

**Pequea Valley School District**  
**STEM**

**Unit 1: Tech Literacy**

**Course: STEM 5**

**Grade: 5**

**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 communicate, collaborate, and create?
2. 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.

**CC.1.5.5.F-** Include multimedia components and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

**CC.1.4.5.U-** With some guidance and support, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

**CC.1.4.5.V-** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

**Pacing:** Approximate number of class sessions per unit

- 14

**Tier 3 Vocabulary** (Content specific vocabulary)

- Algorithm, loop, troubleshoot, code, create, communicate, collaborate, sync, cloud, link, mock-up, hyperlink, URL

**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”.*

Google Drive Digital Publishing

1. A word processor is used to write digitally, both online, and as software.
2. Cloud Software syncs and saves often, whereas software must be saved.
3. Presentation software, like slides, keynote, and powerpoint, are tools used to present information to a large audience. They use visual tools and text.

Coding

4. An algorithm is a list of step-by-step directions that a computer follows to complete a task.
5. Create an algorithm for a sprite to follow in the app, “Code.org”
6. Loops are lines of code that repeat over and over again.

7. 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.*

1. Google Drive hosts tools to present in different ways. You must know the task to understand which tool to use.
2. Google drive works like other tools, but can be shared, saved to the cloud, and shared with others.
3. Research topics can be broken down into smaller subtopics or main ideas.
4. Coding is giving a computer directions to follow in order to solve a problem.
5. When problems arise in an algorithm, we can solve them through Troubleshooting.
6. A function is a list of steps to accomplish a task
7. A loop repeats the same steps over and over to complete the desired task.
8. 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.*

1. Students will create a google doc that has information about themselves, a photo, changes to the font (size, color, font), and shared.
2. Students will create a collaborative Google slide as a website mock-up for a topic.
3. Students will show Understanding of how computers are programmed to solve problems while using the Swift Programming language.

**Assessments:**

- Google doc- Wanted poster for good things
- Google slides- Math research google slide
- assessment- Swift Playgrounds programming understandings.

**Software/Resources:**

**Pequea Valley School District**  
**STEM**

**Unit 2: Engineering Forces Project**

**Course: STEM 5**

**Grade: 5**

**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 machines use energy transfers and transformations to complete work and solve problems?

**Keystone Eligible Content/PA Core Standard**

- **3.2.7.B2**- Describe how energy can be changed from one form to another (transformed) as it moves through a system or transferred from one system to another system.
- **3.2.6.B1**: Explain how changes in motion require a force.
- **3.2.8.B2**: Identify situations where kinetic energy is transformed into potential energy, and vice versa.
- **3.4.5.C1**- Explain how the **design** process is a purposeful method of planning practical solutions to problems.

**Pacing:** Approximate number of class sessions per unit

- 12

**Tier 3 Vocabulary** (Content specific vocabulary)

- Ask, Imagine, Plan, Create, Improve, Prototype, invention, innovation, brainstorming, constraints, engineer, energy, work, kinetic, potential, mechanical, gravitational, electrical, heat, sound, chemical, transfer, transform, law of conservation of energy.

**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”.*

- Energy is the ability to do work. Work is done when energy is exerted to move matter. No movement = no work.
- Energy comes in many forms- kinetic, potential, mechanical, gravitational, electrical, heat, chemical, nuclear.
- The steps of the engineering process

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

- Energy is neither lost, nor added, but it is transformed into another form of energy.
- Inventions and innovations to objects and systems are created by utilizing the Engineering Design Process.
- The engineering design process is a fluid and iterative process where students revisit steps in the process.

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

- Given examples of energy, a student should be able to accurately identify what type of energy it is.
- Cite examples of energy transformations in real-world examples.
- Accurately Cite energy transformation in their invention.
- Describe each step of the engineering design process as it pertains to their invention.

**Assessments:**

- Energy quiz
- Rube goldburg invention project

**Software/Resources:**

- laptop
- google drive
- consumables
- tools to manipulate consumables to create rube goldburg inventions.

**Pequea Valley School District**  
**STEM**

**Unit 3: Lego Engineering**

**Course: STEM 5**

**Grade: 5**

**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**

**3.4.5.C1-** Explain how the design process is a purposeful method of planning practical solutions to problems.

**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

**3.4.5.E3-** Explain how tools, machines, products, and systems use energy in order to do work.

**CC.2.4.5.A.4-** Solve problems involving computation of fractions using information provided in a line plot.

**CC.2.4.5.A.5-** Apply concepts of volume to solve problems and relate volume to multiplication and to addition.

**M05.D-M.3.1.1-** Apply the formulas  $V = l \times w \times h$  and  $V = B \times h$  for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. Formulas will be provided.

**Pacing:** Approximate number of class sessions per unit

- 14

**Tier 3 Vocabulary** (Content specific vocabulary)

- Volume, line plot, distribution, prototype, Ask, Imagine, Plan, Create, Improve

**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”.*

- How to create and use a line plot involving fractional data points
- Make inferences and predictions based on graphs and line plots
- Coding an algorithm to complete specific tasks
- Make conclusions about how a machine will operate through experimentation and observation.
- Identifying the volume of a rectangular prism

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

- The volume of a rectangular prism is the area of its base, multiplied by its height.
- coding is seen in sequence by a computer in order to complete work.
- Data can be used to make inferences, predictions, and decisions for future action.

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

- Complete an algorithm that raises a drawbridge upon detection by a sensor, then lowers it after the boat passes.
- Complete a fraction line plot
- Make a house out of legos and identify its volume in cm<sup>3</sup>

**Assessments:**

- LEGO drawbridge Notebook
- Fractional Volume activity sheet
- Volume page
- Informal Observation

**Software/Resources:**

- Lego Wedo
- Lego Wedo Resource kit
- Lego Wedo software
- Packet- Lego Drawbridge Notebook.