

# Unit 3 - 3D Design and Printing

Content Area: **Technology**  
Course(s): **Technology 5**  
Time Period: **March**  
Length: **10 Classes**  
Status: **Published**

## Unit Overview

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This unit will take approximately 10 classes.

Vocabulary for this unit includes: CAD, workplane, scroll, group, ungroup, hole, mirror, pan, scale, x-axis, y-axis, z-axis, die

## Priority Standards

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CS.3-5.8.2.5.ED.1	Explain the functions of a system and its subsystems.
CS.3-5.8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
CS.3-5.8.2.5.ED.3	Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
CS.3-5.8.2.5.ED.4	Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).

## Essential Questions

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- How can 3D printing be utilized to create objects and solve problems?
- How can computer aided design assist in the creation of a 3D object?
- How can constraints and possible trade-offs affect a final product?
- What role does a prototype play in the design process?

## Unit Learning Goals

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- SWBAT create a computer aided design based off of a set of constraints.
- SWBAT create a physical model by utilizing a prototype.
- SWBAT describe the basic functionality and capability of 3D printing.
- SWBAT design a prototype of a possible 3D object in addition to explaining how the final design was arrived at.
- SWBAT utilize an online tutorial to create a computer aided design.

## **Unit Learning Targets**

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- I can create a computer aided design while taking in account constraints and trade-offs.
- I can create a physical model by utilizing a prototype.
- I can describe the basic functionality and capability of 3D printing.
- I can design a prototype of a 3D object and explain how this design was arrived at.
- I can use an online tutorial to help me create a computer aided design.

## **Marzano Elements**

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- Examining Errors in Reasoning
- Examining Similarities and Differences
- Helping students examining their reasoning (DQ3)
- Helping students practice skills, strategies and processes (DQ3)
- Helping students process new content (DQ2)
- Helping students record and represent knowledge (DQ2)
- Identifying critical content (DQ2)
- Previewing new content (DQ2)
- Providing Resources and Guidance

## **Strategies for Differentiating Instruction**

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- Modeling and practice with 3D pen and manipulation of CAD resources
- Advanced students to assist others (groupings as needed)
- Independent practice with additional resources available
- One on one monitoring and conferences as needed
- Assignment adaptations as required and needed as per IEP/504
- Allow and encourage more advanced students to create/design more complex objects
- Allow and encourage less advanced students to create/design less complex objects

## **Unit Assessments (Required)**

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- Assessment of creation of a 3D object based on constraints and trade-offs (completed object and explanation of the process)

## **Unit Assessments (Optional)**

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- Knowledge assessment of 3D printing capabilities
- Assessment of justification of design

- Vocabulary term assessment

## Unit Learning Goals / Targets / Plans

<b>Class</b>	<b>Topic</b>	<b>Lesson / Activity</b>	<b>Standard / Learning Goal / Target</b>
1	Introduction to 3D Design	What is 3D Design, preparation for 3D Pens	<p><b>Standard:</b> CS.3-5.8.2.5.ED.1 - Explain the function of a 3D pen.</p> <p><b>Learning Goal:</b> SWBAT describe the basic function of a 3D pen.</p> <p><b>Learning Target:</b> I can describe the basic function of a 3D pen.</p>
2	Creation of a 3D Object	3D Pens and creation of a prototype	<p><b>Standard:</b> CS.3-5.8.2.5.ED.2 - Collaborate to solve a problem, and evaluate all possible solutions to a problem.</p> <p><b>Learning Goal:</b> SWBAT design a prototype of an object that the final design was arrived at.</p> <p><b>Learning Target:</b> I can design a prototype of an object that the final design was arrived at.</p>
3-5	Build an object based off of a design	Utilize a prototype to continue to build a 3D object with a 3D pen	<p><b>Standard:</b> CS.3-5.8.2.5.ED.3 - Follow step-by-step procedures to solve a problem, using appropriate tools to accomplish a task.</p> <p><b>Learning Goal:</b> SWBAT create a physical model of an object.</p> <p><b>Learning Target:</b> I can create a physical model of an object.</p>
6	Introduction to computer aided design	Learn how to utilize a computer to assist with 3D design	<p><b>Standard:</b> CS.3-5.8.2.5.ED.3 - Follow step-by-step procedures to solve a problem, using appropriate tools to accomplish a task.</p> <p><b>Learning Goal:</b> SWBAT utilize an online tutorial to learn how to use a 3D pen.</p> <p><b>Learning Target:</b> I can use an online tutorial to learn how to use a 3D pen.</p>

7-10	CAD design of 3D object / assessment	Unit assessment on 3D design	<p><b>Standard: CS.3-5.8.2.5.ED.3</b> - Follow step b problem, using appropriate tools to accomplish</p> <p><b>Standard: CS.3-5.8.2.5.ED.4</b> - Explain factors products and systems (e.g., resources, criteria</p> <p><b>Learning Goal:</b> SWBAT create a computer a</p> <p><b>Learning Target:</b> I can create a computer aic trade-offs.</p>
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## Cross Curricular Connections

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- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- 5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.
- 5.G.B Classify two-dimensional figures into categories based on their properties.

## 21st Century Themes

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For this unit, students will work on the following 21st century themes:

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

## Materials and Resources

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[Google Classroom](#)

[Tinkercad](#)

[3D Printing Video](#)

[Tinkercad Video](#)