



STEAM Activity: International Energy Racer

Type of Teacher Tool: Small Group

Targeted Grade Level(s): 5-8

Targeted Curriculum Areas: Physics, Visual Arts

Learning Objectives:

The learner will:

1. create a structure (Energy Racer) demonstrating potential energy to kinetic energy.
2. test the racer, modify and redesign to go the farthest distance.
3. research a foreign country and incorporate the colors and imagery of that country in the design of the racer.

Featured National Standards:

1. CCSS.ELA-LITERACY.RST.6-8.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
2. ISTE National Technology Standards 3d—Students build knowledge by actively exploring real world issues and problems, developing ideas and theories and pursuing answers and solutions
3. ISTE 4a—Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems
4. ETS1-2 Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem.

National Core Arts Standard Visual Art

VA:Cr2.3.7a--1. Apply visual organizational strategies to design and produce a work of art, design, or media that clearly communicates information.

Additional State and National Standards related to the content of our videos listed below for this lesson are also provided on the Educate.Today page where you find the video.

Resources/Materials Needed:

1. Physics 9: The Science Behind Roller Coasters
2. Building Materials: different sizes of rubber bands, different washers, wooden or plastic spools, toothpicks, tape, and pencils
3. Various types and colors of paint and brushes
4. The additional Educate.Today videos:

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Sample Video-116: Flag and Location of Argentina
 Geography-10: Flag and Location of Mongolia
 Geography-12: Flag and Location of France
 Geography-13: Flag and Location of Denmark
 Geography-14: Flag and Location of Germany
 Geography-15: Flag and Location of Italy
 Geography-16: Flag and Location of Argentina
 Geography-17: Flag and Location of Russia
 Geography-18: Flag and Location of Brazil
 Geography-19: Flag and Location of Mali

Teacher Instructions:

1. Watch the Physics 9 video and discuss potential and kinetic energy.
2. Divide the class into groups and have each group scan the Geography videos and pick a country that will be displayed on the speed racer.
3. Give each group a spool, toothpick, pencil, rubber band and washer.
4. Give the groups access to paints and instruct them to design and paint the racer to represent their chosen country.
5. Give directions for creating the Energy Racer: push the rubber band through the hole in the spool; secure the rubber band at one end by pushing a toothpick into the rubber band loop that sticks out of the hole and taping the toothpick and rubber band loop to the spool; break off any extra toothpick, on the other side of the spool, push the other end of the rubber band through a washer and slide a pencil through the rubber band loop that sticks out from the washer; holding the spool in one hand use the other hand to wind the pencil around two times; put the spool and pencil on the floor and let it go.
6. Give the students the design challenge: make the Energy Racer run as fast as possible or make the Energy Racer run as far as possible.
7. Have the students choose one challenge and work to redesign their racer using different rubber bands and washers to best meet the challenge.
8. Measure the time and or distance to determine the international winner.

Extension Activity Options:

1. Try different materials for the racer such as Styrofoam cups, paper cups, paper plates, bamboo skewers, beads, and rubber bands.
2. Try to build an Energy Racer with both challenges met.
3. Have the students dress in colors to represent the country.
4. Have the students conduct the races in a social studies class.

Assessment/Evaluation Options:

1. Check that students have built the Energy Racer using the materials and directions given.
2. Check that students did redesign to improve their Energy Racer to make their racer go as fast or as far as possible.
3. On a scale of 1-10 rate the racers visual impact in the use of color, line, and balance in representing the chosen country.