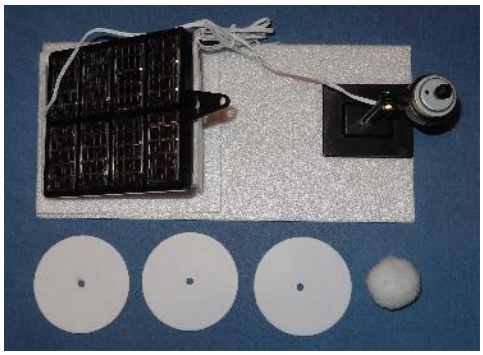
Spinner Instructions

Renewable Energy Project

Follow this step-by-step guide on how to build a spinner.

Associated resources:

- Renewable energy lesson plan
- PowerPoint 4 – Spinner
- Workbook 4 – Spinner



<u>You will need:</u>

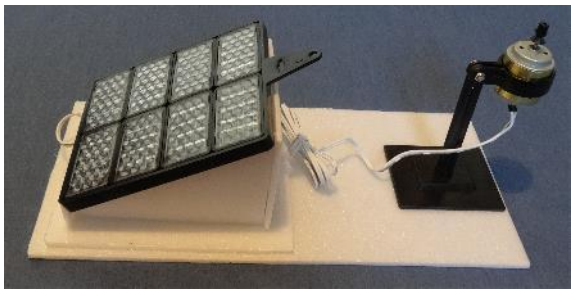
Parts included in class kit

- 1 motor and solar panel mounted on stand (completed in blog 2)
- 3 card discs
- 1 motor pulley
- 1 large pompom

Other parts, tools and consumables

- Ruler
- Felt tip pens (red, blue, yellow, green & black)
- Large scissors
- Low melt glue gun
- Sheet of card
- Pair of compasses

Step 1

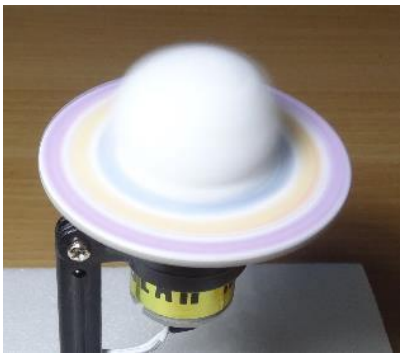


If the propeller is still fitted to the motor shaft from completing module 3, remove the propeller and replace it with the motor pulley. The nose of the motor pulley should be facing away from the motor as shown. Loosen the nut on the motor stand and turn the motor so that the shaft is facing vertically upwards. Re-tighten the nut. Re-attach the motor stand to the base if you have removed it to complete module 3.

Step 2

Hold one of the card discs firmly on the sheet of card. Use the pair of compasses to draw on concentric circles of 5 cm diameter and 4 cm diameter. Make small blocks of pairs of colours around each of the concentric circles as shown. Trim the bottom off the pompom and glue to the centre of the card disc. Make sure you don't glue up the central hole.

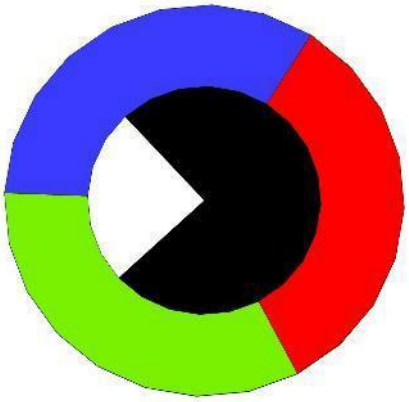
Step 3



Slide the card disc onto the nose of the motor pulley. If it is loose then glue it on. Orientate the base so that the solar panel is facing the sun, watch the disc spin and see what happens to the blocks of colour. This is meant to represent the planet Saturn and its rings. The rings appear solid but are thought to consist of lots of separate particles of dusty ice. The particles appear to form solid rings because there are so many of them and the sun reflecting off the ice makes them look bright.

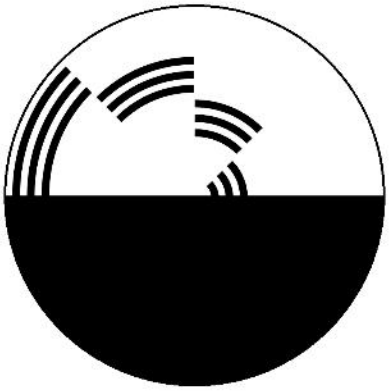
Step 4

Take another card disc and use the protractor to draw a circle of 4 cm diameter. Colour the outside of the disc in red, green and blue. Remove Saturn from the nose of the pulley and replace it with this disc. Watch the disc spin – the outer circle should appear grey. Take the disc off and colour part of the inner disc in black. Place it back on the pulley, watch it spin and check the colour. Keep colouring in more of the disc in black until the grey of the outer ring matches the grey of the inner ring. This experiment was invented by James Clerk Maxwell in the 1850s as part of his research into colour vision and how different people see mixtures of colours.



Step 5

Take a third card disc and use the black felt tip pen to make a pattern as close as possible to the one shown here. Remove the Maxwell disc from the nose of the pulley and replace it with this disc. Watch the disc spin and see what optical illusions you get. Try covering part of the solar panel with your hand to slow the disc down and see if you can change the optical effects you see. This disc was developed by amateur scientist Charles Benham in 1895. The reasons for the optical illusion are not understood but may relate to the behaviour of colour receptors in the eye; this could prove useful for diagnosing eye diseases.



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N.B. Below are some more ideas of tops you can make for your spinner. These include some more black and white Benham discs, a Newton disc in which all the colours of the rainbow mix together when it spins to give white (or nearly white), some rockets orbiting the Earth, and the sun with planets Mercury, Venus, Earth and Mars orbiting around it. You could also make a geocentric model of the solar system (where the Earth is at the centre instead of the sun) to help explain how ideas about the solar system have developed over time.