

ACTIVITY 1.1 SIGNS OF LIFE

From the Chapter One of the Mission Mars Diary
marsdiary.org/activities/signs-of-life

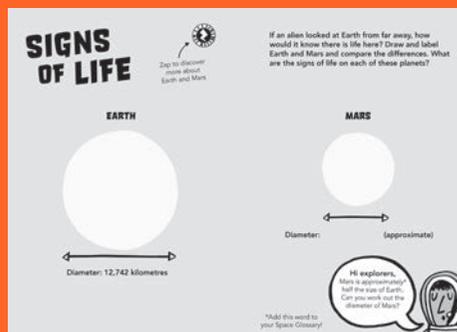
LEARNING LEVEL

KS2, P5-7, Y4-6

CURRICULUM LINKS & DIFFERENTIATION IDEAS

View detailed curriculum links for England, Scotland, Northern Ireland and Wales in the Teacher Toolkit, plus differentiation ideas for your region and year level.

marsdiary.org/resources/#teacher-toolkit



Resources Required

- Smartphone or device for Zap code (optional – see Useful Links)
- Rulers
- Computers, iPads, Textbooks – for research
- Pens/Pencils – to label/draw and annotate
- Mars Fact Cards (if required – see Useful Links)

Background to this Activity

Scientists are particularly interested studying Mars because of evidence that life has existed there – or might even still exist. This activity asks students to research Earth and Mars and draw them side-by-side, focusing on ‘signs of life’.

Comparing Earth with its neighbour Mars and drawing the differences will help students to understand the concept of life as we know it on Earth and what this means in the context of Mars.

Signs of Life

Signs that life exists include:

1. The presence of oxygen, ozone and methane in a planet’s atmosphere

On Earth, humans were already learning about Earth’s atmosphere as early as the 1600s. In 1770s, a pharmaceutical chemist called Carl Scheele discovered oxygen.

On Mars, NASA’s Curiosity rover discovered methane in the air in 2014. The ExoMars Mission will try to determine if the methane is produced geologically or biologically.

2. Evidence of water. Water is essential for life.

On Earth, it is easy to see the presence of water, even from a great distance. Have a look at some of the photos of Earth which Tim Peake took from the ISS to show your

students this. Besides bodies of water, the greenness of Earth indicates life on its surface.

If you look at Mars from a distance, or even from the Martian surface, all you can see is bare rock. But this doesn’t mean there might not be any life on Mars, it just means that if there is life of Mars, it is very small and potentially living in the rock. This type of life is called an endolith. If there was life on Mars in the past, there will still be traces of water somewhere on the planet. These will most likely occur below the Martian surface.

3. Evidence in fossils

On Earth, we have found fossils or organisms that lived 4.2 billion years ago!

The ExoMars mission will be looking for signs of ancient life on Mars in the form of chemical biomarkers and fossil communities, either preserved underground or within surface rocks. These tiny fossils are called microfossils. By analysing the organic compounds in the rock scientists can tell if they are natural or formed by life. There are two instruments on ExoMars (MOMA and RLS) to do this in different ways and a drill to get samples from up to two meters below the surface. Since liquid water is a prerequisite for life, good candidate locations to look for microfossils are terrains occupied by long-lasting bodies of water during Mars’s early history.

Running the Activity

After discussing the various signs of life on Earth and Mars, ask your class to draw and label evidence of life on both planets. Ask them to research and record the diameters, temperature ranges and distances from the sun for both planets.

Give children a range of resources to research from, including trusted internet sites, textbooks, newspapers, articles and the Mars Facts (see Useful Links). Discuss with children the reliability of some sources (for example Wikipedia – with anyone being able to add facts and

Your Mission MARS DIARY

ACTIVITY 1.1 SIGNS OF LIFE

From the Chapter One of the Mission Mars Diary

marsdiary.org/activities/signs-of-life

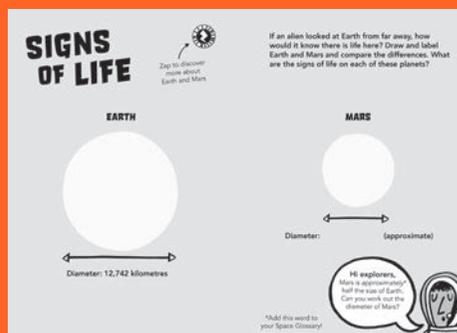
LEARNING LEVEL

KS2, P5-7, Y4-6

CURRICULUM LINKS & DIFFERENTIATION IDEAS

View detailed curriculum links for England, Scotland, Northern Ireland and Wales in the Teacher Toolkit, plus differentiation ideas for your region and year level.

marsdiary.org/resources/#teacher-toolkit



edit).

Once children have researched key facts, they can draw and label (UKS2 with annotations) planet Earth and Mars.

Children can then present their findings as 'real scientists' back to the class.

Solutions to the Activity

Earth Facts:

Diameter: 12,742 km

Temperature range: -88 to 58°C

Distance from sun: 150,000 km (rounded from 149,598,262)

Mars Facts:

Diameter: 6,779 km

Temperature range: -153 to 20°C

Distance from sun: 228 million km (rounded from 227,943,824)

Questions for the Class

- How are Mars and Earth similar?
- How are Mars and Earth different?
- What are the common signs of life?
- What would you do if you discovered life on Mars?
- What reasons might we have to move to Mars in the future? (link to overpopulation, environment damage)
- Would you live on Mars?

Additional Challenges / Extension Activities

Earth vs Mars

Split your class or groups into two teams (Earth/Mars). After the initial discussion around signs of life on both planets, each team can research their planet and the facts and signs of life on it.

After significant research, each team collates their

research into a brief presentation (could be a PowerPoint, an A3/A2 poster/non-chronological report, or a larger, annotated version of the original activity). Each team presents to the class. This could be done in debate form, or as a Socratic seminar, or simply as a presentation to demonstrate methods of scientific communication.

At the end of the presentations, each team/pupil can vote as to which planet they would prefer to live on and why.

Make Your Own Life

This activity encourages microbial growth and can be done in a variety of ways.

Bread: Give children a slice of bread and seal it in a container (sandwich bag will do) – leave for a week and observe. Watch as microbes grow! This can lead to discussion of how they got there.

Water: Give children an empty bottle of water. Get them to fill it up. Leave it for a week or two and observe. Colonies that look clear/white should start to grow in the water. This can again lead to discussion about how the microbes got there.

Ideas for Differentiation

Lower:

Use the Mars Fact Cards provided to structure and support research. Build in discussion around suitability of resources. Children could give examples of real world things that are the temperatures of Earth/Mars – in order to give them a better understanding. For example, -153 degrees is the equivalent to six times colder than the coldest day ever recorded in the UK.

Upper:

To challenge children, they can work with full digits, rounding 6779 km (diameter) to the nearest 10, 100 and

Your Mission MARS DIARY

ACTIVITY 1.1 SIGNS OF LIFE

From the Chapter One of the Mission Mars Diary

marsdiary.org/activities/signs-of-life

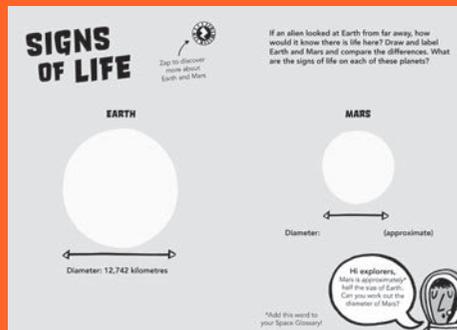
LEARNING LEVEL

KS2, P5-7, Y4-6

CURRICULUM LINKS & DIFFERENTIATION IDEAS

View detailed curriculum links for England, Scotland, Northern Ireland and Wales in the Teacher Toolkit, plus differentiation ideas for your region and year level.

marsdiary.org/resources/#teacher-toolkit



1000 – giving them an additional maths challenge. They could also do this with the distances from the sun for both Earth and Mars.

Useful Links

Zappar Content: Download or view the Zappar content for this activity on its webpage (URL to the left) or access it via the Zap

Mars Fact Cards: View or download these on the activity webpage (URL to the left)

Article about oldest fossils found on Earth: <http://www.telegraph.co.uk/science/2017/03/01/oldest-fossil-ever-found-earth-shows-alien-life-mars-likely/>

Mars 101: <https://www.youtube.com/watch?v=E-PuUs25rJA&t=142s>

ZAP! Students can independently access multimedia resources using the Zappar mobile/tablet app. See Zappar instructions at the link below and note that the mobile/tablet will need to be on a WIFI connection: marsdiary.org/resources/#teacher-toolkit

If you don't have access to the internet in the classroom, all Zap code content is available to download on the activity's web page (see link to the left) as a PowerPoint presentation or as bundles of images.



Find more great space-themed STEM resources at <https://www.stem.org.uk/esero>