



Free resources

The Why and How Challenge

The 'Why and How' Challenge is intended to be something for the staffroom table that lots of teachers will try.

It is specifically designed to encourage the children to work scientifically to design and make something or to solve a problem.

This issue's Why and How Challenge is based on a **RUBBER BAND POWERED CAR**. You may have tried versions of this before, but have you used it as a **whole school competition?**

Rubber band cars – whose goes the furthest?

WHAT TO DO

Make two opposite holes at each end of the cardboard tube and thread the dowel or skewers through them to make the two axles (Figure 1). They should be free to move but not too loose. Cut four pieces of drinking straw to fit exactly between the cardboard tube and the end of the axle where it will attach to the wheel (Figure 2).

Figure 1

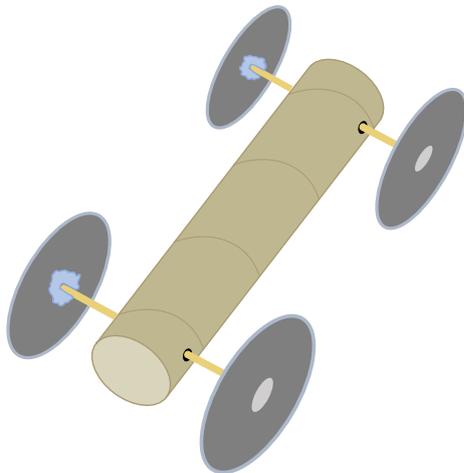
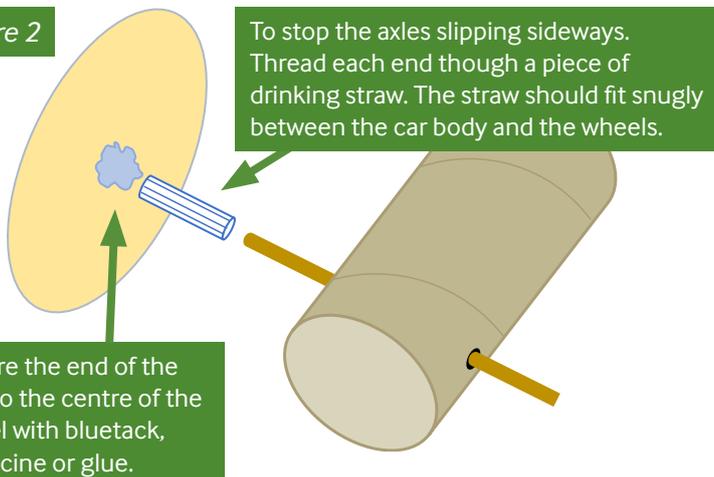


Figure 2



Loop the first elastic band around one of the axles and thread it back through itself to secure it to the axle (Figure 3).



RESOURCES

The same for everyone:

30cm long thick cardboard tube (for the car body)

2 x wooden dowels or skewers (for axles)

Drinking straws (for stoppers to keep the axles from slipping)

4 identical elastic bands

Paper clip

Scissors

Plasticine or bluetack

Glue

Children choose:

A range of materials to make the wheels, e.g. card, bottle tops, CDs, wooden discs, buttons, styrofoam, cotton reels...



Thread a second elastic band through the first and loop it back through itself to make chain. Repeat with two more elastic bands so there is a chain of four. Attach a paper clip to the end of the rubber band chain and drop it down into the tube. Pull the paper clip through the other end of the cardboard tube and clip it to the end of the cardboard tube. The elastic band chain should be inside the tube, attached to the axle at one end and paper clipped to the tube at the other end.

Now for the wheels – this is the part where the children can experiment to find what kind of wheels will make the car go the furthest. They can try changing:

- *the objects/material used for the wheels*
- *the size of the wheels*
- *the position of the wheels on the axle*

When the first set of wheels to test in place, wind up the car by holding the tube and turning the axle where the elastic bands are attached until the elastic is wound multiple times around the axle. Still holding it taut, put the car on the ground and then let go.

The children will need to find a way of making sure that the wheels are securely attached to the axle so the whole thing moves properly. Small amounts of plasticine or bluetack will help with this. For wheels with large holes in the centre (such as CDs) pieces of styrofoam can be cut to fill the hole and hold the axle effectively. Once the children have decided what makes the best wheel they could then glue them securely in place.

Tell the children about the whole school competition and that, as a class, they are going to produce **one car**, that **goes as far as possible**. This will then be their **class entry** to the competition.

RULES FOR THE WHOLE SCHOOL COMPETITION

- *all cars have to be made from the same size and type of cardboard tube with the same kind of axles*
- *all elastic bands used must be the same with four per car*
- *only the wheels can be changed – they can be any size and made of any material and placed at any point on the axle*
- *extra materials to help hold the wheels in place are permitted*

Here's how you could structure a whole school science challenge day:

Morning

Quick assembly to introduce the competition

Children in their own classes, working individually or in pairs/ threes to make the best car they can, ready to race them against the other cars in their class.

After break

Each class holds their own races to decide on their competition entry – only one per class

Afternoon

Whole school to hall for the grand competition. This is best done as a knock out. Two classes at a time race their cars against each other in a best of three. The winner is the car that goes the furthest and this one goes through to the next round and so on.

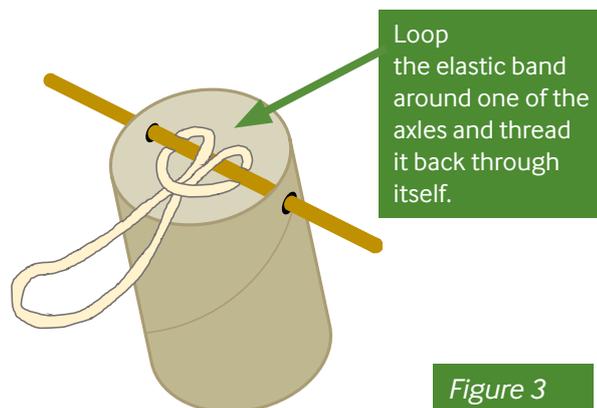


Figure 3