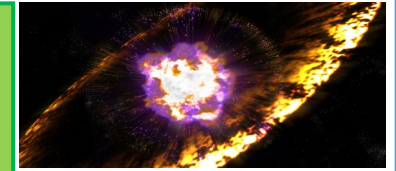


Copernicus, Galileo and the Solar system

(Earth and Space)

PHYSICS



Overview and rationale:

The world (or rather, the universe!) is our children's oyster in their Year 5 Space topic. It is here where the children's capacity for awe and wonder is really tested. There are key pieces of knowledge and key concepts for them to grasp about the relationship between our Earth, the sun and the moon, understanding day, night, months and years, movements and distances, and how the sun impacts on all of the planets in our solar system, as discovered by Copernicus and then Galileo. The children are then also steered towards exploring their own interests about the infinite notions of our galaxy and even inquiring how the universe itself works, with ideas such as black holes and supernovas by no means out of the question!

SCIENCE LEARNING STATEMENTS

Area of Learning	Knowledge and Skills
Scientific Enquiry and applying knowledge in context	I can use my science experience to explore ideas and raise questions about the world.
	I can talk about how different scientific ideas have developed over time.
	I can select and plan, with help, the most appropriate type of scientific enquiry I might use to answer questions and give justifications.
	I can recognise when and how to set up comparative and fair tests. I can explain which variables need to be controlled and why.
	I can use and develop keys and other information records to identify, classify and describe living things and materials. I can identify patterns that might be found in natural environments.
	I can recognise which secondary sources will be most useful to research my ideas and begin to separate opinion from fact.
	I can make decisions about what observations to make, what measurements to use and how long to make them for.
	I can spot causal relationships in my data and identify evidence that refutes or supports my ideas.
	I can choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. I can take repeat measurements where appropriate.
	I can decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
	I can identify scientific evidence that has been used to support of refute ideas or arguments.
I can use relevant scientific language and illustrations to discuss, communicate and justify my scientific ideas, use oral and written forms (such as displays and other presentations) to report conclusions, causal relationships and explanations of degree of trust in results.	
I can use results to make predictions and identify when further observations, comparative and fair tests might be needed.	

NATIONAL CURRICULUM OBJECTIVES

1. describe the movement of the Earth, and other planets, relative to the Sun in the solar system
2. describe the movement of the Moon relative to the Earth
3. describe the Sun, Earth and Moon as approximately spherical bodies
4. use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

KEY VOCABULARY

Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, galaxy, universe, rotates, star, orbit, planets, gravity, mass, supernova, black hole, Nicolas Copernicus, naked eye, heliocentric, Galileo Galilei, telescope

ART AND DESIGN

Exploring and Developing

Exploring and developing ideas	Select and record from first hand observation, experience and imagination and explore ideas for different purposes, including the use of ICT.
	Question and make thoughtful observations about starting points and select ideas to use in their work.
	Explore the roles and purposes of artists, craftspeople and designers working in different times and cultures.
Evaluating and developing work	Compare ideas, methods and approaches in their own and others' work and say what they think and feel about them.
	Adapt their work according to their views and describe how they might develop it further.
	Annotate work in sketchbook.

Drawing Using a Variety of Materials (Recap)

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> -Use a sketchbook to develop ideas. -Explore the potential properties of the visual elements, line, tone, pattern, texture, colour and shape. 	<ul style="list-style-type: none"> - Experiment by using marks and lines to produce texture. -Work in a sustained and independent way from observation, experience and imagination. -Create a plan in sketchbooks and annotate this with opinions, thoughts and feelings. -Use sketchbooks to collect and record visual information from different sources as well as planning, trying out ideas, plan colours and collect source material for future works -Start to develop their own style using tonal contrast and mixed media. 	<ul style="list-style-type: none"> - Know how to use shading to create mood and feeling. -Know how to represent body language when drawing. - Know how to organise line, tone, shape and forms in movement. -Know how to apply the techniques and specific vocabulary of stumping, smudging and stippling -Identify the differences between hatching, cross-hatching, contour hatching, smudging and stumping and stippling and discuss when it is suitable to choose a particular technique. 	Pencil, effect, light, pencil hatching, shading, cross hatching, stumping, smudging, stippling, lighter shading effects, pressure, darker shading effects, pressure, angles, light hatching effects, contour hatching

Painting (Recap)

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
<ul style="list-style-type: none"> -Work on preliminary studies to test media and materials. -Create imaginative work from a variety of sources. 	<ul style="list-style-type: none"> -Use complimentary and contrasting colours. -Use stippling technique learnt using pencil and apply to using paint. -Use primary colours to create secondary and tertiary colours and vary shades and tones appropriately to the task. -Apply the techniques of stippling, washing, splattering, under painting and layering when using acrylic paint. -Work in a sustained and independent way from observation, experience and imagination. -Use sketchbooks to collect and record visual information from different sources as well as planning, trying out ideas, plan colours and collect source material for future works start to develop their own style using tonal contrast and mixed media. -Explore printing on fabric, selecting the appropriate printing technique. 	<ul style="list-style-type: none"> -Know that colours are named using the root primary colour - i.e. blue-green, red-purple -Identify a focal point in a painting -Explain how to colour match. -Explain how colour can create a focal point. -Explain the difference between complimentary and contrasting colours (acrylic). -Know which type of paint works most effectively when stippling. -Know how to use smudging techniques when painting. -Know how to use acrylic paint. 	Harmonising colours, contrasting colours, hues, tints, shades, root primary colour, tonal contrast, stippling, smudging, primary, secondary and tertiary colours, acrylic paint, splattering, underpainting, layering, washing.

3d Form

National Curriculum	Additional Skills	Knowledge	Key Vocabulary
Plan, design, make and adapt models. (clay/papier Mache/woodwork/choice for purpose)	<ul style="list-style-type: none"> -Decorate, coil and produce maquettes (rough draft or scale model) -Develop skills in using clay including slabs, coils, slips etc. -Use recycled, natural and man-made materials to create sculpture. -Plan a sculpture through drawing and other preparatory work. -Explore using Modroc as a means of making a simple 3D sculpture. 	<ul style="list-style-type: none"> -Know that a sketchbook can be used to collect ideas, plan and refine them. -Know that recycled, natural and manmade materials can be used to create sculptures. -Know the difference between a physical and visual texture. -Know how to secure work to continue at a later date. 	Modroc, man-made material plaster, bandage, papier mache, smoother, smoothing, better finish, join, finishing, sculpture, manipulate, form, irreversible, texture, detail, twisting, rolling, designer, material, famous sculptures, recent, modern, ancient, secure, recycled, physical texture, visual texture, mix, maquettes, draft, scale, model

Artist/Style/Activities

Meng: 3d layered landscapes

Detailed pencil sketches and use of other materials to develop lunar landscapes – depth and perspective focus

'CORE' KNOWLEDGE	'ADDITIONAL' KNOWLEDGE
1) I know that Galileo was a scientist/astronomer/mathematician from the 16 th century who developed the telescope.	<p>a) I know that Copernicus first discovered that the sun was the centre of the solar system and the planets rotate around it ('heliocentric') in the 15th century.</p> <p>b) I know that Galileo was imprisoned for backing up Copernicus' research saying that the sun was the centre of the solar system!</p> <p>c) I know that Galileo first discovered that the moon had craters and mountains.</p>
2) I know that the sun is a star, like millions of others in the universe, and is the centre of our solar system.	<p>a) I know that our sun, like other stars, are burning balls of mostly hydrogen and helium.</p> <p>b) I know that some stars are over 100 times bigger than our sun...like Arcturus and Rigel. The biggest known star is 1300 times bigger!</p> <p>c) I know that the next closest star to Earth is Proxima Centauri – 4.24 light years away (40,208,000,000,000 km)!!!!!!!</p>
3) I know that there are eight planets in our solar system and that they travel around the sun in fixed orbits.	<p>a) I know that Jupiter is the biggest planet.</p> <p>b) I know that Mercury is closest to the sun and therefore the hottest planet.</p> <p>c) I know that Earth is sometimes called the 'Goldilocks planet' as it is just the right distance from the sun and has just the right conditions to sustain life.</p> <p>d) I know lots about one planet because I've researched and reported on it!</p>
4) I know that the Earth takes 365½ days to complete its orbit around the Sun.	<p>a) I know that the Earth rotates (spins) on its axis every 24 hours.</p> <p>b) I know that as Earth rotates, half faces the Sun (here it is day) and half is facing away from the Sun (night).</p> <p>c) I know that as the Earth rotates, the Sun appears to move across the sky.</p>
5) I can explain how the Moon orbits the Earth - it takes about 28 days to complete its orbit.	<p>a) I know that the Sun, Earth and Moon are approximately spherical.</p> <p>b) I can show using diagrams the movement of the Earth and Moon and I can explain their movement. REVIEW: Interpret and report: SOLAR SYSTEM RESEARCH</p> <p>c) I know that the moon was made when a rock smashed into the Earth.</p>
6) I know that our solar system is in one of millions of galaxies in the universe and is called 'The Milky Way'.	<p>a) I know that in the middle of every galaxy is a supermassive black hole.</p> <p>b) I can puzzle my brain by trying think about what a black hole is!</p> <p>c) I can tell you some other amazing facts about our galaxy and the incredible universe!</p>

School Value	Topic relevance: How/when/where/why is it needed?	Possible 'higher order' questioning	
Resilience	- Copernicus had to show incredible resilience to stick to his guns – before him, everyone thought the Earth was the centre of the solar system and ridiculed him. - Considering how the universe was formed and how life has evolved on our planet, there are so many examples of the resilience of different species and how some have survived and even thrived for millions of years!	Remember	How big is the sun? How far is it from Earth? How long does its light and heat take to reach Earth? How far is the moon from Earth?
		Understand	Why is Earth sometimes known as being in the 'Goldilocks zone'?
Respect	- The fact that Earth can support life (when it seems the majority in our solar system or even our galaxy or universe cannot as they are too inhospitable) is almost a miracle in itself...so we should respect our planet and look after it!	Apply	Why is the moon important to life on Earth? What difference does our moon have on our lives?
		Analyse	What are the differences between the Earth and other planets in our solar system? Could they sustain life?
		Evaluate	What would happen if there was no gravity on Earth? Could that happen? What would happen if the Earth was closer to the sun? Or further away?
		Create	Having learnt about insulators and conductors of heat, do you think you could invent something which helps us prevent further global warming?