



SPACE[☆] awareness

MEET OUR NEIGHBOURS: MOON

Explore the tactile version of our moon made with household materials.

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Θέμα αναλυτικού προγράμματος
Sun-Earth-Moon

Μεγάλη Επιστημονική Ιδέα
Earth is a very small part of the universe.

Λέξεις-κλειδιά
Moon, Solar System

Ηλικίες
6 - 12

Εκπαιδευτική βαθμίδα
Primary School, Middle School, Indoors (small, e.g. classroom)
Informal

Χρόνος
2h

Μέγεθος ομάδας
Group

Επιβλεπόμενο για λόγους ασφάλειας
Supervised

Κόστος
Low (< ~5 EUR)

Μέρος

Βασικές Δεξιότητες
Asking questions, Developing and using models, Analysing and interpreting data, Communicating information

Τύπος μαθησιακής δραστηριότητας
Partial enquiry

ΣΥΝΤΟΜΗ ΠΕΡΙΓΡΑΦΗ

Converting a visual experience to a tactile one, this activity lets visually impaired students learn and explore our Moon and its characteristics.

ΣΤΟΧΟΙ

- To create a tactile version of the Moon using low cost household materials.
- To explore our moon through a tactile model.

ΜΑΘΗΣΙΑΚΟΙ ΣΤΟΧΟΙ

- Students will be able to recognise and describe lunar features using the tactile Moon.
- Students will be able to explain the importance of building models, identify strengths and limitations of this model, and suggest ways they might improve aspects of the model.

ΑΞΙΟΛΟΓΗΣΗ

Ask students to point at a feature on their model as soon as they know which one it is. First give a description and a couple of seconds to think about it. Then give the name and a couple more seconds to point it out. e.g.:

- This is the main overall surface of the Moon, it is not smooth.
- These are called the seas of the Moon, although there was never water on the Moon. Instead this was caused by lava on the surface a long time ago. They are smooth and dark (the dark coloured Maria).
- This bowl shaped part or feature of the Moon is caused by rocks hitting the surface (Crater). -These are the bumpy features on the Moon at a greater height (Mountains).

Evidently the Moon is not made of fabric and sequins. Ask students to discuss the importance of building models, strengths and limitations of this model of the Moon, and how they might improve the model. Ask students in their groups to write down two things they learned from the activity, and two things they want to learn more about.

ΥΛΙΚΌ

- Fabric, e.g. grey felt, for surface of Moon
- Thick fabric (for different mountains)
- Thin fabric (for mare features)
- Curved sequins (for craters)
- Glue (for the fabric)
- Pen (to write on the fabric)
- Scissors
- Print out Moon Features PDF
- Print out Moon Featureless PDF (two copies)



ΘΕΩΡΗΤΙΚΈΣ ΠΛΗΡΟΦΟΡΊΕΣ

Moon

The Moon is the only natural satellite of the Earth. It orbits our planet in 27.3 days at a mean distance of 384,400 km. Its diameter of 3,474 km makes it the fifth largest satellite in the solar system. It is thought that the Moon was formed at the same time as the Earth, 4.55 billion years ago, from the debris of a giant collision between the Earth and a Mars-size object. The Moon is in on a synchronous orbit around the Earth, which means that it makes one turn around itself as it makes one turn around the Earth. So, it is always showing the same face to us. All we know about the 'hidden' face of the Moon comes from the records taken by astronauts or automatic probes that went around to the other side. There is no rising or setting of the Earth on the horizon of the Moon. If you were standing on the near side of the Moon, the Earth would appear immobile in the sky. During its revolution around the Earth, the disk of the Moon is not always completely lit by the Sun. This variation in the appearance of the lunar disk is called the "phases of the Moon", and is characterized by a well-known cycle. The apparent diameter of the Moon as seen from Earth is almost exactly that of the Sun. This is why the Moon can sometimes completely mask the solar disk and produce total solar eclipses. Another important influence of the Moon on Earth is the phenomenon of tides, which is due to the Moon's gravitational pull on the seas and oceans of Earth. The Moon is the only celestial object that has been visited by human beings. The first visit was on 21 July 1969 when two members of the Apollo 11 mission set foot on our satellite: they were Neil Armstrong and Edwin Aldrin. As many as 12 astronauts walked the surface of the Moon between 1969 and 1972, and they returned with 382 kg of lunar soil to be analysed on Earth.

Tactile features:

The tactile model of the Moon includes a number of features that represent real features of the moon. You can find more information about these features below.



Mountains and Maria

The visible surface of the Moon shows bright and dark areas. The bright areas are generally hills or mountains (represented by thick fabric on the tactile image), while the dark ones are flat lands, called "mare" (represented by thin fabric in relief on the tactile image). These low altitude areas were filled with lava during an ancient period of volcanic activity, around 3 billion years ago. Most of them were named by ancient astronomers after common phenomena encountered on terrestrial seas and oceans: Oceanus Procellarum ('Ocean of Storms'), Mare Imbrium ('Sea of Rains'), Mare Serenitatis ('Sea of Serenity'), Mare Tranquillitatis ('Sea of Tranquility'), etc.

Craters

The whole face of the Moon is dotted with craters, with diameters from a few meters to hundreds of kilometres (curved sequins). They are the result of impacts by asteroids, since the Moon does not have any atmosphere to prevent them from reaching the surface (a few of them are represented by buttons on the tactile image: Plato and Aristoteles at the top, Aristarchus

on the left, Copernicus near the centre, and Clavius at the bottom). Copernicus has a diameter of 93 km and is located in Mare Imbrium at the end of a chain of mountains called Apennins (represented by the thick fabric on top of the thin fabric on the tactile image).

ΠΛΗΡΗΣ ΠΕΡΙΓΡΑΦΗ ΤΗΣ ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ

Introducing the Moon:

- Ask students what they know about the Moon. Discuss information included in the first half of the background information section, up to but not including the tactile features. Tell students that they will be making a model of the Moon and investigating its features.
- Put the students in groups of 5 (ideally 3 non-visually impaired to 2 visually impaired).
- Distribute materials, including the printouts, to each group.

Making the Model:

- Close supervision is important. Follow each group and explain each of the tactile elements and their correspondence to each object feature.
- Understand the different needs of each group of students to promote interaction between the students during the building of the tactile image. Visually impaired students need to be familiarized with the different materials involved.
- Allow enough time to follow instructions and build the tactile image.

Step 1

Cut the outer round shape of the Moon from one of the printed 'Moon Featureless PDF'.

Step 2

Place it on top of the thick fabric and draw a circle.

Step 3

Cut the circle you just drew out of the thick fabric.

Step 4

Apply glue on the surface of the Moon on the other Moon Featureless PDF.

Step 5

Place the circular fabric cutout on top of the glued area of the printed paper.

Step 6

Take the 'Moon Features PDF' and cut out the inner section which has several black dots.



Step 7

Place the inner section on top of the thin fabric and draw the outline of the shape.

Step 8

Cut out the outlined shape.

Step 9

Glue this piece of fabric on top of your fabric moon.

Step 10

Cut a small piece of the thick fabric and glue it in place so it matches the dashed line on the Moon Features PDF.

Step 11

Glue the thick fabric piece on top of the previously glued thin fabric.

Step 12

Place glue on the flat section of the sequins and glue them on top of the fabric, in the same places as the small circles on the Moon Features PDF. Wait for the model to dry before you start exploring.

Exploring the tactile image:

There are several ways in which you can explore the scientific content of the tactile schematic images. If you're presenting the final tactile image to the students, first let them explore and feel the different textures. Questions will arise as the students explore; encourage them to write their questions down and share them with the other groups. Read "Background Information" to understand the different features present in the Moon's schematic tactile model, and share with the students as they ask about them, or (if you have more time), prompt each group to choose a feature to learn more about and then have them present their findings to the other groups in the class.

- The Moon's overall surface is represented by the round shaped thick fabric;
- The second higher layer of fabric depicts the Maria;
- Curved sequins depict cratered surfaces;
- Mountains are depicted by the higher layer of thick fabric.

Discuss the idea of models with the students. Suggested discussion points:

- What is a model? Why is it useful to build models?
- What are the strengths of this model?
- What are limitations?
- How could the model be improved?

Ask students in their groups to write down two things they learned from the activity, and two things they want to learn more about.

ΠΡΟΓΡΑΜΜΑ ΣΠΟΥΔΩΝ

Space Awareness curricula topics (EU and South Africa)

Our wonderful Universe, Our fragile planet, Sun-Earth-Moon

National UK

KS3 - Chemistry, Earth and Atmosphere KS2: Year 5 - Science, Earth and Space KS2 - Art and Design

ΠΕΡΙΣΣΟΤΕΡΕΣ ΠΛΗΡΟΦΟΡΙΕΣ

Explore the rest of the planets through 'Meet Our Neighbours' in tactile form at <http://nuclo.org/astroneighbours/resources/>

ΣΥΜΠΕΡΑΣΜΑΤΑ

This low-cost tactile version of the Moon is a great resource to explore lunar features for both visually impaired and normal vision students.



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