KS4 Physics – Exploring Space

Subject curriculum intent:	To develop in our students: • An enjoyment of Science by providing relevant, interesting and challenging experiences and activities. • Observational skills, by looking for patterns and contrasts. • An inquiring mind and a logical approach to problem solving. • The ability to draw conclusions from simple experiments and, where appropriate, to devise suitable experiments for further investigations. • Communication skills in speaking and listening, written, diagrammatic and symbolic forms. • Co-operation and a respect for others by being able to work as part of a team – the development of appropriate social skills. • Confidence in their own abilities. • A respect for the environment and a careful use of resources. • An interest in the world about them and a greater understanding of it.	
End of KS3 intent/outcome	End of KS4 intent/outcome	End of KS5 intent/outcome
Students will build on their knowledge of science through the different areas – biology chemistry and physics. Students will 'work scientifically' to achieve the goals of each topic area they encounter.	Students will continue to develop their scientific knowledge through the different areas – biology, chemistry and physics. Students will 'work scientifically' to achieve the goals of each topic area they encounter. Students will be able to relate their scientific experiences to everyday life and have an understanding that science is all around them.	N/A
Intent for this topic:	In this module students will learn about the planets in our solar system, their names, moons, atmospheric conditions and position in relation to the sun. Students will learn about the Earth, our moon and space travel. Students will learn about gravity, the stars (including our sun) and the existence of other galaxies. Students will 'work scientifically' to achieve these goals, learning the key features of scientific enquiry; observing over time, pattern seeking, identifying, classifying, investigating (fair tests) and researching.	
Core vocabulary needed for this subject/topic:	**Subject:** Biology, Chemistry, Physics Observe, pattern, identifying, classifying, investigating, fair test, researching. **Topic:** Space: Planets – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune Sun, moon, stars, galaxy, orbit, gravity, axis, day, night, seasons, atmosphere, life cycle	

Vocabulary pupils will have accessed in other topics or subject areas:	Space: Planets – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune Sun, moon, stars, galaxy, orbit, gravity, axis, day, night, seasons, life cycle
Key vocabulary taught within this topic:	Space: Planets – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune Sun, moon, stars, galaxy, orbit, gravity, axis, day, night, seasons, atmosphere, life cycle
Big Questions	What other planets are in the solar system? How are the planets different? What makes our solar system?

Prior knowledge: what pupils may already have studied

Key stage	Subject	Topic title	Term/year taught	Content/What might pupils already know?
KS3	Science	Earth and its atmosphere	Spring 1/Year 1	Pupils will be aware of planet Earth and its features.
KS3	Science	Forces and magnets	Summer 1/Year 3	Pupils will be aware of the force gravity and what it is.
KS3	Science	Space: planets and stars	Summer 2/Year 3	Pupils will have been introduced to the different planets in the solar system. Pupils should have some understanding of what a star is.
KS3/4	Maths	Time	Every year	Pupils will have an understanding of day, night and seasons.

Links to other subjects: Maths, Biology, Chemistry

Links to equality and diversity:
Mae Jemison – The first African-American woman in space.
Dr Maggie Aderin-Pocock – British Space Scientist, science communicator and educator

	OU P Steps 5-6	OU P Steps 7-8	OU Step 1	OU Step 2	OU Step 3
Subject specific knowledge	Can label the different planets in the solar system using symbols. Can label the different parts of the solar system using symbols.	Can name the different planets in the solar system. Know that each planet has its own features.	Can name the different planets in the solar system and put them in order from the sun. Can identify one feature of each planets. E.g. hot, cold, volcanoes	Can name the different planets in the solar system in order from the sun. Knows that planets have different features and	Can name the different planets in the solar system in order from the sun. Knows that planets have different features and

	Can match features to each planet. Knows that gravity is a force and helps keeps things on the ground. Know that the planets move around the sun. Can sort planets and stars. Know the sun is a star. Know that stars give out light. Know that the Earth turns. Know the difference between day and night. Know the names of the 4 seasons. Know that rockets are needed to travel into space.	Knows that gravity is a force and helps keep things in their place. Knows that gravity helps keep the planets in their place. Know that planets orbit the sun. Know the sun is a star. Know that stars give out light and planets don't. Know that a galaxy is a large group of stars. Know that our galaxy is called the Milky Way. Know that the Earth rotates. Know that when the Earth rotates, part of the Earth will be facing the sun and part of it will be facing away causing day and night. Know that it takes one year for the Earth to orbit the sun. Link phases of the moon to pictures to names.	Knows that gravity is a force and helps keep things in their place. Knows that gravity helps keep the planets in their place. Knows that gravity is the attraction of two objects. Know that the Earth and moon are attracted by gravity. Know that the Earth and sun are attracted by gravity. Understand that different planets have different gravitational field strengths. Know that planets orbit the sun and can define the word orbit. Know the sun is a star and is our closest star. Know that other stars are really far away. Know that stars give out light and planets don't.	give examples for each planet. Simply describe the atmosphere of each planet. Knows that gravity helps keep the planets in their place. Knows that gravity is the attraction of two objects. Know that the Earth and moon are attracted by gravity. Know that the Earth and sun are attracted by gravity and this is a bigger attraction than the moon and Earth. Can explain how the planets orbit the sun. Know the sun is a star and is our closest star. Know that other stars are really far away. Can compare differences between planets and stars e.g. stars give out light and heat.	give several examples for each one. Knows that gravity helps keep the planets in their place. Knows that gravity is the attraction of two objects. Knows how gravity is linked to: The planets and their placement. The Earth and Sun The Earth and Moon. Can explain how the planets orbit the sun and make links to gravity. Can explain the difference between planets and stars. Know that the sun is our closest star and other stars are really far away meaning we may not be able to see them clearly. Can explain what a galaxy is and name the galaxy Earth is a part of. Know that the Earth rotates about its axis.

		Identify that rockets are needed to travel in space and match images to label a diagram. Sequence images to create a timeline of milestones in space travel. Sequence images to demonstrate the lifecycle of a star.	Know that a galaxy is a large group of stars. Know that our galaxy is called the Milky Way. Know that when the Earth rotates, part of the Earth will be facing the sun and part of it will be facing away causing day and night. Know that it takes one year for the Earth to orbit the sun. Know that the 4 seasons are caused by the tilt of the Earth's axis. Describe the atmosphere of a given planet using images and a communication aid. Order the phases of the moon and name them using a word or symbol bank. Identify and label the parts of a rocket. Use a word or symbol bank to create a timeline of milestones in space travel.	Know that a galaxy is a large group of stars and there are several galaxies. Know that our galaxy is called the Milky Way. Know that the Earth rotates about its axis. Can explain how day and night is caused linked to the Earth's axis. Know that it takes one year for the Earth to orbit the sun. Know that the 4 seasons are caused by the tilt of the Earth's axis. Can describe, name and order the phases of the moon. Can identify, label and describe parts of a rocket. Can create a timeline of milestones in space travel. Can describe the effect of gravity on Earth	Can explain why we have day/night, years and seasons. Can explain how day and night is caused linked to the Earth's axis. Know that it takes one year for the Earth to orbit the sun. Can explain how the 4 seasons are caused by the tilt of the Earth's axis. Can suggest reasons why each planet has a different atmosphere. Can name and order the phases of the moon and explain why we see different phases. Can identify, label and explain the function of parts of a rocket. Can create a timeline of past and future milestones in space travel.

			Sequence and describe the lifecycle of a star.	compared to another planet. Can describe each stage of the life cycle of a star.	Can explain why astronauts need zero gravity training. Can explain that the lifecycle of a star takes billions of years.
Subject specific skills **Space**	Is able to use a model of the earth and a torch to identify day and night. Is able to build a model rocket after demonstrations. Is able to classify planets and stars.	Is able to use a model of the earth and a torch to identify day and night, including the earth rotating on its axis after a demonstration. Is able to build a model rocket using visual instructions. Is able to research different planets on the internet with support.	Is able to use a model of the earth and a torch to identify day and night, including the earth rotating on its axis. Is able to build a model rocket with visual and written instructions. Is able to research different planets on the internet.	Is able to use a model of the earth and a torch to identify day and night and a year. Is able to follow written instructions to build a model rocket. Is able to research different planets on the internet.	Is able to use a model of the earth and a torch to identify day and night and a year, then start to explain seasons. Is able to build a model rocket and evaluate how your prototype could be improved. Is able to research different planets on the internet.
Subject Specific Skills **Working Scientifically**	Is able to follow a set of demonstrations to make models. Is able to follow a set of demonstrations to carry out a simple investigation.	Is able to label diagrams using symbols. Is able to make models following a picture method. Is able to make a prediction from a choice of 3 using symbols. Is able to follow a picture method to carry out a simple investigation.	Is able to label diagrams. Is able to make models following a word and picture method. Is able to link their model to a concept. Is able to select an appropriate prediction from a given choice.	Is beginning to draw and label diagrams. Is able to make models following a written set of instructions. Is able to use their model to explain a concept. Is able to make a prediction linked to their investigation.	Is able to draw and label diagrams. Is able to make models following a written set of instructions. Is able to suggest improvements to their model. Is able to use their model to explain a concept.

		Is able to identify one thing that has changed when completing a fair test. Identifies the correct result in a table.	Is able to follow a word and picture method to carry out a simple investigation. Is able to suggest what to change when completing a fair test. Is able to record results in a simple table. Analyses results in the form of tables, simple bar graphs and a brief descriptions using key words or sentence blanks.	Is able to follow a written set of instructions to carry out a simple investigation. Is able to explain why their investigation included a fair test. Is able to record results in a suitable table. Is able to record results in the form of a simple bar graph. Analyses results in the form of tables, simple bar graphs and a brief description.	Is able to make predictions. Is able to follow a written set of instructions to carry out a simple investigation. Is able to design an experiment to include a fair test. Is able to record results in a suitable table. Analyses results in the form of tables, simple bar graphs and a brief description. Is able to draw conclusions from their results.
Suggested activities	Space • Learn about the force of gravity and how this links to the moon orbiting the sun, the planets orbiting the sun. • Make a model/mobile of the moon orbiting the Earth and the Earth orbiting the sun. • Look at the gravitational field strength on the different planets. • Research each planet and their unique features. • Mini experiments linked to planets e.g. bicarbonate of soda & vinegar to show volcanos. • Learn about and label the different parts of the solar system. • Learn and label the order of the planets from the sun. • Make bubbling or fizzing planets. • Look at and compare the size of the planets – inflatable planets, different size fruit. • Explore galaxies and learn about our galaxy – the Milky Way. • Explore day and night and how this is linked to the Earth making one complete rotation about its axis. • Look at the position of the sun throughout the day. • Explore the 4 seasons and how they are linked to the tilt of the Earth. • Explore the different star constellations and recreate them.				

	• Marshmallow constellations • Phases of the moon demonstration. planets/ information top trumps • Creating fact files / posters / presentations about each planet. • Building model rockets. • Timeline of space travel milestones • Lifecycle of a star.
Possible Investigations/ Working Scientifically	Space • Explore gravity by dropping different objects – potential to time how long they take to fall to the ground. • Crater experiment: Which ball makes the biggest crater? – Pupils throw different sized/shaped balls in flour or sand to make craters. Children to measure the size of each crater either using standard (cm) or non-standard (cubes) units of measure to measure the size of the craters. • Glowing stars science experiment.
Personal development	**Problem solving** Investigations and matching exercises **Communication skills** Working as pairs in investigations, asking and answering qustions **Self-belief** Learning new skills, practising them and demonstrating them. **Self-management** Working with new equipment **Teamwork** Working as groups to solve problems or find out new information
Online resources twinkl CLEAPPS for risk assessments BBC bitesize for video resources.	
Evidencing Work All work / evidence sheets need to be printed off, annotated by staff, self-assessed by pupils and stored in student folders.	

RRS Articles:
This unit of work is linked to Articles of the UN Convention on the Rights of the Child.
Article 13 (freedom of expression)
Article 29 (goals of education)