esa

Andøya Space

Norway esero

Our Sun is a Star

A project for early education

About the activity

Can we travel to the sun? in real life we would have melted and evaporated long before we arrived, but we shouldn't let such trifle details stop us! What if...

What if we had magical space suits that protected us from the heat (and radiation) so we could land on the sun! what would we have seen? What would we have experienced?

Children are often engaged by the sun, even if they don't know it themselves. They are fascinated by light and shadow or puzzled by water evaporating from a dish on a hot day. In a lot of children's drawings, the sun plays a crucial role, either as a small triangle in a corner or as a large glowing ring with lines all around. But do the children ever think about what this glowing disk is?

Through the activities in this booklet, the children will explore the sun through play, wonder and reflection.

The activities are linked to many framework plan objectives and make it possible to enrich the children's initiative, wonder, curiosity, creativity, desire to learn and confidence in their own abilities.

This booklet is part of a series on space. All the themes and activities are designed so that it can be used in a larger (or smaller) project work about outer space. Let the children decide which direction the project should take, pick and choose among the activities to create the common thread that ties the project together. Remember to document the work along the way, so that others can also see what you have done.

Warning!

The activities in this booklet are about the sun and many may feel like looking up at the sky a little extra on a cloudless day. Make sure none of the children look directly at the sun as this can damage their eyes.

This activity can be used together with the ASE's activity "Earth is a globe". This can give the children a greater understanding of sizes and distances in space and how the sun works in relation to our earth. There you will also find tasks that explain where the sun sets at night.

Curriculum (Norwegian Rammeplan for early education)

The primary goal of the kindergarten is to promote learning. In the kindergarten, the children will experience a stimulating environment that supports their desire to play, explore, learn and master (...).The children's curiosity, creativity and desire for knowledge should be recognized, stimulated, and create a foundation for their learning processes.The children should examine, discover, and understand relationships, expand their perspectives, and gain new insights.

The children will	The staff will
• Experience, explore and experiment with natural phenomena and physical laws • Construct from different materials and explore the possibilities of tools and technology • Examine and experience how to solve mathematical problems and experiencing a joy of using mathematics • Experience and explore nature and diversity of nature • Discover and wonder about mathematical relationships • Develops an understanding of basic mathematical concepts • Experiences sizes in their surroundings and compares them • Uses the body and senses to develop spatial awareness • Researches and gains experience in solving mathematical problems and experiences the joy of mathematics • Explores and wonders about existential, ethical, and philosophical questions	• Observe, analyze, support, participate and enrich the game on the children's premises • Be aware and evaluate their own role and participation in children's play • Visualize natural phenomena and reflect together with the children about relationships in nature • Give the children time and opportunity to ask questions, reflect on and make their own explanations for matters, and to participate in conversations about what they have experienced • Explore and experiment with technology and natural phenomena together with the children • Use mathematical concepts reflectively and actively in everyday life • Strengthen the children's curiosity, enjoyment of mathematics and interest in mathematical relationships based on the children's forms of expression • Facilitating mathematical experiences by enriching children's play and everyday life with mathematical ideas and in-depth conversations • Stimulate and support the children's ability and perseverance in problem solving

Contents

Teacher's guide

Our sun is the center of our solar system and the origin of all life as we know it. Do you ever think that the big, glowing sun we see in the sky is actually the same as the tiny, luminous dots we see in the night sky and call stars? The sun is a star. The only difference is that it is so much closer to us than all the other stars, *only* 150 million kilometers away.

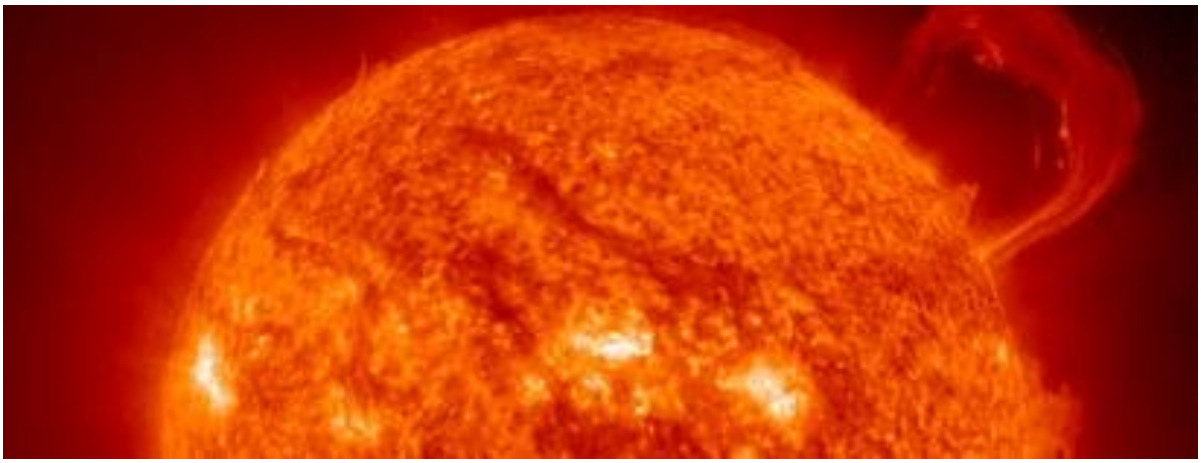

Image credit: ESA

The Sun consists mostly of the gases hydrogen and helium. Inside the core of the sun, where it is up to *15 million degrees*, these gases are squeezed hard together due to tremendous pressure and this creates constant collisions. The collisions cause the hydrogen nuclei to fuse together and create helium atoms. At the same time, light rays (gamma radiation) are released. It is this energy that keeps the sun so brilliant. Each second approx. 700 million tonnes of hydrogen is converted into helium and light particles.

On the way out from the core, the tremendous amount of light particles constantly collide and change direction. This means that the light can take up to 200,000 years before it reaches the surface and can radiate freely into space. From there it moves much faster. From the sun to the earth, light only takes 8 minutes and 20 seconds.

The Sun's surface, which only consists of billowing gases, is called the Photosphere. There it is *only* 5500 degrees.

-Fun Fact-

An area of the sun's surface, the size of a postage stamp, shines with the same brightness as 150,000 candles

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On the surface of the sun we can observe dark spots. These are called sunspots. Sunspots occur when strong magnetic fields penetrate the surface of the sun and prevent some of the energy from escaping. The spots become dark because they are much cooler than the rest of the surface, only 1500 degrees. It is possible to see these spots with a solar telescope or sunspotter. When children are learning about the sun, it is important that they never look up at the sun without adequate protection. It can damage the eyes.

If anyone is curious about what it looks like, you can find many nice pictures of the sun on these websites:

https://www.esa.int/ESA_Multimedia/Keywords/Description/Sunspots/(result_type)/images

https://sdo.gsfc.nasa.gov/

https://www.nasa.gov/mission_pages/soho/index.html

Activity 1: Solar Activity

Start a conversation with the children. This can be a random time when you are out in the sunshine or during assembly time. What actually happens inside the sun? Why does it shine so brightly? Do the kids have any ideas or thoughts about it? Why is the sun so hot?

You need:

Soft foam rubber balls or inflatable balls

Prepare an open space, or a relatively empty room, a gym or large outdoor area is best suited. Let the children play with soft balls. Let's imagine that we are inside the sun and that the balls are the particles, the substance, the sun is made of. Feel free to use the correct words in the conversation so that the children become familiar with science expressions. For example: particles, hydrogen, helium, radiation etc. (see glossary)

See if the children manage to throw the balls at the others' balls. What happens when they collide? Why do they bounce back, or in a different direction? Let's imagine that every time two or more balls hit each other, light and heat (and maybe sound?) are created. How much light and heat (and sound) can the children create? Imagine if we gathered all the children in the whole world and everyone had their own ball. How much light and heat would we produce?

During such imaginative play, it is important to pay attention to the children's comments or reflections. Feel free to pick up on what is being said and continue the conversation with questions that make the children wonder why and how?

Activity 2 How far away is the sun?

When we on earth look up at the sun, we see a small luminous disc, about the size of the moon. Then it is easy to believe that the sun is that big. For many children, this is a completely natural thought.

In fact, the sun is 1,300,000 times larger than the earth. It is quite large. The reason the sun looks so small from our perspective, is that it is really far away. 150 million kilometres

You need:

A flashlight
A globe
A dark room

Stand away from the children and turn on the flashlight. Move the light slowly closer to the children. What happens to the light? Can they tell it is getting bigger? When the light is close to the children it looks relatively big, but as you move away the light will get smaller. That's what it is like with the sun. It is so far away it looks very small. But in truth it is enormous.

Now, think about the other stars in the sky, that we only see as tiny dots when the sky is dark. Some of those stars are unbelievably large, much larger than our own sun. Can you imagine how far away they are?

Activity 3 Create a sundial

Find an open area outside where the sun can shine without interuptions of shadows. Place a stick in the ground and create a circle around it so that the shadow of the stick reaches it.

Check on the stick together with the children every full hour and mark the place the stick creates a shadow. Perhaps some of the children can write the correct number to mark the hour?

Image: ASE

A sundial is a clock that runs on sunlight.

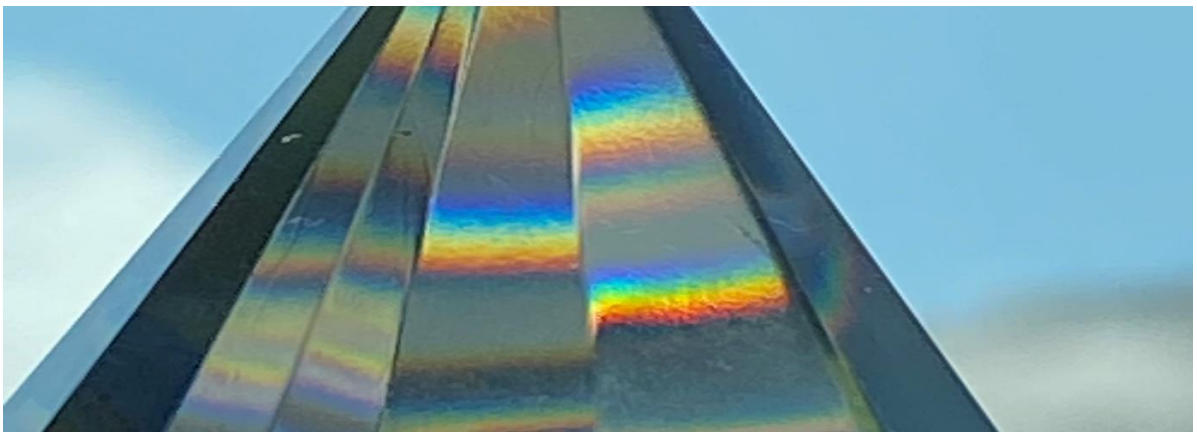
The moves across the sky with the same speed every day. Well, actually, the sun doesn't move at all, the earth spins and creates an illusion that the sun moves across the sky. Find a globe and show the children how the earth spin.

A fun game can be for one person to stand in the middle, symbolizing the sun, while another person (with or without a globe) moves around in a large circle.

Activity4 Create a suncatcher

The sun can allow us to see incredible reflections of light. Most children have seen a rainbow. A rainbow is created from sunlight shining through water droplets in the atmosphere.

This phenomenon can be used to create beautiful rainbows inside.



You need:

Glass beads
transparent glue
Small plastic or paper dish
String or ribbon
A sunny window to hang the decorations

Each child gets a dish. This determines the size of the suncatcher. Fill the dish with transparent glue and let the children create patterns with glass beads. The best results are achieved when it is completely filled up with beads. Pour a little more glue over the pattern and allow to dry. If you put a small stick or a straw between two beeds you will create a hole for the string or ribbon. This makes it easier to hang when it is dry.

Watch the sun hit the suncatchers and create rainbows inside the room.

Where do we go now?

Space is a topic that interests most children, and hopefully this activity has triggered their curiosity to explore further.

Allow the interests of the children to decide how to continue the project.

- Will you travel through the solar system? To the sun or the other planets?
- Or will you travel to an entirely different galaxy?
- Can we go to the end of space? How big is space?
- Are you looking for life other places in space?
- Are you space scientists?
- Or space explorers?

Only the imagination sets the limits. Look at the set of resources from Andøya Space Education and create your own project about space.

Gathering time is a great way to allow the children to share their experiences. Make up stories or songs and pull space into the kindergarten. Create a nook where the children can sit and look at books or pictures about space. Maybe you can invite parents and families to an exhibition to see what you are working on?

Such a project is the perfect arena for using educational documentation in the kindergarten. Use assemblies or other gatherings to reflect and discuss what you have learned and what you want to do now.

Teddynaut has his own page where he answers questions about space related topics from children. Check him out.

Projects about space

The sun is an important source of life on earth. If the sun didn't exist, we wouldn't have it either.

How about throwing a sun party to celebrate the light and show off what you have done in kindergarten. Invite others to come and see what you have learned about the sun. Let it be part of a larger project that shows what other exciting things you can learn about space or the stars.

Space is a topic that engages many children and hopefully this activity has made them curious and eager to explore more.

Let the children's interests decide where you go next in the project

- Are you going to travel through the solar system? To planets, or a new galaxy?
- Can we travel to the end of space? How big is outer space?
- Are you going to look for life in space?
- Are you space scientists?
- Or astronauts?

Here the only limits are the imagination. Look at other ASE resources and create a project about space.

Assembly time is a great way to get the children to talk about their experiences. Make up stories or songs and create a space environment in the classroom. Create a cozy nook where the children can sit and look at books or pictures about outer space. Perhaps you can invite the parents to come and see what you are up to.

Dictionary

Particle - Particles are the smallest, indivisible, building blocks in nature. Everything is made up of these particles. Even if we had a microscope with infinite resolution, we would not be able to see these particles.

Radiation- Radiation is when energy is transferred at a high speed from one place to another. This applies to all forms of energy, heat, light, sound, electromagnetic radiation, etc.

Hydrogen- This is the first element in the periodic table. That means it has only one electron and one proton. When two such collide, they fuse together so that they get two electrons and two protons, and it then becomes Helium.

Helium- The second element in the periodic table, which means it has two electrons and two protons.

Gamma radiation- All electromagnetic radiation above a certain amount of energy (100 Ke V) is called gamma radiation.

Sources

- This resource is created by Andøya Space Education for ESERO Norway.