



# MAKE YOUR OWN BOTTLE CAR RACER

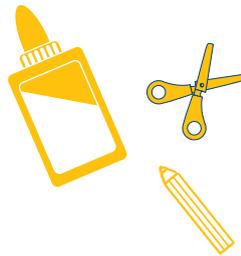


## YOUR CHALLENGE!

Using materials that you probably already have at home, can you build an elastic band-powered racer and race it to see how far it goes?

### YOU WILL NEED:

- 2 plastic drinks bottles
- 6 plastic bottle tops
- 3 wooden sticks, such as kebab skewers
- 3 elastic bands
- Craft knife
- Scissors
- Super glue (optional)



### WHAT TO DO:

#### STEP ONE:

Use the craft knife to cut away most of one side of the bottle, and put face up.



#### STEP TWO:

Carefully make four holes, two on each side of the bottle, and then push two of the skewers through - these will be the axles for your car's wheels.

It's important that the holes are level, and big enough for the skewers to spin around.





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## WHAT TO DO:

### STEP THREE:

Make a small hole in the middle of each bottle top and fix one onto each end of the skewers - these are your wheels!

Make sure they are all touching the ground, and fix with superglue if necessary.



### STEP FOUR

Cut the top off the second bottle and make slits from the cut edge up to the mouthpiece. They should be about an inch apart. Bend all the flaps back and twist them to make a propeller.

### STEP FIVE

Make a hole in a fifth bottle top, and insert the third skewer into the hole. Then screw the cap onto the propeller you just made.



### STEP SIX

Make a hole on the bottom of the bottle, and insert this skewer into the hole.





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## WHAT TO DO:

### STEP SEVEN

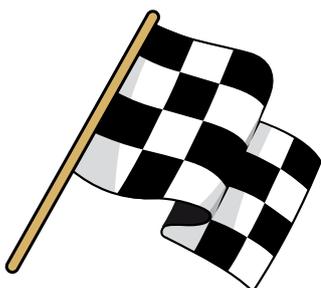
Cut one of the elastic bands so that it is no longer a loop, and use it to fix the other two bands onto the end of the skewer you just inserted into the bottle - tie it tightly so they don't pull off, or fix with superglue.

### STEP EIGHT

Now stretch the rubber bands, and pulling them out through the bottle's mouthpiece. Holding them in place, screw the bottle's lid back on so that the bands stay in position. This is fiddly, so ask an adult to help

### STEP NINE

To wind up your car, spin the propeller round and round so the elastic bands twist - do this as much as you can without breaking the bands. Let go, and watch what happens!

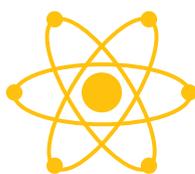


# MAKE YOUR OWN BOTTLE CAR RACER

How could you change your design to ensure your car travels further? What other materials could you use?

Get everyone in your household to build a car - have a competition to see who's goes furthest! What was it about the winning design that made it travel so far?

What happens to the distance your car travels if you use different sized rubber bands, or a different number of them?



## AND NOW FOR THE SCIENCE...

Objects don't start moving of their own accord. We need a force to act on them to get them to move, and in the case of our car the rubber band provides the energy. However, a rubber band on it's own doesn't seem like a great source of energy.

But by twisting the bands - and stretching them in the process - we produce lots of elastic potential energy. This is energy that is stored up, and ready to do some work! As soon as we let the car go, the bands unwind - so the potential energy is converting into kinetic (moving) energy. This in turn moves the propeller on the back of the car, which 'drives' the car forwards by creating differences in air pressure in front of the propeller and behind it.

## COMPETITION TIME!

- Complete 4 challenges and submit an entry to our poster competition to be in with a chance of winning an EDT Experience Day at your school.
- For funded schools, you have the opportunity to receive the Industrial Cadets Challenger Award - click [here](#) for full details.
- Share a photo or video of your experiment with us on social media and use the hashtag #STEAMstars

## IN THE REAL WORLD:

Which of the following are similar to the propeller on the back of your car?

- a) A windmill
- b) A ceiling fan
- c) A boat prop
- d) An aeroplane propeller
- e) All of the above



E - All propellers work in the same way, creating differences in air pressure between the front and the back of the propeller.

## EXPLORE FURTHER

For more resources and videos search for the following:

- [Explain That Stuff: How Propellers Work](#)
- [Ted-Ed: Newton's 3 Laws, with a Bicycle](#)
- [Guinness World Records - an alternative design for a rubber band car](#)

