

ANSWER GUIDE:


Space: the final frontier

Space: the final frontier

Term 2, 2019

Part 1: Our place in space

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Activity title	Answers
Name the planets	<ol style="list-style-type: none"> 1. Mercury 2. Venus 3. Earth 4. Mars 5. Jupiter 6. Saturn 7. Uranus 8. Neptune
Space terminology	
Hello, Pluto!	1930
What is space junk?	<p>Space junk refers to man-made items left in space that serve no purpose.</p> <p>Examples are disused satellites, items dropped by astronauts such as gloves or cameras, rocket boosters, and parts that have come loose from spaceships.</p> <p>Space junk is a problem as it can cause collisions in space, damaging spaceships and working satellites.</p>

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Activity title	Answers
Space search	
When was the Australian Space Agency formed?	2018
Animals in space	<p>Students' own responses, but may include:</p> <ul style="list-style-type: none"> • FOR: making it safer for humans, means human life not at risk, cost effective • AGAINST: cruelty to animals, animals don't have a choice in doing this, animals may get stressed, animals won't understand what is happening
How did people contribute to making Perth the 'City of Lights'?	Street lights and people's outdoor lights were left on. People also hung lanterns on their washing lines surrounded with white sheets to help light up their gardens so Perth could be seen when Friendship 7 passed over. The large flame at Kwinana was made to burn brighter.
What were the mission goals of BepiColombo, ExoMars and Rosetta?	<p>BepiColombo – study and understand the composition, geophysics, atmosphere, magnetosphere and history of Mercury.</p> <p>ExoMars – finding out if there ever has been life on Mars.</p> <p>Rosetta – to do a comprehensive investigation of comets.</p>

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Activity title	Answers
Newspaper front-page	Students' own responses

Part 2: To infinity and beyond

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Activity title	Answers
From out of this world and back into it	Vaccines

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Activity title	Answers
Aboriginalastronomy.com.au	<p>Students own answers. Possible answers include:</p> <ul style="list-style-type: none"> • Meteors often have a negative association. Linked to serpents, evil magic, death and punishment. • The Sun is very important in Aboriginal culture. It is the source of life and death. • There are different stories in different regions about the path of the Sun, Moon and planets. One story is of the Sun woman carrying a torch across the sky each day, followed by the Moon man with a smaller torch.
Same rock, different ideas	<p>Ancient Sumerians invented the 'base 60' number system which divides circles into 360 sections. This system is still used today to calculate time and angles and to predict movements of celestial objects.</p> <p>Ancient Egyptians came up with the idea of dividing the day into 24 hours and a constant year of 365 days broken into 12 months.</p> <p>Ancient Greeks estimated the size of the Earth, figured out that it is a globe and that it spins around its axis.</p> <p>Ancient Chinese developed extensive star catalogues and kept meticulous records of other astronomical occurrences such as comets, sunspots, novas and solar flares.</p> <p>Ancient Mayans painstakingly recorded the movements of the planets – in particular Venus, calculating the length of its year with astonishing accuracy.</p>

Defining moments	<div data-bbox="531 125 1177 911"> <div> 1781 Charles Messier discovers and creates a database of numerous objects in space – things that are now known to be galaxies, nebulae and star clusters. </div> <div> 1828 Caroline Herschel was the first female astronomer to be awarded the Gold Medal by the Royal Astronomical Society for her work cataloguing stars and nebulae. </div> <div> 1923 Edwin Hubble proves that the Milky Way is just one of many galaxies and that the Universe is expanding. </div> <div> 1543 Nicolas Copernicus revives rival ancient Greek theories and for the first time describes the way planets in our Solar System move around the Sun and not the Earth, using maths. </div> <div> 2011 Austrian astronomer Brian Schmidt finds evidence that the expansion of the Universe is getting faster and wins the Nobel Prize with his colleagues. </div> <div> 1726 Isaac Newton describes the laws of gravity and motion. </div> <div> 1610 Galileo Galilei makes major improvements to the telescope, uses it to observe celestial bodies – including the moons of Jupiter – and proves that not everything moves around the Sun. </div> <div> 1944 Austrian Ruby Payne-Scott becomes the first female radio-astronomer. Her work includes making a connection between sunspots and increased radio outbursts from the Sun. </div> </div> <p>Students own answer. Possible answers include:</p> <ul style="list-style-type: none"> • 1726: Isaac Newton discovers the laws of gravity and motion. • 1905: Albert Einstein suggests that the laws of physics are the same throughout the universe; that the speed of light is constant, and that space and time are linked but distorted by gravity. • 1937: Grote Reber builds the first radio telescope.
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Activity title	Answers
Beneath our radiant...	<div data-bbox="531 1305 1377 1865"> <div>  <div>Explore</div> </div> <div>Which countries have the Southern Cross on their flags?</div> <div> <div>  <div>Samoa</div> </div> <div>  <div>Australia</div> </div> <div>  <div>New Zealand</div> </div> <div>  <div>Papua New Guinea</div> </div> <div>  <div>Brazil</div> </div> </div> </div>

Activity title	Answers
Radio telescopes	<p data-bbox="539 197 1355 264">Which of the following statements about radio telescopes are true? They:</p> <ul style="list-style-type: none"> <li data-bbox="539 286 1355 331"><input checked="" type="checkbox"/> use antennas, some shaped like dishes <li data-bbox="539 353 1355 398"><input checked="" type="checkbox"/> can be used day and night <li data-bbox="539 421 1355 465"><input checked="" type="checkbox"/> can 'see' through rain and cosmic clouds <li data-bbox="539 488 1355 555"><input type="checkbox"/> are not affected by other modern radio frequencies from TV signals or mobile phones <li data-bbox="539 577 1355 645"><input checked="" type="checkbox"/> can gather data on things which don't emit visible light, such as pulsars

Part 3: One small step

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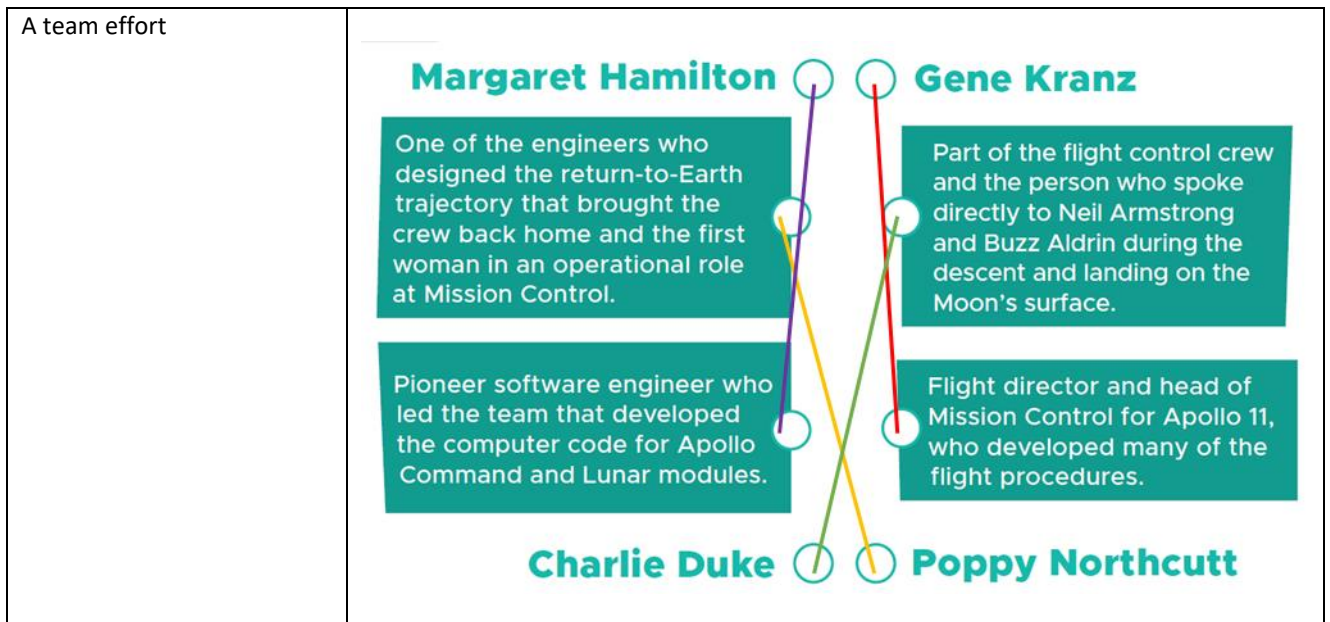
Activity title	Answers
Many Moon missions	Students' own response.

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Activity title	Answers
Saturn V rocket	<p>Possible answers include:</p> <ul style="list-style-type: none"> It launched the Skylab space station in 1973. It was designed to be disposable. Built in three stages, each stage would fire its engines until it ran out of fuel and would then detach. Stage 1 and 2 would detach and fall into the ocean. Some of these have been recovered from the ocean and are on display in museums. Stage 3 stayed in space. Some are still in space now orbiting the Sun near Earth. In 2017 Lego released a model of the Saturn V rocket. It was made of 1969 bricks, to reference the year humans landed on the moon. It is the tallest, heaviest, widest and most powerful rocket to successfully reach orbit.
True or False	True
Draw a rocket	Visit www.space.com/18422-apollo-saturn-v-moon-rocket-nasa-infographic.html for a labelled diagram.

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Same, different	<p>Possible answers:</p> <p>Similarities:</p> <ul style="list-style-type: none"> Born 1930. Previous experience piloting a space mission. Received the Congressional Gold Medal in 2011. There are four plaques with their name on the Hollywood Walk of Fame. Had 3 children. <p>Differences:</p> <table border="1"> <tr> <td>Armstrong</td><td> <ul style="list-style-type: none"> Has died. Pilot in the Navy (the others were in the US Air Force) Became a university professor. </td></tr> <tr> <td>Aldrin</td><td> <ul style="list-style-type: none"> Has a PhD in aeronautics and astronautics. Mother's maiden name is Moon. Legally changed his name. (Born Edwin, he changed his name in the 1980's to his nickname 'Buzz') </td></tr> <tr> <td>Collins</td><td> <ul style="list-style-type: none"> Born in Italy (the others were born in America). Didn't go to the Moon surface. Didn't serve as a pilot in the Korean War (the others did). </td></tr> </table>	Armstrong	<ul style="list-style-type: none"> Has died. Pilot in the Navy (the others were in the US Air Force) Became a university professor. 	Aldrin	<ul style="list-style-type: none"> Has a PhD in aeronautics and astronautics. Mother's maiden name is Moon. Legally changed his name. (Born Edwin, he changed his name in the 1980's to his nickname 'Buzz') 	Collins	<ul style="list-style-type: none"> Born in Italy (the others were born in America). Didn't go to the Moon surface. Didn't serve as a pilot in the Korean War (the others did).
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Getting ready to go to the Moon – on Earth!	Students' own response.
Tokens and mementos	<p>What would you put into your PPK?:</p> <ul style="list-style-type: none"> Students' own response. <p>What things did the astronauts leave on the moon?:</p> <ul style="list-style-type: none"> A commemorative plaque, a gold replica of an olive branch, photographs of humans, audio recordings of many different languages, American flag, containers of urine, air sick bags, a camera and moon boots.
From history into pop culture	Students' own response.
NASA what is Artemis	<p>Possible answers:</p> <ul style="list-style-type: none"> Artemis is NASA's program to return astronauts to the moon surface. The first woman will walk on the moon. They will land on the Moon's South Pole, where no one has been before. They plan to stay on the Moon for longer.

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