

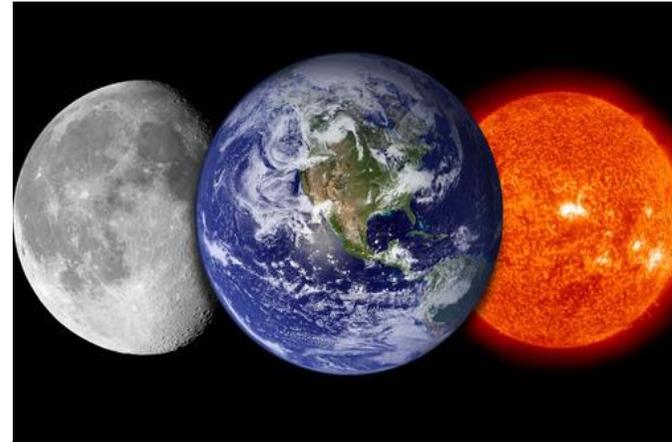
# Year 5 Science & Technology Unit 2018

## Earth and Space

Term:	Four	Duration:	10 weeks	Grade:	Five	Year:	2018
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UNIT OVERVIEW	OUTCOMES
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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.



**ST3-1WS-S Working Scientifically**  
plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions

**ST3-10ES-S Earth and Space**  
explains regular events in the solar system and geological events on the Earth's surface

SKILLS FOCUS	ASSESSMENT
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**Working Scientifically**  
**Processing and analysing data**

- 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

**Communicating**

- Communicate ideas, explanations and processes, using scientific representations including multimodal forms

**Design & Production**  
**Researching and planning**

- 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

Throughout this unit a variety of different assessment types will be used to gauge students' knowledge and understanding.

**Diagnostic:** occurs at the beginning of the unit during the tuning in phase of inquiry. This assessment is used to elicit students' prior knowledge so that the teacher can take account of this when planning how the unit will progress.

**Formative:** occurs throughout the unit at various points during the sorting out and finding out phases of inquiry. This assessment type enables the teacher to monitor students' developing understanding and provide feedback that can extend and deepen students' learning.

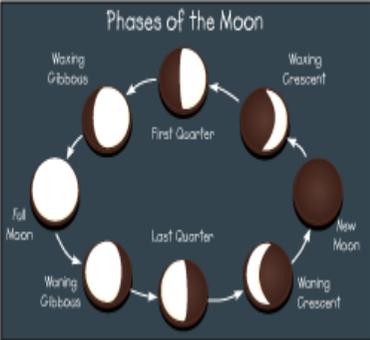
**Summative:** occurs towards the end of the unit. This assessment type is used to determine students' achievement of Science Inquiry Skills and Science Understanding as developed throughout the unit

ESSENTIAL INQUIRY QUESTIONS	CONTENT	
<p>1. How does the Earth compare to other planets in the solar system?</p> <p>2. How do sudden geological changes and extreme weather events affect the Earth's surface?</p>	<p><b>Earth's Place in our Solar System</b></p> <ul style="list-style-type: none"> <li>▪ Identify that Earth is part of a system of planets orbiting around a star (the Sun)</li> <li>▪ Investigate the role of light energy in how we observe the Sun, Moon and planets</li> <li>▪ Compare the key features of the planets of our solar system, for example:               <ul style="list-style-type: none"> <li>○ Time it takes for the planets to revolve around the Sun</li> <li>○ Size of the planets</li> <li>○ Distance of the planets from the Sun</li> </ul> </li> <li>▪ 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"> <li>○ Gathering food</li> <li>○ Ceremonies</li> <li>○ Song lines</li> <li>○ Navigation</li> </ul> </li> <li>▪ Examine and discuss current developments in astronomy, space and planetary science, particularly related to making observations and gathering data</li> </ul>	<p><b>Changes to Earth's Surface</b></p> <ul style="list-style-type: none"> <li>▪ Investigate the effects of sudden geological changes and extreme weather events on the Earth's surface, for example:               <ul style="list-style-type: none"> <li>○ Earthquakes, volcanic eruptions, tsunamis</li> <li>○ Cyclones, storms, drought and floods</li> </ul> </li> <li>▪ Investigate ways that advances in science and technology have assisted people to plan for and manage natural disasters to minimise their effect, for example:               <ul style="list-style-type: none"> <li>○ Design and construction of buildings and roads</li> <li>○ Detection systems for tsunamis</li> <li>○ Digital flood and fire warning systems</li> </ul> </li> </ul>
<b>RESOURCES</b>		
<ul style="list-style-type: none"> <li>▪ Australian Backyard Astronomy → <a href="http://publishing.nla.gov.au/documents/Australian_Backyard_Astronomy.pdf">http://publishing.nla.gov.au/documents/Australian_Backyard_Astronomy.pdf</a></li> <li>▪ National Geographic: Our Solar System → <a href="https://www.nationalgeographic.com/science/space/our-solar-system/">https://www.nationalgeographic.com/science/space/our-solar-system/</a></li> <li>▪ Earth's Place in Space Weebly → <a href="https://earthspaininspace.weebly.com/index.html">https://earthspaininspace.weebly.com/index.html</a></li> <li>▪ Earth's Place in Space Weebly II → <a href="http://qnlsyear5.weebly.com/earths-place-in-space.html">http://qnlsyear5.weebly.com/earths-place-in-space.html</a></li> <li>▪ Snapshot Science → <a href="https://snapshot-science.weebly.com/earth-space.html">https://snapshot-science.weebly.com/earth-space.html</a></li> <li>▪ ABC Education: Space and our Solar System → <a href="http://education.abc.net.au/home#!/topic/496370/space-and-our-solar-system">http://education.abc.net.au/home#!/topic/496370/space-and-our-solar-system</a></li> <li>▪ Ask an Astronomer: Our Solar System → <a href="http://curious.astro.cornell.edu/our-solar-system">http://curious.astro.cornell.edu/our-solar-system</a></li> <li>▪ Thinglink solar system → <a href="https://www.thinglink.com/scene/723686637766180864?buttonSource=viewLimits">https://www.thinglink.com/scene/723686637766180864?buttonSource=viewLimits</a></li> </ul>	<ul style="list-style-type: none"> <li>▪ ABC Voyage to the planets → <a href="http://www.abc.net.au/tv/voyage/">http://www.abc.net.au/tv/voyage/</a></li> <li>▪ ABC Space Exploration → <a href="http://education.abc.net.au/home#!/digibook/618096/solar-system-and-space-exploration">http://education.abc.net.au/home#!/digibook/618096/solar-system-and-space-exploration</a></li> <li>▪ Nasa Solar System Exploration → <a href="https://solarsystem.nasa.gov/">https://solarsystem.nasa.gov/</a></li> <li>▪ BTN: Aboriginal Astronomy → <a href="http://www.abc.net.au/btn/story/s4560044.htm">http://www.abc.net.au/btn/story/s4560044.htm</a></li> <li>▪ Syllabus Bites: Aboriginal Astronomy → <a href="https://app.education.nsw.gov.au/rap/resource/access/0908b15c-c8d9-4ccc-90da-753b9c5b087c/1">https://app.education.nsw.gov.au/rap/resource/access/0908b15c-c8d9-4ccc-90da-753b9c5b087c/1</a></li> <li>▪ Exploring our solar system → <a href="https://youtu.be/Qd6nLM2QIWw">https://youtu.be/Qd6nLM2QIWw</a></li> <li>▪ Earth's rotation &amp; revolution → <a href="https://www.youtube.com/watch?v=I64YwNI1wr0">https://www.youtube.com/watch?v=I64YwNI1wr0</a></li> <li>▪ Astronomy of the Kamilaroi People → <a href="http://education.abc.net.au/res/pdf/indigenous-astronomy-guide.pdf">http://education.abc.net.au/res/pdf/indigenous-astronomy-guide.pdf</a></li> </ul>	<ul style="list-style-type: none"> <li>▪ ABC Education: Extreme weather resources → <a href="http://education.abc.net.au/home#!/topic/494984/extreme-weather">http://education.abc.net.au/home#!/topic/494984/extreme-weather</a></li> </ul>

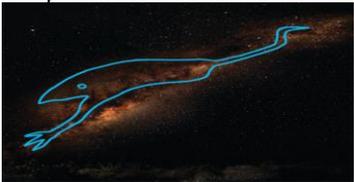
## TUNING IN TO THE INQUIRY

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



CONTENT	LEARNING AND TEACHING: SHARED INQUIRY	EVALUATION	RESOURCES
<p><b>Earth's Place in our Solar System</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>Identify that Earth is part of a system of planets orbiting around a star (the Sun)</li> <li>Investigate the role of light energy in how we observe the Sun, Moon and planets</li> </ul> <p><u>Curriculum Links:</u></p> <p>→ <b>Mathematics:</b></p> <ul style="list-style-type: none"> <li><u>Fractions (1): model &amp; represent unit fractions</u></li> </ul> <p>→ <b>English:</b></p>	<p><b>Key Inquiry Question</b></p> <p><u>How does the Earth compare to other planets in the solar system?</u></p> <ul style="list-style-type: none"> <li><b>Pose the question:</b> <i>If light from the sun reflects off the moon, why don't we see the whole moon all of the time?</i></li> <li>Using a ball and torch/lamp demonstrate how light can be reflected, just as it is when sunlight is reflected from the moon. Add in another ball to represent the Earth. <ul style="list-style-type: none"> <li>Investigate how changing the position of the moon changes the amount of sunlight that is reflected from the moon.</li> <li>Students draw the different phases of moon and link in key terms for these phases (**OREO project) → full moon, ¼ moon, waxing/waning gibbous, waxing/waning crescent</li> <li>Recall fractions and link to phases of the moon, identifying full moon as a whole number and new moon as zero. Write the fractions of light illuminated on the moon for each phase</li> </ul> </li> <li><b>HOME/SCHOOL CONNECTOR:</b> Students investigate and record the phases of the moon for a month, identifying the key terms (full moon, ¼ moon, waxing/waning gibbous, waxing/waning crescent) <ul style="list-style-type: none"> <li>students could represent this using illustrations or capture using images</li> <li>describe the moon using key terms and fractional language</li> </ul> </li> <li><b>Pose the question:</b> <i>How do the features of the planets in our solar system compare to one another?</i></li> <li>View the video <a href="#">Solar System</a> / or NASA's eyes application (Eyes on the Solar System) and engage students in a <a href="#">See Think Wonder</a> thinking routine to make observations about the planets in our solar system.</li> </ul> 		<p>2x different sized balls Torch/lamp</p> <p>**paper plates **Oreo biscuits x7ea pair **plastic knife</p> <p>Phases of moon recording sheet Task explanation sheet</p>

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<p><b>Earth's Place in our Solar System</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>Compare the key features of the planets of our solar system, for example: <ul style="list-style-type: none"> <li>Time it takes for the planets to revolve around the Sun</li> <li>Size of the planets</li> <li>Distance of the planets from the Sun</li> </ul> </li> </ul> <p>Curriculum Links:</p> <p>→ <b>Mathematics:</b></p> <ul style="list-style-type: none"> <li><u>Length (l): measure, order and compare objects using familiar metric units of length</u></li> </ul> <p>→ <b>English:</b></p> <ul style="list-style-type: none"> <li><u>Speaking &amp; Listening: respond to and compose texts</u></li> <li><u>Responding &amp; Composing: respond to and compose texts</u></li> <li><u>Reflecting on Learning: respond to and compose texts</u></li> </ul>	<p><b>Key Inquiry Question</b></p> <p><u>How does the Earth compare to other planets in the solar system?</u></p> <ul style="list-style-type: none"> <li>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.</li> <li>Small groups: Investigate the distance of the planets from the sun through the creation of a <u>scale model</u> in the playground. <ul style="list-style-type: none"> <li>Write names of the sun and eight planets on separate pieces of paper – Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune</li> <li>Group members position themselves to show the relative position of the planets from the sun</li> </ul> <table border="1" data-bbox="566 555 1093 938"> <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> </li> <li>View the video <u>Solar System 101</u> and identify the 2 types of categories we divide the 8 planets into (terrestrial and jovian)</li> <li><b>COLLABORATIVE RESEARCH TASK:</b> Students are given 1 of the 8 planets to investigate using the <u>National Geographic</u>, <u>NASA</u> 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 (<b>Assessment</b>)</li> <li><u>Pose the question:</u> <i>How did the stars help Indigenous people understand their universe?</i></li> <li>View the video <u>Aboriginal Astronomy</u> and discuss the key ideas, focusing on the Wurdi Youang stone arrangement and the seasons, storytelling through constellations, and Indigenous people as the 1<sup>st</sup> astronomers</li> </ul>	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 <b>NB:</b> students could combine with others to create a Google Site of the planets</p>
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<p><b>Earth's Place in our Solar System</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>▪ 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"> <li>○ Gathering food</li> <li>○ Ceremonies</li> <li>○ Song lines</li> <li>○ Navigation</li> </ul> </li> <li>▪ Examine and discuss current developments in astronomy, space and planetary science, particularly related to making observations and gathering data</li> </ul> <p>Curriculum Links:</p> <p>→<b>Creative Arts:</b> drama, visual arts</p> <p>→<b>English:</b> <i>respond to and compose texts</i></p>  	<p><b>Key Inquiry Question</b></p> <p><u>How does the Earth compare to other planets in the solar system?</u></p> <ul style="list-style-type: none"> <li>▪ Define the key scientific terms – <i>astronomy, astronomer, constellation</i> and <i>cultural astronomy</i> (study of the sky knowledge of ancient &amp; traditional people)</li> <li>▪ Examine dreamtime stories that use the night sky and their related images, such as <u>Emu in the Sky</u>, <u>The Canoe in Orion</u> and <u>Seven Sisters</u> → Use questions to prompt exploration: <ul style="list-style-type: none"> <li>○ What can you see in the picture?</li> <li>○ Where in the night sky can this constellation be found?</li> <li>○ What message does this story convey?</li> <li>○ Retell <u>one</u> of the traditional stories. For example, through drama/ role play, illustrations, artworks, create a book etc.</li> <li>○ 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 <b>(Assessment)</b></li> </ul> </li> <li>▪ <b>SCHOOL/COMMUNITY CONNECTION:</b> 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</li> <li>▪ <b>Pose the question:</b> <i>What developments are occurring in astronomy, space and planetary science at the moment?</i></li> <li>▪ Examine and discuss a range of videos and texts about current developments: <ul style="list-style-type: none"> <li>○ Super Telescope SKA: <a href="http://www.abc.net.au/btn/story/s3517663.htm">http://www.abc.net.au/btn/story/s3517663.htm</a></li> <li>○ Amateur Astronomer: <a href="http://www.abc.net.au/btn/story/s4183263.htm">http://www.abc.net.au/btn/story/s4183263.htm</a></li> <li>○ What's next for NASA: <a href="https://www.nasa.gov/about/whats_next.html">https://www.nasa.gov/about/whats_next.html</a></li> <li>○ Space Communications: <a href="http://www.abc.net.au/catalyst/stories/2358763.htm">http://www.abc.net.au/catalyst/stories/2358763.htm</a> and the Deep Space Network: <a href="https://www.cdsc.nasa.gov/">https://www.cdsc.nasa.gov/</a></li> </ul> </li> <li>▪ <b>ROBOTICS CHALLENGE:</b> Use robotics kits to design and make a space robot, such as the 'Mars Rover'.</li> </ul>		<p>Robotics kits</p>

CONTENT	LEARNING AND TEACHING: SHARED INQUIRY	EVALUATION	RESOURCES
<p><b>Changes to Earth's Surface</b> Students:</p> <ul style="list-style-type: none"> <li>▪ Investigate the effects of sudden geological changes and extreme weather events on the Earth's surface, for example: <ul style="list-style-type: none"> <li>○ Earthquakes, volcanic eruptions, tsunamis</li> <li>○ Cyclones, storms, drought and floods</li> </ul> </li> <li>▪ Investigate ways that advances in science and technology have assisted people to plan for and manage natural disasters to minimise their effect, for example: <ul style="list-style-type: none"> <li>○ Design and construction of buildings and roads</li> <li>○ Detection systems for tsunamis</li> <li>○ Digital flood and fire warning systems</li> </ul> </li> </ul> <p><u>Curriculum Links:</u> →<b>English:</b></p> <ul style="list-style-type: none"> <li>▪ <u>Speaking &amp; Listening:</u> <i>respond to and compose texts</i></li> <li>▪ <u>Responding &amp; Composing:</u> <i>respond to and compose texts</i></li> <li>▪ <u>Reflecting on Learning:</u> <i>respond to and compose texts</i></li> </ul> <p>→<b>Geography:</b></p> <ul style="list-style-type: none"> <li>▪ <u>Factors that shape places:</u> <i>Bushfire Hazard</i></li> </ul>	<p><b>Key Inquiry Question</b> <u>How do sudden geological changes and extreme weather events affect the Earth's surface?</u></p> <ul style="list-style-type: none"> <li>▪ <b>Pose the questions:</b> <i>What geological changes and extreme weather events occur on the Earth? How can we plan for and manage them to minimise their effect?</i></li> <li>▪ <b>COLLABORATIVE RESEARCH TASK:</b> Small groups - each person in the group researches one of the following: <ul style="list-style-type: none"> <li>○ Earthquakes</li> <li>○ Volcanic eruptions</li> <li>○ Tsunamis</li> <li>○ Cyclones</li> <li>○ Drought</li> <li>○ Floods</li> </ul> </li> </ul> <p>Students research and use a variety of media sources to gather information about:</p> <ul style="list-style-type: none"> <li>○ What causes this extreme event?</li> <li>○ What does this extreme event look like?</li> <li>○ What connections can you make to this extreme event? (self, text, world)</li> <li>○ What impact does this extreme event have on the environment and on humans and animals?</li> <li>○ Where in the world does this extreme event occur?</li> <li>○ How do people plan for and manage this extreme event?</li> </ul> <p>Groups combine the information they have individually gathered to create a collaborative Google Site. Share and present research to the class and beyond (if desired). (<b>Assessment</b>)</p> <ul style="list-style-type: none"> <li>▪ <b>GEOGRAPHY LINK:</b> Students investigate 'How the impact of bushfires on people and places can be reduced?' through the Geography unit Factors that Shape Places <a href="https://thinkingpathwayz.weebly.com/geography.html">https://thinkingpathwayz.weebly.com/geography.html</a></li> </ul>		

<b>Going Further – Pathways &amp; Possibilities for Independent Inquiry</b>	<b>Reflection &amp; Action</b>
<p>How can we cater for individual and small group pathways as they emerge during the unit? How will we facilitate students' personal inquiries related to this topic? How can we encourage students to make choices about what and how they will learn?</p> <p><b>(NOTE: individual teachers will need to add to documentation of the unit once personal inquiry pathways have been established)</b></p>	<p>How can we empower students to act on what they have learnt? How can we assist students to pull it all together and reflect on their learning? How can we encourage higher order thinking (synthesis evaluation throughout the inquiry? What thinking routines would help this?)</p>