ul style="list-style-type: none"> • Locating the SD Card 	<p>Teacher Observation</p>

Students will follow proper procedures for closing out and recharging and putting away their digital camera.



- Compartment
- Removing the SD Card
 - Locating the Battery Compartment
 - Charging the battery

Achieve ArtShop Unit Rubric

Unit: FF#3 - Field Assignments

Number of Weeks: 27

Class Periods: 27

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (What you want students to learn/be able to do by the end of the unit)

Unit Goal:

To use a digital camera to take targeted artistic images that show a personal artistic voice.

Standards:

VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.

MA:Cr3.1.1a. Consolidate production processes to demonstrate deliberate choices in organizing and integrating content and stylistic conventions in media arts productions, demonstrating understanding of associated principles, such as emphasis and tone.

VA:Cr1.2.1a Shape an artistic investigation of an aspect of present day life using a contemporary practice of art or design.

Unit Materials:

Digital cameras, neck straps, SD cards, camera chargers, photography subjects, stop and start Red and green cards, printer, printing paper

Still Life Photography:

Themed still life objects, backdrops, still life photo stations

Focus:

Empty water bottles, sharpie marker, scissors, masking tape, bins of various colored and textured items like feathers, puzzle pieces, leaves, soda cans, etc., photo stations

Perspective:

Objects or environments where you can take images pointing up (worms eye view), pointing down (birds eye view) and eye level. Objects and environments are situated so you can zoom in and out

People/Portraits:

Part 1 - People/classmates, backdrops and/or environments, tripods

Part 2 - Mirrors, personal object

Animals/Texture:

Coordinate with Vocational Agricultural staff, coordinate on location field trips such as a zoo, animals and plants

Shadows:

Light source/flashlights, backdrop table boards, objects that cast interesting shadows, dark room setting

Reflections:

Mirrors, tinfoil, plastic wrap, mug with liquid, bin with water, backdrop table boards, objects that cast interesting reflections

Abstracts in Oil:

Clear bins, water, water pitchers, vegetable oil, cups, paint brushes, food coloring, colored tissue paper, light tables

Handmade Filters:

Rubber bands, tape, fake flower bunches, vases, backdrop table boards
 Part 1 - Sandwich bags, colored Sharpies, nylon stockings, construction paper, scissors
 Part 2 - Bubble wrap, compact discs, glow sticks

Landscape:

Outdoor settings, coordinate local farm visit

Negative Space:

Bins of small objects, various colored or textured backdrop table boards/fabrics

Food Photography:

Part 1 - place mats, plates, napkins, silverware, drinks, food items, decorative elements
 Part 2 - very thin sliced fruits and vegetables, light tables

Light Modifiers:

Flash lights, objects with repeated hole patterns (lace, blinds, stencils, etc.), backdrop table boards, dark room setting

Light Painting:

Tripods, flashlights, colored glow sticks, objects that light up, wall backdrops, slow shutter speeds

Motion Abstracts:

Colorful bins full of objects, colorful environments, people in motion, slow shutter speeds, camera motion

Word Photography:

Art materials to create letters, letter stencils, white glue, paint brushes to apply glue, planned words (about 5 letters), 11X14" white board, printed background images, scissors, glue sticks

Backdrops - Interactive Wall Mural:

Large backdrop paper, wall, tripods, planned backdrop idea, acrylic paint, painting supplies, possible mixed media materials added

Fashion Photography:

Variety of easy, over clothes, dress up outfits, hats, accessories, props, backdrops and/or environments, tripods, spot lights (see drama production closet)

Bokeh Effect:





Variety of colored holiday light strands, mugs, vases, teapots, bowls, backdrops, flashlights, tinfoil, glass plate, dark paper, setups near outlets, dark room


Photo Scavenger Hunt:

List of locations, environments, objects and/or people

Lesson Level
(Progression of Learning that Leads to Unit Goal)

Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
<p>Class #1 Still Life Photography</p> <p>Students will learn that a still life is an arrangement of objects that don't move.</p> <p>Students will learn how to set up a still life.</p>	<ul style="list-style-type: none"> ● Individually and independently set up a backdrop and 3 small objects ● Stack those objects in various ways ● Practice having the still life fill the camera frame ● Photograph the various 	<p>Teacher observation Photographic images Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

<p>Students will effectively use a digital camera to take clear images.</p> <p>Students will learn how to use the zoom lever to fill the frame.</p> <p>Students will learn how to use the playback feature to compare the quality and success of their image taking.</p> <p>Students will make personal decisions about their approach to photography and image taking.</p> 	<ul style="list-style-type: none"> stacked still life options In small groups, create themed still set-ups at photo stations around the room Rotate to each of the stations Photograph the various still life set-ups. Use the playback feature to compare the images Make decisions that show a personal artistic voice 	
<p>Class #2 Focus</p> <p>Students will learn the difference between in focus and out of focus within a photographic image.</p> <p>Students will learn how to make a water bottle camera hack.</p> <p>Students will learn how to use the focus feature touch screen on their digital camera to direct the focus to a particular area within the frame.</p>   	<ul style="list-style-type: none"> Follow the steps to make the water bottle camera hack for practicing focus Practice how to use the touch screen Using the bins of objects at the photo stations while also using the touch screen, take 1 image of the objects in focus and then one image where the water bottle frame is in focus Use the playback feature to compare the images Make decisions that show a personal artistic voice 	<p>Teacher observation Photographic images Project sharing Achieve ArtShop Unit Rubric</p>
<p>Class #3 Perspective</p> <p>Students will learn how to take photographic images from</p>	<ul style="list-style-type: none"> Gather objects Place or hang objects that are high, at eye level and low or on the floor And/or go outside or to 	<p>Teacher observation Photographic images Project sharing Achieve ArtShop Unit Rubric</p>

<p>different perspectives or angles.</p> <p>Students will learn to broaden their approach to photography by looking up, at eye level and down when taking images.</p> <p>Students will learn to change their position as the photographer by standing, sitting and lying down when taking images.</p> <p>Students will learn how to use the zoom lever to crop or expand their subject or environment within the camera frame.</p> 	<p>environments where the same conditions exist</p> <ul style="list-style-type: none"> • Sit/lie on the floor/ground and take images where the camera is pointing up (worms eye view) • Sit or stand so that the subject is at eye level and take images • Stand and take images where the camera is pointed down at the subject and take images • Practice using the zoom lever • Use the zoom lever to zoom in and out as an option for picture taking • Rotate through various stations/environments and take images based on 1 of the 3 above. • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	
<p>Class #4 People/Portraits Part 1</p> <p>Students will learn how to take people/portrait images more effectively.</p> <p>Students will learn that posing with various attitudes makes for more interesting and powerful photographic images.</p> <p>Students will learn that experimenting with various facial expressions makes for more interesting and powerful photographic images.</p> <p>Students will learn how to set up their camera on a tripod.</p> <p>Students will learn to seek out persons/subjects for variety.</p>	<ul style="list-style-type: none"> • Practice posing to show various attitudes • Practice facial expressions to show various emotions • Set up various backdrops or environments • Set up camera and tripods at each station/location • In pairs or small groups, rotate as camera person and subject to take people/portrait images • Choose a mentor figure within the building and take a picture (pre-arranged) • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	<p>Teacher observation Photographic images Project sharing <u>Achieve ArtShop Unit Rubric</u></p>



**Class #5
People/Portraits Part 2**

Students will learn that a selfie is an image taken of oneself.

Students will learn that self-portraits can be represented through headless images by only including the body, just hands, just feet or objects that represent the essence of the person.



- Practice holding the camera safely and steadily so that it is turned toward oneself
- Take selfie images at arm's length, closer with arms bent and then almost touching the face
- Experiment using already practiced and learned facial expressions
- Take images of oneself in a mirror
- Practice placing one's feet in a variety of positions where they are interacting with each other and resting on the table
- Lean back and take a variety of images of your feet (shoes on)
- Set backdrop boards on the table
- Practice a variety of hand gestures
- Take images of a variety of hand gestures
- With a partner, take pictures of each others hands holding a personal object in a unique manner
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

**Class #6
Animals/Texture**
Contingent on school approval/weather

Students will learn how to take pictures of plants and animals more effectively.

Students will learn both the behavioral and camera rules to follow for alternative locations.

- Follow rules for a new environment
- Follow rules for camera transport
- Take on location images of a variety of plants and animals.
- Practice using the touch focus feature to take clear images
- Practice using the zoom lever to take close up, medium range and full

Teacher observation
Photographic images
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Students will reinforce their learning of the zoom and touch screen focus features on their digital camera.

Students will learn fieldcraft skills in an uncontrolled environment.



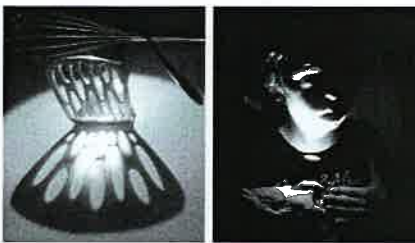
range images of animals and plants in/showing their environment

- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Class #7 Shadows

Students will learn how to photograph images in a dark environment.

Students will learn how to manipulate and cast interesting shadows and take artistic images of them.



- In small groups, set backdrop boards on the tables with a selected object on top
- Practice using the flashlights in a dark room setting to make dramatic shadows at different angles
- Take turns holding the flashlight to cast shadows and the camera to take shadow images
- Rotate in various interesting objects and follow the process
- In small groups have one person be the model, one be the camera person, one hold the flashlight and take dramatic portrait pictures of each other.
- Rotate the roles for taking portrait pictures
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

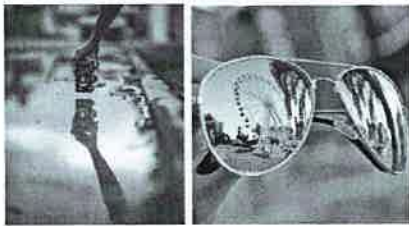
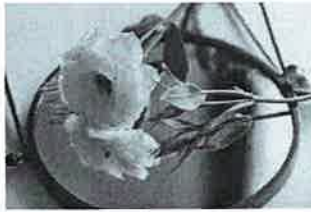
Class #8 Reflections

Students will learn how to manipulate and cast interesting reflections and take artistic images of them.

- Individually, set backdrop boards on the tables with a mirror and a selected object on top.
- Investigate how placing the object at various resting places and angles affect

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

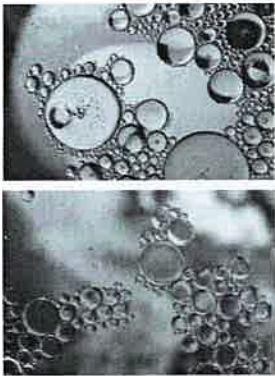
Students will learn how to use offbeat reflective surfaces to take imaginative photographic images.



- the reflection
- Practice getting the object and its reflection to fill the frame
- Take images of various objects and their reflections
- Test using tinfoil, plastic wrap, a mug with liquid, a bin with water and a floating object and possibly puddles for artistic alternative reflections
- Take additional images of various objects and their reflections
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

**Class #9
Abstracts in Oil**

Students will learn that abstract art through photography is a form of art with no recognizable subject, it doesn't represent images of our everyday lives. It has form, so it has colors, lines and shapes, but they are not designed to represent living things or actual objects.



- In small groups, on a light tables, set up a clear bin, place a piece of colored tissue paper underneath, add water to the bin using the water pitcher, add droplet of vegetable oil from the cup, and then turn on the light table
- Experiment by using the paint brush to stir or spread out the oil droplets into different configurations
- Take turns taking pictures of each of the configurations
- As an extra, change the color of the tissue underneath or add drops of food coloring to the mix and take more images
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

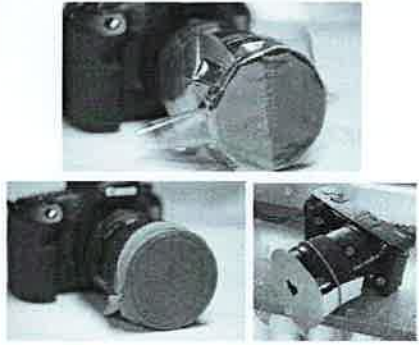

**Class #10
Homemade Filters Part 1**


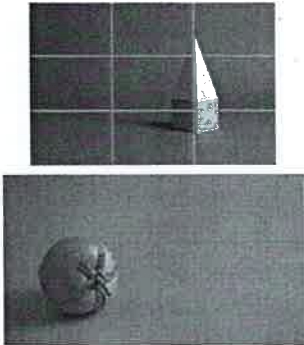
Students will learn that photographic filters are physical objects that allow light to pass through but modify it in some way.

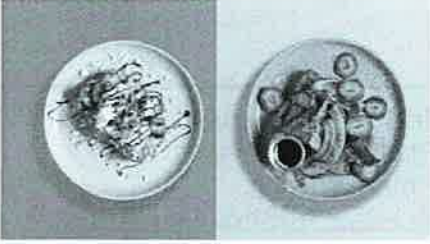

Students will learn how to use everyday items as creative photo filters.

- Use Sharpie markers and a sandwich bag to make a circular two tone filter
- Use a piece of nylon stocking to make a soft diffuser filter
- Use scissors to cut a heart shape into a piece of construction paper to create a stencil frame filter
- Set backdrop boards on the table with a selected

Teacher observation
Photographic images
[Achieve ArtShop Unit Rubric](#)

	<ul style="list-style-type: none"> • flower bunch/vase on top • One at a time, Attach filters to the lens of the digital camera • Photograph the flower bunches using the handmade filters • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	
<p>Class #11 Homemade Filters Part 2 Continued</p> <p>Students will learn that photographic filters are physical objects that allow light to pass through but modify it in some way.</p> <p>Students will learn how to use everyday items as creative photo filters.</p> 	<ul style="list-style-type: none"> • Use a piece of bubble wrap to create a bubble pattern filter • Use 2 angled compact discs to create a reflective dreamy photo filter • Use multiple colored glow sticks to create a glow effect photo filter • Set backdrop boards on the table with a selected flower bunch/vase on top • One at a time, Attach filters to the lens of the digital camera • Photograph the flower bunches using the handmade filters • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	<p>Teacher observation Photographic images Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #12 Landscape Contingent on school approval/weather</p> <p>Students will learn the visible features of a landscape.</p> <p>Students will learn how to capture the essence of the environment around them.</p> <p>Students will learn to capture images of nature to bring the viewer to the scene.</p> <p>Students will reinforce their learning of using the zoom tool to crop or expand how the environment fills the frame.</p>	<ul style="list-style-type: none"> • Follow rules for a new environment • Follow rules for camera transport • Take on location images of a various landscape views • Practice singling out a single objects as small as a leaf or as big as a barn • Practice taking images that include the full landscape • Practice stopping and holding the camera steady throughout the process • Practice taking images where the main subject in the environment is slightly to the side, top or bottom of the frame (rule of thirds) • Considering all of the 	<p>Teacher observation Photographic images Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

<p>Students will learn the rule of thirds.</p> 	<p>above, alternatively, take images outside and around school property</p> <ul style="list-style-type: none"> • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	
<p>Class #13 Negative Space</p> <p>Students will learn that negative space is the empty space around and between the subject(s) of an image.</p> <p>Students will learn that positive space is the object of interest and focus in an image.</p> <p>Students will learn that negative space should have no distracting elements. It is a place to rest and not too busy.</p> <p>Students will learn how to increase negative space to put all the attention on the object or positive space.</p> <p>Students will reinforce their learning of the rule of thirds.</p> 	<ul style="list-style-type: none"> • As a class, gather a variety of backdrops of different colors and textures and place them at stations around the room • Add a bin of small objects to each station making sure that each object is as small or smaller than $\frac{1}{3}$ of the space of the backdrop • Individually choose a station • Practice placing a chosen object on the backdrop following the rule of thirds. (up high, down low, to the right, to the left, to all four corner areas) • When directed, place the object in the announced location • Take an image where the cropping within the frame has $\frac{2}{3}$ more negative space than positive space • Rotate around to all the stations with different backdrops, objects and object placement and take a picture • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	<p>Teacher observation Photographic images Project sharing Achieve ArtShop Unit Rubric</p>
<p>Class #14 Food Photography Part 1</p> <p>Students will reinforce their learning that a still life is an arrangement of objects that don't move.</p> <p>Students will reinforce their learning on how to set up a still</p>	<ul style="list-style-type: none"> • Prepare food and drink to be used for the photo shoot • Individually, set up a placemat, plate, napkin, silverware • Add the prepared food and drink to the set-up in an appealing artistic manner considering placement 	<p>Teacher observation Photographic images Achieve ArtShop Unit Rubric</p>

<p>life.</p> <p>Students will learn that Food Photography is a still life photography genre used to create attractive still life photographs of food.</p> 	<ul style="list-style-type: none"> space, overlapping, color, textures, sizes and shapes Photograph the food set-up from a variety of angles and distances Eat, drink or take away part of the food set-up and photograph the difference Use the playback feature to compare the images Make decisions that show a personal artistic voice 	
<p>Class #15 Food Photography Part 2 Fine Art Food Close-ups</p> <p>Students will learn that Fine Art Food Photography means taking an artistic and unique approach to shooting food. The lighting, composition, and styling create a distinct mood. And the images may or may not be realistic.</p> <p>Students will learn how to locate and adjust exposure compensation.</p> <p>Students will learn that exposure compensation allows the camera to lighten or darken the image.</p> 	<ul style="list-style-type: none"> In small groups, gather a variety of sliced fruits and vegetables to experiment with (best if they have some transparency to them) Place a like grouping of them on a light table in close proximity to each other Set camera exposure compensation to +1 through +3 and turn the light table on Take turns arranging the sliced fruit or vegetable set-up Take turns taking close up cropped images of the set-up Rotate in different fruits or vegetables and continue taking images 	<p>Teacher observation Photographic images Project sharing <u>Achieve ArtShop Unit Rubric</u></p>
<p>Class #16 Light Modifiers</p> <p>Students will learn that a light modifier is a device used to manipulate how much and where light hits an object or person in the photographic process.</p> <p>Students will learn about patterns.</p> <p>Students will learn how to use a variety of specialized objects to cast shadow patterns on their</p>	<ul style="list-style-type: none"> In small groups, set backdrop boards on the tables with a selected display on top. Practice using the flashlights in a dark room setting to shine light through the various light modifiers to create shadow patterns on the display Take turns holding the flashlight to cast shadow patterns and the camera to take images 	<p>Teacher observation Photographic images Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

subject or person for picture taking.



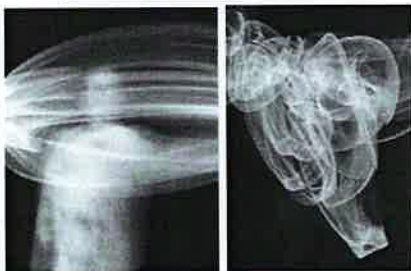
- Rotate in various light modifiers and follow the process
- In small groups have one person be the model, one be the camera person, one hold the flashlight, one person hold the light modifier and take dramatic portrait pictures of each other.
- Rotate the roles for taking portrait pictures
- Consider additionally using a tripod, wall backdrop and stool for light modifier portrait pictures
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Class #17 Light Painting

Students will learn how to use light in motion and a dark setting to create a light painting photographic image.

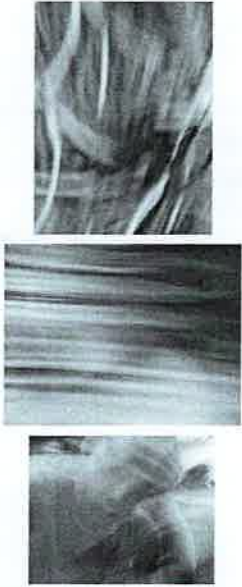

Students will learn how to make light move in circular, zig-zag, up/down, cross like and random motions.


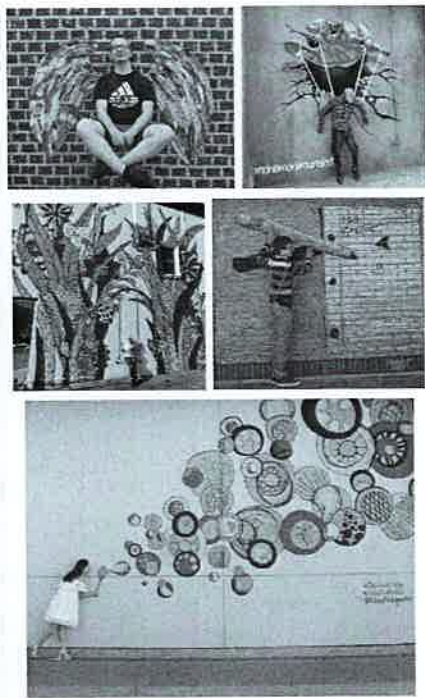
Students will learn how to set slower shutter speeds on their digital camera.

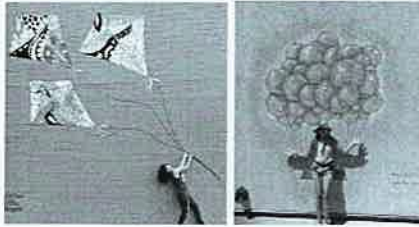


- Set up a backdrop board on the table
- Individually activate a grouping of glow sticks or light up objects
- Personally arrange them in an interesting fashion and tight grouping on the backdrop board
- In a dark classroom, photograph the arrangement
- Set up black wall backdrops at various stations
- Set up camera and tripods for each station
- Set camera to a slower shutter speed setting
- Practice creating circular, zig-zag, up/down, cross like and random motions with the light up objects
- In pairs have one person control the camera and one person control moving the flashlight, glow stick or lighted object and take light painting images
- Experiment taking images with the different light up objects
- Change rolls with your partners
- Use the playback feature to compare the images

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

	<ul style="list-style-type: none"> • Make decisions that show a personal artistic voice 	
<p>Class #18 Motion Abstracts</p> <p>Students will learn to use camera motion to transform real objects, environments and people into unexpected, unclear and often unrecognizable scenes within their image.</p> <p>Students will reinforce their learning of how to set slower shutter speeds on their digital camera.</p> 	<ul style="list-style-type: none"> • Set camera to a slower shutter speed setting • Practice creating circular, zig-zag, up/down, cross like and random motions with a digital camera while simultaneously pressing the shutter release button. • Individually, experiment taking pictures of bins of colorful objects using a variety of camera motions to create abstract images • Practice acceptable ways for the model to be in motion (jumping jacks, hopping on one foot, squatting up and down, etc.) • In pairs, (one being the person in motion and one being the photographer) experiment taking pictures of people while using a variety of camera motions to create abstract images. • Interchange roles as photographer and person in motion • Use the playback feature to compare the images • Make decisions that show a personal artistic voice 	<p>Teacher observation Photographic images Project sharing Achieve ArtShop Unit Rubric</p>
<p>Class #19 Word Photography Part 1</p> <p>Students will learn to create letters/props for a photo shoot.</p> 	<ul style="list-style-type: none"> • As a class, use art materials/objects to create all the letters of the alphabet 	<p>Teacher observation Achieve ArtShop Unit Rubric</p>
<p>Class #20 Word Photography Part 2</p> <p>Students will learn to photograph letters/props as a necessary part to build their words or phrases.</p>	<ul style="list-style-type: none"> • Set up camera and tripods at each station • As a class, photograph all the letters of the alphabet 	<p>Teacher observation Achieve ArtShop Unit Rubric</p>

<p>Class #21 Word Photography Part 3</p> <p>Students will learn to use words or phrases as the main component within their photographic image.</p> <p>Students will learn to combine language and visual imagery.</p> 	<ul style="list-style-type: none"> • Use prints of the photographed letters to make words • Research and print coordinating background images • create a photo collage with the word(s) and background images • Make decisions that show a personal artistic voice 	<p>Teacher observation Photographic/collage images Project sharing Achieve ArtShop Unit Rubric</p>
<p>Class #22 Handmade Backdrops Part 1</p> <p>Students will learn that a backdrop is a background used to take pictures.</p> <p>Students will learn how to create a unique handmade backdrop for a photo shoot.</p> 	<ul style="list-style-type: none"> • From a list of options, as a class, choose a backdrop idea (angel wings, floating balloons, marionette hand with dangling strings, etc.) • As a class, use art materials to make a life size backdrop 	<p>Teacher observation Completed backdrop Achieve ArtShop Unit Rubric</p>
<p>Class #23 Handmade Backdrops Part 2</p> <p>Students will learn how to use body language and posing to meld or merge themselves naturally into the backdrop.</p>	<ul style="list-style-type: none"> • Practice posing naturally within the backdrop • Set up the backdrop and tripodded digital camera • In pairs, one inserting themself in the backdrop and one being the 	<p>Teacher observation Photographic images Project sharing Achieve ArtShop Unit Rubric</p>



photographer, take animated photographic images

- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Class #24 Fashion Photography Part 1

Students will learn that Fashion Photography focuses on the display of fashion clothing, accessories, and coordinating props.

Students will learn that there are different types of Fashion Photography such as high fashion (one of a kind Haute Couture), street fashion (sneakers, t-shirts and hoodies) and catalog fashion (mass market like Target, Kohls and Old Navy).

Students will learn that a fashion photoshoot will include a display of the clothing/model, location, mood, lighting, styling and the appreciation of how these are combined.



- Students will research and discuss Fashion Photography
- Students will differentiate between the three different types of Fashion Photography (high fashion, street fashion and catalog fashion)
- As a class, students will set up a location, backdrop, tripods, cameras and lighting for a fashion shoot
- Create a list of items for their personal fashion statement

Teacher observation
Completed List
Achieve ArtShop Unit Rubric

**Class #25
Fashion Photography Part 2**

Students will learn that Fashion Photography focuses on the display of fashion clothing, accessories, and coordinating props.

Students will learn that there are different types of Fashion Photography such as high fashion (one of a kind Haute Couture), street fashion (sneakers, t-shirts and hoodies) and catalog fashion (mass market like Target, Kohls and Old Navy).

Students will learn that a fashion photoshoot will include a display of the clothing/model, location, mood, lighting, styling and the appreciation of how these are combined.



- Students will choose clothes, accessories and coordinating props to wear and style themselves for a fashion photo shoot
- Students will individually, in pairs, and in small groups, take turns posing to highlight their fashion
- Students will take turns being the fashion photographer
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

**Class #26
Bokeh Effect**

Students will learn the characteristics of the bokeh effect include blurred backgrounds with soft blurred circles of light.

Students will learn how to set a wide aperture on their camera.

Students will learn how to create the soft blurred circle of light by setting up holiday lights and/or crumpled tin foil as part of the backdrop behind the still life, casting light and having their camera set to a wide aperture.

- View multiple pictures of the bokeh effect.
- In small groups, set-up a still life backdrop and drape strands of holiday lights
- Place a mug, vase, teapot, or bowl in front of the backdrop so that the strand of lights either appears to go inside the container or actually fills it
- Locate the mode dial on the camera and set it to aperture priority with a wide aperture setting (consider tripodding the camera)
- Make the room a dark setting
- Take turns holding the flashlight(s) to cast light and the camera to take images that exude the

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)



- bokeh effect
- Substitute the holiday lights with tinfoil and add a glass plate with a dark bottom underneath the container
- Cast light on both the background and the subject.
- Take turns holding the flashlight(s) to cast light and the camera to take images that exude the bokeh effect
- Use the playback feature to compare the images
- Make decisions that show a personal artistic voice

**Class #27
Photo Scavenger Hunt**

Students will learn that a photo scavenger hunt challenges your group to complete tasks, find unique items and environments, or do something and photograph it as proof for the whole team to see at the end.

Students will reinforce their learning for both the behavioral and camera rules to follow for alternative locations.



- As a class, review the procedural and behavioral expectations for moving about the building and photographing subjects and environments.
- In small group teams, take photographic evidence in unique and artistic ways that shows the group found, followed and/or completed the list of items, environments and actions
- Use the playback feature to compare the images

Teacher observation
Photographic images
Project sharing
[Achieve ArtShop Unit Rubric](#)

Unit: Achieve ArtShop FF#4 - Alternative Processes

Number of Weeks: 3

Class Periods: 3

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (*What you want students to learn/be able to do by the end of the unit*)

Unit Goal:

To create photographic images using processes that do not necessitate the use of a digital camera.

Standards:

VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.

MA:Cr3.1.1a. Consolidate production processes to demonstrate deliberate choices in organizing and integrating content and stylistic conventions in media arts productions, demonstrating understanding of associated principles, such as emphasis and tone.

VA:Cr1.2.1a Shape an artistic investigation of an aspect of present day life using a contemporary practice of art or design.

Unit Materials:


Photo Montage:

Student Ipads/Chromebooks, printed images, 11X14" white board, scissors, glue sticks, graphite

Sun Prints:

Photographic images printed on clear acetate, flat objects like pressed leaves or flowers, glass plates, light sensitive fabric/paper, sun, timer, water rinse, drying rack, iron, weight plate

**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: (For each class)	Learning Activities/Task: (What student are doing)	Assessment: (Formal and Informal)
<p>Class #1 Photo Montage Part 1</p> <p>Students will learn the process and the result of making a composite photograph.</p> <p>Students will learn how to gather the necessary parts to build a photo montage.</p> 	<ul style="list-style-type: none">• Research/view photo montages• Gather images that follow a particular theme, color and/or texture.• Using graphite, create a drawing plan/layout on their montage board.	<p>Teacher observation <u>Achieve ArtShop Unit Rubric</u></p>

Class #2
Photo Montage Part 2

Students will combine several photographs or images joined together for artistic effect in which the pieces form a unified picture or scene.



- Cut and/or rip gathered pieces to fit particular areas of the layout.
- Adhere pieces until the entire layout is full and aesthetically pleasing

Teacher observation
Completed artwork
Project sharing
[Achieve ArtShop Unit Rubric](#)

Class #3
Sun Prints

Students will learn that sunlight is a developing agent.

Students will learn that sun print paper or fabric is coated with a photo-sensitive chemical which reacts in light.

Students will learn when sunlight interacts with light-sensitive paper or fabric, it changes the color of the exposed paper/fabric and leaves a silhouette (like a shadow).



- Print one of their photographic images on clear acetate
- In a dark room stack their light sensitive paper/fabric with the acetate image on top and place it within the glass plate.
- Expose the plate to a predetermined amount of sunlight
- Evaluate the sun print for proper exposure
- Wash the completed sun print to stop the developing
- When dry flatten the paper with the weight plate or iron the fabric
- Follow the same process but replace the acetate image with pressed leaves, flowers or other flat objects.

Teacher observation
Completed prints
Project sharing
[Achieve ArtShop Unit Rubric](#)

Unit: Achieve ArtShop FF#5 - Photo Editing

Number of Weeks: 1

Class Periods: 1

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (*What you want students to learn/be able to do by the end of the unit*)

Unit Goal:

To adjust, manipulate and combine photographic images and text to create a unified document using Photoshop image editing software.

Standards:


VA:Cr1.1.1a Use multiple approaches to begin creative endeavors.

MA:Cr3.1.1b. Refine and modify media artworks, honing aesthetic quality and intentionally accentuating stylistic elements, to reflect an understanding of personal goals and preferences.

Unit Materials:

Digital images, Photoshop image editing software, computers, printer, printing paper


**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
<p>Class #1 Photoshop Editing</p> <p>Students will learn how to retrieve images from their SD card and transfer them to their computer.</p> <p>Students will learn basic editing adjustments to improve their image exposure</p> <p>Students will learn basic photoshop editing tools to build or put together their images, text and background.</p> <p>Students will learn how to send their documents to print.</p> 	<ul style="list-style-type: none"> ● Import images from their SD card. <p>Locate and practice using:</p> <ul style="list-style-type: none"> ● Photoshop adjustments with: <ul style="list-style-type: none"> Levels ● Photoshop tools with: <ul style="list-style-type: none"> Crop tool Move tool Text tool Paint bucket ● Adjust each image using levels ● Crop images to remove distractive background elements ● Transfer images to the background document using the move tool ● Adjust the placement of the images using the move tool ● Add a word or phrase that matches the vibe of the images using the text tool ● Insert a background color 	<p>Teacher observation Completed compositional document Achieve ArtShop Unit Rubric</p>



- using the paint bucket tool
- Finetune the entire document for completion
- Locate, follow instructions, and send the document to print

ACHIEVE ARTSHOP UNIT PLANNING

Unit: Achieve ArtShop OS#1 - Independent Exploration		
Number of Weeks: 16	Class Periods: 16	
UNIT LEVEL (Overarching-Big Picture)		
Overarching Goals (<i>What you want students to learn/be able to do by the end of the unit</i>)		
<p>Unit Goal: To enhance or develop art making skills by individually examining art subjects/themes and their creation while also exploring a variety of art making materials.</p> <p>Standards: VA:Cr1.1.1a Use multiple approaches to begin creative endeavors. VA:Cn10.1.1a Document the process of developing ideas from early stages to fully elaborated ideas.</p>		
<p>Unit Materials: Sketchbooks and sketchbook prompts Weekly menu for material options</p>		
Lesson Level (Progression of Learning that Leads to Unit Goal)		
Learning Target: <i>(For each class)</i>	Learning Activities/Task: <i>(What student are doing)</i>	Assessment: <i>(Formal and Informal)</i>
<p>Same learning plan for all 16 classes</p> <p>Part A - Sketchbook Prompt Based on the class day art prompt or creative suggestion, students will respond with a personal, artistic interpretation in their sketchbook.</p> 	<p>Opening class activity (10/15 minutes)</p> <ul style="list-style-type: none"> ● Gather one's sketchbook ● Review the posted sketchbook prompt ● Reflect on their personal artistic interpretation ● Gather materials ● Respond through a work of art in their sketchbook 	<p>Teacher observation Completed artwork <u>Achieve ArtShop Unit Rubric</u></p>
<p>Part B - Independent Exploration Students will develop and enhance their awareness of the visual world through the process of art creation. (research, planning, practice, art creation)</p>	<p>Core class activity</p> <ul style="list-style-type: none"> ● Select materials from a weekly menu ● Plan out an independent course of action for art creation. (Drawing, painting, craft, sculpture, 	<p>Teacher observation Completed artwork Project sharing <u>Achieve ArtShop Unit Rubric</u></p>

Students will strengthen their art skills by creating an independently motivated work of art or photograph.



- mixed media, photography)
- Gather materials needed
 - Follow a step-by-step process
 - Create a personally motivated finished work of art or photograph

Unit: Achieve ArtShop OS#2 - Music, Movement & Dance

Number of Weeks: 16 (Same 16 weeks as OS#1) Class Periods: 16 (Same 16 class periods as OS#1)

**UNIT LEVEL
(Overarching-Big Picture)**

Overarching Goals (*What you want students to learn/be able to do by the end of the unit*)

Unit Goal:

To help students achieve emotional, cognitive, physical and social integration through meaningful movement with music and dance.

Standards:


DA:Cr1.1.I b. Experiment with the elements of dance to explore personal movement preferences and strengths, and select movements that challenge skills and build on strengths in an original dance study or dance.

DA:Pr4.1.I c. Connect energy and dynamics to movements by applying them in and through all parts of the body. Develop total body awareness so that movement phrases demonstrate variances of energy and dynamics.

Unit Materials:

Predetermined music, smart board, external speakers, music videos, dance step tutorials, open space

**Lesson Level
(Progression of Learning that Leads to Unit Goal)**

Learning Target: (For each class)	Learning Activities/Task: (What student are doing)	Assessment: (Formal and Informal)
<p>Same learning plan for all 16 classes</p> <p>Part C - Music, Movement & Dance</p> <p>Students will learn to process, analyze and respond to sensory information through the language and skills unique to music, movement & dance.</p> <p>Students will demonstrate increased movement skills, concentration and physical control in performing movement for artistic expression.</p> 	<p>Closing class activity (20 minutes)</p> <ul style="list-style-type: none">• Choose music genres• Learn a variety movements and dance steps• Follow dance tutorials• Move to the music of popular videos• Work collaboratively with others to produce dance numbers	<p>Teacher Observation</p> <p><u>Achieve ArtShop Unit Rubric</u></p>



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Achieve ArtShop

Curriculum Presentation

The Achieve ArtShop Course is broken down into 3 main categories and 80 blocks of learning for a full year course.

- Art Minds - 26 Mini-Units in 32 Blocks
- Flash Friends Photography - 26 Mini-Units in 32 Blocks
 - Open Studio - Unit total will vary - 16 Blocks

As you can see most units will start and finish spanning only 1 teaching and learning block. This is necessary to sustain student interest, focus and attention to task.

All units are “hands on” with direct instruction.

Art Minds - This exploratory component will introduce students to the foundations of Art. Lessons will present a variety of challenges dealing with personal artistic expression, creativity and exposure to fundamental approaches necessary for the development of basic skills common to artistic endeavors. Students will be involved in a variety of experiences dealing with different art media. Units include: (26 Mini-Units in 32 Blocks)

- Elements & Principles of Design (10 Mini-Units)
- Drawing and Painting (6 Mini-Units)
- Crafts (4 Mini-Units)
- 3D Design (2 Mini-Units)
- Mixed Media (4 Mini-Units)

Some Highlighted Units



Found Object Sculpture



Crayon Salt Resist Painting



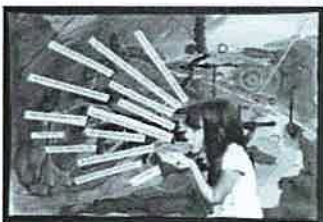
Mosaic



Mask Making



Basket Weaving



Expressive Self-Portrait



City & Town



Abstract Non-Objective Color Burst

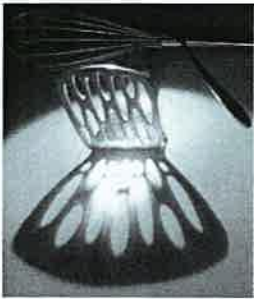


Modeling Clay Bowls

Flash Friends Photography - This exploratory component will introduce students to the process and techniques of photography, both technically and creatively. They will become familiar with basic digital camera parts and functions and visual communication through a variety of field assignments and photo taking opportunities. Units include: (26 Mini-Units in 32 Blocks)

- Camera Etiquette (1 Mini-Unit)
- Parts & Functions (1 Mini-Unit)
- Field Assignments (20 Mini-Units)
- Alternative Processes (3 Mini-Units)
- Photo Editing (1 Mini-Unit)

Some Highlighted Units



Shadows



Animals & Texture



Abstracts in Oil



Light Painting



Reflections



Food Close-Ups



Handmade Backdrops



Bokeh Effect



Word Photography



Still Life



Homemade filters



Motion Abstracts

Open Studio - This exploratory component will offer students the ability to choose art media and subject matter of their liking and create artworks from their own personal perspective. Ideas and their implementation will be student driven. Classes include: (16 blocks)

- Sketchbook Prompt (10-15 min.)
- Individual Exploration (40-45 min.)
- Music, Movement and Dance (30 min.)

Every other week students will receive a menu highlighting 4 to 5 media and art making options that they review and choose from. (Share sample)

Field Trip Opportunities

We are currently working on scheduling the following:

- Flash Friends Photography - Lewis Farms
Fall Foliage - Landscape Photography
- Art Minds - SoCCA Southington Community
Arts Center - Workshop Visit
- Flash Friends Photography - Zoo Visit -
Animal Photography

In closing, the primary focus of this curriculum is to teach a combination of art and photography to students with varying disabilities the way they think and learn. The curriculum has also been designed with the greater purpose of promoting positive and kind hearted social interactions and compassion for the unique challenges they face.

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ X _____ Board Meeting Date October 26, 2023

Decision Requested _____ Agenda Code 9 d.

AGENDA REPORTING FORM

Agenda Topic: SHS – Computer Science Course Proposal - First Reading.

Summary of Issue: The Curriculum & Instruction Committee has reviewed the SHS – Computer Science Course Proposal - First Reading.

Background: _____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – Computer Science Course Proposal - First Reading to the full Board for a First Reading.

Titles of Attachments:

1. Course Proposal



Signature of Staff Member Submitting Report



Signature of Superintendent of Schools

PROPOSED COURSE/PROGRAM CHANGE FORM

Southington Public Schools Southington, Connecticut

School: Southington High School

Department: Mathematics

Please check appropriate item:

New Course:

Revised Course:

Course Title: AP Computer Science Principles - Javascript, and Computer Science Principles - App Inventor

1. Proposed Change – Please give a brief description of the proposed new course or revision to an existing course.

Computer Science Principles is currently taught at the AP level using the College Board curriculum and assessments. We are proposing that in addition to the AP level, a second course is designed to run in tandem with AP for students who wish to continue in the Computer Science pathway but may not be prepared for the rigor of the AP level. This course would be titled Computer Science Principles, Accelerated. These two levels would be taught in different coding languages and at a different pace and rigor.

In addition to the new course, we would like to change the level of Visual Basic Programming I and II raised to the accelerated level to align with current course expectations and future course proposals.

2. Rationale & Target Population – What is the purpose of the proposed new course or course change? To what extent will it benefit the students? Which group of students will be directly affected?

Through conversations with students, teachers in the computer science courses believe that there are some students who do not enroll in our elective courses as they are either not challenging enough or the level of challenge increases too rapidly from one course to the next. Our current AP Computer Science Principles course is taught in App Inventor, which is a block-based coding language. More experienced students see this as a negative, preferring a text-based language, and choose to take a different elective which results in lower enrollment.

In addition to increasing the rigor of the AP course by offering the text-based language, the addition of the accelerated level would provide a continuum of courses offered for students interested in Computer Science that may not be suited for the challenges of an AP level course. This Computer Science Principles course at the Accelerated level will offer them the building blocks to be successful in future computer science courses at a pace more appropriate for them.

The population of students who would be directly affected by this would be our students who are completing Visual Basic I and II and have a desire to continue their education in the field of Computer Science. Experienced, and prepared students would be challenged with the change in language at the AP level while the Accelerated level would provide a greater foundation of knowledge for our students to build toward AP courses in the future.

PROPOSED COURSE/PROGRAM CHANGE FORM

3. **Evaluation** – How do you plan to assess the implementation of the proposed new course or the course change?

Enrollment numbers and student performance in each course will be used to evaluate the proposed changes.

5. **Cost** – What are the anticipated costs for staff, textbooks, materials, other?

None

	YEAR		
	I	II	III
Staff	\$	\$	\$
Textbooks	\$	\$	\$
Materials	\$	\$	\$
Other	\$	\$	\$
TOTAL	\$	\$	\$

Comments: _____

Director of Teaching & Learning

Principal:

Approved



Denied



Signature



Unit Overview	
Unit Title:	What is Life: Cell Energetics
Teacher:	K. Radziwon and S. Kirsche
Grade Level/Course:	Accelerated Biology
Length/Dates:	5 weeks (November-December)
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students will explore the role of carbon in living things and the ecosystem through the lens of climate change. Students will look at how plants that undergo photosynthesis impact the composition of the atmosphere around us and that there are many factors that impact the rate of photosynthesis. The class will then explore a seed germinating and ask the question where the seed gets its mass and energy from. This will lead to an exploration of cellular respiration and the role of oxygen and carbon dioxide in this process. The unit will conclude with an exploration of how carbon cycles through the ecosystem beyond photosynthesis and respiration and how the carbon cycle impacts climate change. Students will evaluate the solution of planting trees to mitigate climate change and compare it to other climate change solutions.

Explanation
Select PEs that work together (bundle) to promote proficiency in using ideas expressed. Often a bundle will include PEs from a single NGSS topic or DCI, but a bundle could draw in PEs from other topics or DCIs.
PE(s) to be addressed (include assessment boundaries and clarification statements). <ul style="list-style-type: none"> HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

- [HS-LS1-5](#). Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- [HS-LS1-7](#). Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
- [HS-LS2-5](#). Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- [HS-ESS3-4](#). Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Unpack DCI(s), SEPs, and CCCs coded to the PEs to identify implications for instruction.

SEP Implications	DCI Implications	CCC Implications
<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> ● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. <p>Developing and Using Models</p> <ul style="list-style-type: none"> ● Use a model based on evidence to illustrate the relationships between systems or between components of a system. 	<p>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems</p> <ul style="list-style-type: none"> ● Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. ● Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological <p>LS1.C: Organization for Matter and Energy Flow in Organisms</p> <ul style="list-style-type: none"> ● The process of photosynthesis converts light energy to stored chemical energy by converting 	<p>Energy and Matter</p> <ul style="list-style-type: none"> ● Energy drives the cycling of matter within and between systems. ● Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. ● Energy cannot be created or destroyed; it only moves between one place and another place, between objects and/or fields, or between systems. <p>Systems and System Models</p> <ul style="list-style-type: none"> ● Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions — including energy, matter and information flows — within and

	<p>carbon dioxide plus water into sugars plus released oxygen.</p> <ul style="list-style-type: none"> As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment 	<p>between systems at different scales.</p> <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system.
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Transfer Goals (Vision of the Graduate)

List the long-term and/or school-wide independent student behaviors that this unit will address.

Communication - Students will practice communicating ideas throughout the unit using a variety of strategies and will culminate by constructing an argument that communicates their findings on a climate mitigation strategy.


TEACHER LEARNING PLAN (including Assessments)





Starting: mid-November






Unit 3- Cell Energetics

Anchoring Phenomenon: Climate Change

MATERIALS NEEDED

Teacher Target Question	Activity	Learning Targets and Success Criteria	Students Will Know and Wonder
<p>Why do atmospheric carbon dioxide levels change throughout the year?</p> <p><i>Anchoring Phenomenon Routine</i> (.5 block)</p>	<ul style="list-style-type: none"> • Anchoring Phenomenon- Climate Change 	<p>Learning Target: <i>I can analyze data about atmospheric carbon dioxide levels to identify patterns and generate questions.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • <i>I can write three open ended questions about what I observe.</i> • <i>I can recognize patterns in data.</i> 	<p>Know:</p> <ul style="list-style-type: none"> • Atmospheric CO₂ levels increase during winter months and decrease during the summer. <p>Wonder:</p> <ul style="list-style-type: none"> • What is the relationship between the seasons and atmospheric CO₂? • Is there a connection between greenery and atmospheric CO₂? <p>Next steps:</p> <ul style="list-style-type: none"> • Investigate the effect of trees on the atmosphere.
<p>Do trees really change the</p>	<ul style="list-style-type: none"> •  Activity 2: Do trees really c... <ul style="list-style-type: none"> ○ Reading 	<p>Learning Target: <i>I can explain how the outputs generated by</i></p>	<p>Know:</p> <ul style="list-style-type: none"> • Trees take in CO₂ and produce

<p>composition of the atmosphere around us?</p> <p>(1 block)</p>		<p><i>plants contribute to the molecules found in the atmosphere.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can analyze and interpret a research paper to pull out relevant data.</i> <i>I can apply the data to explain how the trees change the composition of the atmosphere.</i> 	<p>O₂.</p> <ul style="list-style-type: none"> Humans release CO₂ and consume O₂. <p>Wonder:</p> <ul style="list-style-type: none"> Why does a tree take in CO₂? <p>Next steps:</p> <ul style="list-style-type: none"> Investigate leaf anatomy for clues as to how CO₂ enters plants. Track the journey of CO₂ molecules through a tree.
<p><i>How does carbon dioxide get into a tree and what does the tree do with it?</i></p> <p>(1 block)</p>	<p> Activity 3: How does carbon diox...</p> <p>Image source for Act 3</p> <p><u>Enrichment/Supplementary Activities:</u></p> <ul style="list-style-type: none"> Hands on stomata lab (enrichment options)  15 Leaf Reading and Colo... Interactive overview of Photosynthesis process Where does plant mass come from. Serendip 	<p>Learning Target: <i>I can conduct an investigation to determine how the structure of plants allows carbon dioxide to enter and what the tree does with it.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can use microscopic images to identify unique structures in a leaf.</i> <i>I can run a simulation to determine the inputs and outputs of photosynthesis.</i> 	<p>Know:</p> <ul style="list-style-type: none"> Photosynthesis is an anabolic process that fixes carbon and uses it to build biomass in plants. <p>Wonder:</p> <ul style="list-style-type: none"> How does the color of a leaf impact its ability to photosynthesize? Why are most plants green? <p>Next steps:</p> <ul style="list-style-type: none"> Investigate the relationship between pigments and energy absorption.
<p><i>What color light does chlorophyll absorb and why do plants look green?</i></p>	<p> 17a Pigment absorption worksheet</p> <p>Updated Pigment absorption ws</p> <p> 17 Chromatography lab 2021</p> <p>Chromatography Lab 2022</p> <p>Chromatography simulator</p> <p>Elodea CO2 Lab</p>	<p>Learning Target: <i>I can conduct an experiment to determine the pigments present in spinach leaves.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can explain the relationship between the color of an object and the wavelengths of light that are</i> 	<p>Know:</p> <ul style="list-style-type: none"> Most plants are green because they reflect green wavelengths of light while most efficiently absorbing red and blue wavelengths. <p>Wonder:</p> <ul style="list-style-type: none"> How does the plant use the light energy that it absorbs? <p>Next steps:</p>

		<p><i>absorbed and/or reflected.</i></p> <ul style="list-style-type: none"> <i>I can explain how photosynthetic organisms have specialized pigments, membranes, and/or organelles that absorb solar radiation and convert it into chemical energy.</i> 	<ul style="list-style-type: none"> Trace and model the conversation of light energy into chemical energy through the process of photosynthesis.
<p><i>How can light energy be converted to glucose?</i></p>	<p>  Copy of 11 Photosynthesis-S.pdf  photosynthesis_review_packet (1)... HHMI Photosynthesis interactive Photosynthesis RAFT Project </p> <p>Enrichment/Supplementary Activities:</p> <ul style="list-style-type: none">  Killing Chloroplasts Case ... <p>**students should revise their model here**</p>	<p>Learning Target: <i>I can create and/or use models to explain the process of converting solar energy into chemical energy through photosynthesis.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can identify the inputs and outputs of light-dependent reactions and the Calvin Cycle.</i> <i>I can explain the role of NADPH and ATP in building glucose molecules.</i> 	<p>Know:</p> <ul style="list-style-type: none"> Photosynthesis is divided into two stages: light-dependent and light-independent reactions. Light-dependent reactions require sunlight energy and H₂O to transfer energy to ATP and NADPH. A byproduct of this process is oxygen. Light-independent reactions (Calvin Cycle) use CO₂, ATP, and NADPH to produce sugars. <p>Wonder:</p> <ul style="list-style-type: none"> What environmental variables might impact the ability of a plant to undergo photosynthesis? <p>Next steps:</p> <ul style="list-style-type: none"> Evaluate data regarding photosynthesis rates in different environments.
<p><i>What factors affect the rate of photosynthesis?</i></p>	<p>  Photosynthesis Virtual Lab  Photosynthesis Virtual Lab with m... Photosynthesis and Light intensity simulation (works, not flash) Light intensity graphing (no simulation) </p>	<p>Learning Target: <i>I can use data to describe what factors affect rates of photosynthesis.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> 	<p>Know:</p> <ul style="list-style-type: none"> Water, light intensity, and CO₂ are limiting factors for photosynthesis. <p>Wonder:</p> <ul style="list-style-type: none"> What happens to the CO₂ that is fixed by a tree?

			<p>Next steps:</p> <ul style="list-style-type: none"> Investigate the sources of the CO₂ in the atmosphere.
<p>Where do living things get the energy and mass they need to grow?</p>	<p>Seed Germination Intro</p> <p><u>Enrichment/Supplementary Activities:</u></p> <ul style="list-style-type: none"> BioZone Measuring Respiration 	<p>Learning Target: <i>I can develop a model and use experimental data to determine whether or not germinating peas obtain their energy from photosynthesis or cellular respiration.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can use CO₂ levels to identify the process that germinating cells are undergoing.</i> <i>I can develop a preliminary model with appropriate labels of how germinating seeds are able to grow.</i> 	<p>Know:</p> <ul style="list-style-type: none"> A seed begins to grow underground without sunlight and ends up with much more mass than it started with. Germinating seeds give off carbon dioxide so they must be undergoing cellular respiration. <p>Wonder:</p> <ul style="list-style-type: none"> How do plants release energy when there isn't sunlight? Where does the mass come from? <p>Next steps:</p> <ul style="list-style-type: none"> Students will trace the flow of carbon through cellular respiration and figure out how this process releases energy.
<p>How is the energy released from molecules stored in the body?</p> <p>(2-3 blocks)</p>	<p>Cellular respiration POGIL</p> <p>How organisms use energy - serendip</p> <p>**students should revise their model here.**</p>	<p>Learning Target: <i>I can use models to trace the breakdown of carbon molecules from glucose into CO₂, ATP, and H₂O in cellular respiration.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can identify the inputs and outputs of glycolysis, the Link reaction, the citric acid cycle, and oxidative phosphorylation.</i> 	<p>Know:</p> <ul style="list-style-type: none"> Glucose is broken down through a series of reactions to generate ATP, carbon dioxide, and water. A germinating seed uses cellular respiration to generate energy and mass. <p>Wonder:</p> <ul style="list-style-type: none"> What happens if oxygen isn't present? How can energy be generated? <p>Next steps:</p>

		<ul style="list-style-type: none"> • <i>I can explain the role of NADH and FADH₂ in generating ATP.</i> • <i>I can explain why oxidative phosphorylation generates more ATP per glucose molecule than substrate-level phosphorylation.</i> 	<ul style="list-style-type: none"> • Students will explore how energy can be generated when not in the presence of oxygen.
<p>Can living things generate energy without oxygen? (1-2 blocks)</p>	<p>Muscle Fatigue activity (updated) Text Resource for muscle fatigue</p>	<p>Learning Target: Conduct an investigation to explore the effect of lack of oxygen on the rate of cellular respiration.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • Identify the variable and controls in a muscle fatigue lab. • Gather data on muscle fatigue. • Draw a conclusion explaining what happens when there is less oxygen. 	<p>Know:</p> <ul style="list-style-type: none"> • When oxygen isn't present, anaerobic processes such as glycolysis and fermentation occur. These generate energy but in smaller quantities. <p>Wonder:</p> <ul style="list-style-type: none"> • Oxygen is a factor that limits the rate of energy generation through cellular respiration. What other limiting factors are there? <p>Next steps:</p> <ul style="list-style-type: none"> • Students will explore various other factors that affect the rate of respiration.
<p>What factors affect the rate of cellular respiration? (1-2 blocks)</p>	<ul style="list-style-type: none"> • Measuring Rate of Respiration Virtual Lab 	<p>Learning Target: Analyze the data to draw conclusions about the factors that affect the rate of photosynthesis.</p> <p>Success Criteria:</p> <ul style="list-style-type: none"> • <i>Conduct the virtual investigation.</i> • <i>Write a conclusion</i> 	<p>Know:</p> <ul style="list-style-type: none"> • Various factors affect the rate of cellular respiration including number of living things and temperature. <p>Wonder:</p> <ul style="list-style-type: none"> • If these factors release more or less carbon dioxide, how does this contribute to the global ecosystem? How does carbon

		<i>statement that answers the driving question.</i>	<p>cycle through these systems?</p> <p>Next steps:</p> <ul style="list-style-type: none"> Students will explore how carbon cycles through an ecosystem and ways that humans can impact it.
<p><i>How does carbon dioxide cycle through an ecosystem?</i> (1 block)</p>	<p>Carbon Cycle Models</p> <p>**students should revise their models here**</p>	<p>Learning Target: <i>Recognize the inputs of photosynthesis and the outputs of cellular respiration are the same compounds.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can trace carbon through a cycle of the ecosystem from photosynthesis to respiration and back</i> 	<p>Know:</p> <ul style="list-style-type: none"> The inputs of photosynthesis are the outputs of cellular respiration and vice versa. <p>Wonder:</p> <ul style="list-style-type: none"> How do these processes contribute to climate change? What other factors influence climate change? <p>Next steps:</p> <ul style="list-style-type: none"> Students will explore the role of combustion in the carbon cycle and how this impacts climate change.
<p><i>How can we mitigate climate change?</i> (2-3 blocks)</p>	<p>Additional resources</p> <p>Photosynthesis/Respiration cycle interactive slides</p> <p>CO2 modeling simulation</p>	<p>Learning Target: <i>I can explain why the products of photosynthesis are ecologically important through the use of modeling.</i></p> <p>Success Criteria:</p> <ul style="list-style-type: none"> <i>I can model how combustion contributes to an increase in CO2.</i> <i>I can draw conclusions about the changes in CO2 levels in recent history.</i> 	<p>Know:</p> <ul style="list-style-type: none"> An increase in photosynthesis would lead to the uptake of the materials that are causing climate change. <p>Wonder:</p> <ul style="list-style-type: none"> What other solutions are there to climate change? How effective would planting trees be to mitigate climate change? <p>Next steps:</p> <ul style="list-style-type: none"> Students will complete a performance task to explore the wonder questions above.

<u>Unit 3 Assessment</u> (all PEs addressed and Communication)			

Potential data based summative assessment to develop:

[Data Nugget-Surviving the flood](#)



Accelerated Biology:

Unit 3: Cellular Energetics

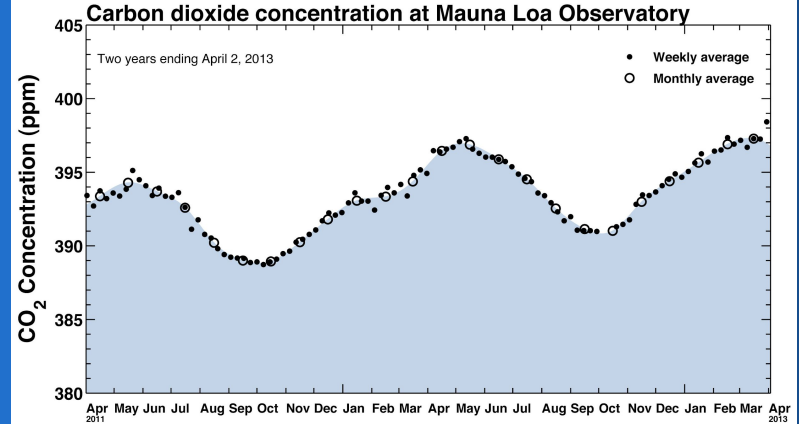
Unit Overview



- ▶ Students will explore the role of carbon in living things and the ecosystem through the lens of climate change. Students will look at how plants that undergo photosynthesis impact the composition of the atmosphere around us and that there are many factors that impact the rate of photosynthesis. The class will then explore a seed germinating and ask the question where the seed gets its mass and energy from. This will lead to an exploration of cellular respiration and the role of oxygen and carbon dioxide in this process. The unit will conclude with an exploration of how carbon cycles through the ecosystem beyond photosynthesis and respiration and how the carbon cycle impacts climate change. Students will evaluate the solution of planting trees to mitigate climate change and compare it to other climate change solutions

Anchoring Phenomenon

Can **planting trees** help combat **climate change**?



WRITE/DRAW AN INITIAL MODEL:

The video explained a process of trees taking in CO₂ from the atmosphere and storing it in the wood of the tree as it grows. Draw an initial model showing:

- how a tree might take carbon out of the atmosphere; and
- how it might store it in the tree as it grows.
- other materials that a tree needs in order to grow.

QUESTIONS:

After sharing your initial model with your table group, capture any questions you now have about how trees take carbon dioxide out of the atmosphere. You can use the back of this paper to add your initial ideas. As a group, choose 3 questions to share out on your class jamboard.

Driving Questions & Learning Sequence



<i>Can planting trees help combat climate change?</i>	<i>Why do atmospheric carbon dioxide level change throughout the year?</i>	<i>Do trees change the composition of the atmosphere around us?</i>	<i>How does carbon dioxide get into a tree and what does the tree do with it?</i>	<i>What color light does chlorophyll absorb and how does this contribute to energy production?</i>
<i>How can we mitigate climate change?</i>	<i>How does the product of carbon dioxide cycle through an ecosystem?</i>	<i>Can living things generate energy without oxygen?</i>	<i>How is the energy released from molecules stored in the body?</i>	<i>Where do living things get the energy and mass they need to grow?</i>

Assessment Highlight: Trees and Climate Change Solutions



Climate Change Solutions - PART 1- Background

What are the best ideas for mitigating climate change?

Over the course of this unit, we have explored the idea that planting a large amount of trees could be a method to reduce the amount of carbon dioxide in the atmosphere and consequently mitigate climate change. This week, we will explore not only the planting of trees as a possible solution, but other avenues as well.



1. What have we figured out about where carbon is located in biological systems? Describe or draw a model of what you know.

Creativity

Critical Thinking

Collaboration

Communication

Assessment Highlight: Trees and Climate Change Solutions



Climate Change Solutions - PART 2 - Planting Trees

Just how much carbon can a million trees store?

In order to decide how effective a climate change solution planting trees could be, we must first understand exactly how much carbon that trees can store. In order to do this, we will use a tool called [iTree](#) (Directions can be found [HERE](#)), which will allow us to explore how much carbon would be stored in a given tree, depending on the species of tree and how many trees are planted.

Creativity

Critical Thinking

Collaboration

Communication

Assessment Highlight: Trees and Climate Change Solutions



Climate Change Solutions - PART 3 - Analyzing Solutions

How does planting trees compare to other solutions for climate change?

With the threat of an ecological tipping point looming in the future, it is essential that we begin to think creatively to mitigate the effects of anthropogenic sources of greenhouse gas emissions. While some ideas are more fantastical, others are valid and are worthy of being explored to reduce our impact. We all need to work together! For this assignment, you will research a potential solution to reduce carbon emission. Your job is to determine how effective your solution is in reducing atmospheric CO₂, evaluate whether this solution is reasonable, and compare the feasibility and effects of your solution with the effects of planting trees.

1. In a group of 2-3 people, select a solution pertaining to carbon sequestration that interests you from the list below. Only one group per topic will be allowed for each class period. Have your topic approved by your teacher.



- Eating Insects (Entomophagy)
- Lab Grown Meat
- Carbon Engineering
- Carbon Capture & Storage
- Direct Air Capture

Creativity

Critical Thinking

Collaboration

Communication

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 9 f.

AGENDA REPORTING FORM

Agenda Topic: Approval of Special Education Positions

Summary of Issue: Additional staffing is needed to serve students in the TLC (Therapeutic Learning Center) at Kelley Elementary School.

Background: Given the growing behavioral challenges of many of our students in kindergarten through grade two we are finding it increasingly difficult to appropriately program for these students and provide them with a provision of FAPE (Free and Appropriate Public Education). Our district program, TLC (Therapeutic Learning Center) housed at Kelley School is nearing capacity and is no longer an appropriate option. The only other programming option for these students is to explore out of district placement, which is much more costly than keeping students in Southington.

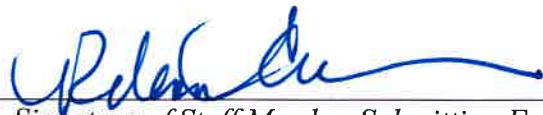
Alternative Strategies: Out-of-District Placements

Cost (if applicable): 145,100 **Funding Source:** _____

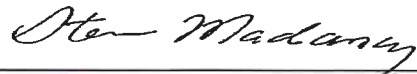
Beginning Date of Program or Project: _____

Ending Date of Program or Project: _____

Recommendation or Comment: Move that the Board of Education approve the Special Education positions as recommended by the administration.



Signature of Staff Member Submitting Form



Signature of Superintendent of Schools

TLC PROPOSAL

Given the growing behavioral challenges of many of our students in kindergarten through grade two we are finding it increasingly difficult to appropriately program for these students and provide them with a provision of FAPE (Free and Appropriate Public Education). Our district program, TLC (Therapeutic Learning Center) housed at Kelley School is nearing capacity and is no longer an appropriate option. The only other programming option for these students is to explore out of district placement, which is much more costly than keeping students in Southington.

For this reason, we are seeking board approval to add staffing so that an additional section of TLC can be added to our continuum of services. This will allow for two sections k-2, and a section to meet the needs of 3-5.

Option A - Out of District Placement	Option B - Create additional section of TLC
<ul style="list-style-type: none"> • Outplacement of three students due to the TLC program at Kelley reaching capacity. All students are at the K-1 level. • Placement cost for these students on average would be \$103, 000 for tuition and \$20,000 for transportation. • Cost per student would be approximately \$123,000. • TOTAL APPROXIMATE UPFRONT COST FOR THREE STUDENTS BEFORE EXCESS COST \$123, 000 X 3 = \$369,000 	<ul style="list-style-type: none"> • Currently there are nine students in the TLC program at KES. Grade range k-2 • Three students not currently in TLC who are in grades k and 1 could then move into the new TLC section in favor of outplacement. • Staff needed with associated cost (approximate)- 1 special education teacher - \$62,600 1 ABA Therapists - \$50,000 .5 School Psychologist - \$32,500 • TOTAL APPROXIMATE COST FOR ADDED CLASSROOM \$145,100 ** EXCESS COST MAY APPLY TO THESE STUDENTS

EXPLANATION OF EXCESS COST FORMULA

When calculating excess cost for students, the state sets a threshold each year that must be met before reimbursement. Last year was 4.5 times the per pupil cost to the district.

Per Pupil - $\$18,407 \times 4.5 = \$82,831$; Therefore, the district must expend $\$82,831$ before a submission for reimbursement can be entered.

For these three students the total threshold to be met would be $\$82,831 \times 3 = \$248,493$

To calculate cost of difference as follows.

\$369,000	– Total upfront cost for 3 students (tuition and transportation)
<u>- 248,239</u>	– Total threshold for 3 students
\$120,761	– Total difference between upfront cost and threshold

Once the difference is determined; the state then calculates a percentage of reimbursement to the district. Last year's reimbursement was based on 70% of the total difference.

To calculate reimbursement total - $\$120,761$ (difference) $\times 70\% = \mathbf{\$84,532.70}$ – **This is our reimbursement on the tuition of these three students.**

Total cost to the district after reimbursement to outplace and transport these three students will be

$\$369,000$ (total upfront) - $\$84,532.70$ (excess cost reimbursement) =

$\$284,467.30$ – Total Cost

**BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT**

Informational Only _____ Board Meeting Date October 26, 2023

Decision Requested X Agenda Code 9 g.

AGENDA REPORTING FORM

Agenda Topic: Unaffiliated Compensation - Technology Department

Summary of Issue: The Board of Education annually determines compensation for Unaffiliated Staff.

Background: N/A

Alternative Strategies: N/A

Cost (if applicable): Varies **Funding Source:** Operating budget

Beginning Date of Program or Project: July 1, 2023

Ending Date of Program or Project: June 30, 2024

Recommendation or Comment: Motion: To approve compensation for Technology Department Unaffiliated staff as proposed by the administration.



Signature of Superintendent of Schools