Big Question: May the force be with you… But what is it?

AoLE: Science & Technology	Subject: Science - Physics	Year: 7

Big Question / Aim / Objective / Concept	Vision (Proposed outcome) / Purpose of curriculum	Prior knowledge / Learners previous knowledge
May the force be with you… But what is it?	This unit revises the concepts of forces and their effects and extends pupils' knowledge of friction, gravity and speed. These ideas are presented using a theme of space, such as rockets, to link to ideas about forces, friction and floating. The pupils then go on to investigate amateur astronomy, showing that there are many observations that can be made without the need for a full-scale observatory. It revises ideas about the Sun, Moon and Earth by looking at how observations of the Sun, Moon and stars can be explained.The unit goes on to look at why we have seasons, and then to the wider picture of the Solar System, stars, galaxies and space exploration.	From KS2 most pupils will: • Know about different kinds of forces, including magnetism, gravity, upthrust and friction • Know that unbalanced forces can change the speed or direction of movement of an object, and that forces are balanced when an object is at rest • Know that objects in water experience an upthrust, and that weight is a force measured in newtons • Be able to measure a force using a force meter • Know that the Sun, Moon and Earth are spherical • Be able to explain why shadows move during the day, and why we have day and night • Know that the Earth orbits the Sun and the Moon orbits the Earth.

What does progression look like in this Big Question?

Progression Indicator	Description of learning (What matters statements)	Student evidence of progression (Blooms) / Knowledge
Excelling	I can explain and calculate how multiple forces acting on an object will affect its motion. By applying simple rules, I can use waves in order to learn more about the world around me. I can describe the impacts of science and technology, past and present, in my everyday life. I can understand how my actions and the actions of others impact on the environment and living things. I can engage with scientific and technological evidence to inform my own opinions. I can evaluate methods to suggest improvements. I can use design thinking to test and refine my design decisions without fear of failure. I can apply my knowledge and skills when making design decisions in order to produce specific outcomes. I can use my findings to draw valid conclusions. I can review my own opinions based on new scientific evidence.	Recall examples of how and why ideas about forces have changed. Evaluate secondary sources to identify a range of variables that may affect the amount of friction, and plan an investigation to investigate them. Explain what is meant by speed and be able to calculate speeds. Explain what is meant by density and be able to calculate densities. Explain why you agree or disagree with others when discussing the arguments for and against the government's spending money on astronomy and space research. Obtain information from secondary sources to investigate the relationships in astronomical data (e.g. between day length and latitude at different times of the year). Compile this information into charts and tables. Use calculations to turn data into a form where it can be compared with other data and present the data to draw conclusions.

Advancing	I can explore how the motion of objects can be affected by applying specific forces. I can use a variety of simple models to describe the forces acting on an object. I can use my knowledge and understanding to predict effects as part of my scientific exploration. I can suggest conclusions as a result of carrying out my inquiries. I can identify questions that can be investigated scientifically and suggest suitable methods of inquiry. I can use design communication methods to develop and present ideas, and respond to feedback. I can use a range of models to explain and make predictions. I can select relevant scientific knowledge from a range of evidence sources to evaluate claims presented as scientific facts.	Describe the difference between mass and weight. Construct diagrams to show the directions in which forces act and their sizes. Describe examples of how using equipment to control forces lets us do things that we would not be able to do. Recognise that ideas about forces have changed as scientists have carried out more experiments. Recall one way in which our Solar System model has changed. Use a model of the Sun, Earth and Moon to explain how eclipses and the phases of the Moon occur. Recognise that astronomy relies heavily on observation rather than experiment, unlike many other areas of science. Describe some ways in which scientists collect evidence to support theories about the Solar System and the universe. Find, select and use information from secondary sources to investigate an idea or to compile a report on the topic.
Securing	I can communicate the effect forces have on myself and on objects. I can identify questions that can be investigated scientifically and suggest suitable methods of inquiry. I can suggest conclusions as a result of carrying out my inquiries. I can evaluate methods to suggest improvements.	Describe how forces acting on an object can work with or against each other. Explain how friction and air resistance can be reduced. Identify balanced and unbalanced forces. Explain how we get years and seasons using a model of the Earth orbiting the Sun. Identify that astronomers from different countries collaborate and exchange ideas. Identify that modern astronomy is based on the work of scientists from many cultures and different civilisations. Organise information about the Solar System from selected secondary sources.
Beginning	I can use my knowledge and understanding to predict effects as part of my scientific exploration. I can recognise patterns from my observations and investigations and can communicate my findings. I can recognise that what I do, and the things I use, can have an impact on my environment and on living things.	Recognise some pieces of equipment that make use of forces. Explain how we get days and nights using a model of the Earth and Sun. Recall ways in which technology helps us to find out more about the planets and stars. Describe how the Sun appears to move across the sky. Describe some of the patterns in the changes that happen during a year (e.g. changes in day length). Locate information about the Solar System from selected secondary sources.

Authentic learning experiences (Local / National / International)	Skills (Literacy / Numeracy / DCF) / Cross Curricular links
Space science in Wales benefits from Airbus's presence, a key aerospace company. Airbus engages in satellite manufacturing. This link offers collaboration opportunities, enhances awareness and education in space science and provides practical experiences for students. This fosters a deeper interest in the field and highlights the multiple pathways such as apprenticeships and academic routes into related industries. The topic goes on to foster opportunities to investigate global projects that have had great impact on our world such as the James Webb telescope and Mars rovers such as Perseverance.	Numeracy ● Measurement using fine division instruments ● Construction of accurate experimental drawings ● Use of averages ● Use of whole and decimal numbers ● Create models that can be used to explain numerical values ● Link times of the year with orbits of the planets Literacy ● Describe and explain using connectives to structure reasoning ● Focus on the command words for the description of processes ● Extended writing formalising sentences and structuring paragraphs. Pupils use connectives to explain their reasoning. ● Summarise information ● Use oracy skills to present and discuss information

Assessment (How will we know that students have learnt what we taught them?)	
Formative assessment: ● Teacher circulating ● Q&A discussions on various phenomenon and scientific understanding ● Identify key terms to definitions/examples ● Peer/self-assessment tasks ● Group experimental work ● Explanations of specific processes such as conduction, convection and radiation ● Lesson tasks such as measuring angles precisely allows the use of whiteboards or tasks that feedback to the teacher to ensure pupils have learnt the desired process	Summative assessment: ● Pupils will undertake longer written questions using correct spelling, punctuation and grammar ● Pupils will undertake an end of topic test to assess their understanding and knowledge

Evaluation (TBC July 2024)		
Strengths	Areas for Development	Pupil Voice