

# Unit 2 - Engineering and Design - Robot Arm

Content Area: **Technology**  
Course(s): **Technology 4**  
Time Period: **December**  
Length: **8 Classes**  
Status: **Published**

## Unit Overview

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This unit will take approximately 8 classes.

Vocabulary for this unit includes: Design Process, Prototype, Troubleshooting, Innovate

## Priority Standards

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|-------------------|---|
| 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.  |

## Essential Questions

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- How can the design process assist me in creating something?
- How can the design process help me to innovate?

## Unit Learning Goals

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- SWBAT create a basic robot arm by utilizing the design process
- SWBAT create a prototype sketch of a robot arm in cooperation with a peer.
- SWBAT differentiate the order of the design process.
- SWBAT express in writing how each step of the design process was utilized in the creation of their arm.

## Unit Learning Targets

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- I can design a working product by creating an illustration with my peer.
- I can explain how I utilized each step of the design process when creating my arm.
- I can order and describe the steps of the design process.
- I can utilize the design process to assemble an arm that can pick up a cup.

## **Marzano Elements**

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- Helping Students Engage in Cognitively Complex Tasks
- Helping Students Examine Similarities & Differences
- Helping Students Examine their Reasoning
- Helping Students Practice Strategies, Skills, & Processes
- Helping Students Process New Content
- Helping Students Revise Knowledge
- Identifying Critical Content from the Standards
- Previewing New Content
- Providing Feedback & Celebrating Success
- Using Formative Assessment to Track Progress

## **Strategies for Differentiating Instruction**

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- Meet with students individually and as a group to provide specific advice and guidance according to progress indicated on robot arm/illustration
- Provide written instructions as needed in addition to the electronic ones provided
- Read directions individually to the student and have them clarify back what the expectation is.
- Provide feedback to students individually and by group by periodically meeting about the progress of their robot arm
- Have student state what guidance they have provided to their partner. (Also fill in for missing partners)
- Model how to interact with a peer in a constructive way.
- Allow and encourage more or less complex arm designs according to ability

## **Unit Assessments (Required)**

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- Robot arm design assessment
- Project reflection assessment

## **Unit Assessments (Optional)**

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- Design process assessment

## **Unit Learning Goals / Targets / Plans**

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| <b>Class</b> | <b>Topic</b>                      | <b>Lesson / Activity</b>                                       | <b>Standard / Learning Goal / Target</b>   |
|--------------|-----------------------------------|--|--|
| 1            | The Design Process                | Introduction to the design process                             | <p><b>Standard: CS.3-5.8.2.5.ED.3</b> - Identify potential problems using common troubleshooting strategies.</p> <p><b>Learning Goal:</b> SWBAT differentiate the order of the design process.</p> <p><b>Learning Target:</b> I can order and describe the steps of the design process.</p>        |
| 2            | Introduction to Robot Arms        | Introduction of Robot Arm project, and creation of a prototype | <p><b>Standard: CS.3-5.8.2.5.ED.2</b> - Collaborate to define a problem, and evaluate all possible solutions and models.</p> <p><b>Learning Goal:</b> SWBAT create a prototype of a robot arm.</p> <p><b>Learning Target:</b> I can design a working prototype of a robot arm.</p>                 |
| 3-7          | Robot Arm Design and Construction | Construction and troubleshooting of robot arms                 | <p><b>Standard: CS.3-5.8.2.5.ED.3</b> - Identify potential problems using common troubleshooting strategies.</p> <p><b>Learning Goal:</b> SWBAT create a basic robot arm.</p> <p><b>Learning Target:</b> I can utilize the design process to create a robot arm.</p>                               |
| 8            | Robot Arm Testing / Conclusion    | Design Process Explanation of Use and Testing of Arm           | <p><b>Standard: CS.3-5.8.2.5.ED.3</b> - Identify potential problems using common troubleshooting strategies.</p> <p><b>Learning Goal:</b> SWBAT express in writing the creation of their arm.</p> <p><b>Learning Target:</b> I can explain how I utilized the design process to create my arm.</p> |

## Cross Curricular Connections

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- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 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.
- 4.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.
- 4.MD.B Represent and interpret data.

## 21st Century Themes

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

- CRP1. Act as a responsible and contributing citizen and employee.
- 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.
- CRP9. Model integrity, ethical leadership and effective management.
- CRP11. Use technology to enhance productivity
- CRP12. Work productively in teams while using cultural global competence.

## Materials and Resources

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[Google Classroom](#)

[PBS Kids Design Squad](#)

[Engineering for Kids](#)

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