# Area

v3.0

Applied Mathematics | Student Engineering Workbook

## Team Members:

1. _____ 2. _____

| Total Points | |
|---|---|
| Workbook: | ..... /10 pts |
| Challenge: | ..... /20 pts |

### What is Area?

Fill in the blanks in the statement below.

1. _____ is the amount of two-dimensional space taken up by an object. Area is measured in _____ _____ of a fixed size, such as square inches (in²) or square centimeters (cm²).

### Assemble a Square, Rectangle, and Circle

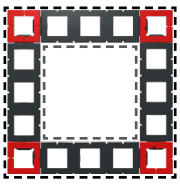
Place a check in each box as each step is completed.

2. ☐ Assemble a **square** using Kid Spark engineering materials.
3. ☐ Assemble a **rectangle** using Kid Spark engineering materials.
4. ☐ Assemble a **circle** using Kid Spark engineering materials.

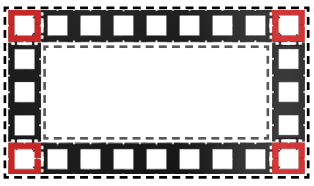
### Determine the area of Squares, Rectangles, and Circles

Fill out the correct information in the spaces provided.

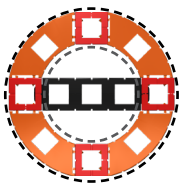
5. **Area** of entire **square**: _____ cm²
6. **Area** of interior **square**: _____ cm²
7. **Area** of entire **rectangle**: _____ cm²
8. **Area** of interior **rectangle**: _____ cm²
9. **Area** of entire **circle**: _____ cm²
10. **Area** of interior **circle**: _____ cm²



Square



Rectangle



Circle

## Design & Engineering Challenge

Follow each step in the Design & Engineering Process to develop a solution to the challenge.
Place a check in each box as each step is completed. Fill in the blanks when necessary.

1. Identify The Challenge

   ☐ Challenge: _____

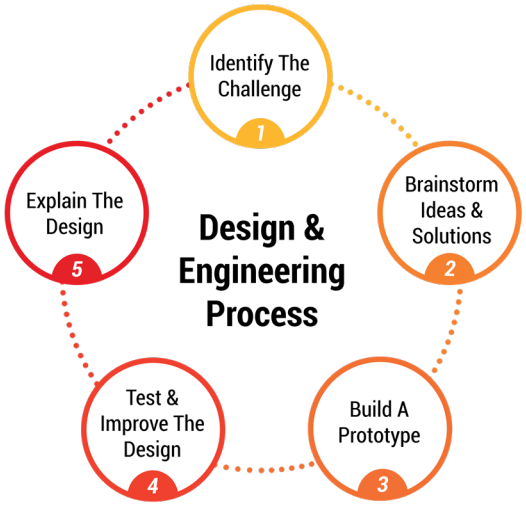
2. Brainstorm Ideas & Solutions

   ☐ Discuss design ideas.

   ☐ Consider building components.

   ☐ Sketch out design ideas on paper.

   ☐ Choose the best design.




3. Build A Prototype

   ☐ Use Kid Spark engineering materials to build a prototype.

4. Test & Improve The Design

   ☐ Look for opportunities to improve the design. (Is it practical, proportional, etc..)

   ☐ Review challenge specifications/criteria and grading rubric.

5. Explain The Design

   ☐ Determine the specifications of the design that was created. *Student Engineering Workbook - Page 3*

   ☐ Discuss the following items with your team and be prepared to share with the rest of the class.

   a. How did the team arrive at the final design solution? Discuss how each step in the Design & Engineering Process was used to develop the design.

   b. Is the design realistic and well-proportioned? Is the large room big enough to store a maintenance vehicle? Is there enough room to walk around the vehicle when it's inside the building?

   c. How did each team member contribute towards the overall design? Do you feel like everyone had an equal opportunity to contribute in the creative process?

   d. Is the team prepared to share detailed specifications of the design to others?

## Design Specifications

Use the space provided to determine the area of the large and small rooms in the storage building.

**Large Room**

**Total area of large room:** _____ $cm^2$

**Small Room**

**Total area of small room:** _____ $cm^2$

## Challenge Evaluation

When teams have completed the Design & Engineering Challenge, it should be presented to the teacher and classmates for evaluation. Teams will be graded on the following criteria:

- **Specifications:** Does the design meet all specifications as stated in the design brief?
- **Team Collaboration:** How well did the team work together? Can each student describe how they contributed?
- **Design Quality/Aesthetics:** Is the design of high quality? Is it structurally strong, attractive, and well-proportioned?
- **Presentation:** How well did the team communicate all aspects of the design to others?

| Grading Rubric | Advanced 5 Points | Proficient 4 Points | Partially Proficient 3 Points | Not Proficient 0 Points |
|---|---|---|---|---|
| **Specifications** | ☐ Meets all specifications | ☐ Meets most specifications | ☐ Meets some specifications | ☐ Does not meet specifications |
| **Team Collaboration** | ☐ Every member of team contributed | ☐ Most members of team contributed | ☐ Some members of team contributed | ☐ Team did not work together |
| **Design Quality/ Aesthetics** | ☐ Great design/ aesthetics | ☐ Good design/ aesthetics | ☐ Average design/ aesthetics | ☐ Poor design/ aesthetics |
| **Presentation** | ☐ Great presentation/ well-explained | ☐ Good presentation/ well-explained | ☐ Poor presentation/ explanation | ☐ No presentation/ explanation |
| **Points** | ..... | ..... | ..... | ..... |
| **Total Points** | | | | ...../20 |