

**Pequea Valley School District  
STEM**

**Unit 1: Intro to the Technological Design Process**

**Course: STEM 7**

**Grade: 7**

**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):**

- Why is the Technological Design Process important?
- How can visual elements be created and arranged to effectively communicate a message?
- How has 3D printing advanced human capabilities?

**PSSA/Keystone Eligible Content/Common Core Standard**

- **3.2.7.B.** Apply process knowledge to make and interpret observations.
- **3.2.7.D.** Know and use the technological design process to solve problems.
- **3.6.7.B.** Explain information technologies of encoding, transmitting, receiving, storing, retrieving and decoding.
- **3.7.7.D.** Apply computer software to solve specific problems.

**Pacing:**

- 36 Days

**Tier 3 Vocabulary:**

- Design
- Brainstorm
- Model
- Test
- Evaluate
- Balance
- Rhythm
- Unity
- Contrast
- Monochromatic
- Slogan
- Render
- Density

**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”*

Learners will know:

- What the Technological Design Process is and how it helps humans
- How visual elements affect the effectiveness of a message
- How the basic 3D printing process works
- The possible future of a design career

**Understand** - What do students need to **understand as a result of the unit**? List broad concepts, generalization or “**big ideas**” in a statement of enduring and transferable ideas (understanding).

Learners will understand:

- How to apply the Technological Design Process to a project
- How the Technological Design Process impacts humans
- How to manipulate various software to produce a desired result

### **Learning Outcome**

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

Learners will be able to:

- Identify and describe the four principles of design (balance, rhythm, unity, contrast)
- Utilize design software to generate a graphic message (ex: logo)
- Scale their logo according to given parameters
- Design a 3D printable project that solves a problem

### **Assessments:**

- Logo Design
- 3D Rendering
- Packaging Project

### **Software/Resources:**

- Illustrator
- InDesign
- Photoshop
- Various online graphic design websites
- SketchUp
- Makerbot software

**Pequea Valley School District  
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**Unit 2: Introduction to Electronics**

**Course: STEM 7**

**Grade: 7**

**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):**

- What components are needed to make a complete circuit?
- How does a basic electrical circuit function?
- How can electrical circuits be used to solve problems?

**PSSA/Keystone Eligible Content/Common Core Standard**

- **3.1.7.A** Explain the parts of a simple system and their relationship to each other.
- **3.2.7.B.** Apply process knowledge to make and interpret observations. Relate energy sources and transfers to heat and temperature.
- **3.2.7.B4.** Explain how electrical current is produced by the flow of electrons.

**Pacing:**

- 10 Days

**Tier 3 Vocabulary:**

- Circuit
- Load
- Path
- Source
- Open/Closed Circuit
- Series
- Parallel
- Voltage
- Amperage / Current
- Resistance
- Ohm's Law
- Schematic

**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”.*

Learners will know:

- The components of a basic circuit
- Basic electrical terminology
- The possible future of an electrical engineering career

**Understand** - What do students need to **understand as a result of the unit**? List broad concepts, generalization or “**big ideas**” in a statement of enduring and transferable ideas.

Learners will understand:

- The difference between series and parallel circuits
- How to utilize Ohm’s Law to solve for a missing variable

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

Learners will be able to:

- Identify open and closed circuits
- Recognize basic circuit symbols
- Create schematics according to given criteria
- Build a working circuit based on given parameters

**Assessments:**

- Basic Circuits Quiz
- Circuit Manipulatives

**Software/Resources:**

- Snap-Kits

**Pequea Valley School District  
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**Unit 3: Computer Programming**

**Course: STEM 7**

**Grade: 7**

**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 does computer programming advance human lives?
- How can coding be created and modified to solve problems?

**PSSA/Keystone Eligible Content/Common Core Standard**

- **3.1.7.C.** Identify patterns as repeated processes or recurring elements in science and technology.
- **3.1.7. E.** Identify change as a variable in describing natural and physical systems.
- **3.2.7.B.** Apply process knowledge to make and interpret observations.
- **3.7.7.C.** Explain and demonstrate basic computer operations and concepts.
- **3.7.7.D.** Apply computer software to solve specific problems.

**Pacing:**

- 18 Days

**Tier 3 Vocabulary:**

- Robot
- Coding
- Program
- Input
- Process
- Output
- Circumference

**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”.*

Learners will know:

- How to define a robot

- How coding and computer programming affect everyday life
- Possible future of a programming career

**Understand** - What do students need to **understand as a result of the unit**? List broad concepts, generalization or “**big ideas**” in a statement of enduring and transferable ideas.

Learners will understand:

- The importance of coding and computer programming
- How to operate the Lego software

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

Learners will be able to:

- Recognize areas that are affected by programming
- Create, test, and modify lines of code
- Code a program that will accomplish a given task

**Assessments:**

- Programming manipulatives
- Programming Quiz

**Software/Resources:**

- Lego EV3 Mindstorms

**Pequea Valley School District  
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**Unit 4: Introduction to Woodworking**

**Course: STEM 7**

**Grade: 7**

**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):**

- Why is Safety important?
- How are tools properly and safely operated?
- How can tools be used to accomplish a desired task?

**PSSA/Keystone Eligible Content/Common Core Standard**

- **3.2.7.B.** Apply process knowledge to make and interpret observations.
- **3.7.7.A.** Describe the safe and appropriate use of tools, materials and techniques to answer questions and solve problems.
- **3.1.7.D.** Explain scale as a way of relating concepts and ideas to one another by some measure.
- **3.6.7.B.** Explain information technologies of encoding, transmitting, receiving, storing, retrieving and decoding.
- **3.6.7.C.** Explain physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design.

**Pacing:**

- 33 Days

**Tier 3 Vocabulary:**

- Safety
- Ignorance
- Attire
- Segment
- Template
- Softwood
- Hardwood
- Grain
- Knot
- Saturated

**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”.*

Learners will know:

- How to maintain personal safety
- How to safely operate machinery
- General procedures for creating wooden projects
- The possible future of a woodworking career

**Understand** - What do students need to **understand as a result of the unit**? List broad concepts, generalization or “**big ideas**” in a statement of enduring and transferable ideas (understanding).

Learners will understand:

- The importance of safety
- The science and nature of wood

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

Learners will be able to:

- Work safely in the Wood Lab
- Safely operate machinery
- Read a scaled drawing, and take measurements from it
- Make accurate measurements
- Use the machinery to create a final product

**Assessments:**

- Nail Puzzle
- Cutting Board
- Science of Wood Worksheet

**Software/Resources:**

- Wood Lab

# Pequea Valley School District

## STEM Department

**Unit 5: Manufacturing**

**Course: STEM 7**

**Grade: 7**

### 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 manufacturing processes compare and contrast?
- How can statistics be utilized to improve manufacturing processes?

#### **PSSA/Keystone Eligible Content/Common Core Standard**

- **3.2.7.B.** Apply process knowledge to make and interpret observations.
- **3.4.7. B.** Relate energy sources and transfers to heat and temperature.
- **3.6.7.C.** Explain physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design.
- **3.7.7.A.** Describe the safe and appropriate use of tools, materials and techniques to answer questions and solve problems.
- **3.7.7.D.** Apply computer software to solve specific problems.
- **3.1.7.C.** Identify patterns as repeated processes or recurring elements in science and technology.
- **3.2.7.D.** Know and use the technological design process to solve problems.

#### **Pacing:**

- 45 Days

#### **Tier 3 Vocabulary:**

- Traditional manufacturing processes
- CNC (computer numerical control)
- 3D printing
- Business Marketing
- Statistical Analysis

**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”.*

Learners will know:

- Basic manufacturing processes
- How traditional manufacturing processes compare and contrast to automated manufacturing processes
- The possible future of a manufacturing career

**Understand** - What do students need to **understand as a result of the unit**? List broad concepts, generalization or “**big ideas**” in a statement of enduring and transferable ideas.

Learners will understand:

- How various manufacturing processes operate
- How statistics can help manufacturing processes

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

Learners will be able to:

- Identify and describe various manufacturing processes
- Choose a manufacturing process best suited for different projects and situations
- Apply statistics to analyze manufacturing processes

**Assessments:**

- CNC designed object

**Software/Resources:**

- CNC software

**Pequea Valley School District  
STEM**

**Unit 6: Agricultural Biology Experience**

**Course: STEM 7**

**Grade: 7**

**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 produce a package to preserve food?

**PSSA/Keystone Eligible Content/Common Core Standard**

3.2.7.B. Apply process knowledge to make and interpret observations.

3.2.7.D. Know and use the technological design process to solve problems.

**Pacing:**

- 38 Days

**Tier 3 Vocabulary:**

- Agriculture
- Biology
- Environment
- Adaptation
- Ecosystem
- Survival Responses
- Waste Management
- Macromolecules

**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”.*

Learners will know:

- How agriculture and biology can be combined to better solve real-world problems
- The possible future of an ag-bio career

**Understand** - What do students need to **understand as a result of the unit**? List broad concepts, generalization or “**big ideas**” in a statement of enduring and transferable ideas.

Learners will understand:

- How to utilize cross curricular knowledge to solve problems

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

Learners will be able to:

- Design, brainstorm, model, and test a solution to an ag-bio related problem

**Assessments:**

- Final ag-bio manipulative

**Software/Resources:**