SPACE awareness

SUN, EARTH AND MOON MODEL

Build an Earth-Moon-Sun model to learn about how they orbit.

NEMO Science Museum, ESERO NL / ESA



Lehrplanthema
Sun-Earth-Moon system, stars

Übergeordnetes wissenschaftliches Konzept
Earth is a system of systems which influences and is influenced by life on the planet.

Schlüsselwörter
Sun, Earth, Moon, Planet, Orbits, Satellite

Altersgruppe
8 - 10

Bildungsebene
Primary School, Informal

Zeit
1h30

Gruppengröße
None

Überwachung aus Sicherheitsgründen
Supervised

Kosten
Average (5 - 25 EUR)

Ort
Indoors (small, e.g. classroom)

Kernkompetenzen
Asking questions, Developing and using models, Communicating information

Art der Lernaktivität
Partial enquiry

KURZBESCHREIBUNG

Students build a model of the Sun-Earth-Moon system, exploring how the Moon revolves around the Earth, and the Earth around the Sun. Students play a matching game and learn some characteristics about the three objects.

ZIELE

Students will practice fine motor skills to build a Sun-Earth-Moon mobile and use it to describe the relative movement of the three objects. Students identify some of the differing characteristics of the Sun, Earth and Moon.

LERNZIELE

By implementing this activity, students will be able to:

- explain that the Earth revolves around the Sun,
- explain that the Moon revolves around the Earth,
- explain that the Sun is a star,
- describe the relative temperatures and sizes of the Sun, Earth and Moon.

BEWERTUNG

The different parts of the activity can be evaluated as follows:

What do you already know?

- Discuss what the students have drawn/written.

The solar system matching game

- Encourage students to explain what they have learnt about the Solar System.

The Sun mobile

- Check if the mobiles are built correctly.
- Encourage the students to explain what they have learnt about the Solar System. Do they know now that in the Solar System, the Earth (a planet) revolves around the Sun (a star) and the Moon (a satellite) revolves around the Earth?

MATERIALIEN

Per student/mobile:

- worksheet in PDF
- A4 paper
- 1 wooden skewer
- 1 cocktail stick
- colouring pencils,
- felt-tip pens or wax crayons
- scissors
- string to attach cutouts to mobile
- sticky tape
- embroidery needles or paper punches to share with the class

Per pair of students:

- stiff card to print matching game onto

Per class:

- one sheet of A2 paper

HINTERGRUNDINFORMATIONEN

Sun

The Sun is a star, a powerhouse of energy, undergoing constant nuclear fusion. It is luminous and extremely hot. Even though the Earth is about 150 million kilometres away from the Sun, we still feel the energy from the explosions that happen within it. Humans and many other creatures on Earth depends on the heat and light coming from the Sun.

Some stars in the universe are bigger and brighter than the Sun, but all other stars are very far away so appear as small points of light. For the part of the Earth that it is day time, the stars are hidden by the brightness of the Sun in the sky, as they are much fainter. When it is night time, with the Sun shining on the other side of the Earth, the stars can be seen in the dark sky.

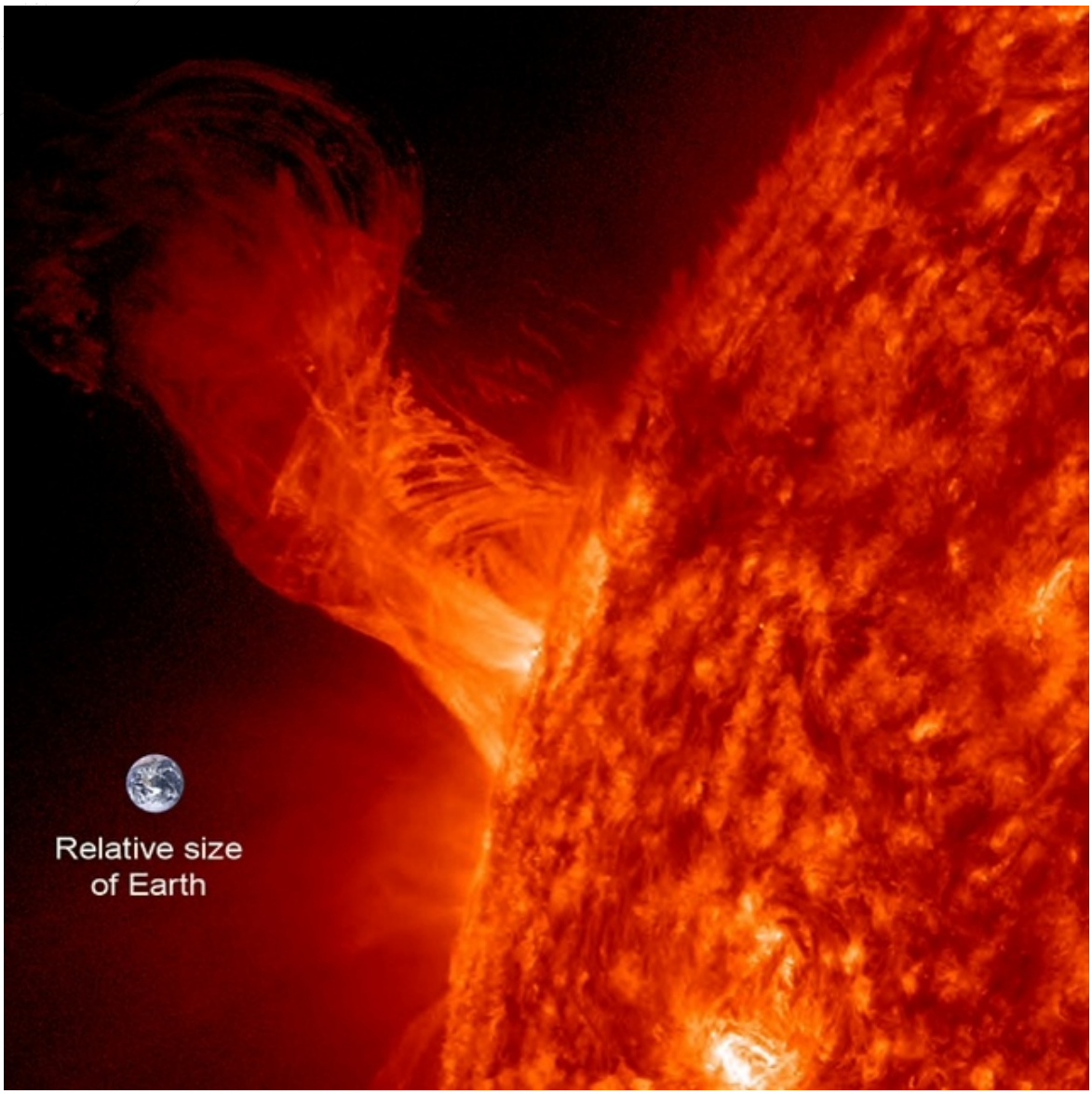


Image Credit: NASA/SDO/Steele Hill

Earth

A planet is an object orbiting a star which is spherical and bigger than an asteroid but smaller than a star. They can be rocky, like Earth, or gassy, like Jupiter. Earth is our home and the third planet from the Sun, with a mean distance of about 150 million kilometres. This distance and the atmosphere of Earth keep its average surface temperature above the freezing point of water (0°C) but below the boiling point of water (100°C), enabling liquid water to exist freely, giving us seas and oceans. This is not the case on Venus, which orbits closer to the sun, and thus has a surface temperature hotter than the boiling point pof water. Neither is it the case on Mars, which orbits further from the sun and has a surface temperature colder than the freezing point of water. Liquid water has been crucial for the development of life on our planet, the only known place where life exists in the universe.

The shape of the Earth is very close to a sphere. It spins, or rotates, once every 24 hours giving us the length of a day. Earth only has one natural satellite, the Moon, which is thought to have played a major role in stabilising the axis of rotation of the Earth. This may have also been a favourable condition for the emergence of life.

Moon

Satellites, including moons, orbit planets. The Moon is a natural satellite of Earth. It takes close to one month (27 days 8 hours) to revolve around our home planet. The Moon and Earth are about the same distance from the Sun. Despite this, the temperatures on the Moon are extreme, reaching higher and lower temperatures than on Earth, because the Moon lacks a rich atmosphere.

Solar System

A solar system refers to a star and all the objects that orbit it. Our Solar System consists of the Sun — our home star —, eight planets and their natural satellites (such as our moon), dwarf planets, asteroids and comets. It is located in an outward spiral arm of the Milky Way galaxy.

Adapted from source: NASA

- https://solarsystem.nasa.gov/planets/moon/basic
- https://solarsystem.nasa.gov/planets/earth/basic
- https://solarsystem.nasa.gov/planets/sun/basic

VOLLSTÄNDIGE BESCHREIBUNG DER AKTIVITÄT

Preparation

The activity is structured into four parts:

- (1) What do you already know?
- (2) The matching game
- (3) Revolving Earth
- (4) Sun-Earth-Moon mobile.

Print the mobile activity worksheet for each student. Prepare the listed materials. For the matching game, print one copy of the game sheet per three students onto stiff card paper. Cut out all the cards before the activity.

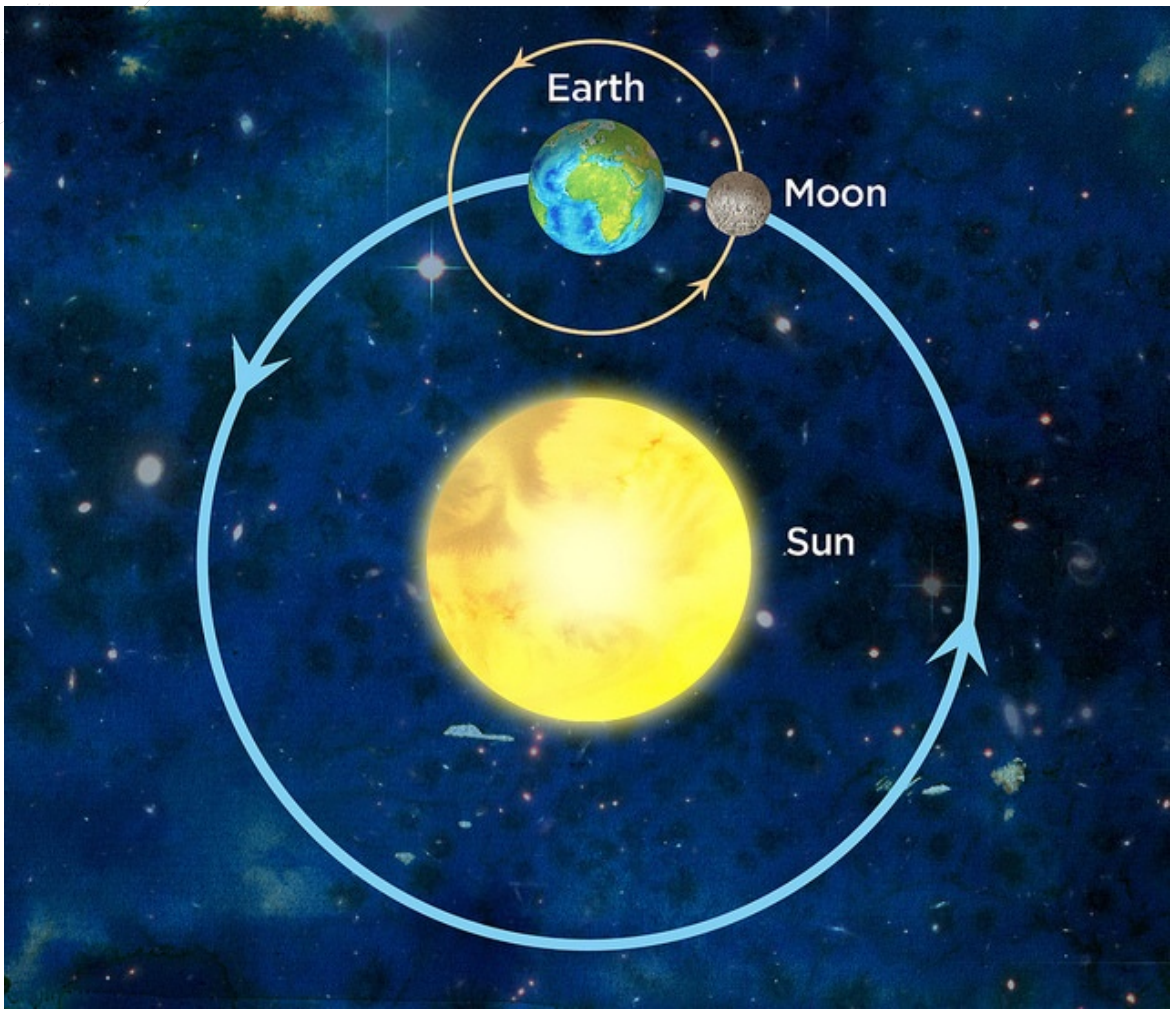


Image: Siyavula Education (not to scale)

Activity 1: What do you already know?

Step 1:

Provide each child with an A4 sheet of paper and some colouring pencils.

Step 2:

Encourage students to draw the Sun, Earth and Moon and to write any words they associate with them. Discuss what the students have drawn/written.

Step 3:

Write their ideas on an A2 sheet of paper and display it in the classroom. Explain to the students that they can add to this whenever they like, either in words or drawings.

Activity 2: Solar System matching game

Step 1:

The students play a matching game to learn some differences between the Sun, Earth and Moon. Explain how the matching game works: in groups of three, students match the picture cards with the cards that have the matching texts. The game finishes when all the card pairs have been found.

Step 2:

Before starting the game, encourage the students to lay out all the cards and look at all of the images and texts on the cards.

Step 3:

Afterwards, show students the correct pairing of the cards (use the answer sheet of the game). Then, discuss what the students learnt about the properties of Sun, Earth and Moon covering the following points:

- It is much hotter on the Sun than on Earth, because the Sun is a star.
- Stars are much hotter and brighter than planets.
- The temperature on Earth is hotter than the temperature water freezes, but colder than the temperature water boils, giving us liquid water, and therefore oceans, on Earth.
- The temperature on the Moon can range from very cold to very hot.
- The Sun is more than a hundred times wider than the Earth.
- The Earth is about four times wider than the Moon.

Activity 3: The revolving Earth

Step 1:

Draw a picture of the Earth in the middle of the board. Explain that the Moon revolves around the Earth, and then add it to the drawing. Now explain that both the Earth and the Moon revolve around the Sun. Draw this on the board as well.

Step 2:

Invite three students to come to the front of the class. Explain that student 1 is the Moon, student 2 is the Earth and student 3 is the Sun. Encourage the students to enact the movement of the Moon around the Earth and the spinning of the Earth on its axis while it revolves around the Sun. Explain that the Moon, a natural satellite, revolves around the Earth, a planet, and both revolve around the Sun, a star.

Step 3:

Explain that they are going to make a mobile showing this.

Activity 4: The Sun-Earth-Moon mobile

Step 1:

Now distribute the Sun-Earth-Moon mobile worksheet and explain the ten steps to making the Sun mobile. Talk through the instructions together.

Step 2:

The wooden skewers are used for the top bar. Help the students tie the string to the wooden skewers. Using the drawing, demonstrate how to put the rest of the mobile together.

Step 3:

Hang the mobiles in the classroom. Check that the mobiles they have made work properly. Does the Earth revolve around the Sun and the Moon around the Earth?

LEHRPLAN

Space Awareness curricula topics (EU and South Africa)

Our wonderful Universe, Sun-Earth-Moon system, stars

National Curricula UK

KS2: Year 5, Science, Earth and Space: -Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. -Describe the movement of the Moon relative to the Earth. -Describe the Sun, Earth and Moon as approximately spherical bodies.

FAZIT

In this activity, students make a model of the Sun, Earth and Moon and play a matching game. They learn that the Earth revolves around the Sun and the Moon around the Earth. Students learn that the Sun is a star and some additional characteristics about the Sun, Earth, and Moon.

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