



SCIENCE@HOME

You may have seen photos of Earth from space where it looks like it is round, like a blue marble as it is described by astronauts.

Planet Earth is not, in fact, perfectly round! Instead it is an oblate spheroid — a sphere that is squashed at its poles (top and bottom) and swollen at the equator (middle).

We are going to look at why...

The bigger the planet, the bigger the squashed effect. Planets are shaped this way because they spin, and this experiment will show you how.

We are going to build a model planet!

You will need:

- A stick**
(provided)
- Some card**
(provided)
- Glue**
(provided)
- Access to scissors**
(if you do not have scissors at home ask if you can use some at school or at your local library).

1 Cut out the three discs from the card, the larger two are A and B. The smaller one is C.

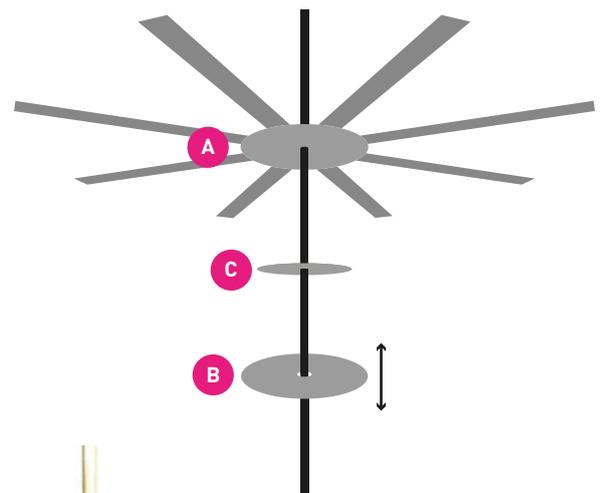
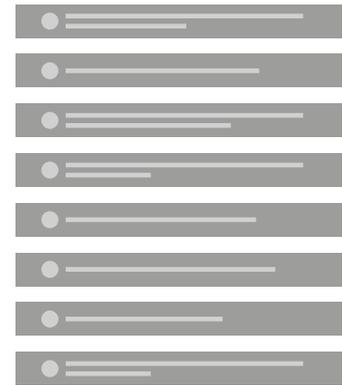
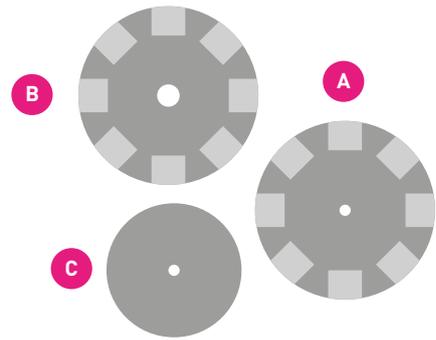
2 Cut the central holes in discs A and C so they are a tight fit on the stick (so they do not move). Cut the larger hole into B so that it can slide up and down the stick easily.

3 Now cut out the strips of card. Glue one end of each strip around the edge of disc A then put it on the stick.

4 Next fix C halfway up the stick as a reference point. Put B on the stick beneath C and glue the ends of the strips around its edge so that it looks like the model planet pictured. Make sure that B can easily move up and down the stick.

5 Hold the stick with B at the bottom and spin it. Change how fast you spin the stick and see what happens.

What do you notice?





Cut along dashed lines 

- 1** The Moon is the Earth's **only natural satellite**. A natural satellite is a space body that orbits a planet, a planet like object or an asteroid.
- 2** Ours is the **fifth largest** moon in the Solar System.
- 3** The average distance from the Moon to the Earth is **384403 kilometres** (238857 miles).
- 4** The Moon orbits (goes around) the Earth every **27.3 days**.
- 5** Mons Huygens is the tallest mountain on the Moon, it is **4700 metres tall**, just over half the height of Mt Everest (8848m).
- 6** America's NASA Apollo 11 mission in 1969 was the **first time a person landed on the moon**.
- 7** The Earth's tides are largely caused by the **gravitational pull** of the Moon.
- 8** A **lunar eclipse** occurs when the Earth is between the Sun and the Moon.

WHY YOUR MODEL BEHAVES THE WAY IT DOES

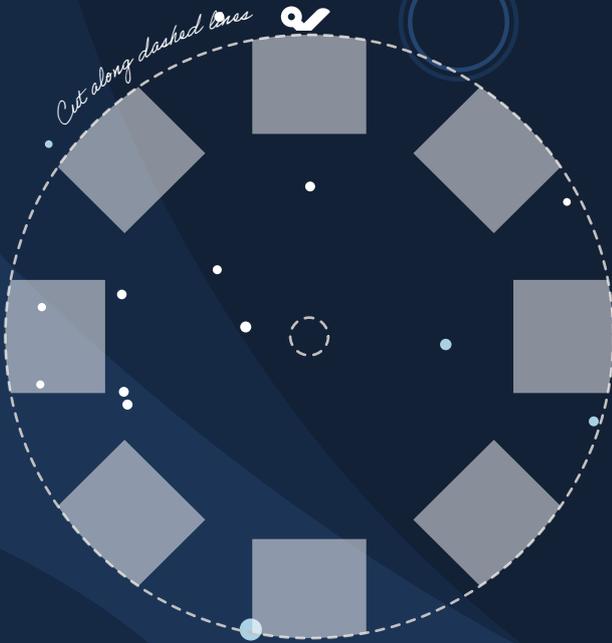
Once you have made your model you should see that the faster you spin your planet the further B moved up the stick and the more squished the planet became. In this case, B is able to move freely and the space inside your planet was empty, but what about with the planet Earth?

Our planet does not feel like it is spinning fast, but it rotates completely in about 24 hours, which means that the surface of the earth is spinning at about **1,600 kilometres per hour** (km/h). That is faster than the world's fastest car! How fast do you think your model planet was going?

Even at these incredible speeds the Earth is only **43 kilometres** (km) wider at the equator than it is at the poles (from top to bottom). This is a huge distance, but still quite small on the scale of the size of planet Earth, it would be roughly the same as if your planet had only squished by 1 millimetre (mm). Even though the planets are squished because of how fast they spin they will still look pretty round to our eyes.

Earth is not the fastest spinning planet in our solar system, Jupiter has a surface rotational speed of over **70,000 km/h**. With this huge speed the equator is over **9,000 km wider** than the poles. This is the same as disk B moving up by less than 2 centimetres (cm) on your planet spinner, can you get yours to do that?

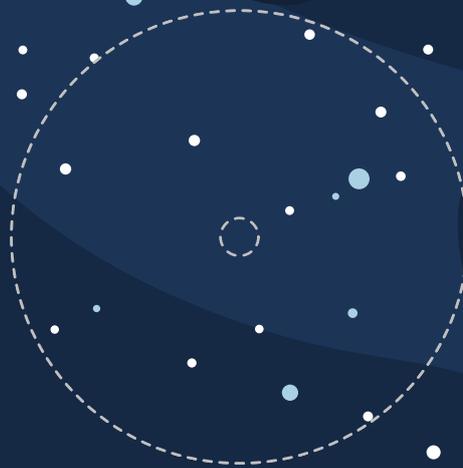
We see this effect all over the universe, and even if you try and spin around, although you won't shrink, your arms will want to move outward the faster you spin. Engineers used this idea in old steam engines in something called the Governor, which works just like your planet spinner. As it gets squished it closes a valve to the engine. If it closes the valve too much the engine slows down, and the Governor spins less, opening the valve once again.



A



B



C