

**Pequea Valley School District  
STEM**

**Unit 1: Computer Aided 3D Rendering**

**Course: STEM 8**

**Grade: 8**

**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 has computer aided drafting and 3D renderings affected human lives?
- How can scale and other math concepts be applied through 3D renderings?

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

- **3.2.10.B** Apply process knowledge and organize scientific and technological phenomena in varied ways
- **3.2.10.D** Identify and Apply the technological design process to solve problems.
- **3.7.10.A** Identify and safely use a variety of tools, basic machines, materials, and techniques to solve problems and answer questions
- **3.8.10.C** Evaluate possibilities consequences and impacts of scientific and technological solutions

**Pacing:**

- 15 Days

**Tier 3 Vocabulary:**

- Render
- Build plate
- Filament
- Scale
- Proportion

**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 current applications of 3D rendering & printing
- The basic process of 3D rendering & printing
- The possible future of a CAD 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 3D rendering & printing has affected human lives
- How to manipulate 3D rendering software
- Applications of 3D printing in industry

**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:

- Manipulate SketchUp in order to create a rendering based on given specifications
- Scale a rendering to meet given specifications
- Recognize manufacturing applications where 3D printing is beneficial
- Operate a 3D printer

**Assessments:**

- Rendered object

**Software/Resources:**

- SketchUp
- Makerbot Software

**Pequea Valley School District  
STEM**

**Unit 2: Earthquake Structure**

**Course: STEM 8**

**Grade: 8**

**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 are earthquakes an important engineering issue?

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

- **3.2.10.B** Apply process knowledge and organize scientific and technological phenomena in varied ways.
- **3.2.10.D** Identify and Apply the technological design process to solve problems.
- **3.6.10.C** Apply Physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, research and design to real world problems.

**Pacing:**

- 15 Days

**Tier 3 Vocabulary:**

- Topographic Map
- Contour line
- Contour interval
- Seismic wave
- Epicenter
- Fault Line
- Divergent
- Convergent
- Transform
- Mitigate
- X-bracing
- Shear wall
- Tuned-mass damper
- Base isolator
- Energy dissipating device

**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 earthquakes occur
- How engineers design structures to mitigate the effect of earthquakes
- The possible future of a civil engineer career
- The value of collaboration to achieve a goal

**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 structures can be shaped and designed to withstand earthquakes
- The importance of civil engineers
- How the pythagorean theorem can be applied to engineering

**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 a structure that will withstand a testing on a shake table
- Read and interpret a topographic map
- Apply the Pythagorean Theorem

**Assessments:**

- Earthquake proof structure

**Software/Resources:**

**Pequea Valley School District  
STEM**

**Unit 3: Physical Sciences**

**Course: STEM 8**

**Grade: 8**

**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 can physical sciences be manipulated to produce desired results?
- How can math be applied to design and build more effective products?
- How can an understanding of the physical sciences advance human capabilities?

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

- **3.2.10.B** Apply process knowledge and organize scientific and technological phenomena in varied ways.
- **3.2.10.D** Identify and Apply the technological design process to solve problems.
- **3.6.10.C** Apply Physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, research and design to real world problems.
- **3.7.10.A** Identify and safely use a variety of tools, basic machines, materials, and techniques to solve problems and answer questions

**Pacing:**

- 60 Days

**Tier 3 Vocabulary:**

- Potential energy
- Kinetic energy
- Circumference
- Radius
- Wheel-to-axle-ratio
- Arm ratio
- Sling type
- Counterweight type
- Projectile
- Fulcrum
- Bernoulli's principle
- Airfoil

- Cross-section
- Thrust
- Lift
- Drag
- Weight

**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 definitions of related physical science terms
- The possible future careers associated with physical sciences

**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 physical forces are related and affect each other
- How physical forces affect engineer's decisions on the design of products
- How to create, understand, and apply data from a graph

**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:

- Define physical science terms
- Distinguish between different physical forces
- Make related math calculations
- Transform ideas into a physical solution for a given problem
- Demonstrate understanding of physical sciences by designing and constructing related physical products

**Assessments:**

- Mousetrap vehicle
- Trebuchet project

**Software/Resources:**

- Online trebuchet simulator
- Woodshop
- Classroom Trebuchet Models
- Classroom MouseTrap Vehicles



**Pequea Valley School District  
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**Unit 4: Environmental Science**

**Course: STEM 8**

**Grade: 8**

**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 are the advantages and disadvantages of various energy sources?
- What are the impacts of different energy sources on humans?
- How can experimental data be used to design more efficient energy solutions?
- How can the design process be used to solve environmental problems?
- How can agriculture and biology be combined to provide a solution to a given problem?

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

- **3.2.10.B** Apply process knowledge and organize scientific and technological phenomena in varied ways.
- **3.2.10.D** Identify and Apply the technological design process to solve problems.
- **3.6.10.C** Apply Physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, research and design to real world problems.

**Pacing:**

- 45 Days

**Tier 3 Vocabulary:**

- Fossil fuel
- Blade
- Hub
- Nacelle
- Tower
- Airfoil
- Swept Area
- Levee
- Rise vs run ratio
- Sand boil
- I / T wall

- Environment
- Renewable
- Nonrenewable

**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 various energy sources are obtained, transmitted, and used
- Positives and negatives for various energy sources
- The reasons for choosing renewable vs. nonrenewable energy
- The possible future careers associated with environmental science
- The difference between the independent and dependent variable

**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 energy sources affect the environment
- How to reduce experimental errors
- How to prevent negative environmental changes (such as erosion)
- How to make recommendations to improve property’s water quality

**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:

- Improve research and analysis skills
- Make informed decisions when choosing future energy sources
- Utilize math concepts and calculations to improve desired outcome of a project
- Apply the technological design process to solve problems

**Assessments:**

- Wind turbine project
- Water Cycle
- Water Levee

**Software/Resources:**

- Google Drive
- Wind turbine testers
- Classroom resources

- Stream Table

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

**Unit 5: Computer Aided Manufacturing**

**Course: STEM 8**

**Grade: 8**

**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 are accuracy and precision important in manufacturing?
- How do basic material processes produce a finished product?
- Why is safety an important issue for manufacturing companies?
- How can math be applied to manufacturing?

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

- 3.7.7 D. Explain scale as a way of relating concepts and ideas to one another by some measure.
- 3.7.7 A. Describe the safe and appropriate use of tools, materials and techniques to answer questions and solve problems.
- 3.6.7 C. Analyze manufacturing steps that affect waste and pollutants.

**Pacing:**

- 45 Days

**Tier 3 Vocabulary:**

- Coordinate plane
- Tolerance
- Troubleshooting
- Netting
- Accuracy
- Precision
- CNC
- Laser

**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 accuracy and precision play an important role in manufacturing

- How to create, test, modify and read G-Code
- How basic material processes create a finished product
- The possibility 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 tolerance is a necessary part of manufacturing
- The importance of safety in the manufacturing field

**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:

- Apply various math concepts and calculations
- Net a 3D object
- Design a package according to given specifications
- Manipulate inequalities that relate to manufacturing
- Explain how accuracy and precision play an important role in manufacturing

**Assessments:**

- CNC project
- Laser Engraver project
- Netting of 3D object assignment

**Software/Resources:**

- CNC software
- Laser Engraver software