


Year 5 Science & Technology Unit 2020

Earth and Space

Term:	One & Two	Duration:	15 weeks	Grade:	Five	Year:	2020		
UNIT OVERVIEW					OUTCOMES				
<p>This unit focuses on Earth's place in the solar system, changes on its surface caused by natural disasters and the exploration of how these may be mitigated. Learning experiences in this unit further develop students' understanding of the Earth, its position in the solar system and as a dynamic part of a complex, interrelated system.</p>							<p>ST3-1WS-S <i>Working Scientifically</i> plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions</p> <p>ST3-10ES-S <i>Earth and Space</i> explains regular events in the solar system and geological events on the Earth's surface</p>		
SKILLS FOCUS					ASSESSMENT				
<p><i>Working Scientifically</i> <u>Processing and analysing data</u></p> <ul style="list-style-type: none"> ▪ Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data ▪ Employ appropriate technologies to represent data ▪ Compare data with predictions ▪ Present data as evidence in developing explanations <p><u>Communicating</u></p> <ul style="list-style-type: none"> ▪ Communicate ideas, explanations and processes, using scientific representations including multimodal forms 					<p><i>Design & Production</i> <u>Researching and planning</u></p> <ul style="list-style-type: none"> ▪ research, identify and define design ideas and processes for an audience ▪ consider functional and aesthetic needs in planning a design solution ▪ develop, record and communicate design ideas, decisions and processes using appropriate technical terms ▪ produce labelled and annotated drawings including digital graphic representations for an audience ▪ consider sustainability of resources when researching and planning design solutions ▪ manage projects within time constraints 		<p>Assessment: <i>For/ As/ Of</i> Learning</p> <ul style="list-style-type: none"> <input type="checkbox"/> Revolution, Rotation, Orbit Explanation (Assessment For Learning) <input type="checkbox"/> Planets of the solar systems research task (Assessment For Learning) <input type="checkbox"/> Reflection on robotics challenge (Assessment As Learning) <input type="checkbox"/> Natural disaster research task (Assessment For Learning) and system prototype (Assessment Of Learning) 		

CONTENT

Earth's Place in our Solar System → *How does the Earth compare to other planets in the solar system?*

- Identify that Earth is part of a system of planets orbiting around a star (the Sun)
- Investigate the role of light energy in how we observe the Sun, Moon and planets
- Compare the key features of the planets of our solar system, for example:
 - Time it takes for the planets to revolve around the Sun
 - Size of the planets
 - Distance of the planets from the Sun
- Research and communicate how Aboriginal and/or Torres Strait Islander Peoples use observations of the night sky to inform decisions about resources and significant cultural events, for example:
 - Gathering food
 - Ceremonies
 - Song lines
 - Navigation
 - Examine and discuss current developments in astronomy, space and planetary science, particularly related to making observations and gathering data

Changes to Earth's Surface → *How do sudden geological changes and extreme weather events affect the Earth's surface?*

- investigate the effects of sudden geological changes and extreme weather events on the Earth's surface, for example:
 - earthquakes, volcanic eruptions, tsunamis
 - cyclones, storms, drought and floods
- investigate ways that advances in science and technology have assisted people to plan for and manage natural disasters to minimise their effect, for example:
 - design and construction of buildings and roads
 - detection systems for tsunamis
 - digital flood and fire warning systems

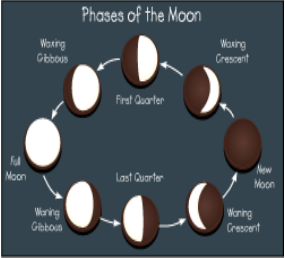
RESOURCES

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|---|--|
| <ul style="list-style-type: none"> ▪ Australian Backyard Astronomy 🔗 http://publishing.nla.gov.au/documents/Australian_Backyard_Astronomy.pdf ▪ National Geographic: Our Solar System 🔗 https://www.nationalgeographic.com/science/space/our-solar-system/ ▪ Earth's Place in Space Weebly 🔗 https://earthspacinspace.weebly.com/index.html ▪ Earth's Place in Space Weebly II 🔗 http://gnlsyear5.weebly.com/earths-place-in-space.html ▪ Snapshot Science 🔗 https://snapshot-science.weebly.com/earth-space.html ▪ ABC Education: Space and our Solar System 🔗 http://education.abc.net.au/home#!/topic/496370/space-and-our-solar-system ▪ Ask an Astronomer: Our Solar System 🔗 http://curious.astro.cornell.edu/our-solar-system ▪ Thinglink solar system 🔗 https://www.thinglink.com/scene/723686637766180864?buttonSource=viewLimits | <ul style="list-style-type: none"> ▪ ABC Voyage to the planets 🔗 http://www.abc.net.au/tv/voyage/ ▪ ABC Space Exploration 🔗 http://education.abc.net.au/home#!/digibook/618096/solar-system-and-space-exploration ▪ Nasa Solar System Exploration 🔗 https://solarsystem.nasa.gov/ ▪ BTN: Aboriginal Astronomy 🔗 http://www.abc.net.au/btn/story/s4560044.htm ▪ Syllabus Bites: Aboriginal Astronomy 🔗 https://app.education.nsw.gov.au/rap/resource/access/0908b15c-c8d9-4ccc-90da-753b9c5b087c/1 ▪ Exploring our solar system 🔗 https://youtu.be/Qd6nLM2QIWw ▪ Earth's rotation & revolution 🔗 https://www.youtube.com/watch?v=l64YwNI1wr0 ▪ Astronomy of the Kamilaroi People 🔗 http://education.abc.net.au/res/pdf/indigenous-astronomy-guide.pdf |
|---|--|

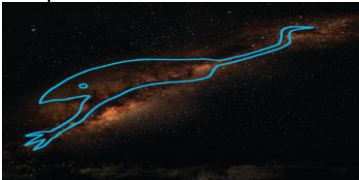

TUNING IN TO THE INQUIRY

Tuning In to the Inquiry		Reviewing Tuning In Data
Tuning In (Baseline Data)		<i>(What did the tuning in tasks reveal to us about students' interests and needs? What questions did they pose that can help drive learning?)</i>
<ul style="list-style-type: none"> ▪ How can we assess students' prior knowledge and experience in relation to this context? ▪ How will we record this information for later assessment? ▪ What can we do to PROVOKE interest/enthusiasm/curiosity/motivation? ▪ How can we assist students to make "conceptual connections" and see relationships to and links with their own lives? 	<p>Suggested Tuning In Tasks:</p> <ul style="list-style-type: none"> ▪ Watch <i>Space School: Solar System</i> https://www.youtube.com/watch?v=mtKNH2Y2OJM ▪ Read the brief overview of the solar system from NASA's Science website (LINK: English) https://solarsystem.nasa.gov/solar-system/our-solar-system/overview/ ▪ Explore NASA's Eyes interactives app to examine space exploration and data gathering (needs to be downloaded prior to learning) https://eyes.jpl.nasa.gov/eyes-on-the-solar-system.html ▪ View a range of images relating to our solar system, astronomy and space exploration (See Think Wonder) ▪ Use the thinking routine Think Puzzle Explore to gauge student understandings, misconceptions and wonderings. (NB: introduce question starts to help students questioning) 	

CONTENT	LEARNING AND TEACHING: SHARED INQUIRY	EVALUATION	RESOURCES
<p>Earth's Place in our Solar System</p> <p>Students:</p> <ul style="list-style-type: none"> Identify that Earth is part of a system of planets orbiting around a star (the Sun) Investigate the role of light energy in how we observe the Sun, Moon and planets <p><u>Curriculum Links:</u></p> <p>🔗Mathematics:</p> <ul style="list-style-type: none"> <u>Time (I): tell time to the minute & investigate relationship between units of time</u> <u>Time (II): convert between units of time</u> <u>Fractions (I): model & represent unit fractions</u> <p>🔗English:</p> <ul style="list-style-type: none"> <u>Speaking & Listening: respond to and compose texts</u> <u>Responding & Composing: respond to and compose texts</u> <u>Reflecting on Learning: respond to and compose texts</u> 	<p><u>Key Inquiry Question</u></p> <p><u>How does the Earth compare to other planets in the solar system?</u></p> <ul style="list-style-type: none"> <u>Pose the question</u> the following questions. Students could engage in a <u>Chalk Talk</u> thinking routine to record their thinking and also make connections to and elaborate on the thinking of others. <ul style="list-style-type: none"> What defines our days, months and years on Earth? What do you notice about the sun in summer compared to winter? What is the difference between what we see in the sky during the day compared to at night? What makes you say that? Different planets have different temperatures, but does this temperature stay the same (e.g. on Earth)? Why do you think this is the case? What makes planet Earth unique? Examine the animations <u>Space School: Earth</u> and <u>Crash Course: Earth's Rotation and Revolution</u> Define the key scientific terms: <i>revolution, rotation and orbit</i> <ul style="list-style-type: none"> <u>Revolution</u>: a planet making one full trip around the sun <u>Rotation</u>: a planet spinning on its axis <u>Orbit</u>: the path a planet takes on its journey around the sun Divide students into small groups. Have the groups use a range of objects and tools to explain <u>one</u> of the following key ideas: (LINK: English) <ul style="list-style-type: none"> How the Earth's rotation on its axis creates day and night How the Earth's tilt and orbit around the sun creates the seasons How light from the sun reflects off the moon, allowing us to see it in the sky Groups present their explanations to the class – this could either be live-action or a recorded explanation. (Assessment) Explore the NASA's eyes application to examine the Earth in real-time (Eyes on Earth) – viewing rotation, what the Earth looks like during day/night from space. Students will also be able to view the orbit of satellites around the Earth. NB: this application will need to be downloaded prior to use. https://eyes.jpl.nasa.gov/eyes-on-the-solar-system.html 		<p>Larger pieces of paper with questions recorded</p> <p>Various sized balls Torch/ lamp Globe?? iPad/ camera</p>

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<p>Earth's Place in our Solar System</p> <p>Students:</p> <ul style="list-style-type: none"> ▪ Compare the key features of the planets of our solar system, for example: <ul style="list-style-type: none"> ○ Time it takes for the planets to revolve around the Sun ○ Size of the planets ○ Distance of the planets from the Sun <p>Curriculum Links:</p> <p>🔗 Mathematics:</p> <ul style="list-style-type: none"> ▪ <u>Length (l): measure, order and compare objects using familiar metric units of length</u> <p>🔗 English:</p> <ul style="list-style-type: none"> ▪ <u>Speaking & Listening: respond to and compose texts</u> ▪ <u>Responding & Composing: respond to and compose texts</u> ▪ <u>Reflecting on Learning: respond to and compose texts</u> 	<p>Key Inquiry Question</p> <p><u>How does the Earth compare to other planets in the solar system?</u></p> <ul style="list-style-type: none"> ▪ Introduce the scientific term 'Heliocentric Model' (Helios is Greek for Sun). Read through the history of our solar system and explore the difference between the geocentric and heliocentric models. (LINK: English) ▪ Small groups: Investigate the distance of the planets from the sun through the creation of a <u>scale model</u> in the playground. (LINK: Mathematics) <ul style="list-style-type: none"> ○ Write names of the sun and eight planets on separate pieces of paper – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune ○ Group members position themselves to show the relative position of the planets from the sun <table border="1" data-bbox="564 539 1093 858"> <thead> <tr> <th>PLANET</th> <th>MODEL DISTANCE FROM SUN</th> </tr> </thead> <tbody> <tr> <td>Mercury</td> <td>38cm</td> </tr> <tr> <td>Venus</td> <td>72 cm</td> </tr> <tr> <td>Earth</td> <td>1 m</td> </tr> <tr> <td>Mars</td> <td>1.5 m</td> </tr> <tr> <td>Jupiter</td> <td>5.2 m</td> </tr> <tr> <td>Saturn</td> <td>9.5 m</td> </tr> <tr> <td>Uranus</td> <td>19.2 m</td> </tr> <tr> <td>Neptune</td> <td>30.1 m</td> </tr> </tbody> </table> <ul style="list-style-type: none"> ▪ View the video Solar System 101 and identify the 2 types of categories we divide the 8 planets into (terrestrial and jovian) ▪ COLLABORATIVE RESEARCH TASK: Students are given 1 of the 8 planets to investigate using the National Geographic, NASA websites and NASA Eyes application to gather information about – time taken to orbit sun, what it looks like, size of planet, distance from sun, what it is made of, number of moons, how long is a day/ year, amazing fact. Present research to the class (Assessment) (LINK: English) ▪ <u>Pose the question:</u> <i>How did the stars help Indigenous people understand their universe?</i> ▪ View the video Aboriginal Astronomy and discuss the key ideas, focusing on the Wurdi Youang stone arrangement and the seasons, storytelling through constellations, and Indigenous people as the 1st astronomers 	PLANET	MODEL DISTANCE FROM SUN	Mercury	38cm	Venus	72 cm	Earth	1 m	Mars	1.5 m	Jupiter	5.2 m	Saturn	9.5 m	Uranus	19.2 m	Neptune	30.1 m		<p>History of solar system information sheet</p> <p>Meter rulers Paper Pencils iPad or camera</p> <p>Chromebook or iPad devices NB: students could combine with others to create a Google Site of the planets</p>
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<p>Earth's Place in our Solar System</p> <p>Students:</p> <ul style="list-style-type: none"> ▪ Research and communicate how Aboriginal and/or Torres Strait Islander Peoples use observations of the night sky to inform decisions about resources and significant cultural events, for example: <ul style="list-style-type: none"> ○ Gathering food ○ Ceremonies ○ Song lines ○ Navigation ▪ Examine and discuss current developments in astronomy, space and planetary science, particularly related to making observations and gathering data <p>Curriculum Links:</p> <ul style="list-style-type: none"> 🔗 Creative Arts: drama, visual arts 🔗 English: <i>respond to and compose texts</i>  	<p>Key Inquiry Question</p> <p><u>How does the Earth compare to other planets in the solar system?</u></p> <ul style="list-style-type: none"> ▪ Define the key scientific terms – <i>astronomy, astronomer, constellation</i> and <i>cultural astronomy</i> (study of the sky knowledge of ancient & traditional people) ▪ Examine dreamtime stories that use the night sky and their related images, such as Emu in the Sky, The Canoe in Orion and Seven Sisters 🔗 Use questions to prompt exploration: <ul style="list-style-type: none"> ○ What can you see in the picture? ○ Where in the night sky can this constellation be found? ○ What message does this story convey? ○ Retell <u>one</u> of the traditional stories. For example, through drama/ role play, illustrations, artworks, create a book etc. ○ EMU: create a table that outlines the months of the year, the location of the Emu in the sky and what this means for the people ▪ SCHOOL/COMMUNITY CONNECTION: Connect with the schools Aboriginal Education Officer or with a local Indigenous person to get a local perspective on how the night sky was used in that area ▪ Pose the question: <i>What developments are occurring in astronomy, space and planetary science at the moment?</i> ▪ Examine and discuss a range of videos and texts about current developments: <ul style="list-style-type: none"> ○ Super Telescope SKA: http://www.abc.net.au/btn/story/s3517663.htm ○ Amateur Astronomer: http://www.abc.net.au/btn/story/s4183263.htm ○ What's next for NASA: https://www.nasa.gov/about/whats_next.html ○ Space Communications: http://www.abc.net.au/catalyst/stories/2358763.htm and the Deep Space Network: https://www.cdsc.nasa.gov/ ▪ ROBOTICS CHALLENGE: Use robotics SPHERO kits to design and make a space robot, such as the 'Mars Rover' that can move from one point to another or around a series of objects. 		<p>SPHERO Robotics kits iPad devices</p>

CONTENT	LEARNING AND TEACHING: SHARED INQUIRY	EVALUATION	RESOURCES
<p>Changes to Earth's Surface Students:</p> <ul style="list-style-type: none"> ▪ investigate the effects of sudden geological changes and extreme weather events on the Earth's surface <ul style="list-style-type: none"> ○ earthquakes, volcanic eruptions, tsunamis ○ cyclones, storms, drought and floods ▪ investigate ways that advances in science and technology have assisted people to plan for and manage natural disasters to minimise their effect <ul style="list-style-type: none"> ○ design and construction of buildings and roads ○ detection systems for tsunamis ○ digital flood and fire warning systems <p><u>Curriculum Links:</u> 7</p>	<p><u>Key Inquiry Question</u> <u>How do sudden geological changes and extreme weather events affect the Earth's surface?</u></p> <ul style="list-style-type: none"> ▪ Watch the video Nature's Fury: The Science of Natural Disasters <ul style="list-style-type: none"> ○ Use the thinking routine Think Puzzle Explore to gauge student knowledge of natural disasters and wonderings, using the following guiding prompts: <ul style="list-style-type: none"> <input type="checkbox"/> What do you <u>think</u> you know about natural disasters? <input type="checkbox"/> What questions or <u>puzzles</u> do you have? <input type="checkbox"/> How might we <u>explore</u> the connection between our wonderings? (use these to guide learning moving forward) ▪ Read books from the Natural Disaster series by Jackie French → Flood, Cyclone and Drought (Fire will be covered in Term 4 Geography Unit) <ul style="list-style-type: none"> ○ Compare and contrast the natural disasters in the text ○ What impact do these geological events have on the environment and on people <p><u>INDEPENDENT RESEARCH TASK: (Assessment)</u></p> <ul style="list-style-type: none"> ▪ Choose one natural disaster - Earthquakes, Volcanic eruptions, Tsunamis, Cyclones, Drought, Floods ▪ Students research and use a variety of media sources to gather information about: <ul style="list-style-type: none"> ○ What causes this extreme event? ○ What does this extreme event look like? ○ What connections can you make to this extreme event? (self, text, world) ○ What impact does this extreme event have on the environment and on humans and animals? ○ Where in Australia and/or the world does this extreme event occur? ○ How do people plan for and manage this extreme event? create an e.g ▪ Share research in unique and engaging way - booklet, website, digibook, slideshow, documentary etc. 		<p>video Nature's Fury: The Science of Natural Disasters</p> <p>Books Flood, Drought, Cyclone</p>