

The amazing shrinking coin

What you'll need

- 1x 1p coin
- 1x 2p coin
- piece of paper (approx 10cm x 10cm)
- pencil
- scissors

What to do

1. Lay your small coin in the centre of the piece of paper. Trace around it using the pencil.
2. Cut out the centre of the circle so that you're left with a piece of paper with a hole in the centre.
3. Demonstrate that the small coin slips easily through the hole.
4. Challenge your family to get the larger coin through the hole – WITHOUT ripping the paper or altering it in any way. Give them some time to try (it might be a nice idea for each person joining in to have their own coin and piece of holey paper).
5. Show them how it can "really" be done:

Take the piece of paper and bend it in half. Hold the paper so that the bend is at the bottom. Drop the big coin between the sides of the paper into the centre of the hole.

Grasp the paper between finger and thumb near the bend, on either side of the coin. Slide your fingers upwards around the coin. Allow the paper to buckle around the coin – you don't want to keep it tight all the way around.

The coin should now slip through the hole! A top tip for you here though – try to use fresh sheets of paper with each experiment, as the folds you make might give them a clue...

What to talk about

- *What happens when you fold your paper? Is it still totally flat?*
- *Try naming some different 2D and 3D shapes.*

What's going on?

This is definitely a challenge and to solve it your family will have to put their problem solving skills to the test. The answer isn't obvious, so how can you help them along the way?

Firstly, work out exactly what the problem is. So set up the trick – first with the 1p and then 2p piece (or equivalent). See if they can pinpoint exactly why it won't work.

- For our coins it is pretty simple, the 2p coin is too big for the hole!

Now that you know exactly what is stopping the coin, ask your family if there is anything that they can change?

- We can't change the coin, but we can change the paper – ripping it is against the rules but is there anything else they can try?
- Folding it in half turns the round hole on our flat (2D) piece of paper into a slit across the bottom of our folded (3D) one. Of course our problem is still there: the points on either side of our coin are still too close together for it to fit through the slit.

Finally, don't be afraid to be creative! Because we have folded the paper we can now pull these two points apart very gently and the paper will bend to allow the slit to get wider and not tear. The coin slips through, almost like it has shrunk.