

Pequea Valley School District
STEM

Unit 1: Inventions and Media

Course: STEM 4

Grade: 4

Planning the Focus Based on the Desired Result

What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

1. How do I use technology to effectively communicate, create, think critically, and collaborate with others?

Keystone Eligible Content/PA Core Standard

3.4.4.A1- Understand that tools, materials, and skills are used to make things and carry out tasks.

Pacing: Approximate number of class sessions per unit

- 10

Tier 3 Vocabulary (Content specific vocabulary)

app, share, import, export, backup, stylus, algorithm, loop, troubleshoot, code, create, communicate, collaborate

Know - What do students need to **know** in order to be able to do and understand? *List concepts, such as facts, formulas, key vocabulary and knowledge “nuggets”.*

Applications and the 4 C’s

1. PicCollage- using the software to import pictures into a project
2. PicCollage- Adding online pictures, stickers, and gifs.
3. PicCollage- Adding text to a project.

iMovie

1. iMovie smashes media into a movie file product.
2. The timeline is where all files are inserted into the video.
3. Storyboarding is a rough draft plan of a movie.

Understand - What do students need to **understand**? What is the **big idea**? *List broad concepts or “big ideas” in a statement of enduring understanding.*

1. PicCollage is a tool used to communicate using visuals and text.
2. iMovie is used to mash video, photos, and text into a product for advertising.
3. Technology can be used to communicate our ideas to ourselves, others, and the world, in the way we understand it.

Learning Outcome - What do students need to be able to **accomplish** by the unit's end? *List skills and competencies.*

1. Students will be able to:
 - a. Use PicCollage to create a picture collage using pictures, text, and other media that communicates a message
 - b. Use iMovie to create an advertisement for a topic which involves video, photos, and text.

Assessments:

- PicCollage- Invention poster
- iMovie- Commercial

Software/Resources:

1. iPad's - 1 per student
2. Notability App
3. PicCollage App
4. iMovie app
5. Safari App

Pequea Valley School District
STEM

Unit 2: Coding

Course: STEM 4

Grade: 4

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

1. How do I use computer coding to accomplish tasks and solve problems?

Keystone Eligible Content/PA Core Standard

3.4.4.A1- Understand that tools, materials, and skills are used to make things and carry out tasks.
ISTE 1.b.-Effectively Design, evaluate, and test algorithms.

Pacing: Approximate number of class sessions per unit

- 8

Tier 3 Vocabulary (Content specific vocabulary)

stylus, algorithm, loop, troubleshoot, code, create, communicate, collaborate

Know - What do students need to **know** in order to be able to do and understand? *List concepts, such as facts, formulas, key vocabulary and knowledge “nuggets”.*

Coding

1. An algorithm is a list of step-by-step directions that a computer follows to complete a task.
2. Create an algorithm for a sprite to follow in the app, “Code.org”
3. Loops are lines of code that repeat over and over again.
4. To troubleshoot means to look for errors in code that keep our sprite from completing the task.

Understand - What do students need to **understand**? What is the **big idea**? *List broad concepts or “big ideas” in a statement of enduring understanding.*

Coding:

1. Coding is giving a computer directions to follow in order to solve a problem.
2. When problems arise in an algorithm, we can solve them through Troubleshooting.
3. A function is a list of steps to accomplish a task
4. A loop repeats the same steps over and over to complete a desired task.

5. An event is an action (up, down, left, right, when you touch a color, sensors, etc) that causes something to happen in code (game end, goes a direction, plays a sound.)

Learning Outcome - What do students need to be able to **accomplish** by the unit's end? *List skills and competencies.*

Digital Literacy and the 4'C's

1. Students will be able to:
 - a. Create an algorithm to accomplish a task that requires up to 4 blocks of code.
 - b. Identify an algorithm that accomplishes a task in multiple choice with up to 4 actions or blocks of code.
 - c. Put an algorithm in order from first to last in a simple, real-life situation.
 - d. Identify a looped algorithm from a set of answer choices that accomplishes a task.
 - e. Break down a function that completes a task in the real world by describing the simple steps.

Assessments:

- PicCollage- Engineering Design Process Poster
- Code.org mini-assessments- Informally assessed throughout.

Software/Resources:

1. iPad's - 1 per student
2. Laptops
3. Swift playgrounds

Pequea Valley School District
STEM

Unit 3: Lego Engineering

Course: STEM 4

Grade: 4

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s)

- How do engineers design and develop solutions to problems in the real world?

Keystone Eligible Content/PA Core Standard

CC.2.4.3.A.4- Represent and interpret data using tally charts, tables, pictographs, line plots, and bar graphs.

CC.2.2.4.A.1- Represent and solve problems involving the four operations.

CC.2.4.3.A.1- Solve problems involving measurement and estimation of temperature, liquid volume, mass or length.

CC.2.4.6.B.1- Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions.

3.4.4.C2- Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make the item. Evaluate the item. Communicate the solution with others. Present the results

3.4.4.C1- Understand that there is no perfect design.

3.4.3.C1- Recognizing design is a creative process and everyone can design solutions to problems.

3.2.4.B7- Nature of Science as Inquiry

- Distinguish between scientific fact and opinion.
- Ask questions about objects, organisms, and events.
- Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.
- Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.
- Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.
- Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.
- Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.

Pacing: Approximate number of class sessions per unit

14 x 2 (students will go through a 2 year rotation of concepts- year 1 on Advanture Stories (boat lab and measurement) year two on mechanisms and physical forces of motion) Math concepts will be integrated based on building data needs assessments.

Tier 3 Vocabulary (Content specific vocabulary)

variable, Iteration, prototype, hypothesis, problem, procedure, materials, procedure, conclusion, ferry, improve, mean, average, median, data table, measurement, centimeter, data, data set, balance, unbalanced, even, uneven, distribution

Know - What do students need to **know** in order to be able to do and understand? *List concepts, such as facts, formulas, key vocabulary and knowledge “nuggets”.*

Students need to:

1. calculate the mean of a set of data
2. set up and record data in a data table
3. set up a bar graph
4. know the steps of the scientific method
5. know the steps of the engineering process
6. code an algorithm that calculates the mean of a set of data
7. code using the wedo software so that it completes a desired task.

Understand - What do students need to **understand**? What is the **big idea**? *List broad concepts or “big ideas” in a statement of enduring understanding.*

1. Coding allows learners to create more complex inventions that solve ever increasingly complex problems.
2. Data can be manipulated to explain and create inferences on a particular data set.
3. Students will be able to understand how the engineering design process creates prototypes to solve problems and improves them with testing.

Learning Outcome - What do students need to be able to **accomplish** by the unit’s end? *List skills and competencies.*

Students will be able to:

1. calculate the mean of a set of data
2. identify the median of a data set
3. discuss their design elements that prove innovations backed by science and experimentation that fulfill desired criteria.
4. Walk through the design process and discuss relevant elements of each step.

Assessments:

- Giant Measurement lab data table and questions
- Top spinner design lab sheet
- Drumming monkey bar graph

Software/Resources:

- WeDo software
- WeDo LEGO kits
- Mac Laptops

- Notability app
- Schoology app