STEM – Forces and Motion & Energy Conservation and Transfer—
Paper Plate Roller Coaster

Suggested Grade Level: 7th and can be modified for younger or older students

NC Standard - 7.P.2; Physics

Words and Phrases to Discuss – Potential energy, kinetic energy, height, slope

Materials List:

- Paper plates
- Index cards, card stock or cardboard tubes
- Tape
- Scissors
- Pompom, rubber ball, ping pong ball or marble
- Pieces of foam board or cardboard to serve as the base for each roller coaster

Instructions: Ask the students if they think they can create a roller coaster out of paper plates (and other materials if provided.) If students have not seen a roller coaster, find images or videos to preview before the lesson.

Activity: Break the classroom into small groups and explain that they are going to construct a roller coaster with the materials provided. Have students discuss their design and draw out their ideas.

Provide each group the same types and quantities of materials to begin their construction. Have students take the materials and construct their roller coaster according to their design plan—taping the components together and securing their structure onto the base. Have students test its construction by launching a pompom, ball or marble with the goal of keeping it on the track for the duration of its run. Then, have students conduct test runs with a pompom, rubber ball, ping pong ball and/or marble to test for speed and velocity.

Science Notebook Helper - During the planning stage, have students draw their coaster design prior to constructing it. Have students record their findings as they conduct their test runs.

Tips and Talking Points: Ask: What do you know about roller coasters? Discuss the various components or features of a roller coaster. Ask students to hypothesize on the impact of each component or feature on the object it will carry. Have students discuss how they might go about cutting or altering a paper plate to transform it into a roller coaster.

Guiding Questions

- Did your object make it all the way to the end of the coaster without falling off the track? Why or why not?
- What happened when you tested other objects? Did the lighter object move faster or slower than the heavier object?
- What role does the height or slope of the track play on your object? Did you have any track failures along the way? If so, what did you do to correct them?

- What impact did a steep slope have on your object?
- How could you improve your coaster to make it faster and stronger?
- Did you get similar results with each type of object you tested? Is what you observed what you expected? Can you explain why?

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