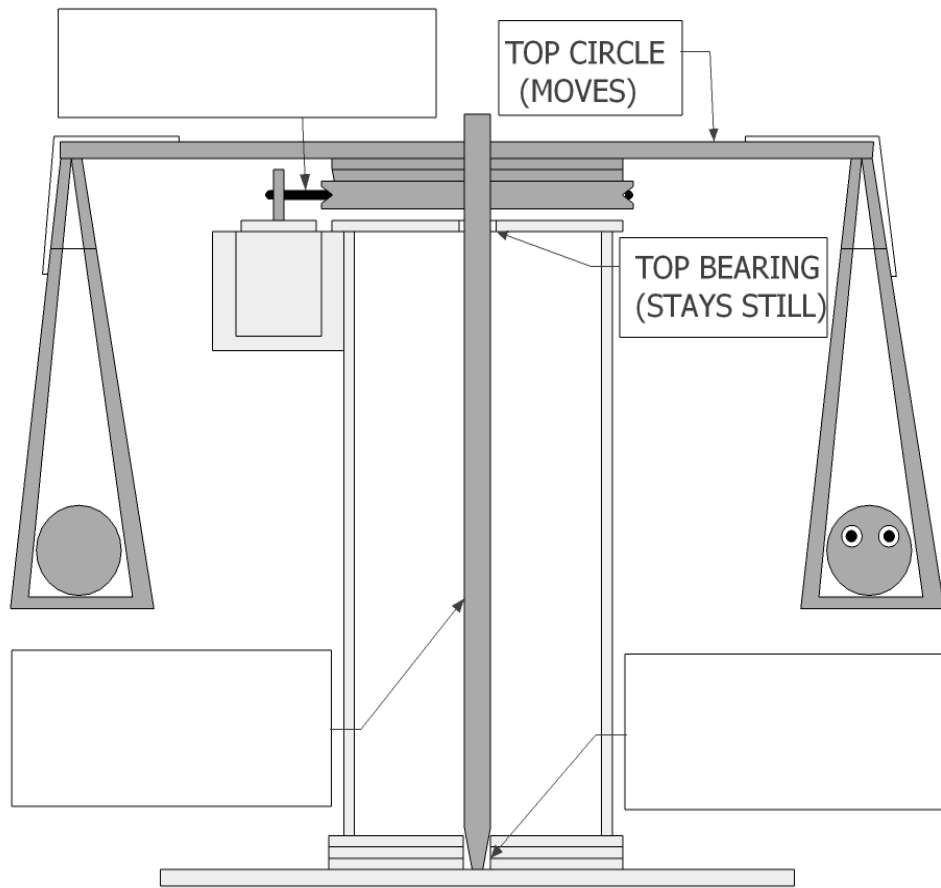


STEP 13

Program a ride for your passengers to make them go forwards and backwards at different speeds. Include a delay when changing direction. An example of a flowchart for this is shown on the right. If your ride stops working see if you can work out why and try to fix it.

EXTENSION ACTIVITIES (optional):

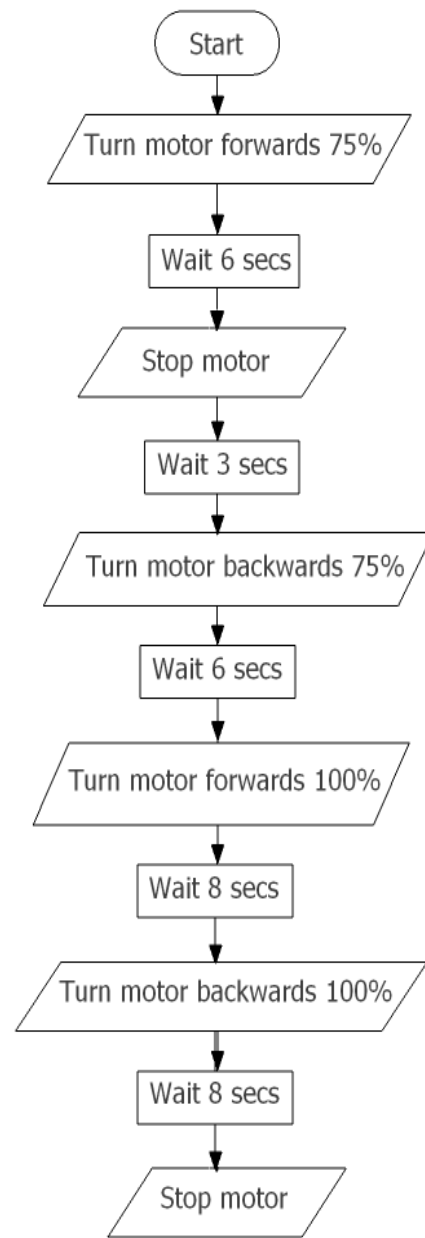
1. On the cross sectional view below, complete the labels for the top circle, top bearing, lower bearing, drive belt and rod, noting whether they move or stay still.



2. Suggest some forces which might act to slow the chair-o-plane down:

STEP 14

Unclip the snap battery connector from the battery holder when not in use to avoid draining the battery.



CRUMBLE WORKBOOK 4 CHAIR-O-PLANE

NAMES:

.....

.....

.....

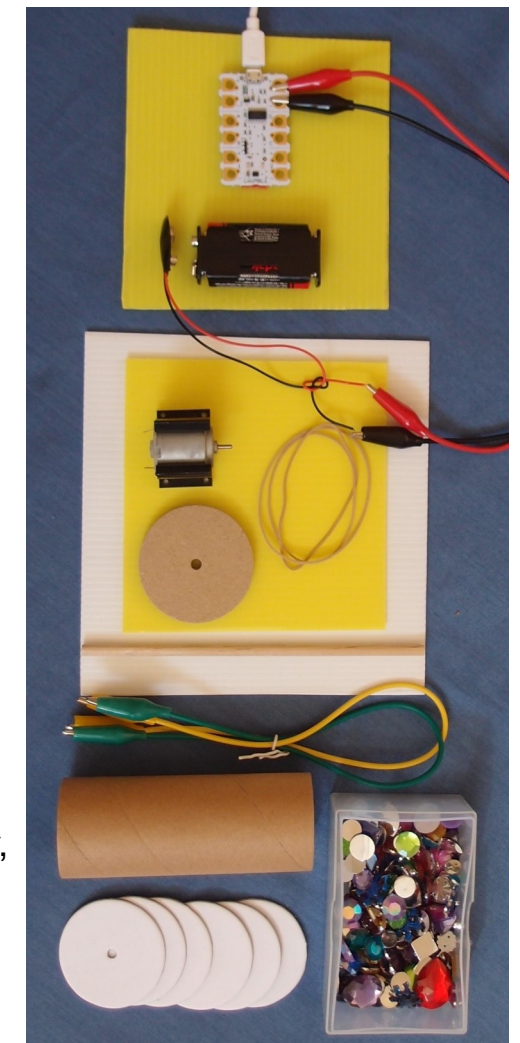
YOU WILL NEED:

Parts

- 1 Crumble controller unit
- 1 large square of corrugated plastic
- 1 small square of corrugated plastic
- 1 motor and motor mount
- 3 rubber bands (about 8.5 cm long)
- 1 pulley
- 1 wooden rod
- 2 crocodile leads
- 1 cardboard craft roll
- 6 card discs
- Coloured gems

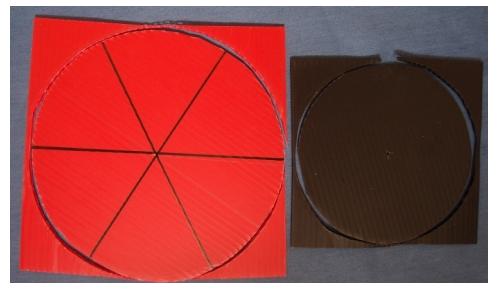
Tools and consumables

Computer, pencil, ruler, pair of compasses, protractor, pair of large scissors, pencil sharpener, transparent sticky tape, low melt glue gun, offcuts of corrugated plastic, 6 lightweight passengers (optional)



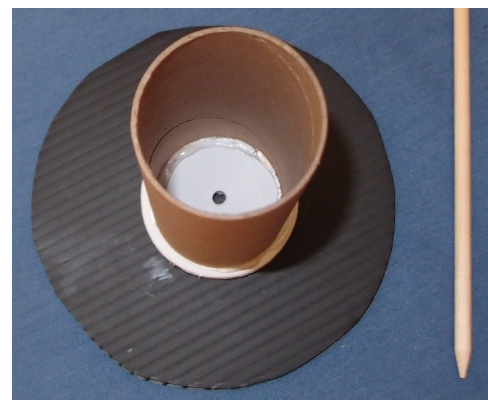
STEP 1

Mark and cut out circles from the plastic squares. The smaller circle is the base and the larger is the top. Mark lines at 60° on the top circle.



STEP 2

Remove any card from the central holes of the card discs. Turn the base over and glue a stack of three discs to the middle. Don't get glue in the central holes. Glue on the craft roll. Partially sharpen one end of the rod so that it slides easily into the holes in the discs. Don't make it pointed; the rod must rest on the base, not pierce it.



STEP 3

Use the nose of the scissors to enlarge the hole in the middle of a disc until the rod can rotate easily in it. Glue the disc to the top of the craft roll.



STEP 4

Mark the wooden rod 13 cm from the sharpened end. Sharpen the blunt end very slightly. Push on the pulley until it just covers the mark. If the pulley is loose on the rod, glue it on. Push two more card discs onto the rod. Glue them to the top of the pulley.



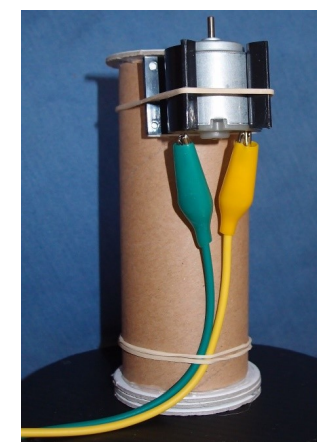
STEP 5

Slide the rod down through the craft roll until it rests on the base. Hold it very straight and feel around for when the end of the rod drops down through the holes in the discs. Check there is a small gap between the bottom of the pulley and the disc on top of the craft roll. Spin the rod to check it rotates easily, then take it out.



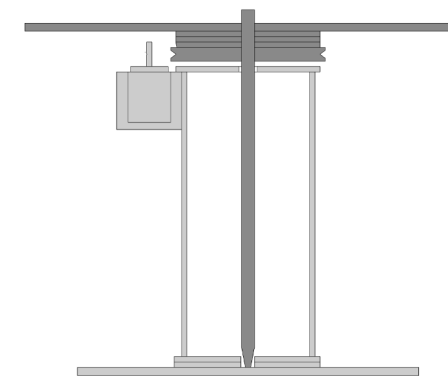
STEP 6

Remove the plastic film and glue the motor mount firmly to the craft roll as shown. Stretch a rubber band over the motor mount and craft roll. Clip two crocodile leads onto the motor contacts, and use a second rubber band (you will have to double this one over) to hold the wires close to the bottom of the craft roll.



STEP 7

Use the pencil to enlarge the hole in the centre of the top circle until it just pushes onto the rod. Glue the circle to the top disc. Slide the rod back through the craft roll.



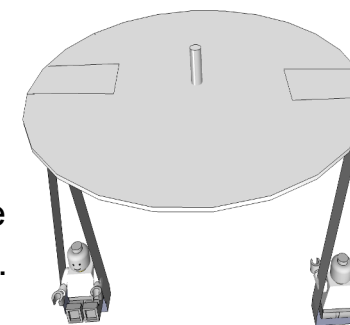
STEP 8

Cut 6 strips 1.5 cm x 20 cm from offcuts. If you don't have passengers then make some from corrugated plastic. Glue a passenger to the middle of each strip. Bend each chair around the passenger, then tape the ends together.



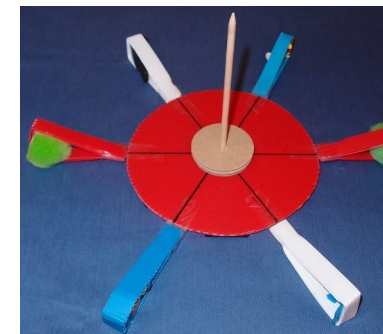
STEP 9

Tape each chair to the top circle at the end of a pencil line, so it hangs down vertically. Try to position passengers of equal weight opposite one another to help balance the ride.



STEP 10

Remove the completed chair unit from the craft roll, turn it upside down and lay the chairs out to the sides. Tape the underside of each chair to the bottom of the top circle, to reinforce the joint.



STEP 11

Stretch the third rubber band over the pulley, keeping hold of the end. Turn the chair unit the right way up again and slide the rod back into the craft roll. Stretch the rubber band over the motor shaft as you push the rod back into the holes in the card discs.



STEP 12

Connect up the following circuit.

