scitech

Measuring meteors

ACTIVITY SHEET

Have you ever seen a shooting star? Did you make a wish?
So, what exactly is a shooting star? Why would we want to study them?

A shooting star is not a star at all! It is actually a meteor, a small piece of space rock or dust that has hit the Earth's atmosphere. Meteors travel so fast (usually more than 20km/sec) that they begin to burn up due to the intense heat caused by compression and friction with the air – think of the world's worst carpet burn and multiply by one million! OUCH!

As they burn, they become visible to people on Earth. Most of the time, they burn up before hitting the Earth; but occasionally, they hit the Earth, causing a crater to form. Space rocks that land on Earth are called **meterorites**.

Large impacts on Earth are rare, but if it was to happen, it would cause a major natural disaster – think tsunamis, severe weather, explosive shock waves and wind blasts, and an impact winter that could devastate life on Earth – whoa!

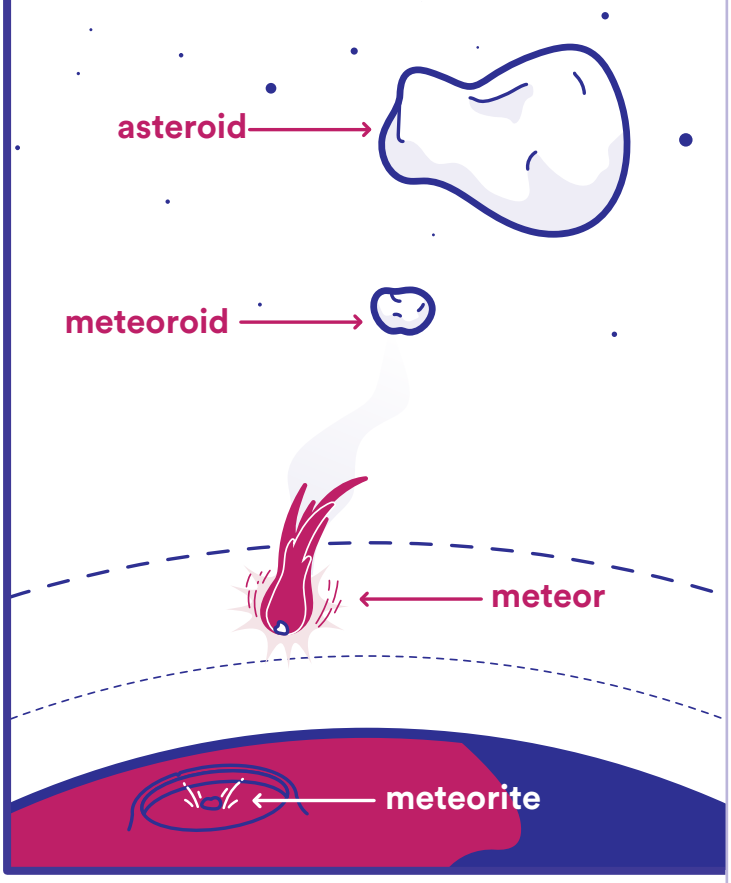
Thankfully, the chances of this happening are EXTREMELY rare! But to be extra safe, there are teams of scientists working around the world to prevent such a disaster.

Planetary defence systems are an active area of research and development for organisations like NASA. These systems can protect us from larger meteors and asteroids and help us plan for impacts.

Would you like to have a job working on planetary defence?

Did you know?

Larger space rocks, called asteroids, have also collided with the Earth in the past, with devastating consequences! The most famous asteroid in our history hit the Yucatán Peninsula in Mexico some 66 million years ago. This led to the extinction of the dinosaurs.



Making and measuring craters

Your first step towards a career as a planetary defender is to learn more about the relationship between meteor size and crater size. From this, we can determine the impact different meteors and asteroids might have on a planet. We can consider how to prepare for a large impact, and how we might prevent them altogether.

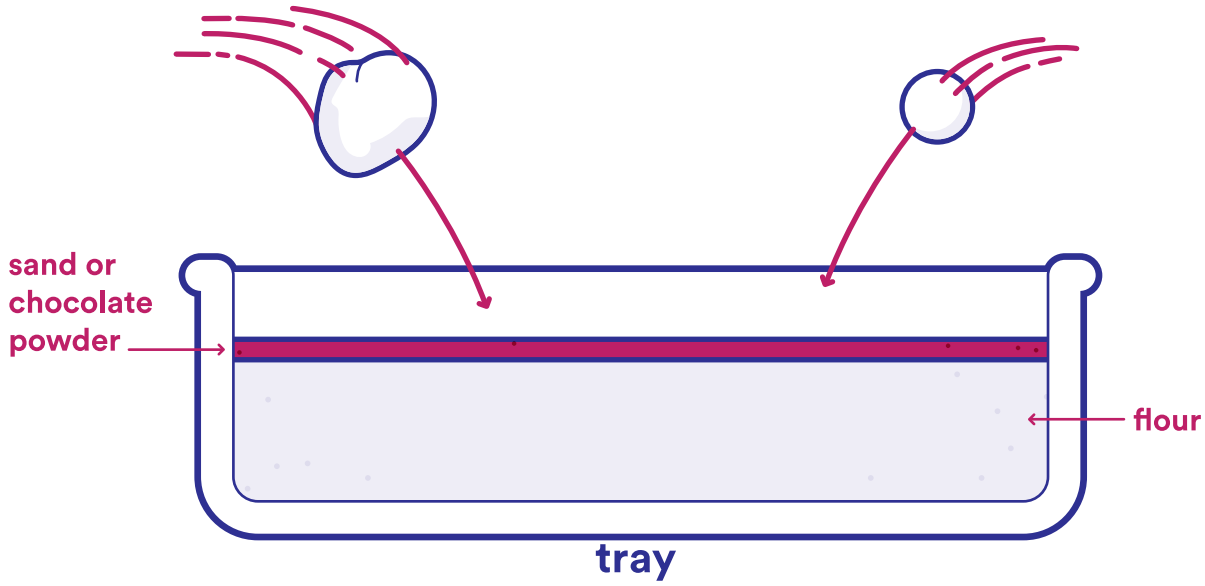
What you'll need

- **A large container – at least 7cm deep**
- **Flour**
- **Cocoa powder or any dark powder that will stand out against the flour**
- **At least 3 spherical objects of different sizes e.g. rubber ball, tennis ball, fruit or rocks – think small pebbles to fist sized chunks**

If you don't have flour or cocoa, you can also use different coloured sand.

STEP 1: Getting started

1. Pour the flour into the bottom of the container so that the flour is at least 5cm deep. Shake it gently to smooth it out.
2. Cover the flour with a thin layer of chocolate powder, using a sieve, as shown in the picture above.
3. Measure the **diameter** of each of your objects and write this in the table below.



Object	Diameter of object (cm)	Diameter of craters (cm)			Average crater diameter (cm)
		Drop 1	Drop 2	Drop 3	
Example: Cherry Tomato	3.5cm	4.8cm	4.5cm	4.7cm	4.8 + 4.5 + 4.7 = 14 14 ÷ 3 = 4.7cm

STEP 2: Take the challenge!

4. Hold your object at arm's length, 60cm above the container (measure this with measuring tape).
5. Drop your object into the container using a gentle underarm throw. Then carefully remove it so that you don't disturb the crater - you may like to use a tweezers or tongs to help you to remove the object.
6. Measure the diameter of the crater left behind and note this in the table provided.
7. Repeat steps 4 – 6 another two times so that you have three craters for each object. Take photos or make drawings of the craters.
8. Finally, calculate the average crater diameter for each object, by adding your three results together and then dividing by three.
   NOTE: If you need to re-set the flour in between drops, give the container a gentle shake to smooth the surface. Add more cocoa if necessary.
9. You might like to extend your experiment by dropping the objects from different heights. Try dropping the objects from 30cm and 90cm. Don't forget to note down the results.

STEP 3: Analyse your results

Write down a few sentences describing the results of your experiment. What did you observe? Which object made the largest crater? What do you notice about the craters formed by objects dropped from a greater height?

Share your results with your friends and family. Your parents or carer might even like to share photos from your experiment and journal to social media using **#ScitechAtHome**

The Moon's surface is covered in craters of all different sizes that are visible from Earth. These craters are all caused by impacts from asteroids, meteoroids and comets.

Take a look up at the moon this evening – can you see the moon's craters? (It is best to try this just before, during or after a full moon)

Staying safe

Make sure there's a grown up to help you and keep any younger brothers or sisters away from your flour mix.

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