



Team Members:

1. _____ 3. _____

2. _____ 4. _____

Total Points

Workbook: /7 pts

Challenge: /25 pts

Exploring Rotary Motion

Instructions: Write the correct answer in the spaces provided.

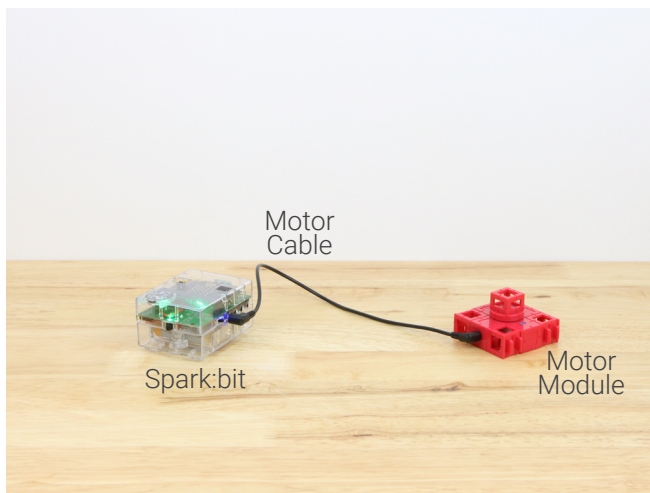
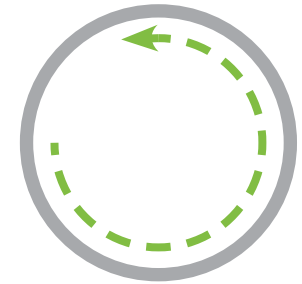
1. _____ is motion that turns round in a circle.

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

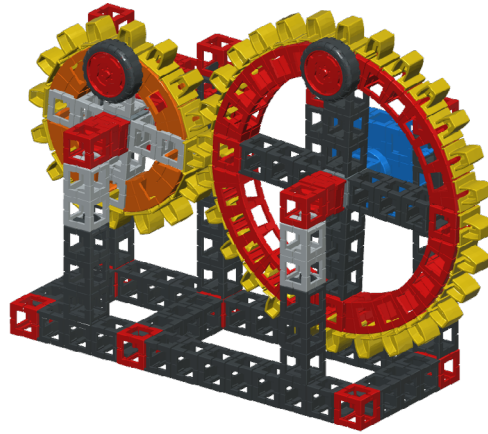
2. ☐ Locate an Axle Block and a Snap-In Wheel, and observe how they create rotary motion.
3. ☐ Try and locate a few additional engineering materials in the Kid Spark Lab that produce rotary motion.
4. ☐ Discuss and/or research real-world examples of rotary motion.
5. ☐ Using a Motor/Output Cable, connect a Motor Module to output 1 on the Spark:bit. Activate Motor Override Mode using the switch located next to output 1 on the Spark:bit. Observe the rotary motion produced by the Motor Module when pressing the A/B buttons on the Spark:bit.

Rotary Motion

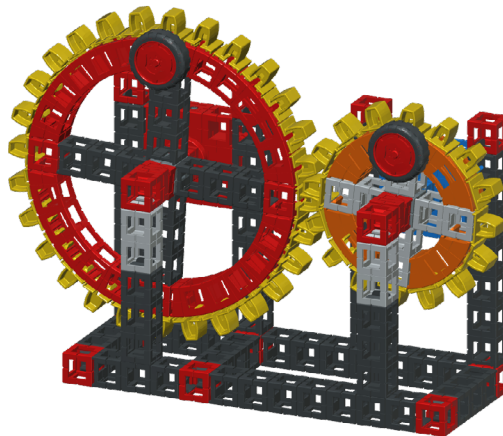
- Turning round in a circle -



6. ☐ Assemble a simple gear train and observe how it produces rotary motion. Look closely at the rotating gears and observe how they are rotating in opposite directions.



7. ☐ Rearrange the gears so the large gear is connected to the motor module and the small gear is connected to the bearing module. Activate the gear train and observe how much faster the small gear is rotating than the large gear.



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.

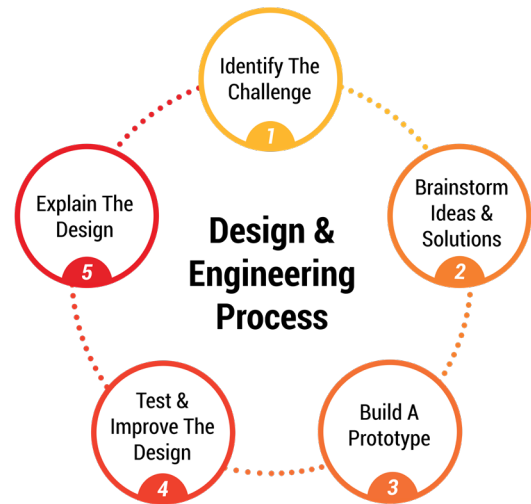
4. Test & Improve The Design

- ☐ 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?
- 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 Specification

Determine the specifications of the completed design/project. Teams can use these specifications as they prepare to present their design to others.

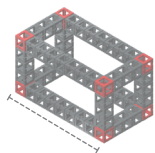
Product Innovation/Invention: _____

Purpose: _____

Engineering Notes:

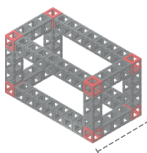
(How does the design work? Are there any key engineering materials that make the design function well?)

Project Dimensions



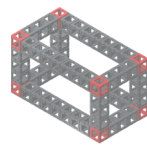
Length

_____ cm



Depth

_____ cm



Height






_____ cm

Cost Analysis

Engineering materials used: _____ x 2 = Total Cost \$ _____

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:

-  **Design and Engineering Process:** Did the team complete each step of the Design and Engineering Process on page 3?
-  **Design Specification:** Did the team complete the design specification on page 4?
-  **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/explain all aspects of the design to others?

Grading Rubric	Advanced 5 Points	Proficient 4 Points	Partially Proficient 3 Points	Not Proficient 0 Points
Design & Engineering Process	<input type="checkbox"/> Completed all 5 steps of the process	<input type="checkbox"/> Completed 4 steps of the process	<input type="checkbox"/> Completed 3 steps of the process	<input type="checkbox"/> Completed 2 or fewer steps of the process
Design Specification	<input type="checkbox"/> Complete/well-detailed and of high quality	<input type="checkbox"/> Complete/opportunities for improvement	<input type="checkbox"/> Incomplete/opportunities for improvement	<input type="checkbox"/> Incomplete
Team Collaboration	<input type="checkbox"/> Every member of the team contributed	<input type="checkbox"/> Most members of the team contributed	<input type="checkbox"/> Few members of the team contributed	<input type="checkbox"/> Team did not work together
Design Quality/Aesthetics	<input type="checkbox"/> Great design/great aesthetics	<input type="checkbox"/> Good design/good aesthetics	<input type="checkbox"/> Average design/average aesthetics	<input type="checkbox"/> Poor design/poor aesthetics
Presentation	<input type="checkbox"/> Great presentation/very well-explained	<input type="checkbox"/> Good presentation/well-explained	<input type="checkbox"/> Poor presentation/poor explanation	<input type="checkbox"/> No presentation/no explanation
Points
Total Points			/25