11. Sunita in Space

Straight from the heart

What do you think the earth looks like? Make a drawing of the earth in your notebook. On your drawing show where you are. Take a look at your friends' drawings too.



What is our earth really like?

Uzaira and Shahmir are playing with the globe. While they play they are talking to each other.

Uzaira: Do you know that Sunita Williams is visiting our school tomorrow? I have heard that she has spent more than six months in space.

Shahmir: (*looking at the globe*) Hmm... look here is America, Africa. Hey, where is space?

Uzaira: The sky, stars, sun and moon, they are all in space.

Shahmir: Yes, I know. Sunita Williams went in a spaceship. I saw on TV that she could see the earth from there.

Uzaira: Yes, from there the earth looked like this globe.

Shahmir: If our earth looks like this globe, then where are we?

(*Uzaira takes a pen and places it on the globe.*)

Uzaira : Here we are. This is India.

Shahmir: If we were here like this, we would all fall off. I think we must be inside the globe.

Teacher's Note : We know that scientists have also struggled to build an understanding of the shape of the earth. It is difficult for young children to understand the shape of the earth. Encourage children to express their ideas freely.



Uzaira: If we are inside, then where is the sky, the sun, the moon and the stars? We must be on the globe. And all the seas and oceans must also be on the globe.

Shahmir: (*pointing towards the lower part of the globe*) You mean to say that no one stays here?

Uzaira: People live here too. Brazil and Argentina are here.

Shahmir: Are the people there standing upside down? Why don't these people fall off?

Uzaira: Yes, it looks strange, isn't it? And this blue part must be the sea. Why doesn't the sea water fall off?





What do you think?

- If the earth is round like a globe, how is it that we do not fall off?
- Do the people in Argentina stand upside down?

Talking with Sunita

When Sunita Williams came to India, thousands of children like Uzaira and Shahmir got a chance to meet her. Sunita says

Teacher's Note : Children can be told about Kalpana Chawla and her space travel. An interesting book for teachers is – *How We Found the Earth is Round* by Isaac Asimov (Longman). This book talks about the way people in different cultures have been thinking about the concept of earth over centuries. Interestingly, even today children's ideas match many of those ideas and thoughts. Even for adults it can be mind boggling to imagine that people in Argentina and India are actually standing upside down in relation to each other. There is actually no 'up' and 'down' on the earth, it is relative.

that her friend Kalpana Chawla wanted to come to India and meet children. She came to India to fulfil Kalpana's dream.

Sunita's experiences of living in space!

- We could not sit at one place. We kept floating in the spaceship from one end to another.
- Water too doesn't stay at one place. It floats around as blobs. To wash our face or hands we had to catch these blobs and wet paper with them.


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- We ate very differently there. The real fun was when all of us would float into the dining area of the spaceship and catch the floating food packets!
- In space there was no need to use a comb. My hair kept standing all the time!
- Not being able to walk, we had to get used to floating around. We had to learn to do simple things differently. To stay at one place, we had to strap ourselves there. Papers also had to be stuck to the wall of the spaceship. It was a lot of fun living in space but it was also difficult.



Look at the photographs and write

- Can you think why Sunita's hair was standing?
- Look at Sunita's photographs and the dates written on each of them. Write what all is happening and when?







We take off (9-12-2006)



Our feet don't stay on the floor! (11-12-2006)



Look, my hair is standing, no problem while working (13-12-06)



Where is this food flying away? (11-12-2006)



Sunita outside the spaceship, really in space! (16-12-06)

Courtesy : NASA



Classroom becomes a spaceship

- Close your eyes. Imagine that your class is a spaceship. Zooo…m – in 10 minutes you have entered in space. Your spaceship is now going around the earth. Now say:
  - Are you able to sit at one place?
  - What about your hair?
  - Oh, look … where are your bags and books going?
  - And what is your teacher doing? Where is her chalk?
  - How did you eat your food during the break? How did you drink water? What happened to the ball that you threw up?
- Act out or draw the scene.

Isn't it amazing?



On the earth when we throw something up, it comes down. When we throw a ball up in air, it falls back. We are able to catch it. On the earth, we don't keep floating around. When we fill a glass or bucket with water, it stays there. It doesn't float around in blobs as Sunita Williams says. It is something special about the earth that makes this happen! The earth pulls everything towards itself.

Sunita Williams went 360 kilometres away from the earth, in the spaceship. Think how far this would be! Find out which town or city is located about 360 kilometres away from where you live. This is how far Sunita Williams went away from the earth.

- Can you now say why Sunita's hair kept standing?
- Think why water flows downwards on any slope. On mountains too water flows downwards, not upwards.

Teacher's Note : It is challenging even for adults to understand how things behave in space. The photographs given can be used to initiate discussion. It is important to help children to raise questions and imagine things in space. We become so used to things being pulled by the earth's gravity that we never give it much thought. It becomes tough for us to imagine what would happen if there was no gravitational pull.

Magic 1 – A tiny paper races a coin

Take a 5 rupee coin and a small piece of paper. The paper should be about one-fourth the size of the coin.

1. Hold the coin in one hand and the paper in the other. Drop them at the same time. What happened?
2. Now place the tiny paper on the coin and drop them. What happened this time? Surprised!

1



2



Magic 2 – A mouse lifts an elephant!

To play this you will need a small stone, a bigger stone (lemon-sized), a thick roll of paper (which can be made with layers of papers), mouse and an elephant made of paper.

- Take a string about 2 feet long.
- At one end of the string tie the small stone. Stick or tie the mouse to the stone.
- Put the string into the roll of paper.
- At the other end of the string tie the bigger stone and stick the elephant.
- Hold the roll of paper and move your hand to rotate the small stone.

Who is pulling whom? You will be surprised! The mouse lifts the elephant! How did this magic happen?

Where are the lines, really!

Sunita describes her view of the earth from the spaceship: "The earth looks so beautiful and amazing. We could watch it for hours, from the window of the spaceship. We could clearly see the curved shape of the earth."

Teacher's Note : Sunita's experiences have been used to give to children a sense of the earth's gravity. Use of the term 'gravity' is not needed here. Children would need to be helped to construct an understanding about the pull of the earth. This can be done only by linking it with children's own experiences.

It seems magical when the tiny paper falls with the coin at the same time. This is because in our daily life we find that the air slows down the speed of leaves or paper while they fall. Children are not expected to understand the science behind the magic - 'A mouse lifts an elephant!' They might not even be able to understand that the bigger stone is lifted against the earth's gravitation. Actually, in the spaceship Sunita did not experience the pull of the earth because the spaceship was revolving around the earth.

Look at this photograph of the earth, taken from a spaceship. From such photographs today we know what the earth looks like. But thousands of years ago, people could only imagine what the earth looked like. Scientists tried hard to find out – how big is the earth, how does it go around?



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Look at this photograph and tell

- Can you see India?
- Can you recognise any other place?
- Where is the sea?
- Do you find anything similar between the globe and this picture of the earth? In what ways are they different?
- Do you think Sunita could make out Pakistan, Nepal and Burma separately, when she saw the earth from space?

Look at a globe in your school and tell

- Can you find India?
- Where all do you find the sea?
- Which countries can you see?
- Can you see some of the countries with which India plays cricket matches? For example: England, Australia, Pakistan, Bangladesh and South Africa.
- What else can you see on the globe?



(*Uzaira and Shahmir are looking at different countries on the globe.*)

Uzaira: See, there are lines between the different countries on this globe. Are such lines also there on the earth?

Shahmir: There must be. They are there on the map of India in this book. See, there are lines between the different states too.

Uzaira: If we go from Delhi to Rajasthan, would we find such lines made on the ground?



Look at the map of your country and tell

- Can you find the state in which you live? Write its name on the map.
- Which are the states next to the state you live in?
- Have you been to any other state?
- Shahmir thinks that there are lines drawn on the ground between the states. What do you think?

When Sunita saw the earth from space she found the earth very beautiful. Many thoughts came to her mind. As she describes it, "From so far away, one can only make out the land and the sea. One cannot see the different countries. Division into countries has been done by us. All the lines on the maps are made by us, they are in our minds. I wish we all think about this. Where are the lines, really?"

Look at the Sky

Shahmir: (*He closes one eye and moves the coin back and forth while looking at the moon.*) Look, I can hide the moon behind this coin.

Uzaira: Wow! Imagine hiding such a big moon behind such a small coin.

- Why don't you try to do the same with a coin? How many centimetres away from the eye did you keep the coin to hide the moon?



Think

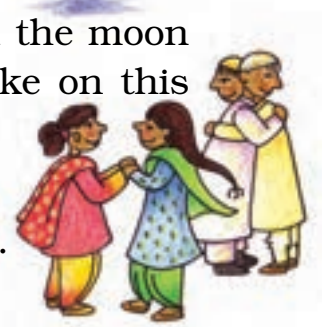
- Do you think the moon is flat like the coin or round like a ball?

Have you ever looked carefully at the sky at night? Don't the twinkling stars look magical! And sometimes the moon is silvery and bright, while sometimes it is nowhere to be seen in the black sky.

- Look at the moon tonight and draw what it looks like. Look and draw again after one week, and then after 15 days.

Today's Date	Date after a week	Date after 15 days

Find out



- When is the next full moon? At what time will the moon rise on this day? What does the moon look like on this day? Draw it.
- What are the festivals related to the moon?
- At night look at the sky carefully for 5 minutes.
  - What could you see?
  - Did you see anything moving in the sky? What do you think it could be? A star or a shooting star or a satellite (satellites are used for the TV, telephones and for weather reports). Find out more about this.



Look at the table and tell

Given below are the times at which the moon rises and sets in Delhi (on the given days).

Date	Time of moon rise (hours : minutes)	Time of moon set (hours : minutes)
28-10-2007	19:16	08:50
29-10-2007	20:17	10:03
30-10-2007	21:22	11:08
31-10-2007	22:29	12:03

- On 28 October the moon came out at ___ minutes past ___ o'clock.
- On 29 October the moon came out at ___ minutes past ___ o'clock.

- On 29 October there was a difference of ___ hours and ___ minutes in the time of the moon rise (as compared to 28 October).
- If you saw the moon rising at 7 pm today, would you see it at the same time tomorrow?
- On 31 October the time of setting of the moon is given as 12:03. Have you ever seen the moon at 12 in the afternoon? Why don't we easily see the moon or stars during the day?

The poet is also raising such questions in this poem.

Twinkling stars



Stars are twinkling
in the sky.
Why do they twinkle?
Tell me why.
How many can you see?

Some seem near
and some seem far.
Is there a name
for every star?
How many can you see?

They shine so bright
in the dark of night!
Why do they hide
in the morning light?
How many can you see?

Some shining stars
we know so well.
But every star
has a tale to tell!
How many can you see?

– Anware Islam
Chakmak, December 2003
(Translated by Anupa Lal)



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An interesting photograph!

A spaceship went to the moon. This photograph of the earth was clicked from the surface of the moon.

See how the earth is looking. Can you see the surface of the moon? Do you have some questions after looking at this picture? Write down those questions and discuss them in the class.

Teacher's Note : Both children and adults enjoy looking at and admiring the night sky. Children will need help understanding the difference between a star, a shooting star and a satellite. Stars can be seen twinkling. A shining object which seems to move with a constant speed in the sky can be a satellite. A shooting star is actually a meteroite which catches fire when it enters the earth's atmosphere. When we show interest ourselves children will also be motivated to observe the night sky and learn many new things.

Do your best and things will work out!

When Sunita was five years old she saw pictures of Neil Armstrong landing on the moon. In 1969, Neil Armstrong was the first man to walk on the moon. Like any other child, Sunita was also fascinated. Sunita says that when she was a young girl she really loved sports and swimming. She was never too interested in studies. After high school Sunita wanted to become a diver. But she could not get into that course. Instead, she became a helicopter pilot. One day she found out that if she studied and trained for it, she could join the Space Mission. And that is what she did! In 2007 Sunita Williams set a new record for the longest space flight by a woman.



Sunita often gives her own example to tell children, "If you want something, but you get something else, do not give up. Do your best, and things will work out!"

When Sunita was asked by a child what would she like to do in the future, she answered, "I want to become a school teacher!" So that she could make children understand how science and maths are closely linked to our lives.



What we have learnt

- Why do children always slide down the slide and not slide up? If this slide were there in Sunita's spacecraft, would children slide like this? Why?
- Why do we see stars mostly at night?
- Looking at earth from the space, Sunita said, "Different countries cannot be seen as separate from here. These lines are on paper. They are made by us." What do you understand by this?

