



**Unit:** Spark Roller Coaster Design Challenge

**Unit Objective:** Participants will be inspired by the ingenuity of simple materials like plates, popsicle sticks to combine with the knowledge of force and motion. Participants will learn about the force, motion gravity and energy while working on teams to design and build a roller coaster track for a marble.

**Creativity Component:**

Inspiration: Participants will be inspired by grade level appropriate lessons about force and motion. Participants will apply the laws of motion to the challenge of designing and building a working roller coaster while working in a team setting.

Iteration: Participants on teams will test their roller coaster and make changes to the design to improve its structure and ability to guide the marble into the cup.

Innovation: Participants will name their roller coaster and add innovation through creative expression and original artwork.

**Materials Needed:** Pool noodles, paper plates, tape, markers, cups, marbles and cardboard platforms.

**Differentiation Activities:** Students will be lead through the activity with consideration given to age and abilities. Students that require additional assistance will be guided through the process. Scaffolding can be added by giving more direct instruction during the building process. Depth can be added by having students explain how the parts of their roller coaster interact with each other in a cause/effect relationship and how those interactions exemplify Newton's Laws of Motion.

**Assessment of Unit Objective:** Each participant will be part of a team that will design and build a roller coaster hill that transports a marble to a destination. Participants will observe the relationships between force, motion and energy.

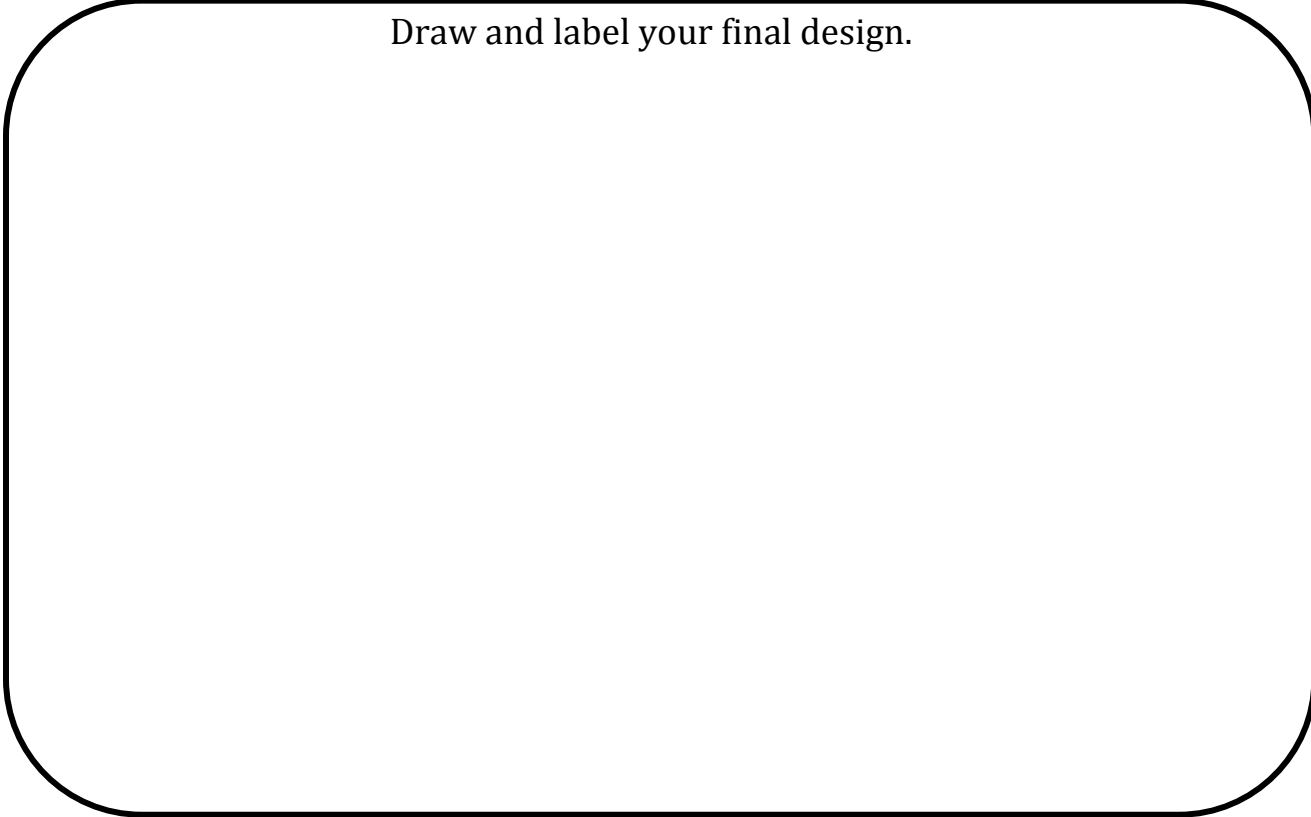
**Grade Levels Supported:**

SCIENCE TEKS	FINE ARTS TEKS
3 <sup>rd</sup> Grade: 3.6	3 <sup>rd</sup> Grade: 3.2
4 <sup>th</sup> Grade: 4.6	4 <sup>th</sup> Grade: 4.2
5 <sup>th</sup> Grade: 5.6	5 <sup>th</sup> Grade: 5.2
6 <sup>th</sup> Grade: 6.8	6 <sup>th</sup> Grade: 6.2
7 <sup>th</sup> Grade: 7.7	7 <sup>th</sup> Grade: 7.2
8 <sup>th</sup> Grade: 8.6	8 <sup>th</sup> Grade: 8.2

**Reflection/Take Home Learning Ideas:** Use paper and tape and see how tall you can build a tower. Can your tower hold weight? Try to build it so it can hold the weight of a book.



Draw and label your final design.



How did your group apply your knowledge about the laws of motion to your design?

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Describe how teamwork factored into this challenge?

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**CONCLUSION:** Rate the success of your rollercoaster.. What factors did you use to determine success?

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# Rollercoaster Design Challenge

Group Members:

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What is the team goal for the day?

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\_\_\_\_\_  
\_\_\_\_\_

Brainstorm with your group and make a list of ideas you think might work.

Plan by sketching.

As you work through the design of your rollercoaster, keep a list of challenges you encounter and how you improved the design.

**Problem**

**How we fixed it**

# Rollercoaster Challenge

## Data Collection

Name: \_\_\_\_\_

**Roller  
coaster  
Trial #**

**Distance**

**Height**

**Directionality**