Lesson 9

Exoplanet Travel Bureau

Explore Alien Worlds

Curriculum links

England Opportunity to link with several science topics eg requirements for plant life, animal nutrition, rocks, light, magnetic force | Food chains, states of matter, sound

Scotland Biodiversity and interdependence

Wales Interdependence of organisms | Enquiry

Northern Ireland The variety of living things | Adaptations of living things

Credit: IAU/L. Calçada

Background

In this activity, children research information about exoplanets and based upon this information, they use their imaginations, working creatively to design and describe a new exoplanet. They consider the key features and the adaptations that living things would have to make to survive the planet's environment.

Objectives

To learn:

- exoplanets and their stars are millions of light years from our solar system
- conditions on these planets are diverse
- living things adapt in different ways over time to survive environmental conditions
- life may exist in other solar systems in a different form from that on Earth

Resources per group of four

Paper
Coloured felt tips and pencils
Access to books, tablets or computers

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Advance preparation

Prepare role badges for exogalactic astronomer and astrobiologist if required.

Introduction

Explain to the children that in this lesson, they will first be taking on the role of exogalactic astronomers to research and design a distant exoplanet. As astrobiologists, they will then research and design unique alien life, describing how it has adapted to conditions on their far-off world.

Begin by taking the children on an exciting trip to far-off worlds using the interactive http://eyes.jpl.nasa.gov/eyes-on-exoplanets.html

Show the children the images from the NASA website:

www.exoplanets.nasa.gov/alien-worlds/exoplanet-travel-bureau

There is a selection of posters on this website advertising a variety of exoplanets and highlighting the unique features of each.

TRAPPIST-1_Planet hop from TRAPPIST-1

PSOJ3188.5-22 _Where the night life never ends

HD4037G_Experience the gravity of a super earth

KEPLER-16B_Where your shadow always has company

51 Pegasi-b_Greetings from your first exoplanet

KEPLER-186F_Where the grass is always redder

These exoplanets range in size from super-Earths to mini Neptunes; some are rocky, some dry as deserts, some volcanic, some blisteringly hot or icy cold; some are ravaged by powerful winds or bombarded by intense radiation.

Activity a

Each group researches several exoplanet systems and, using this information, the children create a detailed description of their far-off world. They next design a poster to advertise their planet's key features.

Activity b

If life could be supported, what form would it take? What kind of adaptations would living things have had to make to survive the planet's environment? Astrobiologists are interested in discovering the conditions required for life and what form that life might take. The children assume the role of astrobiologists, researching extreme conditions on Earth and the adaptations of living things surviving in those environments. They use this information to describe the kind of alien life that may exist on their imaginary new world. They draw and label this new life, pointing out key features.

Plenary

The groups present their designs to their own or another class, describing their alien world in detail. They explain how the living things have adaptations making them suited to their environment.

Extension activities

If it were possible, which exoplanet would the children travel to or send a probe to investigate and why? Emphasise that travelling to these far-off exoplanets is impossible due to the vast distances involved. What kind of place would it be? If they could choose its characteristics, what would make it ideal for their happiness and well-being?

Each group may like to compose music to accompany their poster. They could also design, build and decorate a model to show the key features of their chosen distant world. Further cross-curricular activities could be linked, such as art, drama, technology, engineering, geography, literacy and computing.

Voyager

In 1977, twin spacecraft, Voyager 1 and 2, were launched to explore regions of space, where nothing from Earth has ever reached. They are both further from the Sun than Pluto and from data being sent back to Earth, scientists hope to learn more about the region between stars, called the interstellar space. The spacecraft are carrying a 12-inch gold-plated copper disc containing sounds and images selected to portray the diversity of life and culture on Earth.

What would the children wish to be put on such a disc to be sent on a mission to a planet far away beyond the edge of our galaxy?
How would they describe human beings?
What makes them happy?
What qualities do they feel are desirable in a human being?
What hobbies, animals, geographical features or music would they include?
If they were asked to write a letter to an alien, what would they want to say?

The children might record a video or spoken message, musical compositions, computing, robotics, art or photography. There are many opportunities in this activity for a broad cross-curricular approach appealing to all ages and abilities.