

# SPINNERS

Create a spinning top and investigate how we see colour.

## Overview

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In this activity, you'll make a spinning top from card and a short pencil. You'll explore how your eyes see colour by spinning your top and recording what you can see.

All you need is some card, felt tips or crayons, a short pencil and some scissors.

### What you'll need

- Card- recycled card from a cereal box, old greetings card etc
- A pencil – a short one works best
- Felt tip pens, crayons, colouring pencils or paints
- A small plate, CD or something circular to draw around
- Sticky tack, plasticine or playdough – anything squishy that you can push a pencil into

- Scissors
- White paper if your colours won't show up on card
- Scrap paper to protect your table from pencil marks

## Duration

20 minutes or so.

## Suitable for...

Age 4 and up.

## Safety notes

You know your children better than anyone, and you should judge whether they're ready for this activity. You might want to think in particular about:

- Supervision: the activity involves small parts, so there's a choke hazard.
- Take particular care when poking sharp pencils through card.
- Watch small children with sharp scissors.

## What to do

### Step 1



First collect all of the equipment you will need for your spinners. If you are using cardboard boxes, open them up by cutting along an edge and flatten them out.

If the card you are using is not white, your colours won't show up so you will also need a piece of white paper.

### Step 2

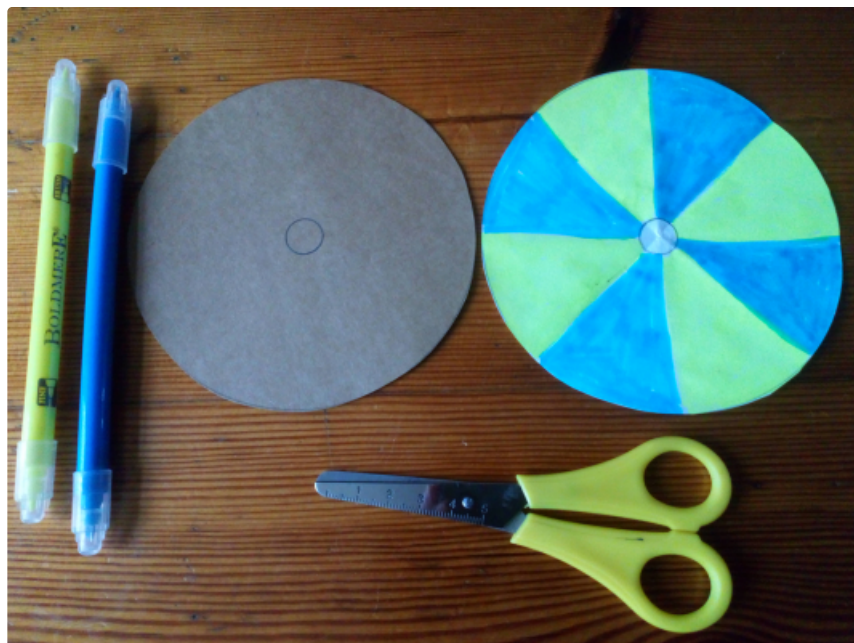




Draw around your CD (or circular object) on your card. If you are using brown card, make another white paper circle using the same circular template.

If you're using a CD, you can draw around the centre circle so that can find the middle of the spinner later.

### Step 3



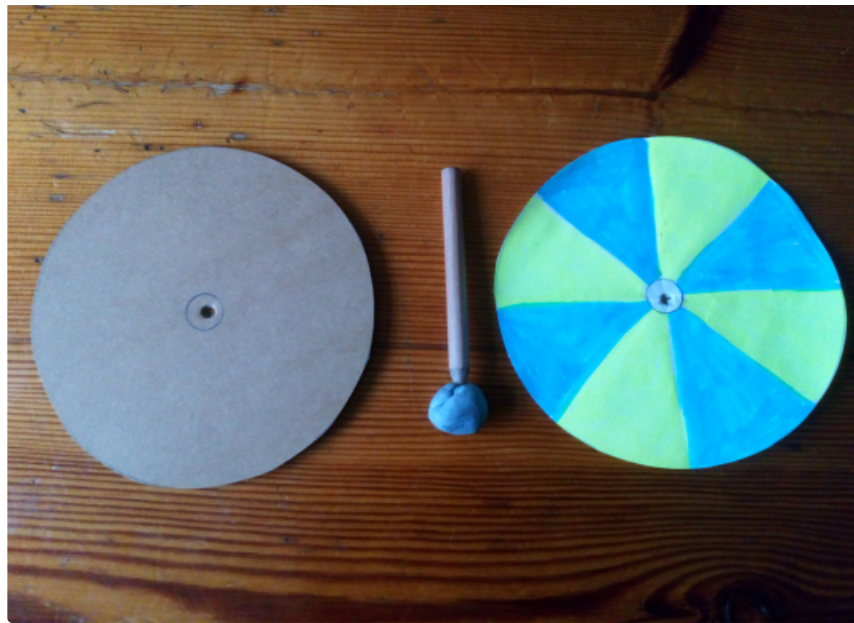
You now need to split your spinner into 8 sections. Fold the spinner in half, half and half again. It doesn't need to be too accurate! When you unfold the spinner again, you will have 8 sections.

Choose two primary colours (red, yellow or blue), and colour the spinner in to make a repeating pattern (like in the picture).

### Step 4







You now need to make a small hole in the middle of the circle. If you used a CD, then you can easily see where the middle is, but when you folded your spinner, all the folds should cross in the middle of the circle.

Put your sticky tack underneath the centre of your spinner and poke your pencil through the card into the sticky tack.

If you have a card and a paper disc, poke the pencil through them both at the same time so that the hole is in the same place.

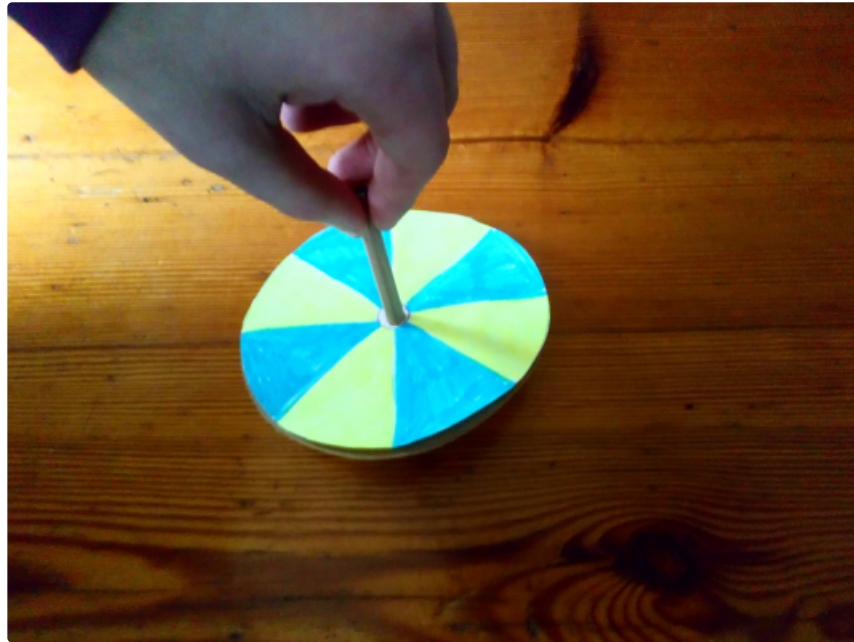
## Step 5



Now move your circle so that it is about 2 cm from the tip of the pencil. Wrap sticky tack around the pencil, underneath the disc.

This helps to make your spinner more stable, and keep the circle in place.

## Step 6



At this point, you may want to put a piece of scrap paper on the table to protect it from pencil marks.

Hold the pencil at the very top and give it a spin.

If you only have a long pencil, keep your finger loosely around the pencil at the top to keep it spinning for longer.



## Things to discuss



What happens to the two colours on the disc when you spin it?

Experiment making different discs. If you don't have any card left, you can make the new disc on paper and put it on top of your cardboard one.

What do you predict will happen if you make a red and yellow pattern? How about a blue and red pattern?

What happens when you spin a disc that has all the colours of the rainbow?

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## How does it work?

The light we see is made up of the different colours of the spectrum, these are the colours of the rainbow. The coloured pen on your spinner absorbs some of the colours of light, and reflects some back to us. So the blue section absorbs all the colours apart from the blue – which is reflected back for us to see.

When the spinner is moving, the colours are changing too quickly for you to see which colour you are looking at. This means that the colours appear to blend into each other.

When you used the pattern of two primary colours, you see this as a mixture of the colours, so a yellow and blue disc becomes green as it spins. When you spin a disc that is coloured with all of the colours of the rainbow, you see it as white.

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## Other things to try

### Investigate colour and pattern

What happens if you use different colours on your spinner?

What happens if you use different patterns.

We have some CD sized [Spinner Templates](#) that you can print out.



### Investigate the size of your spinner

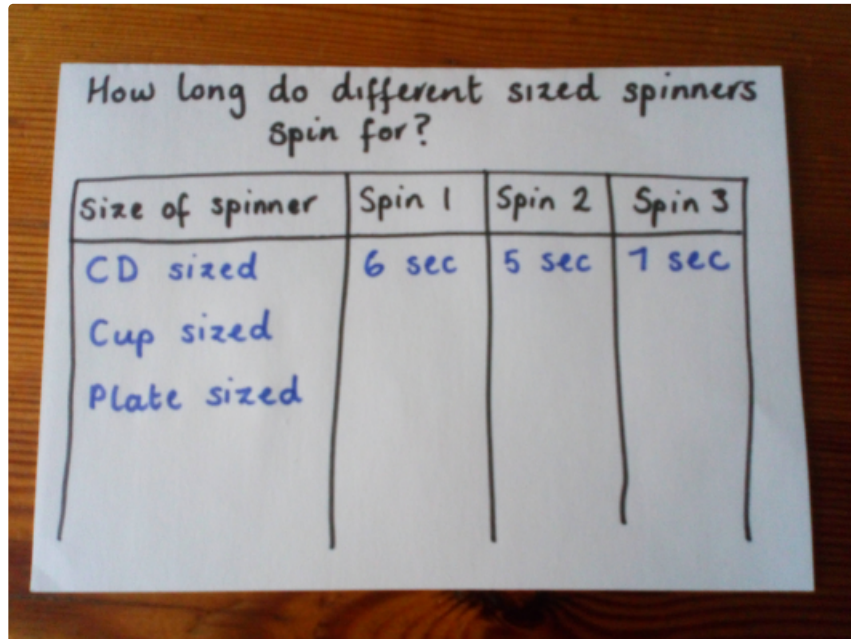


What happens if you make the size of your disc bigger or smaller?

Which size disc spins for the longest?

You could measure the time using a kitchen timer, the timer on your phone, a clock or watch with a second hand or by counting one elephant...two elephants...

To make your test more accurate you could spin your spinners at least three times each, and make sure that you spin it in the same way each time so that it is a fair test. You could record your results in a table like ours.

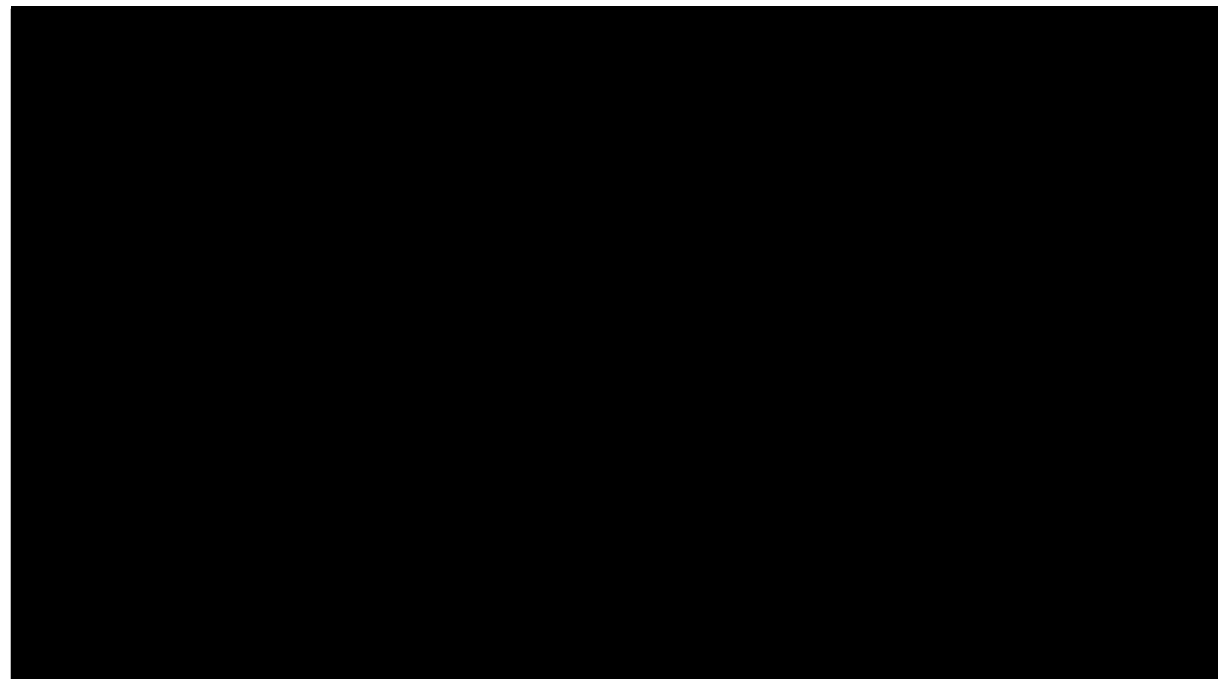


How long do different sized spinners spin for?

Size of spinner	Spin 1	Spin 2	Spin 3
CD sized	6 sec	5 sec	7 sec
Cup sized			
Plate sized			

Can you beat this spinner?

We found this spinner from a Christmas cracker in a drawer. Watch how long it spins for! Can you make a spinner that spins for longer than this?

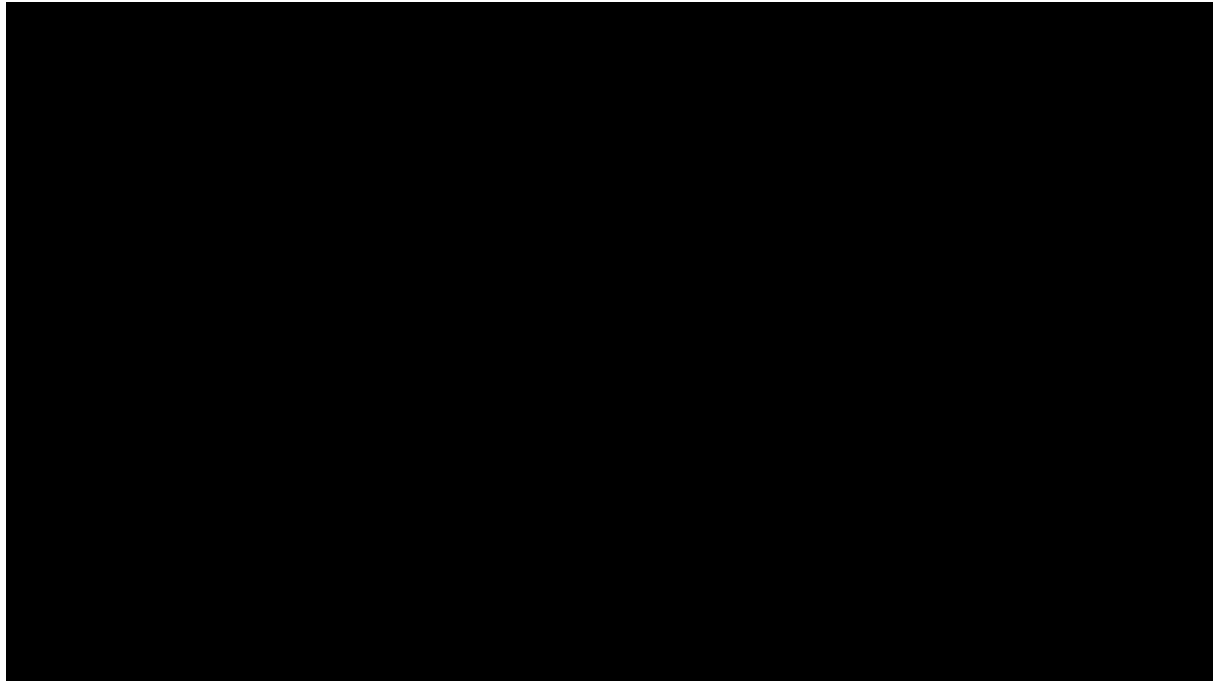


## Careers link- The Optical Engineer

Are you interested in light, colour and how we see? Maybe you could be an optical engineer.

### Want to know how your eyes work?

Dr Chris and Dr Xand explain how you see in this episode of Operation Ouch.



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