principia SPACE DIARY

ACTIVITY 5.1
MAKING HISTORY

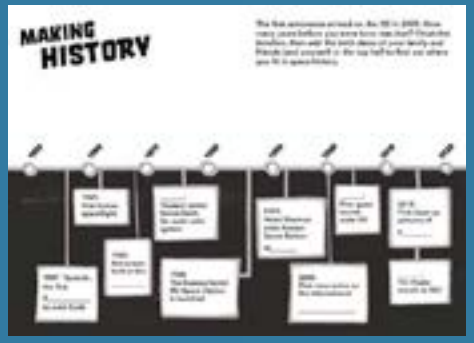
From Chapter 5 of the Principia Space Diary
http://principiaspacediary.org/activities/making-history

LEARNING LEVEL

KS1, KS2, P1-5

CURRICULUM LINKS & DIFFERENTIATION IDEAS

View detailed curriculum links for England, Scotland, Northern Ireland and Wales, plus differentiation ideas for your region and year level.
principiaspacediary.org/curriculum-planner/



Resources Required

- Computers (optional)

Background to this Activity

The space timeline starts at 1950. It is an exciting period of history which continues even now with Tim Peake's visit to the ISS one of the more recent additions to the space history. In the future, there are planned missions to space which will add to the timeline. Who knows, it might be one of your students!

Running the Activity

You might like to discuss timeline scale with your students, to help them understand where to plot different dates along it. You could demonstrate this by drawing a chalk timeline in the playground covering the years your students were born and asking them to stand in the spot that represents their birthdate.

On the Making History timeline, students can identify their birth date, and that of others in their family. They can then identify corresponding events in space to these birth dates. This provides an excellent opportunity for children to interview family and friends about their favourite space memories, and to research different space anniversaries. Space Apprentices can bring their timeline to life by adding pictures and quotes to it from the various missions and space explorers.

Alternatively, students might like to make a timeline on the classroom wall that everyone can add to, or investigate and create an interactive timeline using an app like this one: http://www.readwritethink.org/classroom-resources/mobile-apps/timeline-b-31047.html.

Students can further explore space history:

- Timelines of space are available at: http://www.spacekids.co.uk/spacehistory/ and http://www.timetoast.com/timelines/space-exploration-timeline-dfd0454b-b6c7-4d07-9de0-262e90abc550
- A short animated clip on the history of space exploration is available at: https://youtu.be/_hO6WpwFpf8
- Images from the Voyager missions are available at: voyager.jpl.nasa.gov/gallery/
- Images from the New Horizons mission to Jupiter and the Kuiper Belt are available at: https://www.nasa.gov/mission_pages/newhorizons/images

Answers

Satellite; Moon; 1977; Mir; Space Station; 2001; Pluto; 2015

Questions for the Class

- What caused the Space Race? Why did it suddenly become so important to get human beings into space?
- What other events could be included in the timeline: first woman in space, first spacewalk, first animals in space?
- What do you think could happen between 2016 and 2020 in space travel?
- There are also some very sad events that have happened with the Columbia and Space Shuttle disasters. How have these events affected space travel?
- The Voyager missions each took a Golden Record to space, filled with sounds and images of Earth.
- What would you put on a Golden Record to explain our planet?
- Which other British born astronauts have visited space and when? Research Michael Foale, Nick Patrick, Richard Garriott, Piers Sellers, Helen Sharman. (Students could produce a biography of one of them.)

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ACTIVITY 5.2
SPACE HABITAT

From Chapter 5 of the Principia Space Diary
http://principiaspacediary.org/activities/space-habitat

LEARNING LEVEL

KS1, KS2, P1-5

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Resources Required

- Pens and pencils
- Craft materials or tools like Lego (optional)

Background to this Activity

This activity encourages Space Apprentices to think about a planet to make their home. You may want to discuss things like the 'Goldilocks Zone' and the conditions we need for successful life on another planet. You can look back at the conditions of our own solar system here: http://principiaspacediary.org/exploring-solar-system/.

Running the Activity

Encourage students to consider things like the atmosphere on the planet, its temperatures, gravitational forces, the availability of water and the length of day and night.

The video featuring Stephen Hawking raises a lot of these issues: https://www.youtube.com/watch?v=n4uT3rTSty4

Discuss with the class what would be needed for a habitat on an alien planet.

You can look at this gallery of images to give inspiration: https://www.theguardian.com/cities/gallery/2014/may/16/a-cosy-little-house-on-mars-cities-in-space-in-pictures

Students can create and draw their space city but you can also use Lego or craft materials to model a future habitat in 3D. You might invite students to use computer programmes to model their cities.

Questions for the Class

- How would you grow food on your new home?
- What sort of rules and laws would you want on the planet?
- What are the pros and cons of settling on another planet?
- What is the biggest risk of settling on a new planet?

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ACTIVITY 5.3
ROBOTS IN SPACE

From Chapter 5 of the Principia Space Diary
http://principiaspacediary.org/activities/robots-in-space

LEARNING LEVEL

KS1, KS2, P1-5

CURRICULUM LINKS & DIFFERENTIATION IDEAS

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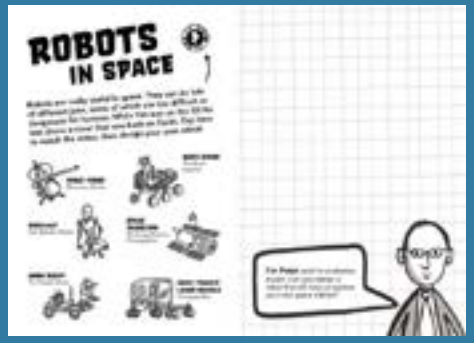

Resources Required

- Computers with internet access
- D&T and electrical equipment (optional)

Background to this Activity

Robots are really useful in space. They can do lot of different jobs, some of which are too difficult or dangerous for humans. Here are some examples:

Robonaut is a robot that will one day be used for spacewalks or extravehicular activities. The robonaut has a humanoid shape and is controlled by a human operator with a computer. Robonaut 2 – or R2 – flew to the ISS in 2011. R2 has hands and fingers like a human, and can perform tasks which involve a high level of dexterity. Engineers and scientists are now developing legs for R2, so that it can perform tasks inside and outside the ISS.

Robotic Arms are used to help handle cargo and inspect the ISS and spacecraft for damage. The current robotic arm on the ISS is called the Canadarm 2. It is 17.6 metres long and weighs 1800kg. It can lift up to 116,000kg! It is a clever system which can relocate itself and move like an inchworm to reach different parts of the ISS.

Space probes are spacecraft that can explore other planets, asteroids or comets without the need for astronauts. Controlled by humans on Earth, they provide information about temperatures, radiation, magnetic fields, what a planet's atmosphere is made of, soil composition and the presence of water.

Space telescopes, like the Hubble Space Telescope http://hubblesite.org, have provided breathtaking images of the solar system. The Hubble Telescope will be replaced by the James Webb Space Telescope http://www.jwst.nasa.gov in 2018. These telescopes have helped us find out about the birth and death of stars, and the existence of exoplanets.

Moon buggies are also known as Lunar Roving Vehicles (LRVs) and were used in 1971 and 1972 to extend the distance that astronauts could explore on the Moon, during the Apollo missions.

Mars Rovers have been used to explore and map the red planet. National Georgraphic have produced a clip of what the rovers might look like as they explore the Martian landscape: http://video.nationalgeographic.com/video/mars-rovers-sci.

Running the Activity

This activity is about how useful robots can be in space exploration. Students can investigate the way robots are used in space by reading the background notes. Alternatively, they can research robots in space for themselves before they begin the designing process. Can you design a robot that will help us explore your new space habitat? Think about what the purpose of the robot will be, then add those features. Make sure you clearly label your design.

Students can further investigate the use of robots in space with:

- ESA information about the ISS robotic arm: http://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/European_Robotic_Arm
- Information about the exploration of Mars: http://exploration.esa.int/mars/
- Play the Science Museum's Rugged Rovers app available for iPhone, iPad and Android. http://www.sciencemuseum.org.uk/online_science/apps/rugged-rovers

Extensions & Digital Resources

ZAP! Students can use the Zappar app to watch a video of Tim Peake controlling a rover while he was on board the ISS. See Zappar instructions at the link below and note that the mobile/tablet will need to be connected to the internet: http://principiaspacediary.org/using-zap-codes-to-strengthen-digital-literacy/

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ACTIVITY 5.3 (CONT.) ROBOTS IN SPACE

From Chapter 5 of the Principia Space Diary
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LEARNING LEVEL

KS1, KS2, P1-5

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Questions for the Class

- Why are robots useful in space exploration? What can they do that a human could not?
- What might be some of the problems in using robots to explore, rather than people?
- Should robots or humans explore other planets?
- What would you let a robotic companion do for you? What wouldn't you let it do for you?
- What is your favourite type of space robot? Why?
- Why would you want to send a robotic probe to the distant planets, rather than humans?

NASA astronaut Shane Kimbrough and ESA astronaut Thomas Pesquet captured and berthed Japan's HTV-6 supply craft on 14 December 2016 using the International Space Station's 17 m-long Canadarm2 robotic arm.

Photo credit: ESA/NASA