YEAR 2: Introduction to Astronomy

Contents Include:

Our Solar System
Orbit and Rotation
The Phases of the Moon
Constellations
The Earth

Please Note: The activities included in this pack are suggestions only. Teachers should adapt the lessons to ensure they are pitched correctly for their pupils. For an outline of the content included in Year 2 Science please see:

Year 2 Science Sequence
Lesson 1: Our Solar System

This is the first lesson in a unit which encompasses both an introduction to astronomy, and some geological science. The Solar System means all the planets, moons and other bodies that circle around our Sun. Teaching this content may take more than one lesson to cover fully, suggestions for activities are included below and can be spread out over several lessons. This lesson focuses on the planets of our solar system including: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto (which is now considered a dwarf planet). Children will learn about each planet including key facts about each, their relative sizes and locations. Children will have an opportunity to build upon this content in Year 4 when they study astronomy in more detail.

See pages 320-321 of What Your Year 2 Child Needs to Know

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<td>To know about the planets in our solar system.</td>
<td>The Sun is a star at the centre of our solar system. There are eight planets and one dwarf planet in our solar system. The planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune – Pluto is a dwarf planet.</td>
<td>Children to explore the solar system using interactive websites (see below). They could record key information about each planet to make a fact-file. Make a fruit solar system using the Royal Observatory Greenwich resources that introduce children to the comparative size of the planets. Make a mnemonic to remember the order of the planets. Visit a planetarium or organise a visit from StarDome from the National Space Centre.</td>
<td>planet dwarf planet Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune Pluto solar system</td>
<td>What is the Sun? How many planets are there in our solar system? What are their names? Which planet is nearest to the Sun?</td>
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Resources:
Spacekids website on the solar system, designed for children.
NASA’s interactive website for children about the solar system.
Royal Observatory Greenwich activity for making a solar system out of fruit.
Children’s University of Manchester website and interactive activity on ordering the planets.
BBC clip from ‘Bang goes the theory’ about each planet in the solar system.
Lesson 2: Orbit and rotation

In this lesson the children will learn that all of the planets in the solar system orbit (go around) the Sun. As the planets orbit the Sun, they also rotate. As the Earth rotates during its orbit, parts of the Earth face the Sun, and others are in darkness. This rotation causes us to have day and night. From Earth, it looks like the Sun is moving across the sky, but in fact the Earth is rotating. This concept can be confusing for children and should be explained using modelling. Where possible children should use the materials used for modelling (a torch and a ball) to create ‘day’ and ‘night’ themselves. Children will begin to understand that the sun rises in the east and sets in the west due to the rotation of the Earth.

See pages 324-325 of What Your Year 2 Child Needs to Know

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<td>To be able to explain why we have day and night.</td>
<td>Planets go around (orbit) the Sun. As the planets orbit the Sun, they also rotate. This causes day and night. The Sun appears to rise in the East and set in the West.</td>
<td>Use a ball and a torch to show how half of the ball is illuminated when the torch shines on it. This can also be shown using the MET office animation (see resources). For the purpose of this demonstration, ensure the torch remains in the same position and the ball moves. In a wide open space, ask the class to hold hands making a big circle, facing outwards. This is the Sun. Remove four children and they hold hands to be the earth. The children making the Earth should rotate their shape anticlockwise and say whether it is day or night for them. Move children around so they can experience the view from Earth. You can then make them rotate and also orbit the Sun. To challenge children you could explain that the Sun is about 100 times the diameter of the Earth, so how many children should be making the Sun? Children could draw a diagram or write an explanation showing their understanding of how day and night occur.</td>
<td>planet orbit Sun rotate day night axis seasons</td>
<td>What is at the centre of our solar system? How do the planets in our solar system move? Why do we have day and night?</td>
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Resources:
Children’s University of Manchester website and animation about day and night, with quiz.
Children’s University of Manchester website and activity about changing day length through the year.
MET office animation and activities on day and night.
Lesson 3: The Moon and its phases

The Moon is a satellite of the Earth – this means it orbits the Earth. The Moon does not make its own light – it reflects the light cast on it by the Sun. Although the Moon appears to change shape in the sky, it doesn’t actually change. Depending on the position of the Moon and the Sun in relation to our location, we either see all, none, or part of the Moon. It takes 29 days for the Moon to orbit the Earth. When it gets bigger, we say it is waxing, and when it is getting smaller, it is waning. We call these different shapes the phases of the moon. The moon is made from rock and has no atmosphere - no air, no water, no clouds – so nothing will grow there. Humans visited the Moon and walked on the surface in 1969 but so far no humans have ever landed on another planet. Perhaps this will happen during the lifetime of your pupils!

See pages 322-33 of What Your Year 2 Child Needs to Know

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<td>To know what the Moon is and why its appearance changes through a month.</td>
<td>The Moon is a satellite of the Earth. As it orbits the Earth, the Moon rotates so we always see the same face. As the Moon’s position changes, it appears differently in the sky.</td>
<td>See BBC clip or complete the activity in class with a revolving chair (Earth), Moon, and light source. This shows that the Moon’s shape is changing as viewed from Earth. Investigate phases of the Moon and then complete a matching activity of names to phases, and then positioning them correctly (see Royal Observatory resources). Over a month, children can create a ‘lunar diary’ showing the shape of the Moon each night. If you are very unlucky with the weather, these can be viewed here. Children could draw pictures of the Moon in different phases.</td>
<td>Moon orbit waxing waning new moon crescent</td>
<td>What is the Moon? Why can we see the Moon? Why does the Moon’s shape change in the sky?</td>
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Resources:
Children’s University of Manchester website and activity about the phases of the Moon.
Royal Observatory Greenwich phases of the Moon activity
BBC clip about the Moon – its history and phases. Good alternative if you cannot do the activity from the clip in class. Touches on eclipses.
Lesson 4: Constellations

Constellations are the shapes people have made by creating ‘join the dots’ pictures with the stars in the sky. These constellations have names. An easy one for children to spot is the Plough which is part of the constellation called Ursa Major (the Great Bear). The constellations appear to flip as the Earth moves through space over a year. It is possible to use the stars for navigation, as sailors did long ago. Polaris, or the Pole Star, can be found by using the Plough. When you are facing Polaris, you are facing north – this will enable you to find the other compass points.

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<td>To be able to describe and name some constellations.</td>
<td>A constellation is a group of stars that, when seen from Earth, form a pattern. The Plough is a constellation which is easy to spot and is part of the Ursa Major constellation. (Children should know the shape of the Plough) You can use the stars to navigate by using the Pole Star to find North.</td>
<td>Tell the children some of the myths behind the names of the constellations. (The Hunting of the Great Bear appears in our later publication What Your Year 4 Child Needs to Know) Children can role play the myths behind the constellations (see BBC role play cards). Link dots of constellations and discuss the shape they make (BBC worksheet). On black paper, children can stick gold stars in the right places to make a chosen constellation, and then join the dots using chalk or white crayon.</td>
<td>constellation star pattern Ursa Major Plough</td>
<td>What are constellations? Why do we give constellations names? Why is the Pole Star useful? How did it help sailors long ago?</td>
</tr>
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Resources:
- The Nuffield Foundation website – a range of activities mostly designed for older children, but some good presentations with images.
- BBC join the dots worksheet of the Plough
- Video of the 17th century map of the constellations
- BBC role play cards of Greek myths connected to the constellations.
- Night Sky app for iPhone/iPad allows you to point camera at night sky and identify the plants and constellations (homework activity)
- National Schools Observatory website shows the night sky each night
Lesson 5: Inside the Earth: layers, volcanoes and geysers

The Earth can be split into three layers – the crust, the mantle and the core. The crust is thin and only accounts for around 5% of the volume of the Earth. This includes the ocean floors. This is the layer we live on and varies from around 5km thick (in the ocean floor) to around 70km thick. The mantle makes up 80% of the volume of the Earth which means it is the largest of the Earth’s layers and lies about 3000km deep. The core makes up the remaining 15% of the Earth’s volume. The core of the Earth is about half as hot as the sun which is still around 5000 degrees Celsius. Volcanoes are mountains which open downwards to molten rock below the surface of the Earth. When pressure builds up, they can erupt, shooting gases and rock into the air. Geysers are a rare kind of hot spring which is under pressure. Like a volcano, they can erupt, sending jets of water and steam into the air. In America, the most famous geyser is Old Faithful at Yellowstone National Park which erupts every 50-100 minutes.

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<tr>
<td>To be able to describe the layers of the Earth, and explain volcanoes and geysers.</td>
<td>The Earth can be split into three layers: the crust, the mantle and the core. Volcanoes can erupt, sending molten rocks and ash into the sky. Geyers can erupt, sending water and steam into the sky.</td>
<td>Use a hard-boiled egg (one between two ideally) to show the layers of the Earth. The shell = the crust; the white (albumen) = the mantle; the yolk = the core. Use different colours of clay/plasticine to show the layers of the Earth. Make a papier-mâché volcano and watch it erupt, using bicarbonate of soda and vinegar. Ask children to draw and label a diagram showing the layers of the Earth. Write an information text about a volcano or geyser. The eruption of Bardarbunga (2014) and Eyjafjallajoekull (2010) are two recent examples.</td>
<td>layer crust mantle core volcano geyser eruption erupt pressure lava steam</td>
<td>What are the three layers of the Earth? Which layer is at the centre? Which layer do we live on? What is a volcano? What is a geyser?</td>
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Resources:
- Instructions with illustrations on making a volcano. Or another option from the University of Manchester.
- Images of Old Faithful (Geyser)
- Images of Bardarbunga erupting in Iceland in summer 2014 and video footage of a volcano at Eyjafjallajoekull in Iceland erupting in 2010.
Lesson 6: Inside the Earth: Rocks and Minerals

There are many different types of rock on our planet. These can be divided into three groups: metamorphic, igneous and sedimentary. The category a rock goes into is dependent on how it was formed. Igneous means ‘made by fire’ – for example, granite. Some igneous rocks come from volcanoes. Sedimentary means ‘made by settling down’, for example under the sea or on a riverbed. Over extremely long periods of time, they press down until rock is formed. An example of a sedimentary rock would be sandstone. Fossils can be found in sedimentary rock. Metamorphic means ‘made through change’ – intense pressure and heat changes rock. When limestone is heated and put under huge pressure deep in the earth, it becomes a metamorphic rock called marble. Lots of ingredients go into making rocks; each of these ingredients is a mineral. Most rocks are made up of more than one type of mineral. There are many different types of mineral on Earth. Gold, diamond and quartz are examples of minerals. This lesson could be split up to allow further investigation of each rock type.

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<td>To be able to describe different types of rock.</td>
<td>Igneous rocks are made deep in the Earth where it is very hot. An example of an igneous rock is granite. Sedimentary rocks are usually made under the sea. An example of a sedimentary rock is sandstone. Metamorphic rocks are made deep in the Earth where it is very hot and squashed. An example of a metamorphic rock is marble.</td>
<td>Using a selection of rocks, children to investigate rocks with hand lenses. Handle the rocks, discuss them and record their observations. Children can write descriptions of each rock accompanied by explanations of how each type of rock is made. Look at images of the layers formed in sedimentary rock. Discuss why discoveries of fossils are almost always from sedimentary rock.</td>
<td>igneous sedimentary metamorphic texture smooth rough grainy glassy sandy crumbly crystalline permeable jagged dull shiny streaked</td>
<td>What are the different types of rock? How are the three different types of rock formed? Can you tell me an example of a metamorphic/igneous/sedimentary rock? Why might we find fossils in sedimentary rock and not in igneous rock?</td>
</tr>
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Resources:
- Website with images of lots of different rocks and minerals.