

# Unit 7 - Problem Solving using 3D Design

Content Area: **Unified Arts**  
Course(s): **Tech Apps 8**  
Time Period: **December**  
Length: **15 days**  
Status: **Published**

## Unit Summary

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Students will use the Human Centered Engineering Design Process and 3D Design to solve design challenges.

## Standards

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MA.8.8.3	Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.F.CS1	Identify and define authentic problems and significant questions for investigation.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.8.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.8.F.CS4	Use multiple processes and diverse perspectives to explore alternative.
TECH.8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
TECH.8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.

TECH.8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
TECH.8.2.8.C.5b	Create a technical sketch of a product with materials and measurements labeled.
TECH.8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.

## Student Learning Objectives

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- Students will learn the design process to develop a learning tool for 8th grade math geometry standards.
- Students will learn how to develop a prototype of their learning tool on paper with measurements labeled.
- Students will learn to incorporate feedback from peers in the redesign of their prototype.
- Students will learn to design their solution in a CAD tool and upload it for printing.

## Essential Questions

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- How are new technologies impacting our world?
- How do we identify and solve problems effectively?
- In what ways do you personally prefer learning new things?

## Enduring Understandings

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- Students will understand that technology systems can be used to create, invent, and design products.
- Students will understand that planning and reflecting are essential skills in the design and development process.
- Students will understand that getting input from your target audience/consumer throughout the product development lifecycle is important in building a successful product.
- Students will understand that knowing how a tool, such as a CAD tool, works is essential to being able to use it to design and innovate products.
- Students will understand that simulation and modeling can aid in the process of learning.

## Application

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- Students will be able to independently use their learning...

## Skills

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Students will be skilled at:

- Working with a partner to empathize with their needs and identify/define a mathematics learning challenge such as the Pythagorean Theorem.
- Designing a prototype on paper complete with measurements and get feedback from their partner.
- Creating a precise CAD drawing and follow the procedure for uploading it to the 3D printer.

- Choosing a path to follow for learning the CAD tool and facilitate their own learning through specific challenges.