Introduction to Meteorites - Upper KS2 Lesson

Learning Objectives	Curriculum Links
A meteorite is a rock from space that landed on the Earth. It is different from a meteor (which is the light phenomenon that happens when a rock enters the atmosphere, also known as a 'shooting star') or an asteroid (a small rocky body in space, which most meteorites come from). Meteorites can come from all over the Solar System! Some meteorites come from asteroids, but some also come from the Moon and Mars.	**Science – Earth and Space (Year 5)** Pupils should be taught to describe the Sun, Earth and Moon as approximately spherical bodies. **Science – Forces (Year 5)** Pupils should be taught to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
Describing meteorites uses the same principles as describing rocks – they can be described based on their colours, textures, whether they contain grains or crystals, and the size of the grains or crystals present.	**Science – Rocks (Year 3)** Pupils should be taught to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties **Science – Properties and changes of materials (Year 5)** Pupils should be taught to compare and group together everyday materials on the basis of their properties, including their hardness. **Science – Working scientifically (Year 5-6)** • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
To recognise a meteorite, there are a few features we can look for: a meteorite is often unusually heavy, with a pitted outside appearance, and covered in a dark glassy crust.	**Science – Working scientifically (Year 5-6)** • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • identifying scientific evidence that has been used to support or refute ideas or arguments
When a meteorite lands, it forms a crater, which is a circular depression that has a crater rim, floor, and walls.	**Science – Earth and Space (Year 5)** Pupils should be taught to describe the movement of the Earth and other planets relative to the sun in the solar system **Science – Working scientifically (Year 5-6)** • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

Materials needed:

- Meteorite samples, to pass around: pallasite (sample 11), lunar (sample 12), Martian (sample 13)
- Meteorite samples, for activity: iron meteorite (samples 9, 10), chondrites (samples 15, 16)
- Terrestrial samples: anorthosite (sample 17), basalt (sample 18), haematite (sample 20)
- 3D crater models (samples 1-8)
- Hand lenses
- Worksheets

Lesson length: 40 – 45 minutes

Lesson Plan

Type/ Slide	Geology	Teaching/Learning activity	Time
Core / 1-4	**Meteorite** = a rock from space that landed on the Earth. **Meteor** = the light phenomenon that happens when a rock enters the Earth's atmosphere. Also known as a 'shooting star'. **Asteroid** = a small rocky body orbiting the Sun. **Meteoroid** = loose rock fragments (usually, fragments of asteroids) that haven't entered the Earth's atmosphere, and which are not in a fixed orbit. Emphasise that meteorites land on Earth because they are unsupported objects pulled down by the Earth's gravity.	***Ask students what is a rock?*** *Rocks come from all sorts of places, and occasionally they can even come from space.* ***Ask students if they know what a rock from space is called?*** *Introduce different terminology.* *While this is happening, pass around the samples below:*	5 mins
Core / 5	We have meteorites from the Moon and Mars, which were separated from their homes due to large collisions and made their way to the Earth. They are both too small and fragile to be handled outside of their boxes. Pallasites are made of metal (the shiny, metallic, opaque part) and olivines (yellow-green, transparent, glass-like).	***Pass around meteorites (lunar, Martian, pallasites) for the students to look at. Remind them not to open the boxes!***	5 mins

Core / 6	There are 3 main types of meteorites: • **Stony** meteorites are made of the same minerals as Earth rocks and they usually look the same as Earth rocks, just a bit darker. They usually come from the surface of a rocky body. • **Iron** meteorites are almost pure iron. They usually come from the deep interior of a rocky body. • **Stony-iron** meteorites are half and half. They form when the two types of meteorites above somehow get combined into one rock! The Palla site they've just seen is a stony-iron meteorite. Iron and stony-iron meteorites don't have a direct equivalent to Earth rocks that we know of. Maybe rocks like this exist deep in the Earth, but it would be too deep for us ever to reach them! That's why studying meteorites is the closest we can get the finding out what the Earth's deep interior is like.	***Introduce types of meteorites***	5 mins
Core	Rocks can be described based on their physical characteristics, including: • Colour(s) • Does it contain metal? • Does the inside look different from the outside? How? • What does the outside look and feel like? • Does it feel unusually heavy, unusually light, or just right? • Any other features? Don't forget to look closely using hand lenses or magnifying glasses! **Differentiation suggestion**: if you need to run the activity with fewer samples, we recommend including the rocks on station 2 (iron meteorite), 3 (basalt) and 5 (stony meteorite) as shown on the accompanying PowerPoint.	***Activity 1**: **Describing rocks*** *Ask students to visit each of the 6 rock stations and make observations about the rocks. They can start at any station, so they should spread out!* ***Ask students to write down their observations in the separate worksheets provided.*** *Circulate the room and give pointers.*	15 mins

Core	In this activity, the students will learn how to distinguish meteorites from Earth rocks (meteor-wrongs). Put these questions on a slide: 1. Is it unusually heavy? 2. Does it have a dark outside crust? 3. Does the outside have an irregular shape, with fingerprint-sized pits? (note for later: these are called regmaglypts) 4. Can you see metal? **Outside Crust:** some samples are broken and you should be able to see a lighter colour inside, if the outside looks 'burnt' then it has a dark outside crust. **Irregular shape:** a regular shape would mean the rock is round, showing evidence of earth process by being transported via water, wind or ice. Meteorites burn up so will melt and break as they fall to earth, giving them a jagged shape. Not all answers have to be 'yes' for a rock to be a meteorite, but the more 'yes's, the more confident we can be that we found a meteorite!	***Activity 2: Meteorite detectives (work out meteorites from meteor-wrongs)*** *Using their observations from before, they can now have a go at finding the meteorites using some questions that we provide.* *If they need to quickly go back to the rocks they can, but they should hopefully already have the right observations and will just need to tick the boxes!* *This could be combined with the previous activity.* ***Give answers*** *For each slide, go through each question and reveal if it's a meteorite.*	10 mins
Optional, if not doing separate crater lesson	Show a slide with labelled crater features (crater floor, rims, walls, ejecta). Extra features they may notice: central peak, multiple rims or rings. These happen in very large craters.	***Activity 3: Handling crater samples*** *In the same groups as before, hand out 3D samples or craters.* *Ask the students to pass them around and look out for the features shown on the slide.* ***Ask the students if there is any other feature they notice?***	5 mins