



ELASTIC POWERED CAR – Colour, Detail, Engineering

Students explore the difference between potential and kinetic energy by creating an elastic powered car out of cardboard and a variety of found objects.

Required Time

180 Minutes

Grade Level

Grade 4 to Grade 8

Subject

Language Arts
Science
Visual Arts

Vocabulary

Materials

Cardboard Boxes and Container Lids

Rubber Bands

Bamboo Skewers

Crayola Glitter Paint

Crayola Tempera Paint

Crayola Paint Brushes

Crayola Scissors

Crayola White Glue

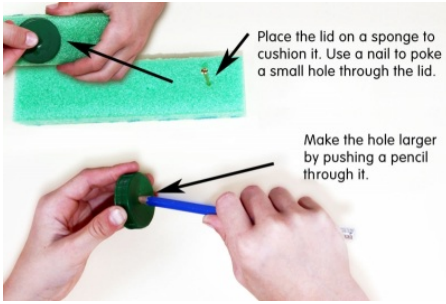
Shop Crayola
Products

Steps

Step One

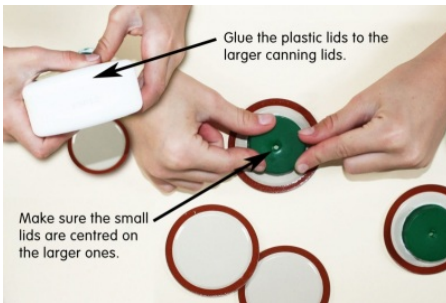
WHEELS

1. Place a small plastic lid on a sponge to cushion it.
2. Use a nail to poke a small hole through the centre of the lid.
3. Make the hole bigger by pushing a pencil through it.
4. Repeat this for 3 more lids.



Step Two

1. Glue a small plastic lid to a bigger canning lid.
2. Make sure the small lid is centred on the canning lid.
3. Have the top of the small lid facing up.
4. Repeat for the other 3 small lids.
5. Place the wheels aside to dry.



Step Three

CAR BODY

1. Use a sturdy box for the body.
2. Make sure the bottom of the box is open.



Step Four

1. Poke holes through opposite sides of the box for the axles of the wheels.
2. Make sure the holes are big enough for the axles to turn smoothly.

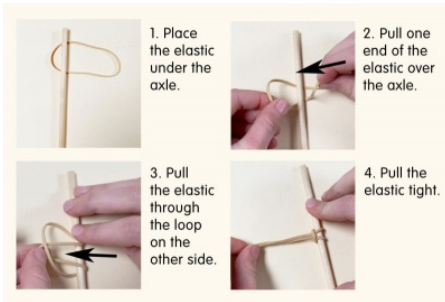


Step Five

1. Insert the axle into the hole in one of the wheels.
2. Insert the axle through the holes in the sides of the box and into the other wheel.

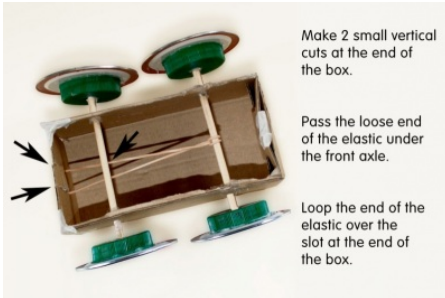


Step Six



1. Loop the elastic around the rear axle.
 - *Place the elastic under the axle.*
 - *Pull one end of the elastic over the axle.*
 - *Pull the elastic through the loop on the other side.*
 - *Pull the elastic tight.*

Step Seven



1. Make 2 small vertical cuts at the end and in the middle of the small box to make a slot for the elastic.
2. Pass the loose end of the elastic under the front axle.
3. Loop the end of the elastic over the slot at the end of the box.
4. Tape the slot in place.



Step Eight

1. Use cardboard to make details for your car and paint them with glitter or tempera paint.



Step Nine

1. View your car from all sides.
2. See how far your car will go.
3. Explain how the energy to move the car is created.

Learning Goals

Students will be able to:

- build an elastic powered car with a working wheel and axle;
- use cardboard and paint to add details that highlight the car's purpose;
- explain the difference between elastic potential energy and kinetic energy;
- demonstrate technical accomplishment and creativity;
- support their ideas with evidence found in the works.

Extensions

Have students:

- work in small groups to test different ways to make model cars powered by kinetic energy, e.g., kinds and lengths of elastics, size and width of wheels; shape and type of car body;
- create a chart to communicate their findings;
- develop a car that will travel a long distance;
- compare their car with the cars of their peers to find the design that goes the furthest;
- explain what they learned.

Prepare

1. Download and display the *Colour* and *Form* **posters** available on this website.
 - review or teach the element of colour - *analogous, complementary, monochromatic colours*
 - review or teach the element of form - *3-dimensional object, mass*
2. Gather small cardboard boxes, plastic bottles, elastics and canning lids.
3. Prior to this lesson teach about gravity, potential and kinetic energy, and simple machines.

Introduction

1. View several different sizes of elastics - stretching them to see how far they will extend.
2. Discuss the qualities of elastics and make a list of possible uses for them, e.g.,
 - holding a paper roll in place
 - hold braces in place
 - an eraser
 - a hair tie
 - keep ribbons from unspooling
 - keep bags sealed
3. Fire an elastic across the room and discuss what happened.
 - stretched elastic stores **elastic potential energy** - the energy created when the elastic material is stretched or compressed (the more stretch - the more potential energy)
 - when you release the elastic the stored energy is converted to **kinetic energy** - motion
4. Explain that they will be making a simple machine that uses that energy.
5. Review how a *wheel and axle* system works.
6. Introduce the challenge.

Activities

The Challenge

1. Build an elastic powered car with a working wheel and axle.
2. Use cardboard and paint to add details that highlight the car's purpose.
3. Explain the difference between elastic potential energy and kinetic energy.
4. Demonstrate technical accomplishment and creativity.
5. Support your ideas with evidence found in the cars.

The Process

1. Make sure everyone understands the challenge.
2. Establish success criteria with your students, for example,
I know I am successful when I have:
 - created a car that has a working wheel and axle
 - added details that highlight the car's purpose
 - explained the difference between elastic potential energy and kinetic energy
 - kept the finished car in good condition
3. Guide students through the steps outlined in this lesson plan.
4. Observe students as they work.
5. Provide individual assistance and encouragement.

Sharing

1. Place students into small groups.

2. Ask them to:
 - *Compare their work and describe to each other what they did to solve problems along the way.*
 - *Explain how their design highlights the car's purpose.*
 - *Run their cars to see how effectively and how far they go.*
3. Share ideas with the whole class.
4. Ask them to tell how they felt about doing this activity and why.

Assessment

1. Observe students as they work - thoughtful focus, discriminating, seeking more information, elaborating, experimenting.
2. Observe students as they discuss their cars - speaks with a clear voice, looks at audience while speaking, holds car to the side, provides accurate information, answers questions from the audience effectively.
3. Observe students as they listen - looks at presenter, asks effective questions, supports ideas with evidence found in the car.
4. Use a checklist to track progress. (Downloads - ElasticCar_tracking.pdf)
5. Have students use the self-assessment form to evaluate their work. (Downloads - ElasticCar_self-assessment.pdf)