

Questacon at HOME

Energy Activity Sheet

Rubber Band Racer

BACKGROUND

A stretched rubber band is a great source of potential energy. When it is released, that energy is converted into kinetic (movement) energy. Using some materials that you have around the house, you can build a small toy car that can be powered by the energy generated from the rubber band snapping back into shape!

MATERIALS

- 3 craft sticks, one cut in half
- Rubber band
- 2 large plastic bottle caps
- 2 smaller plastic bottle caps
- 1 straw (cut into 3 pieces – 1x8cm, 2x2cm)
- 2 wooden skewer (cut into 4 pieces – 2x10cm, 2x2cm)
- Scissors and needle
- Hot glue gun

PROCEDURE

Lie the two longer craft sticks approximate 4cm apart and carefully hot glue gun each of the smaller craft sticks about 2cm from each end – this will form the rectangular frame of your car. To build the rear axle, take the two 2cm straws and glue each of them horizontally to the two longer craft stick ends (facing the same way as the smaller craft sticks). To make your front axle, take the longer straw and glue it horizontally to the opposite end of the frame.

Puncture a hole in the centre of each of the 4 bottle caps. Take one of the smaller caps and place one of the 10cm skewers through it. Push the skewer through the long straw on the car, then place the other smaller bottle cap on the other end of the skewer.

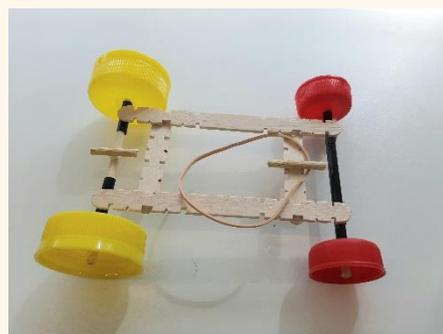
Take one of the larger bottle caps and push the other 10cm skewer through it. Push the skewer through the two smaller straws and place the other large cap on the other end. For some added security, seal the wheels in place with some hot glue (but make sure the skewer is able to spin freely in the straws).

SAFETY

Activity to be conducted under adult supervision. Hot glue gun can cause burns. Broken rubber bands can be a choking hazard. Puncturing holes in plastic and the cutting of the skewers will require parental assistance.



Finally take the 2cm wooden skewers and hot glue one piece to the centre of the back skewer of the car and the other to the centre of the small craft stick at the front of the car. Take the rubber band and wrap it under the front of the 2cm skewer and glue it in place. Pull the rubber band and wrap the other end around the 2cm skewer on the rear axle. Wind the rear axle, and you should see the rubber band getting tighter. Place on a flat surface and let it go!



TIPS AND TRICKS

- To help with traction, add some more weight to the back of your car (i.e. more glue in the wheels, or hot glue on some small metal screws onto the back)
- Try and make sure the straws are sitting in a horizontal position – if they aren't this can interfere with your axles spinning

WHAT'S THE SCIENCE?

Have you ever stretched a rubber band and let it go? When you stretch a rubber band it generates a stored form of energy called **potential energy**. When you release the rubber band the potential energy is converted into movement which is called **kinetic energy**. In our car the rubber band stores potential energy by being wound around the axle. Releasing the axle allows the rubber band to quickly unwind, spinning the axle. The potential energy is converted into kinetic energy, and the car is propelled forward.

Obviously real cars are not powered by giant rubber bands – could you imagine having to get out of your car every few meters in order to wind it up? Going anywhere would take ages! However, cars do require kinetic energy to move, and that comes from the burning of petrol (chemical energy) and the electrical energy that is created in a battery. Some modern cars only need a battery.

WHAT QUESTIONS COULD I ASK?

- How far can I make it go?
- What happens if I wind the rubber band the other way?
- Will different rubber bands have a different effect on the car?
- How does the car drive on different surfaces?

WHAT'S NEXT?

Design Challenge: All this car needed was a frame, wheels, axles and a rubber band. Can you build a better design? Can you create a car that travels further – or faster? Experiment with different materials, frame shapes, wheel sizes and rubber band lengths

Obstacle Challenge: Can you create obstacles for your car like ramps or tunnels? Could your car carry a load or push another object?

Size Challenge: Could you construct a larger car operated by rubber band power? Would you need bigger wheels or more support in the frame?

When experimenting, saying “I don't know” is ok - solving problems is about curiosity and finding things out. If we always knew the answer we would never learn anything new!

