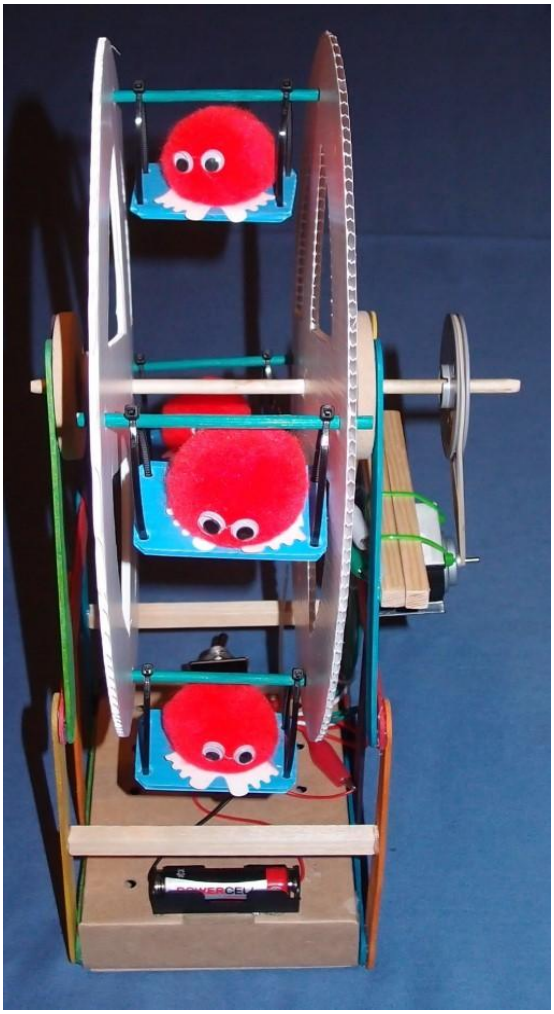
How to make a Ferris Wheel



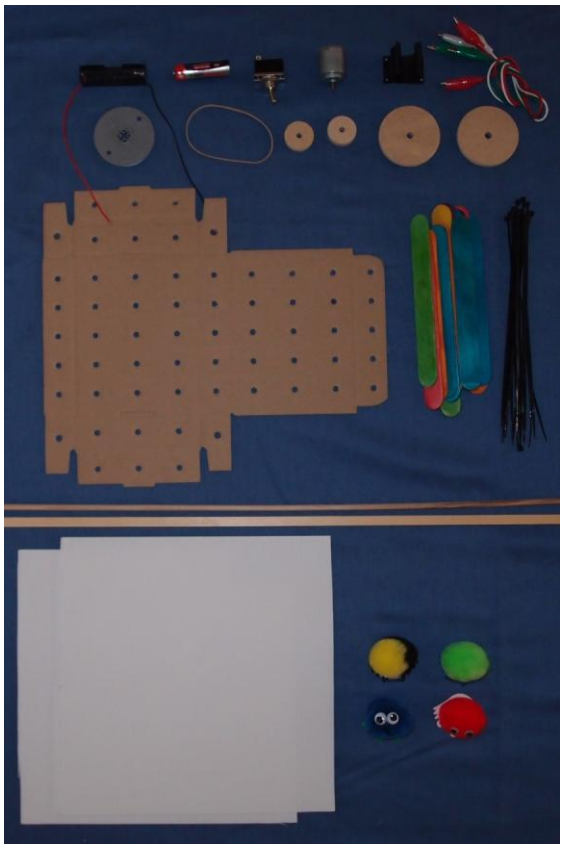
Follow this step-by-step guide on how to make your own pulley-driven Ferris wheel.

Associated resources:

- Fairground Rides lesson plan
- Fairground Rides lesson presentation
- Fairground Rides worksheet & suggested answers
- Fairground Ride Design sheet

You will need:

Components and Materials



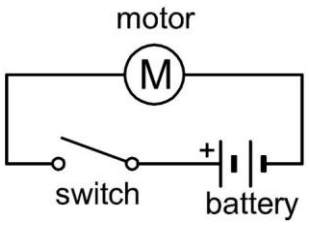
- Battery holder
- AA zinc cell
- Toggle switch
- Motor
- Motor mount
- 3 crocodile leads
- Plastic pulley 50 mm diameter
- Rubber band – 1.5 mm x 1.5 mm x 9 x 10 cm long
- 4 wheels 25 mm diameter with 5 mm diameter hole
- 2 wheels 54 mm diameter with 6 mm diameter hole
- Focused task box
- 14 giant lolly sticks
- 15 cable ties
- Square section wood 8 mm x 45 cm long
- 2 sheets of 3 mm thick corrugated plastic sheet 25 cm square.
- Wooden dowel 5 mm diameter x 52 cm long (If you are short of 5 mm dowel you can use a 17 cm length for the central shaft and use garden cane or wooden skewers for the outer shafts, If using skewers cut off the sharp tips).
- Passengers: you could use 'bugs', pompoms with googly eyes or small pine cones with googly eyes.

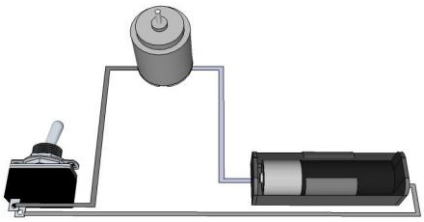
Tools

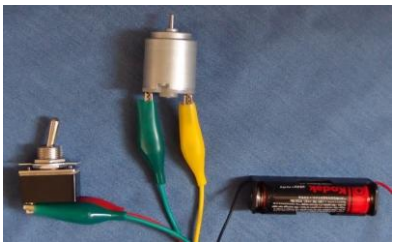
- Ruler
- Sharp pencil
- Pencil sharpener
- Blu Tack
- Pair of compasses
- Protractor
- Large scissors
- Nail scissors
- Junior hacksaw and vice (or bench hook)
- Sandpaper
- Low melt temperature glue gun
- Secateurs, craft knife, straight edge and cutting mat (optional – to be used by adults only)

Step 1

Make this circuit and check that the motor shaft goes round when you switch on. Be careful not to short circuit your battery (i.e. connect the wires from your battery directly together) – they must go via the motor Switch off and disconnect the motor.

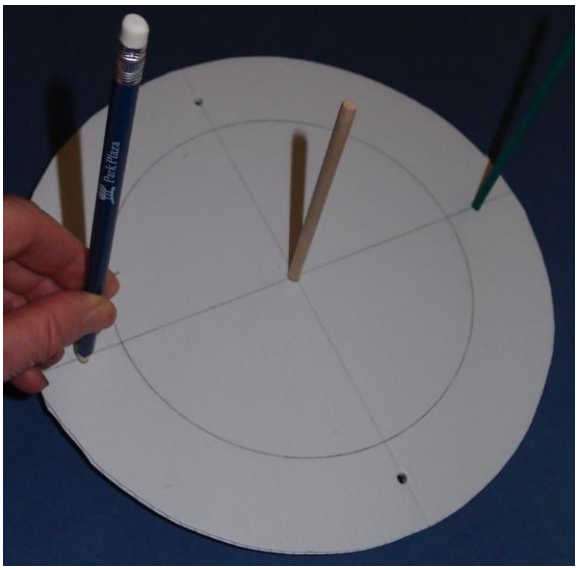






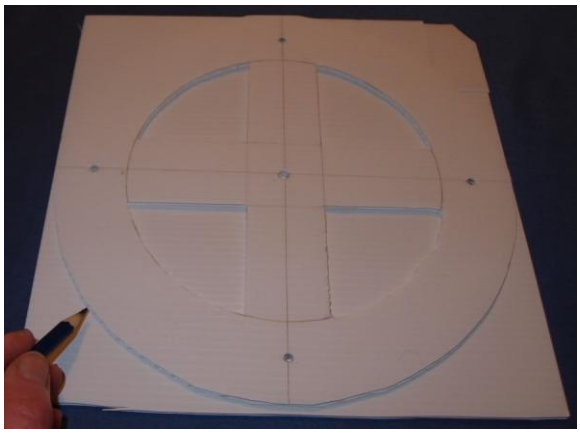
Step 2

Mark a 25 cm diameter circle on the corrugated plastic sheet and cut out the disc with the large scissors. Mark an inner circle of about 17 cm diameter. Mark a line all the way across passing through the Centre. Mark a second line at right angles to this one (If you prefer you can mark lines at 60° and have 6 passengers instead). Push the disc down onto the Blu Tack and use the sharp pencil to make holes in the centre and 2 cm from each end of the lines. Enlarge the holes a little by pushing the pencil in and twisting it – they must be a tight fit on the wooden rod. If you are using garden cane or wooden skewers for the outer shafts then make sure the holes just fit these tightly.



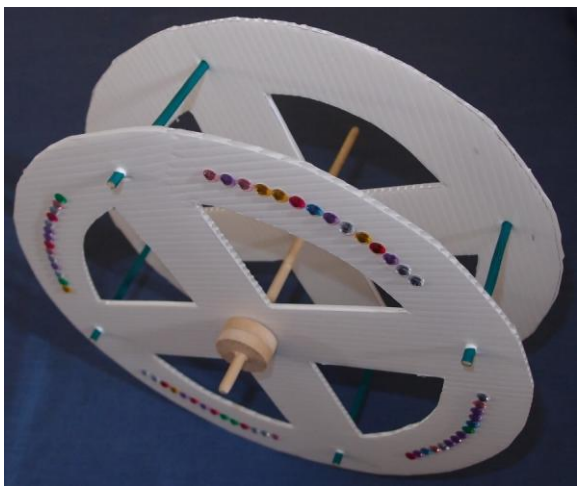
Step 3

Mark lines 2 cm either side of the lines passing through the centre and make cut-outs as shown. You can use the nail scissors to do this (the craft knife makes a neater edge but should not be used by children). Now use this as a template to make a second disc. Place it on the second sheet of corrugated plastic sheet, draw round it (including the holes and cut-outs), pierce the holes with the pencil then cut out. Use the pencil to enlarge the holes so that the wooden rod (or garden cane or skewer) just fits tightly.



Step 4

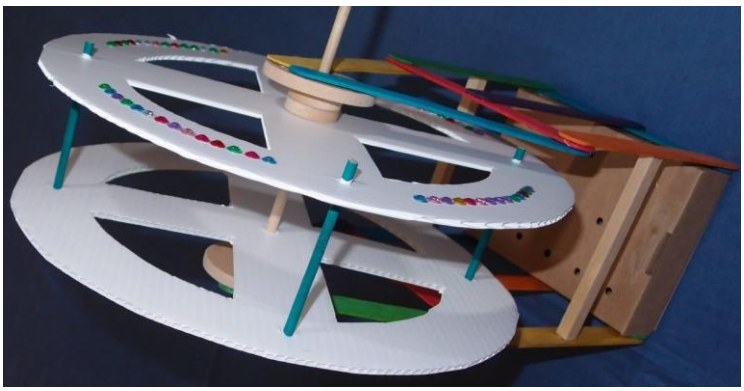
Cut 4 pieces of rod 8.5 cm long. Smooth the ends with Sandpaper and slide through the outer holes in both the discs as shown, so that there is about 0.5 cm protruding at either end. This is the disc assembly. Cut a 17 cm length of 5 mm rod and sharpen the ends slightly. Slide on the disc assembly until there is 3 cm of rod sticking out. Push two 25 mm diameter wheels onto either side and glue the inner ones to the discs.



Step 5

Fold up the focused task box and glue the final seam to make a cardboard base. Make this shape using giant lolly sticks and a wheel with 6 mm central hole. Glue to one side of the base with the wheel facing down as shown.

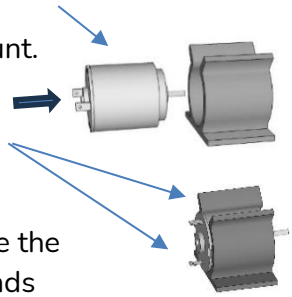
Step 6



Make a second identical shape. Lie the base on its side and slide the short end of the disc assembly central shaft into the wheel. Slide the second shape over the long end of the shaft and glue to the other side of the base. Cut two 11.5 cm lengths of square section wood and smooth the ends with sandpaper. Glue the ends and use them to join the two shapes together as shown.

Step 7

Push the pulley onto the long end of the shaft until there is about 1.5 cm of rod sticking out. The pulley may be a very tight fit – you could drill or ream it 5 mm to make it fit more easily. Place the rubber band over the pulley. Clip the motor into the motor mount; do this from the end, not from above to avoid snapping the motor mount.



Rotate the motor so that the motor contacts are at the top and bottom. Cut two 11 cm lengths of square section wood, sand the ends and stick them together. Stick the motor 2 cm from one end as shown, cable tie the motor mount firmly to the wood and trim the loose ends short so they won't catch on the rubber band. With the motor upside down, stretch the rubber band over the motor shaft. Position the wood so that the rubber band is slightly stretched (e.g. by about 0.5 cm), then glue to the lolly sticks as shown. (It is easier if you first mark the position of the wood on the lolly sticks with the rubber band stretched, then remove the rubber band and glue on the wood).

Step 8

Glue the battery and switch to the base. Re-connect the motor, making sure the crocodile leads won't get in the way of the Ferris wheel when it rotates. Switch on and check the Ferris wheel rotates. If the rubber band comes off the motor shaft when running, try sliding the motor forward in its mount slightly, or pushing the pulley further onto the shaft. If you would like the Ferris wheel to rotate in the opposite direction then swap over the crocodile clips on the motor contacts. Tidy the wires neatly (so they won't get in the way of the Ferris wheel when it rotates) and cable tie them in position.

Step 9

Make seats for your passengers from offcuts of corrugated plastic and hang them from the 8.5 cm rods. An example is shown here. Make sure the seats will hang freely from the rods, and passengers won't fall out.