

Topic 11 : The earth, the moon and the sun

1. Key concept	Characteristics and movements of earth, sun and moon
2. Learning objective	
General	1) Be able to understand that the earth rotates on its axis. 2) Be able to know the orbit of the moon and earth
Specific	1) Be able to explain shape and size of the earth. 2) Be able to explain why we have day and night 3) Be able to describe main characteristics of moon 4) Be able to describe main characteristics of moon 5) Be able to explain their position and movements
3. Activities involved	Guessing quiz for the size and distances for 3 planets Day and night due to spinning Positions and movements of sun, earth and moon
4. Activity purpose	To promote deeper understanding of key concepts To attract interests of children To stimulate imagination and creativity of children

Before Getting Started

Self-check list for Teachers	<input type="checkbox"/> Do I have a good image of the earth, the moon, and the sun? <input type="checkbox"/> Do I know how big sun is? <input type="checkbox"/> Do I know how far the sun is? <input type="checkbox"/> Do I know why moon looks different from time to time? <input type="checkbox"/> Do I have a good idea for the size of the earth?
Background information for teachers	
The Earth	<p>The earth is one of nine planets that travel around the Sun in the Solar System. Of these planets, the Earth is the third nearest to the Sun. It is the only planet known to support life. Almost 5 billion years ago, within a disc of material spinning around the Sun, a cloud of gas and dust began to condense into a solid mass – the young Earth. At first, this mass was very cold, but later it was melted as a result of the heat generated by radioactivity. Heavy metals collected at the center of the Earth and rocks floated near the surface. After millions of years, the rocks formed a hard crust and the oceans and the atmosphere appeared.</p> <p>Earth's origins The Earth developed from a spinning cloud of gas and dust nearly 5 billion years ago.</p>

The Moon

The moon is the Earth's only natural satellite. It is a rocky sphere with a diameter about one-quarter that of the Earth. The Moon emits no light of its own, but we can see the Moon's surface when it reflects sunlight towards us. It is a lifeless and dusty place with very little water and no atmosphere. The lunar surface is scarred by thousands of craters, an example being Tycho, which has a diameter of 84 kilometers. Volcanic lava has seeped through the lunar crust into some of the larger craters, forming maria, or "seas".

The Moon's heavily cratered surface is the result of bombardment by meteoroids billions of years ago.

The Sun

The sun is a 5-billion year old main sequence star. It is a sphere composed mainly of hydrogen and helium gases, about 1.4 million kilometers in diameter. The Sun's core is surrounded by four distinct layers: the radiation zone, the convection zone, the photosphere, and the chromospheres. In the core, where temperatures reach 15 million °C, nuclear reactions convert mass into electromagnetic radiation, a form of energy. The radiation takes 2 million years to travel from the Sun's core to the photosphere, where it is emitted into space in the form of light, infrared radiation (heat), ultraviolet radiation, and other forms of energy.

The Solar system

The sun and the nine planets in orbit around it make up the Solar System. The nine planets, which are drawn to the Sun by gravity, are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. The Sun is far more massive than any of the planets. Unlike the sun, the planets emit no light of its own, but we can see the surfaces when they reflect sunlight towards us.

	Distance from the sun (Comparison to the earth)	Size (Comparison to the earth)
Mercury	0.4	0.4
Venus	0.7	1
Earth	1	1
Mars	1.5	0.5
Jupiter	5	11
Saturn	9.5	10
Uranus	19	4
Neptune	30	4
Pluto	39	0.2

Lesson Planner

Suggested periods (8)	Period 1	Period 2	Period 4
Lesson topic	Shape and size of earth	Day and Night	Moon
Sample lesson plan	11-1	11-2	11-3
Specific objective	Be able to explain shape and size of the earth.	Be able to explain why we have day and night	Be able to describe main characteristics of moon
Introduction (Motivation/Create interest/Active prior knowledge)	Encourage children to talk about what they know about earth	Why we have day and night?	Encourage children to talk about what they know about moon
Core/Development (Active engagement with test/task)	Activity 2,3,4	Activity 5	Activity 7 (partly), 12
Assessment points	Observation of activities: Do they participate in learning process? Do they discuss well?; Do they apply their idea?; and Do they positively discover anything extra?	Observation of activities: Do they participate in learning process? Do they discuss well?; Do they apply their idea?; and Do they positively discover anything extra?	Observation of activities: Do they participate in learning process? Do they discuss well?; Do they apply their idea?; and Do they positively discover anything extra?
Adaptation of curriculum	Try to find something locally available to make good model to image the earth, the moon and the sun.		

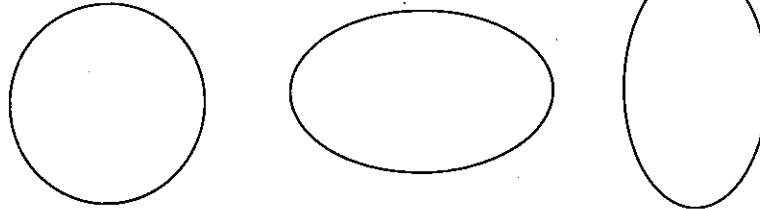
Lesson Planner

Suggested periods	Period 5	Period 6	Period 3 7 8
Lesson topic	Sun	Movement of Earth and Moon	Assessment/Review
Sample lesson plan	11-4	11-5	
Specific objective	Be able to describe main characteristics of moon	Be able to explain their position and movements.	
Introduction (Motivation/Create interest/Active prior knowledge)	Encourage children to talk about what they know about sun	Do you remember the properties of moon and sun?	
Core/Development (Active engagement with test/task)	Activity 6,8,12	Activity 14	
Assessment points	Observation of activities: Do they apply their idea? Do they draw conclusion?; and Do they positively discover anything extra?	Observation of activities: Do they participate in learning process? Do they discuss well?; Do they apply their idea?; and Do they positively discover anything extra?	
Adaptation of curriculum	Try to find something locally available to make good model to image the earth, the moon and the sun.		

Activity 1 Space of the earth

Teaching/learning material

Paper cutouts in the following shapes



Concept Forming the image of the earth

Show children the above cutouts made of paper and ask which shape is mostly like the earth's shape. Let them choose out of three.

Teachers do not need to give the correct answer at this time. They will know later from the lesson.

Show children a ball and a bucket lid (something flat and round), and ask.

Which one do you think is more like the shape of the earth? (Let children raise their hands.)

If children think the earth is more like a ball, ask what evidence they can find to prove it. Teachers must not tell "right or wrong" but just let them think. After story telling in Activity 2, children will know by themselves. It is most important for them to develop the skill of "thinking why something is the way it is." It is possible to let children discuss in groups.

Activity 2 Story telling

Teaching/learning material

Concept The earth is round

Around the 15th century in Europe, spices were very valuable for ordinary people. At that time, pepper's value was the same as gold. But spices were not available in Europe. They could get it only in warm lands like Myanmar. So people wanted to go to warm countries in Asia to get spices to earn a lot of money.

You might know Asia is "east of Europe," but one person at that time thought about going to Asia, via a western route instead of going east. He was Columbus. He believed, "the world is round so we can reach Asia maybe easier if we go west." He worked hard to realize his plan and at last he got support from the queen of Spain for his trip.

But at that time, most people believed that the world was flat. If they went to the far end of the west, they would be killed. So Columbus had problem to recruit a crew for the trip.



If you were living at that time of Columbus, would you have believed the world was round and have joined the trip?

If children are divided into two parties "join" or "not join," have a debate to convince each other of their point of view with reasons.

Activity 3 The size of the earth 1

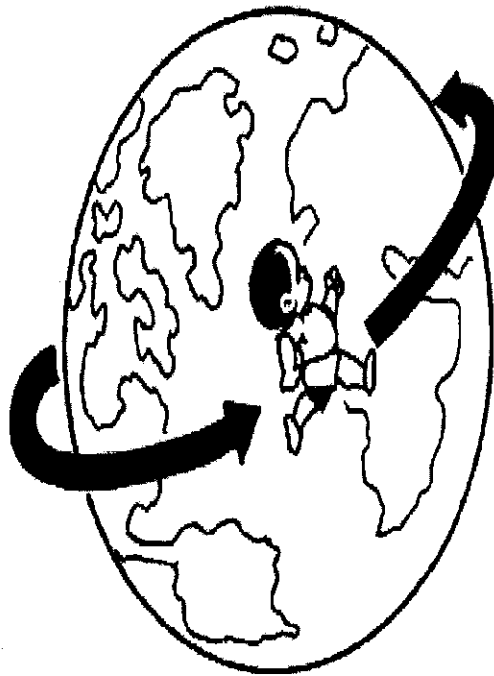
Teaching/learning material

Concept Making a correct image of the earth

Ask children, "Our walking speed is 2.5 miles per hour. If you walked around the earth at this speed 10 hours per day, how long would it take?"

Let children choose an answer from the following.

- a. 1-2 months
- b. 3 years
- c. 10 years



Activity 4 The size of the earth 2

Teaching/learning material

Concept The size of the earth

After children, "Guess the answer." Teacher asks children to calculate following procedure.

The circumference of the earth is 25000 miles.

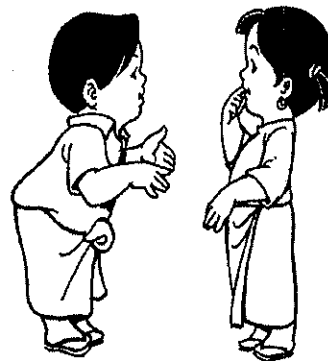
Now teacher shows how to calculate if we walk 2.5 miles per hour and 10hours per day.

Therefore we can walk 25miles per day

So we take 1,000 days to walk around the earth.

A year is 365 days, $1000/365 = 2.739$, So the answer is about 3 years.

Teacher asks children, "Did you get the right answer?"



Other example for "round the earth trip"

	Speed	Duration round the earth trip
Walking	2.5 Miles/hour	3 years
Bus	50 Miles/hour	50 days
Air plane	625 Miles/hour	40 hours

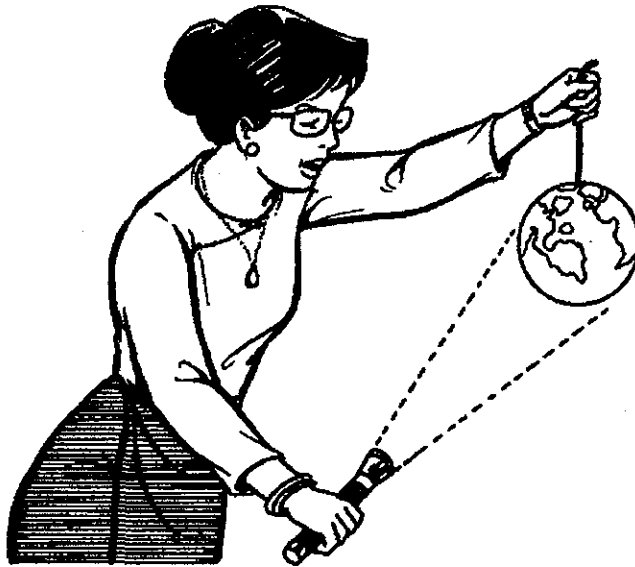
Activity 5 The rotation of the earth (day and night)

Teaching/learning material

Ball or globe and torch lamp

Concept Day and night are related to the rotation of the earth.

Show children the ball (or the globe) lighting it with the torch lamp. Let the ball (or the globe) turn around and explain that the earth turn around like that.



Ask children, "Where do you think it is day?"

Let children choose an answer from the following.

- a. The place where torch lamp is hitting the globe is daytime.
- b. The place where torch lamp is not hitting the globe is daytime.
- c. Others.

Explain to the children that on the other side of the "day time place," it is night time. Now ask children, "Where is it dawn on the globe and where is it sunset?"

Activity 6 The moon and the sun

Teaching/learning material

Small glass ball (pangoli), ball with a 5-inch diameter, ball with a 3.5-inch diameter, table tennis ball, maize grain, and sesame seed

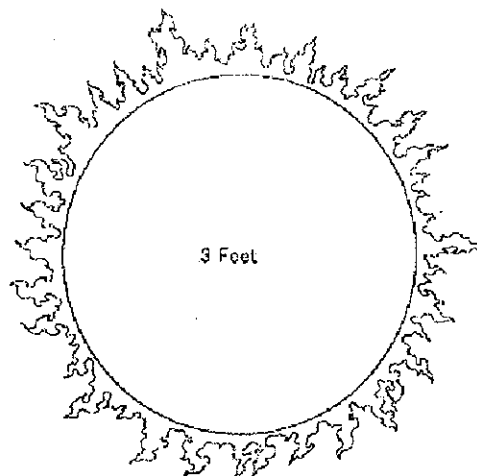
Concept The size of the moon and the sun

First it is not necessary for children to guess correctly. They will learn the correct answer even they guess incorrectly and they will never forget.

Ask children what is the size of the moon and the earth compared to the size of the sun. If the size of the sun is assumed three feet cycle, how many times bigger or smaller are the moon and the earth? Let them choose an answer from the following.

Moon (_____)
 Earth (_____)

- a. Same size
- b. Bigger ball (5 inches)
- c. Smaller ball (3.5 inches)
- d. Table tennis ball
- e. Glass ball
- f. Maize grain
- g. Sesame
- h. Dahl seeds (Pe wak lay)
- i. Others



Solution

After children to guess and possibly discuss what they are thinking, and teachers can give following information and answers.

A diameter of the earth is about 8000 miles.

A diameter of the moon is about 2000 miles.

That is a quarters of the earth.

A diameter of the sun is about 800,000 miles.

That is 100 times bigger than size of the earth.

The answer is _____

The earth f
 The moon g

Activity 7 Distance to the moon

Teaching/learning material

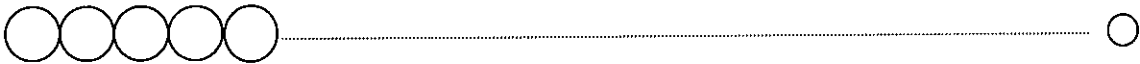
30 circle paper cutouts (a 5-inch diameter),
ball with a 5-inch diameter, and table tennis ball

Concept Distance to the moon

Ask children to guess an answer from the following.

How many earths can we put between the earth and the moon?

- a. 5 b. 10 c. 30 d. 100 e. 300 f. 1,000 g. more



The earth

Solution

After children guess and possibly discuss about their opinions with each other, show children by putting round paper cutouts between "the earth" and "the moon" that there can be 30 "earth's" in-between the moon and the earth.

Tell children if you walk to the moon, it takes 26years.

If you go by bus (50 miles/hour), it takes about 475 days.

If you go by rocket (7 miles per second), it takes 9.5 hours.

(A distance between the earth and the moon is 237,500 miles.)

Activity 8 Distance to the sun

Teaching/learning material

30 pieces of circle paper cutouts (a 4 inch diameter each)

Concept Imaging the distance to the sun

Ask children

Ask children, "How far is it to the sun compared to the distance between the moon and the earth?"

Show children the round paper cutouts to help them guess easily.

Give a hint to children, the sun is 400 times bigger than the moon, but it looks the same size from the earth (here). Ask children, "why is that?" Let them choose an answer from the following.

- a. Same distance as to the moon
- b. 20 times farther than to the moon (600 pieces that are equivalent to half mile)
- c. 400 times farther than to the moon (12,000 pieces that is equivalent to one mile)
- d. more

Solution

Tell children information about the distance from the earth to the sun,

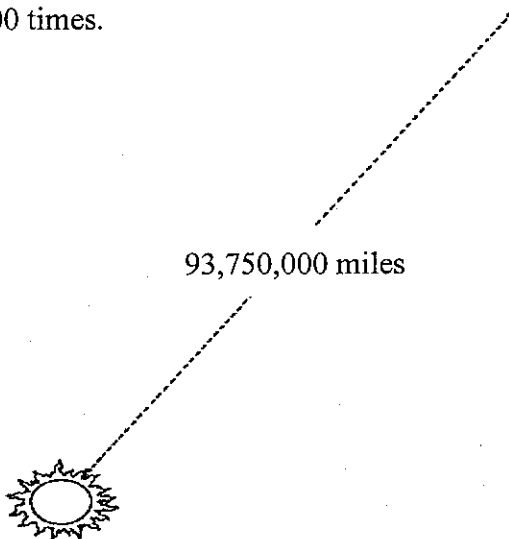
If we walk (2.5miles per hour), it takes 10,300 years.

If we go by bus (50 miles per hour), it takes about 500 years.

If we go by rocket (7 miles per second), it takes 2 months.

(A distance between the earth and the sun is 93,750,000 miles.)

Therefore the answer is 400 times.



Activity 9 Space of the moon

Teaching/learning material

Concept The shape of the moon (from the earth) is related to the orbit of the moon.

Ask children, "How long does it take from the full moon to the next full moon?"

Let them choose an answer from the following.

- a. About a year
- b. About half a year
- c. About a month
- d. About half a month
- e. About a week
- f. Other



Activity 10 The shape of the moon

Teaching/learning material

Concept The shape of the moon (from the earth) is related to the orbit of the moon

The moon is going around the earth in an orbit of a month.

Unlike the situation on the earth, objects in space we can not see unless the sun is shining on it. Therefore we can only see the part of the moon which is lightened by the sun. Since the moon is going around the earth, the lightened part changes based on the direction from where we are looking at the moon. From the earth, the shape of the moon looks like it is changing for this reason.



Activity 11 The moon going around the earth

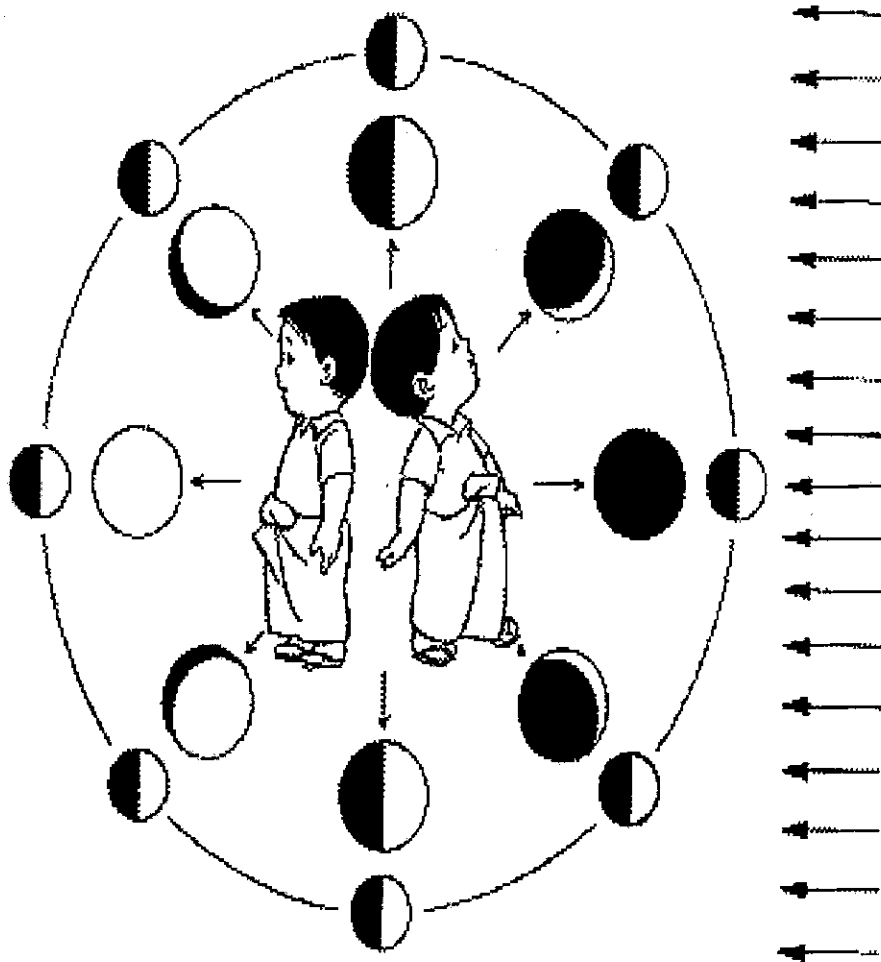
Teaching/learning material

White or yellow plastic ball with half of it painted black

Concept

The movement of the moon and the look from the earth.

Explain the movement of the moon with a ball (the moon) painted half black. The moon is going around the earth and light is coming from the sun.



Activity 12 Story telling (Moon and Sun)

Teaching/learning material

Concept Some information about the moon and the sun

The moon

The first man who observed the moon through a telescope was Galileo in Italy. He found very high mountains and craters (big holes) on the moon. In 1969, Apollo 11 reached the moon for the first time in human history. Now we can know more details about the moon.

The moon has no atmosphere. It is in vacuum. The place where there is sunlight, the temperature rises to about 120 degrees. Where it gets no sunlight, it falls to minus 80 degrees. The gravity of the moon is one sixth of the gravity on the earth. Under such circumstance, a lot of different phenomenon can be observed on the moon.

The sun

The surface temperature of the sun is 6000 degrees (water boils at 100 degrees). Inside of the sun, it is 20,000,000 degrees. Even though the sun is very far away from the earth, it can send a lot of heat and light.

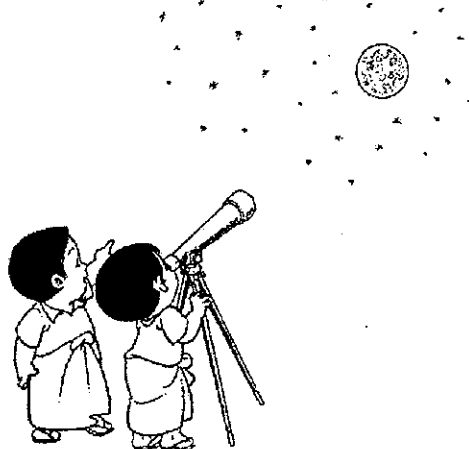
The heat the earth gets from the sun is 10 times more than all the heat produced by petrol used all over the world in a year. Now we can understand how much heat the sun sends to the earth, so that living things on the earth can survive. But the heat we get from the sun is only a fraction of the total heat the sun produces. Therefore it is unimaginable how much heat the sun can produce. For a long time, many scholars have been wondering how the sun can produce so much heat.

Do you know why?

The sun gets its heat from a reaction similar to atomic power.

On the surface there are dark areas called sunspots, which have a slightly lower temperature (4000 degree) than other areas. Big sunspots can be 10 times bigger than the earth.

Can you find more books to read about the sun?



Activity 13 The earth and other planets

Teaching/learning material

Posters of planets, stories about planets, and photos of planets

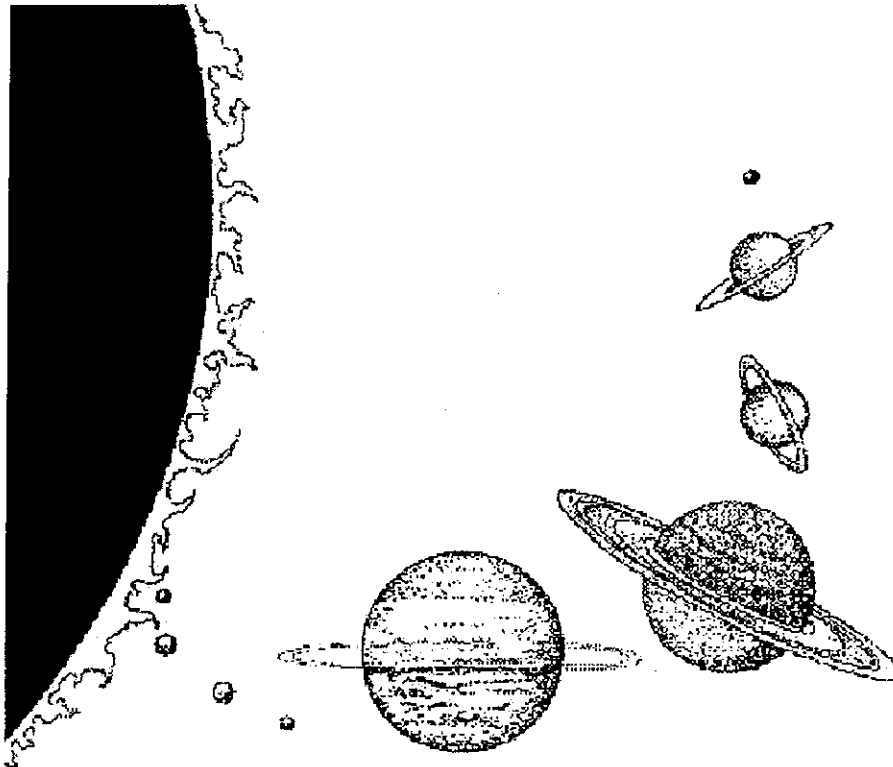
Concept

The earth and other planets orbit around the sun and form the solar system.

Show posters and tell the following story.

The earth is going around the sun. However, the earth is not the only planet that goes around the sun. There are nine planets going around the sun (show the poster). They look very small from the earth but in fact some of them are much bigger than the earth.

Those planets (including the earth) together with the sun called solar system.



Comparison of the sizes of nice planets (The distance between planets are NOT correct).

Activity 14 Movements of the Earth, the Moon and the Sun

Teaching/learning material

Football(any big ball), pigeon pea, goose berry

Concept Moon orbits around earth and earth orbits around sun.

This activity is for children to get images of movements of three planets.

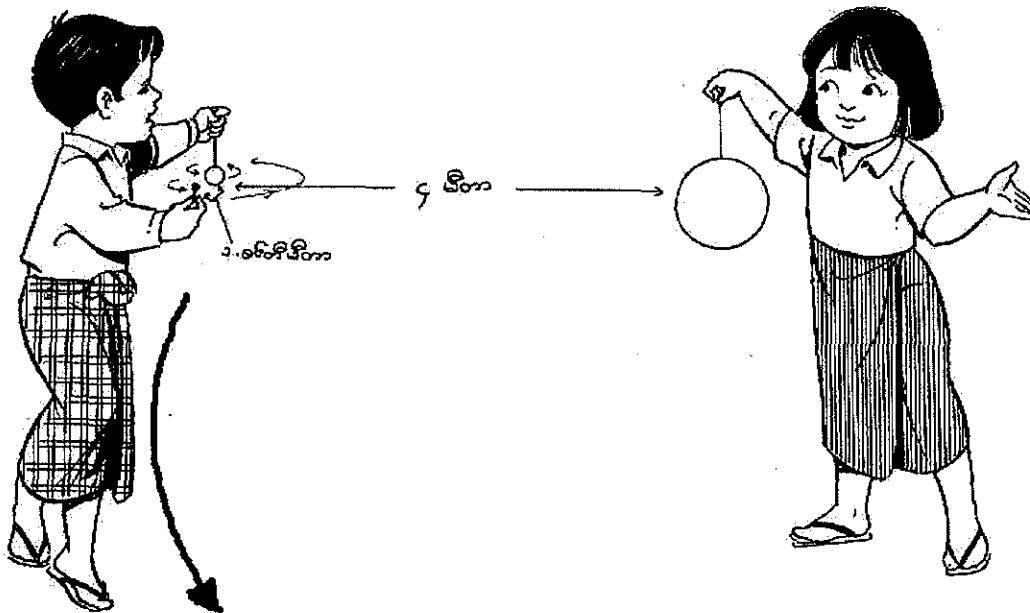
We use pigeon pea as the moon, gooseberry as the earth and the ball as the sun. We need a bigger space in the classroom. It is better to move all desks and chairs in the back or sides of classroom.

Since the distance between the sun and the earth is 400 times as long as the distance between the moon and the earth, we take 1 centimeter from pigeon pea(moon) to goose berry (earth) and 400 centimeter (4 meter) from goose berry to a ball (sun).

Movement 1 (Earth and Sun), let us move only earth around the sun. Earth spins and orbits around sun. Let us spin the earth anti-clock wise and remind children that day and night happens due to this spinning. Then, while you spins earth, start moving around sun with keeping 4 meter from the sun. Make children sure that this orbiting takes one year to go around. If taking 4m is difficult, do it with 2-3 m.

Movement 2 (Earth and Moon), take earth and moon. Remind children of moon's orbiting around the earth, which takes about 30 days. Move moon around the earth with keeping 1 cm between them.

After doing Movement 1 and 2, let's do them together. One child keeps sun (a ball) and stands the center of the classroom. Another child spins earth (gooseberry) and move moon (pea) around earth. Then, s/he with moon and earth moves around sun. Refer to the diagram shown below.



It is also very interesting to use caps instead of a ball, pea, and berry. We prepare 3 caps written Sun, Moon and Earth. A child with Sun cap stands at the center, a child with Earth cap spins and orbit around the sun, and a child with Moon cap try to move around the earth.

Learning activities	Time	Teaching/learning materials	Points to be noticed
<p>(a) 1-2 months (b) about 3 years (c) about 10 years</p> <p>After listing to children's idea, teacher can tell the answer. Answer is (b) This is how to calculate.</p> <p>If we walk 2.5 miles per hour and 10 hours per day we can walk 25 miles per day.</p> <p>to walk around the earth we need $\frac{25000}{25} = 1000$ days</p> <p>So we take 1000 days to walk around the earth. A year has 365 days. Therefore, 1000 days are about 3 years.</p> <p>There are other examples. If we go by bus. Bus is faster than walking. It can go about 50 miles an hour. So if we go by bus it will take 50 days. It will be much faster if we go by air plane. The plane can fly about 625 miles an hour. So it will take 40 hours. (about 2 days)</p> <p style="text-align: center;">Conclusion</p> <p>Let us try to enrich children's imagination about the earth, especially for its size and shape. This lesson can be successful if children have images of size and shape of earth as well as knowing the actual circumference.</p>			<p>Give them time to think and imagine how long it takes.</p> <p>Let us count how many children support choice (a), (b) and (c). It might interesting to ask children why they think so.</p> <p>Children do not necessarily have to memorize the numerical descriptions.</p>

Lesson Plan 11-2

Lesson topic: Day and Night (spinning of earth)
 Learning objectives: Be able to understand why we have day and night is related to earth's spinning
 Teaching/learning materials: Ball, thread, torch, cello tape
 Teaching period: 35 minutes (1 period)
 Teaching/Learning procedure

Learning activities	Time	Teaching/learning materials	Points to be noticed
<p style="text-align: center;">Introduction</p> <p>Teacher introduces the lesson by asking children the following questions.</p> <ol style="list-style-type: none"> 1) Where is the sun in the sky when you come to school? 2) Where is the sun in the sky now (at ten o'clock)? 3) Where is the sun at noon? 4) Where is it in the evening? (Is it in the same side as in the morning?) 	5		Remind the children not to look straight at the sun as direct sunlight can hurt the eyes.
<ol style="list-style-type: none"> 5) Is the sun locating at only one position all the time? 6) Why do you think the location of the sun is changing? <p>It is possible due to the rotation of the earth, isn't it? (Teacher has to ask the leading question.)</p> <p>What is likely to happen if the earth rotates? Think about it.</p>	5		Let the children think in group. Have the children give answers only after giving time to think.
<p style="text-align: center;">Development (refer to Activity 5)</p> <ol style="list-style-type: none"> 1) Specify the ball as if it is the earth. 2) Stick a string of thread somewhere on a ball with cello tape. 3) Hold the upper end of thread and let the ball in dangling position. 4) Mark "X" on a point of the ball, let say it is the place where children are standing, with a marker pen. 5) Specify the torch as if it is the sun and make a spotlight on the ball with it. 6) Rotate the ball gradually anti-clock wise. 	5	Ball, thread, torch, cello tape	To find out their guesses without telling their answers are right or wrong?
<p>Let children notice that what is happening to the point "X" where the children are standing.</p> <p>Have the children do practically and ask the following questions.</p> <ul style="list-style-type: none"> - Does the place of the children' location always get light? - When is it light and when is it dark? - What is likely to happen if the earth does not rotate? - What do you think is the light time? - What do you think is the dark time? - How long does it take from one morning to next morning? 	15		Record the answers of the children groups.
<p style="text-align: center;">Conclusion</p> <p>Teacher gives a right concept according to overall children's answers. The part of the earth where the sunlight falls on is daytime and the remaining part that does not get the sunlight is nighttime. The earth is rotating on its axis so as to form day and night. It takes one day for the earth to rotate completely.</p>	5		

Lesson Plan 11-3

Lesson topic: Moon
 Learning objectives: Be able to describe the size of the moon, the distance from the earth and its extraordinary facts.
 Teaching/learning materials:
 Teaching period: 35 minutes
 Teaching/Learning procedure

Learning activities	Time	Teaching/learning materials	Points to be noticed
<p style="text-align: center;">Introduction</p> <p>Let us think about the moon, which can be seen from the earth. What do you know about moon? Tell us anything about moon you know.</p> <p>Today, we will learn about moon.</p>	10		<p>Children will answer differently. List up whatever they say.</p>
<p style="text-align: center;">Development</p> <p>Activity A (Size of moon, refer to Activity 6 partly) Let us start with thinking about its size, specifically diameter. Do you remember the size of the earth? When we compare moon with the earth, do you think which one is proper? The diameter of moon is (a) bigger than that of the earth (b) 1/2 smaller than that of the earth (c) 1/4 smaller than that of the earth</p> <p>After counting numbers of children, let us ask why they choose it. Proper answer is (c)</p>	5		<p>Diameter of the earth is about 8000 miles. Diameter of the moon is 2000 miles. Therefore, it is 1/4 of the earth.</p> <p>Count the numbers of children who support choice (a), (b) and (c)</p>
<p>Activity B (distance to moon, refer to Activity 7 partly) Then, let us think about the distance to moon. Do you have any idea how far it is from the earth to the moon? The distance from the earth and moon is 237,500 miles. 237,500 is too big to imagine.</p> <p>In order to get the idea of how far it is, Let me use some examples. If you try to walk (2.5 miles/hour) to the moon, which is in fact impossible it will take 26 years by walking. If you take a bus (50 miles/hour), it will take 475 days If you get on the rocket (25,200miles/hour), it will take 9.5 hours.</p> <p>Or how about this? It is 400 miles from Yangon to Mandalay. The distance from earth to moon is about 600 times as long as the distance from Yangon to Mandalay.</p> <p>Do you think that human can go to moon? Answer is Yes. In fact, in 1969 that is about 35 years ago, human reached moon by Apollo 11. Can you believe?</p>	5		<p>Record the children's saying on the blackboard.</p> <p>Teacher shows examples to stimulate children's imagination.</p> <p>Mention how fast the rocket is.</p>

Learning activities	Time	Teaching/ learning materials	Points to be noticed
<p>Activity C (other characteristics of moon, refer to Activity 12)</p> <p>“Do you know how moon moves?” It orbits around the earth. At night, moon shines but moon is in fact reflecting the light from the sun. The shape of moon looks different from time to time because it moves around the earth. We will learn about its movement in the following lessons.</p> <p>“When you look at the moon from the earth on a full moon at night, what do you see on the surface of the moon? How does it look like?” Very high mountains and craters can be found on the surface of the moon.</p> <p>“Do you think that human can live on moon? or Do you think any kind of creature lives there?” The moon has no atmosphere and is vacuum. In addition, the temperature in moon can be 120 Celsius (which is hotter than boiling water) when it gets sun light. The temperature can be also minus 80 (which is much colder than ice) when it gets no sun light. “Do you think you can live there?” In fact, it is not possible that human or any creature live there.</p> <p>More interestingly, the gravity on the moon is much less than the gravity on the earth. It is 1/6 of the gravity of the earth. For example, your body will become very light if you go to moon. If you can jump 30 cm on the earth, you will be able to jump about 2m. Can you imagine? Can you lift up 60 kg of rice in a package on the earth? It is impossible. But you can easily do it on the moon. 60 kg of rice will be like 10 kg of rice.</p> <p style="text-align: center;">Conclusion</p> <p>There are main characteristics about moon.</p> <ol style="list-style-type: none"> 1) It orbits around the earth. 2) Its size is 1/4 of the earth in diameter 3) The distance from the earth to moon is 237,500 miles. 4) The gravity on the moon is 1/6 of that of the earth. 5) It can be very hot (120 C°) and very cold (-80C°). 6) It has mountains and craters. 7) It has no atmosphere. <p>Teacher makes sure that children understand these basic facts about the moon.</p>	10		<p>Encourage children to speak what they know about moon as much as possible. Teacher support and add information basically.</p> <p>Mention many examples to help imagine how things are on the moon.</p>

Lesson Plan 11-4

Lesson topic: Sun
 Learning objectives: Be able to describe the size of the sun, the distance from the earth and its extraordinary facts.
 Teaching/learning materials:
 Teaching period: 35 minutes (1 period)
 Teaching/Learning procedure

Learning activities	Time	Teaching/learning materials	Points to be noticed																
<p style="text-align: center;">Introduction</p> <p>Let us talk about the sun today. - What do you know about the sun? Sons and daughters. Encourage children to speak whatever they know about sun.</p> <p style="text-align: center;">Development</p> <p>Activity A (size of sun, refer to Activity 6 partly) Which do you think is bigger, the earth or the sun? Children will be asked to choose from the following answers.</p> <table border="1" data-bbox="220 1010 815 1144"> <tr> <td>The size of the earth and sun is the same</td> <td></td> </tr> <tr> <td>Smaller than the earth</td> <td></td> </tr> <tr> <td>50 times larger than the earth</td> <td></td> </tr> <tr> <td>100 times larger than the earth</td> <td></td> </tr> </table> <p>The chosen answers will be presented according to groups and after that; the teacher will tell the correct answer is '100 times bigger than the earth'. Let us think why it looks so small though it is so big.</p> <p>Activity B (distance to sun, refer to Activity 8) Teacher will discuss the following questions reciprocally with the students. - How far do you think is the sun from the earth? - Do you remember the distance of moon from the earth? Children will be asked to choose from the following answers.</p> <table border="1" data-bbox="220 1529 815 1664"> <tr> <td>Same distance as to the moon</td> <td></td> </tr> <tr> <td>20 times farther than to the moon</td> <td></td> </tr> <tr> <td>100 times farther than to the moon</td> <td></td> </tr> <tr> <td>400 times farther than to the moon</td> <td></td> </tr> </table> <p>The chosen answers will be presented according to groups and after that; the teacher will tell the correct answer is '400 times farther than to the moon'. Infact, the sun is 93,750,000 miles far from the earth. Can you imagine how big it is? - Teacher will explain the following facts related with the distance from the earth to to the sun to children.</p>	The size of the earth and sun is the same		Smaller than the earth		50 times larger than the earth		100 times larger than the earth		Same distance as to the moon		20 times farther than to the moon		100 times farther than to the moon		400 times farther than to the moon				<p>The size means the diameter in this activity.</p> <p>Record the children's answers on the blackboard.</p> <div data-bbox="938 1570 1417 1917" style="border: 1px solid black; padding: 5px;"> <p>If we walk (2.5 miles per hour) it will take about 10300 years. If we go by bus (50 miles per hour) it will take about 500 years. By rocket (25200 miles per hour), it will take about 2 months. Therefore, the answer is 400 times. Distance between the earth and the sun is 93,750,000 miles.</p> </div>
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Learning activities	Time	Teaching/ learning materials	Points to be noticed
<p>Activity C (Other characteristics, refer Activity 12) Teacher will discuss the significant facts about the sun by using the following questions with the students. (i) What do you think the temperature of the sun is? Do you think it is hotter than fire? After accepting the children's answers, the following facts will be explained. The surface temperature of the sun is 6000 degrees, inside of the sun is 20,000,000 degrees. Even the sun is very far away from the earth, it can send so much heat and light. (ii) What do you think will happen to man (sons and daughters) if there is no sun? ----- ----- We together with other living things can survive on this earth. The heat we get from the sun is only very very little of the heat the sun produce. (iii) Where do you think is the heat from the sun obtained? ----- -----</p> <p style="text-align: center;">Conclusion.</p> <p>Teacher will ask students to conclude the lesson as follows.</p> <ul style="list-style-type: none"> -The sun is 100 times bigger than the earth. - It is 93,750,000 miles far away from the earth. - The surface temperature of the sun is 6000 degrees. - Inside of the sun is 20,000,000 degrees in temperature. - Man cannot survive without the sun. - The sun gets heat from atomic energy. 			<p>Record the children's answers on the blackboard.</p>

Lesson Plan 11-5

Lesson topic: Movement of the Earth and the Moon
 Learning objectives: To be able to explain the movements of the earth and the moon.
 Teaching/learning materials: Ball, gooseberry, pigeon pea
 Teaching period: 35 minutes (1 period)
 Teaching/Learning procedure

Learning activities	Time	Teaching/learning materials	Points to be noticed
<p style="text-align: center;">Introduction</p> <p>Let children retell about the earth, the moon and the sun as far as they know. Ask children to retell the distance of the earth and the moon. Ask them to retell the distance of the earth and the sun. Ask them to retell why day and night develop?</p>	5		Let them include the size and extraordinary facts.
<p style="text-align: center;">Development (refer to Activity 14)</p> <p>Put the heading 'the earth, the moon and the sun' by saying, 'Today, we will learn about how the earth, the moon and the sun move'</p> <p>According to the sizes of the earth, the moon and the sun that children know, use pigeon pea as the moon, gooseberry as the earth and the ball as the sun.</p>	5		Since the size of the moon is 1/4 of the earth, the gooseberry, which is 4 times bigger than the pigeon pea is chosen. As the size of the earth is 100 times smaller than that of the sun, the gooseberry is chosen as the earth and the ball is chosen as the sun.
<p>Then, encourage children to think about distances among them. Facilitate children to remember that when we set the distance between earth and moon as 1, the distance between earth and sun is 400. Ask children to locate 3 objects.</p> <p>Place the pigeon pea (moon) and goose berry (earth) 1 centimeter away from each other, then place goose berry (earth) and the ball (sun) 4 meters apart. Teacher demonstrates this for children to imagine their positions.</p>	5		
<p>Sun and Earth</p> <p>Keep sun and earth 4 meters away and ask children how the earth moves. Encourage children to speak their ideas and show it by themselves.</p> <p>Then, teacher may show the spinning(anti-clock wise) of earth. (do not forget to mention about how long it takes to spin once and about the development of day and night)</p> <p>Teacher shows the orbiting(anti-clock wise) of earth and ask children how long it takes to orbit once.</p>	5		Children will mention the spinning and orbiting of earth.
<p>Earth and Moon</p> <p>Keep earth and moon 1cm away and ask children how both move. Encourage them to speak and show it by themselves.</p>	5		

Learning activities	Time	Teaching/ learning materials	Points to be noticed
<p>Then, teacher demonstrates how both move. Earth spins and moon orbit around the earth. Ask children how long it takes moon to orbit once.</p>			
<p>Sun, Earth and Moon After children understating of 2 activities above, let's us do them at the same time. Asking a child to keep sun at the center, teacher can show the movements of earth and moon. After teacher, ask children to volunteer showing the same movement.</p>	3		<p>This activity is very effective for children to get imagination on the movements of 3 planets.</p>
<p>Additional exercise (Becoming sun, earth and moon) Children also become 3 planets to understand their movements. Children put on the cap written earth, moon and sun. One with the sun cap stays the center. The other with the earth cap tries to spin and orbit simultaneously. The other with the moon cap tries to orbit around the earth. This is a tough and interesting exercise for children.</p>	5		
<p style="text-align: center;">Conclusion</p> <p>Conclude the lesson by reviewing that children can get images about the orbit of the moon around the earth, the orbit of the earth around the sun and how the earth, the moon and the sun rotate in the space.</p>	2		

Assessment

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Is s/he interested in moon, sun and earth?	Is s/he clear about time, distance and speed?	Can s/he calculate time with using distance and speed?	Does s/he understand the size and distances of the earth, the moon and the sun?
Is s/he motivated to imagine the distances and sizes of those planets?	Can s/he construct images of sizes and distances about moon, earth and sun?	Can s/he communicate with teacher and friends?	Does s/he understand main characteristics of sun and moon?
Is s/he motivated to think why they can move regularly?	Can s/he think of the differences between moon and earth?	(present his/her ideas and listen to what others say)	Does s/he understand the movement of the earth and moon around sun?
Is s/he interested in doing activities?	Can s/he think of differences between sun and earth?	Can s/he locate objects according to the distances?	
	Is s/he able to construct image of the movement of the earth and the planets?		

Oral Assessment/Group Discussion

1. A long time ago what did ordinary people think about the shape of the earth?
2. How many years will it take if you walk around the earth?
3. How many months will it take if you walk around the moon (one year is twelve months)?
4. Explain why we have day and night?
5. How long does it take earth to spin once?
6. Can you tell me what you know about the earth?
7. Can you tell me what you know about the moon?
8. Can you tell me what you know about the sun?
9. Describe how earth and moon move around sun.

Written assessment

1. Why do the moon and the sun look same size although sun is much bigger than moon?
2. Explain why the moon looks different every night?
3. Do you think what will happen if sun burns out?
4. Do you think what will happen if earth stop spinning?
5. What kind of energy does sun give to us?
6. Draw the positions of sun, earth and moon (be careful about the sizes and distances of them) and indicate how they move.

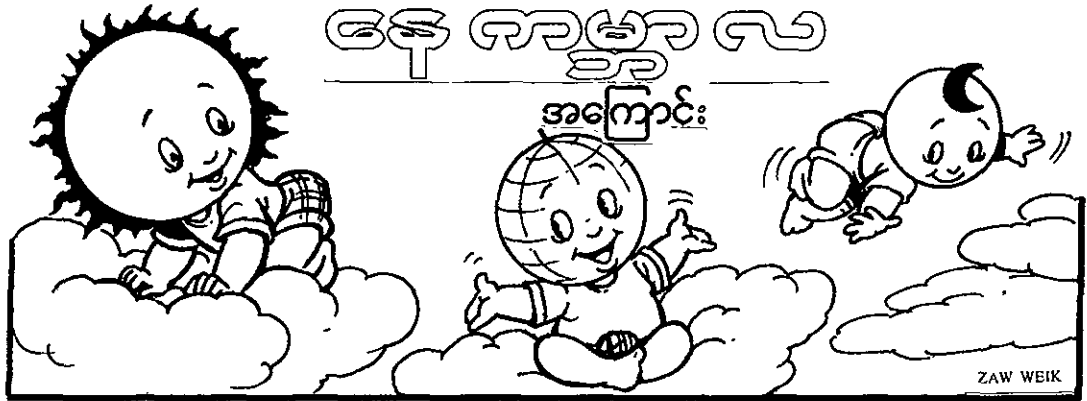
Message to Teachers

It may be good to give some very simple question like "What is the distance between moon and earth" or "How long will it take to walk to sun?" as warming up. But these kind of questions do not promote children to think and not very useful to assess if children understand the main points of the topic.

Let us think good questions which inform us if children understand well or children just memorize the contents.

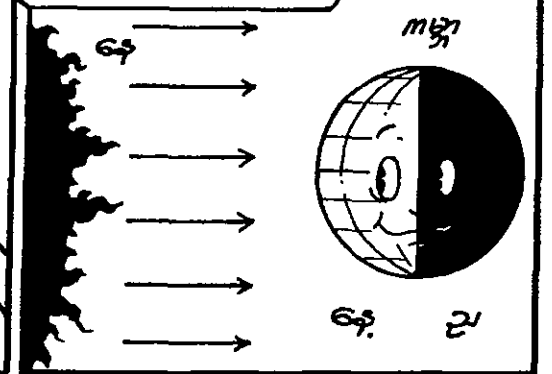
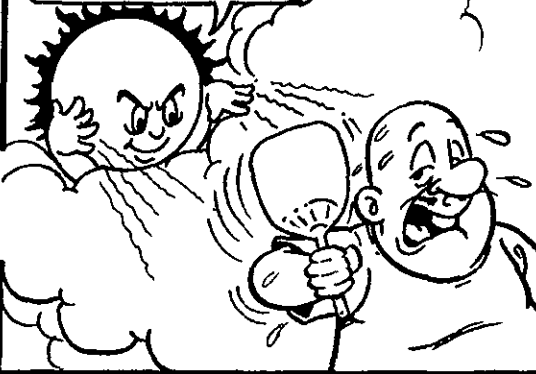
Reference

The sun, The Earth and The Moon



ကျွန်တော်နာမည် "နေ" ပါ
ကျွန်တော်မှာ အပူစွမ်းအားနဲ့
ကိုယ်ပိုင် အပင်းရှောင်တွေ
ပေးနိုင်ပါတယ်။

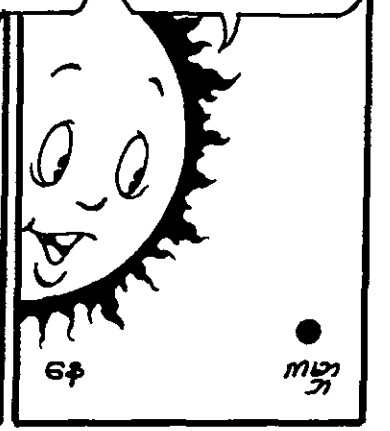
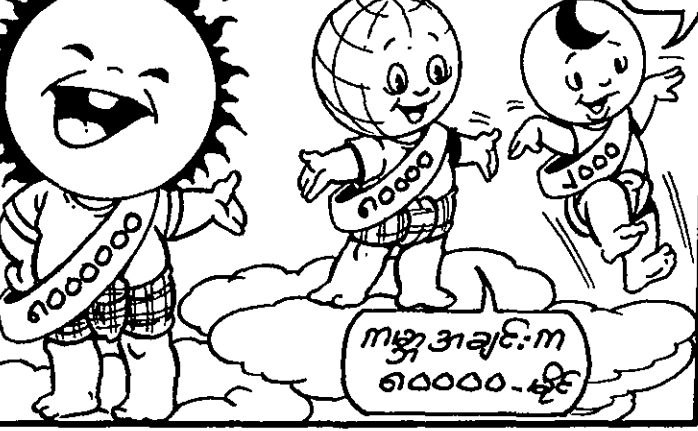
ကျွန်တော် အပင်းရှောင်တွေကျရောက်
တဲ့ ကမ္ဘာကို အခြမ်းကို "နေ" လို့ ခေါ်ပြီး
အပင်းရှောင်မကျတဲ့ဘက်ကို "ည" လို့
ခေါ်ကြတယ် ခင်ဗျ။



"နေ" ဆိုတဲ့ ကျွန်တော်ကို အချင်းဟာ
၈၀၀၀၀၀၀ - မှိုင်ဂရီယာဗျ။

လ - အချင်းက
၂၀၀၀ - မှိုင်
ဂရီပါတယ်

ကမ္ဘာဟာ ကျွန်တော်
ထက် အဆ "၁၀၀"
ငယ်ပါတယ်။



မန္တလေးတို့ ကျွန်တော်က လယ်ထက် အဝ (၄၀) ကြီး တဲ့အတွက် လယ်ဟာ ကျွန်တော်က (၃) ပဲ ရှိပါတယ်။

လ.နဲ့ ကျွန်တော်ဟာ ကျွန်တော်ကိုယ်လုံး အလုံး (၃၀) အကွာအဝေး ရှိပါတယ်။ မိုင်အားဖြင့် (၂၃၇၅၀၀) မိုင်ပါ။

တစ်နာရီကို (၂၅) မိုင်နှုန်းလမ်း ရောက်နိုင်တဲ့ ကုတစ်ယောက်ဟာ မန္တလေး-လ.ကို ရောက်ဖို့ နှစ်ပေါင်း (၂၆ နှစ်) ကြာပါတယ်။

ကျွန်တော်အိကနေ "လ" ကိုရောက်ဖို့ တစ်နာရီ (၅၀) မိုင်နှုန်း သွားနိုင်တဲ့ ဘတ်စကား နဲ့ ဆို (၄၇၅) ရက် တစ်နာရီကို (၂၅၅၀၀) မိုင်နှုန်း သွားနိုင်တဲ့ ခုံးပျံ ဆိုရှင် (၉.၅) နာရီ ဖြစ်ကြပါမယ်။

နေ နဲ့ မန္တလေးတို့ ကျွန်တော်ဟာ မိုင်ပေါင်း (၉၃၇၅၀၀၀၀) ကွာသတိ။

ကုတစ်ယောက်ဟာ မန္တလေးပြင် "နေ" အိကို အရောက်သွားချင်ရင် အောက်ပါရထားအတိုင်း သွားရမယ်။

အဲ... မေ့နေလျက်တာ ကုတစ်ဦး တစ်ယောက်ဟာ မန္တလေးကို တစ်ပတ် လမ်းရောက်ချင်ရင် (၃) နှစ် ကြာပါလိမ့်မယ်။

	နှုန်း	အချိန်
လမ်းရောက်	၁ နာရီ ၂၅ မိုင်	၁၀၃၀၀-နှစ်
ဘတ်စကား	၁ နာရီ ၅၀ မိုင်	၅၀၀-နှစ်
ခုံးပျံ	၁ နာရီ ၂၅၀၀ မိုင်	၂-လ ✓

Epilogue

This **Teacher's Guide for Basic Science** was created in March 2004 with the cooperation of the Department of Educational Planning and Training (DEPT), Ministry of Education, the Union of Myanmar, and the Japan International Cooperation Agency (JICA). This cooperation project, called Myanmar Basic Education Sector Study (MBESS), started in April 2001 until March 2004. During this period, MBESS has targeted three subjects: General Studies, Basic Science and Social Studies. It has also tried to introduce the Child-Centered Approach (CCA) into Myanmar's basic education sector. This Teacher's Guide has been produced from a CCA point of view and includes many information with interesting lesson plans.

To produce this Teacher's Guide, MBESS has established a working group which held many meetings and trials. The following are the members of the Basic Science Working Group. Their efforts are very much appreciated.

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We all hope that this Teacher's Guide will be used nationwide and help improve Myanmar's basic education.

March 2004

