



Living in the Milky Way

Looking at the universe

time

70 minutes

learning outcomes

To:

- know what the Milky Way looks like
- know the position of our solar system in the Milky Way
- know that the Milky Way contains dust, gas, and lots of stars
- know that Earth and the Milky Way are very tiny compared with the universe
- know where the name Milky Way comes from

end product

- a model Milky Way for each child

materials needed

- 24 sheets of black A4 card
- 24 drawing compasses
- scissors
- white paint
- red paint
- paintbrushes
- cotton wool
- glue
- red clay
- cocktail sticks
- fishing line
- computer with internet

Tip. You can see the Milky Way with the naked eye. You can see it best in January when the Moon is new. Encourage the children to look for this if possible.

Preparation

For the activity **Further and further away** you will need to find the film Powers of Ten on the internet. Watch this film and pay attention so that you know precisely when each question is discussed. Prepare to show the film to the class.



Further and further away 20 min.

Read the e-mail in [Task 1](#) of the worksheet with the children. The children need to find answers to the following questions from the researchers:

- a What does the Milky Way look like?
- b Whereabouts in the Milky Way is our solar system?
- c Why can't we see the whole Milky Way from Earth?
- d Is Earth large or small compared with the universe?
- d Is the Milky Way large or small compared with the universe?
- f What is the Milky Way made from?

Watch the film Powers of Ten with the children in order to find the answers to the researchers' questions. This film shows a journey from a picnic in a grassy meadow in America to a location far beyond the Milky Way. Halfway through the film the journey returns to the grassy meadow and into the hand of one of the picnickers. You are recommended to play the film until the journey returns to the picnic field so that the children get a good impression of the immense size of the universe, and just how tiny the Earth is in comparison. Start by watching the whole film with the children. Explain what they are seeing. Then watch the film again, but this time pause it where relevant to give the children the opportunity to answer the research questions. After they have seen the film, the children will be able to answer questions a to e. Once they have completed the Milky Way craft project the children can answer the final question.



The children investigate what the Milky Way looks like and its position in the universe in relation to our solar system.



Make a Milky Way 30 min.

Now the children have some idea of what the Milky Way looks like, they are going to make a model of it. The children complete [Task 2](#) on the worksheet.



What do you know about the Milky Way? 15 min.

The children read the instructions in [Task 3](#) and write all the answers to the research questions in the e-mail in [Task 1](#). If necessary, watch the film Powers of Ten one more time. Discuss the answers in the e-mail.

- a If we could view the Milky Way from the side, it would look like a saucer with a bulge in the middle.
- b The Earth's solar system is situated on a spiral arm about two-thirds of the way from the centre of the Milky Way.
- c We don't have any telescopes that can reach far enough out from the Milky Way to take a good photograph of it as a whole. The existing pictures of the Milky Way look like real photographs, but are in fact an artist's impression of what we think it looks like. Explain that it is possible to see part of the Milky Way at night when the sky is dark. It is easy to photograph the Milky Way from Earth, because this is the part we can see.
- d The most important aspect of this question is that the children see that Earth is only a tiny part of the Milky Way.
- e Here again, the Milky Way is only a tiny part of the much larger universe.
- f The Milky Way is a galaxy made up from dust, gas, and at least 200 billion stars, most of which can be found in the disc. The system contains old stars, younger stars, dust, and gas clouds. It is composed of a central bulge and a disc with four large and several smaller spiral arms.

Good to know. It takes 8 minutes for light from the Sun to reach Earth. It takes much longer for light from the other stars to reach Earth. So when we look at the universe we are really looking into the past. The mass of the universe is estimated to be 100 billion times greater than the mass of the Sun.



The name Milky Way 5 min.

Ask the children if they know where the name Milky Way comes from.

Egyptian mythology describes the Milky Way as being formed by the milk from a celestial cow. The four feet of the cow were supported by the four corners of the Earth. Greek mythology tells the story that Hera, the wife of Zeus had been given the baby Heracles to breastfeed. When she realised he was not her own child, she pushed him away. The milk that was spilled became the Milky Way.

It is important that the children realise that long ago people had no idea what the Milky Way really was.



Living in the Milky Way

1 Further and further away



Read this e-mail sent by a researcher.

HELP !

Send
Chat
Attach
Address
Fonts
Colors
Save As Draft

To:

Cc:

Subject:

Signature:

Dear student,

My research team has spent a long time gathering information about the Milky Way. This research is so complicated that we need your help. We still need to find the answers to some important questions. Do you think you could help us? The questions are:

- a. What does the Milky Way look like?
.....
- b. Whereabouts in the Milky Way is our solar system?
.....
- c. Why can't we see the whole Milky Way from Earth?
.....
- d. Is Earth large or small compared with the universe?
.....
- d. Is the Milky Way large or small compared with the universe?
.....
- f. What is the Milky Way made from?
.....

Thank you very much for your help!
This means that we will not take so long to complete our research.

Prof. F.M.C. Laarhoff

2 Make a Milky Way



You are going to make a model of the Milky Way.

What do you need?

- black card
- cotton wool
- drawing compass
- glue
- pencil
- red clay
- scissors
- cocktail sticks
- red and white paint
- fishing line
- brushes

What do you need to do?

- 1 Set your compass points to a distance of 10cm. This is the radius of your circle.
- 2 Use the compass to draw a circle on the black card. Cut out the circle. In real life this circle has a diameter of 946,052,800,000,000,000 kilometres!
- 3 Use white paint to paint the circle of the Milky Way. Look carefully at the drawing below before you start painting. Make sure that the spiral turns left; that is anticlockwise.



4 Use red paint to paint dots on your Milky Way. These dots are groups of stars. Use a pencil to draw a cross in the outermost ring of your Milky Way.

This shows the position of our solar system!

5 Wait for the paint to dry. When the paint is dry, turn over the disc.

6 Now paint a mirror image of the Milky Way on this side using the white paint.

Look carefully at the drawing again to see how you should paint.

7 Use the red paint to paint some more dots on this side to represent solar systems. Put a cross in the same position as the one on the other side

to show where our solar system is. Wait for the paint to dry.

8 Use the red clay to make 10 small balls, about the size of a pea.

Push a ball on one end of five cocktail sticks. Prick the cocktail sticks

through the card. Attach the remaining five balls onto the other ends

of the cocktail sticks. These balls of clay represent star clusters (nebulae).

9 Use the cotton wool to make two flattened balls, each 7 cm wide.

Use glue to paste these in the centre of both sides of the black card.

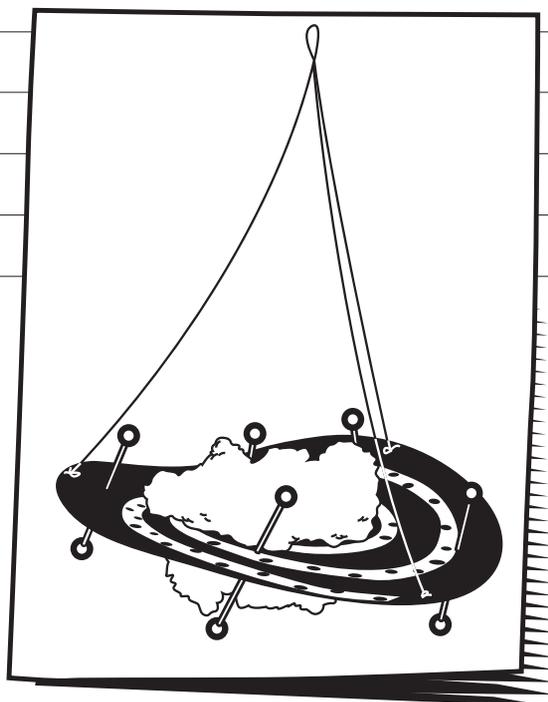
10 Ask your teacher to make three holes in your Milky Way model.

Thread fishing line through the holes and tie it securely.

Tip. Use the compass to prick holes in the card first.

Tip. Apply glue to the card where you want to paste the cotton wool.

Your Milky Way
is ready to be
hung up!



3 What do you know about the Milky Way?



Use your model Milky Way and the film you watched to answer the questions in the e-mail. Write your answers in the space provided at Task 1.
