

**Topic 8: Force and Motion**

<p><b>1. Key concept</b></p>	<p>Force is push, pull or twist and changes the shape or speed of object. Gravity is a type of force Different causes of motion make regular and irregular motion</p>
<p><b>2. Learning objective</b></p>	
<p><b>General Objectives</b></p>	<p>1) To be able to describe what is force 2) To be able to describe the different forces in their surroundings. 3) To be able to describe different causes of motion and it causes regular and irregular motion</p>
<p><b>Specific Objectives</b></p>	<p>1) Be able to differentiate that the force has push, pull and twist forces. 2) Be able to describe that the force can change the shape of objects. 3) Be able to describe that the falling of objects from higher place to lower place is due to gravitational force. 4) Be able to describe that fastness and slowness occurs in the motion of objects by force. 5) Be able to describe that the causes of motion are due to force of water, force of wind, force caused by heat, force of machine, force of gravity and force of electricity. 6) Be able to describe that regular force can cause regular motion and irregular force can cause irregular motion. 7) Be able to describe that there are two kinds of motion; 1. Regular motion.2. Irregular motion</p>
<p><b>3. Activities involved</b></p>	<p>Experiment Group discussion</p>
<p><b>4. Activity purpose</b></p>	<p>To realize 'what is force' which is not visible in fact</p>

**Before Getting Started**

<p><b>Self-check list for Teachers</b></p>	<p><input type="checkbox"/> Can you describe 'what is force'? <input type="checkbox"/> Can you express to children what happens if force is applied? <input type="checkbox"/> Do you know 'what is gravity'? <input type="checkbox"/> Can you distinguish 'Force', 'Energy' and 'Power'? <input type="checkbox"/> Can you give some examples of regular motion and irregular motion?</p>
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**Background information  
for teachers**

**Force and Motion**

Forces are the pushes, pulls and twists that make things move faster or slower, change direction or change shape. Cyclists push on pedals to make their bikes move, birds pull worms out of the ground and cooks roll lumps of pastry into flat sheets. The force from a car's engine turns its wheels and makes the car accelerate, to slow down; friction in the brakes provides a force that decelerates the car.

The force of gravity makes objects fall towards the ground. Centripetal force makes the planets and satellites move in orbits and helps washing machines spin water out of wet clothes. Turning forces spin the shafts of motors and engines. They also twist doorknobs and tighten screws. Forces are often present even when nothing seems to be happening. A balanced seesaw does not move because there are two equal turning forces acting against one another.

When forces move, work is done as energy changes from one form to another. Muscles do work when a person lifts a box onto a shelf. The person converts chemical energy from food into potential energy as he or she lifts the box. The greater the rate of work, the greater the power. Forces, work and energy are what make things happen in the Universe.

**What is motion**

An object in motion is changing its position. Some forms of motion, such as the flight of an aero plane, can be seen clearly. But even objects that seem still, such as rocks and buildings, consist of atoms (tiny particles) that are constantly vibrating. Everything that exists is in motion. We live on the Earth, which is moving around the Sun; the Sun is in a galaxy that is always in motion; the galaxy is in a Universe that is itself expanding. The motion of an object changes when a force is exerted on it. A force can alter the speed of an object or the direction in which it moves.

**What is Force**

We commonly consider force to be a push or a pull but physicists give force a precise meaning. In physics, a force is an influence that causes an object to change its momentum. If all the forces on an object balance, then no change in momentum will occur. Force is a vector quantity – it has both a size and a direction. A force can only influence an object's momentum in the direction in which it acts. Forces bind together the particles that make up atoms, give us weight, and keep the planets of the Solar System in orbit around the Sun.

<b>What is Energy</b>	<p>Energy is the ability to do work (to produce movement or activity). There are many different forms of energy, including light energy, electrical energy, nuclear energy, sound energy, and heat energy. Electrical energy, for example, is the ability to force an electric charge to move through a conductor. Energy can change from one form into another, but the total amount of energy in the Universe never changes.</p> <p>Transforming energy Windmills take energy from the wind and feed it to a generator, which produces electricity.</p> <p>Energy sources Heat and light from the Sun are our main sources of energy.</p>
<b>What is Power</b>	<p>The word “power” has a precise scientific meaning. Power is the rate at which work is done. A power of one watt means that one joule of work is being done every second. A kettle with a power of 2,000 watts converts 2,000 joules of electrical energy into heat energy every second. For a given task requiring a set amount of energy, increasing the power applied will reduce the time taken to complete it.</p>
<b>Gravity</b>	<p>The force gravity acts between any two masses, making them attract one another. Everything on Earth is pulled down to the Earth’s surface by gravity, and this pull gives objects their weight. Like other forces, gravity is measured in newton. The gravitational force exerted by the Earth is about 9.81 newtons on every kilogram of matter on its surface.</p> <p>The force of gravity between objects decreases if they have less mass or are further apart. Between everyday objects, the force of gravity is too small to notice.</p>

**Lesson Planner**

Suggested periods (11)	Period 1	Period 2	Period 3	Period 4
<b>Lesson topic</b>	Various force	Shape changes with force	Gravitational force	Motion from force
<b>Sample lesson plan</b>	8-1	8-1	8-2	8-2
<b>Specific objective</b>	Be able to differentiate that the force has push, pull and twist forces.	Be able to describe that the force can change the shape of objects.	Be able to describe that the falling of objects from higher place to lower place is due to gravitational force.	Be able to describe that fastness and slowness occurs in the motion of objects by force.
<b>Introduction (Motivation/Create interest/Active prior knowledge)</b>	Introducing by showing practically that force is mainly included in the daily activities.	Introducing to guess by showing practically how the shape of object becomes when a little force or greater force is exerted on to it.	Introducing by asking the fundamental cause of falling of objects in dropping them from higher place to lower place.	Introducing by asking to remember the previous lessons.
<b>Core/Development (Active engagement with test/task)</b>	Experimenting of force by asking to push and pull among one another.  Activity 1	Experimenting with spring, rubber band and foam, that force can change the shape of objects.  Activity 2,3	To make experiment with stone to show what gravitational force is.  Activity 4,5	Experimenting with the stone tied to the rope, by pulling it fast or slow to show that slow and fast motion occur due to greater and less force.  Activity 6
<b>Assessment points</b>	Observation of activities Do the children participate in the learning activities? Do they understand the meaning of experiments? Can they discuss properly? Do they conclude with a comment? Do they find anything in reality from the experiment?	Observation of activities Do the children participate in the learning activities? Do they understand the meaning of experiments? Can they discuss properly? Do they conclude with a comment? Do they find anything in reality from the experiment?	Observation of activities Do the children participate in the learning activities? Do they understand the meaning of experiments? Can they discuss properly? Do they conclude with a comment? Do they find anything in reality from the experiment?	Observation of activities Do the children participate in the learning activities? Do they understand the meaning of experiments? Can they discuss properly? Do they conclude with a comment? Do they find anything in reality from the experiment?
<b>Adaptation of curriculum</b>	For experiments according to chapter, it is to use available materials in accordance with the region.			

**Lesson Planner**

Suggested periods	Period 6	Period 8 and 9	Period 5 7 10 11
<b>Lesson topic</b>	Motion from various force	Regular and irregular motion	<b>Assessment/ Review</b>
<b>Sample lesson plan</b>	8-3	8-4	
<b>Specific objective</b>	Be able to describe that the causes of motion are due to force of water, force of wind, force caused by heat, force of machine, force of gravity and force of electricity	Be able to describe that regular force can cause regular motion and irregular force can cause irregular motion.  Be able to describe that there are two kinds of motion; 1. Regular motion. 2. Irregular motion	
<b>Introduction</b> (Motivation/Create interest/Active prior knowledge)	Introducing by asking to observe the pictures and asking to remember	Introducing by asking about previous lessons.	
<b>Core/Development</b> (Active engagement with test/task)	Observation of the textbook pictures after that discussion by various cause of motion. Activity 7	Drawing of various kinds of motion. Discussion about regular motion and irregular motion with the help of pictures.  Activity 8	
<b>Assessment points</b>	Observation of activities Do the children participate in the learning activities? Do they understand the meaning of experiments? Can they discuss properly? Do they conclude with a comment? Do they find anything in reality from the experiment?	Observation of activities Do the children participate in the learning activities? Do they understand the meaning of experiments? Can they discuss properly? Do they conclude with a comment? Do they find anything in reality from the experiment?	
<b>Adaptation of curriculum</b>	For experiments according to chapter, it is to use available materials in accordance with the region.		

**Activity 1 Feeling 'Force'**

**Teaching/learning material**

Box, Towel

**Concept** Force is Push or Pull or Twist

Teacher tells children push and pull one another or pushing and pulling their own body. Let them feel the "Force"

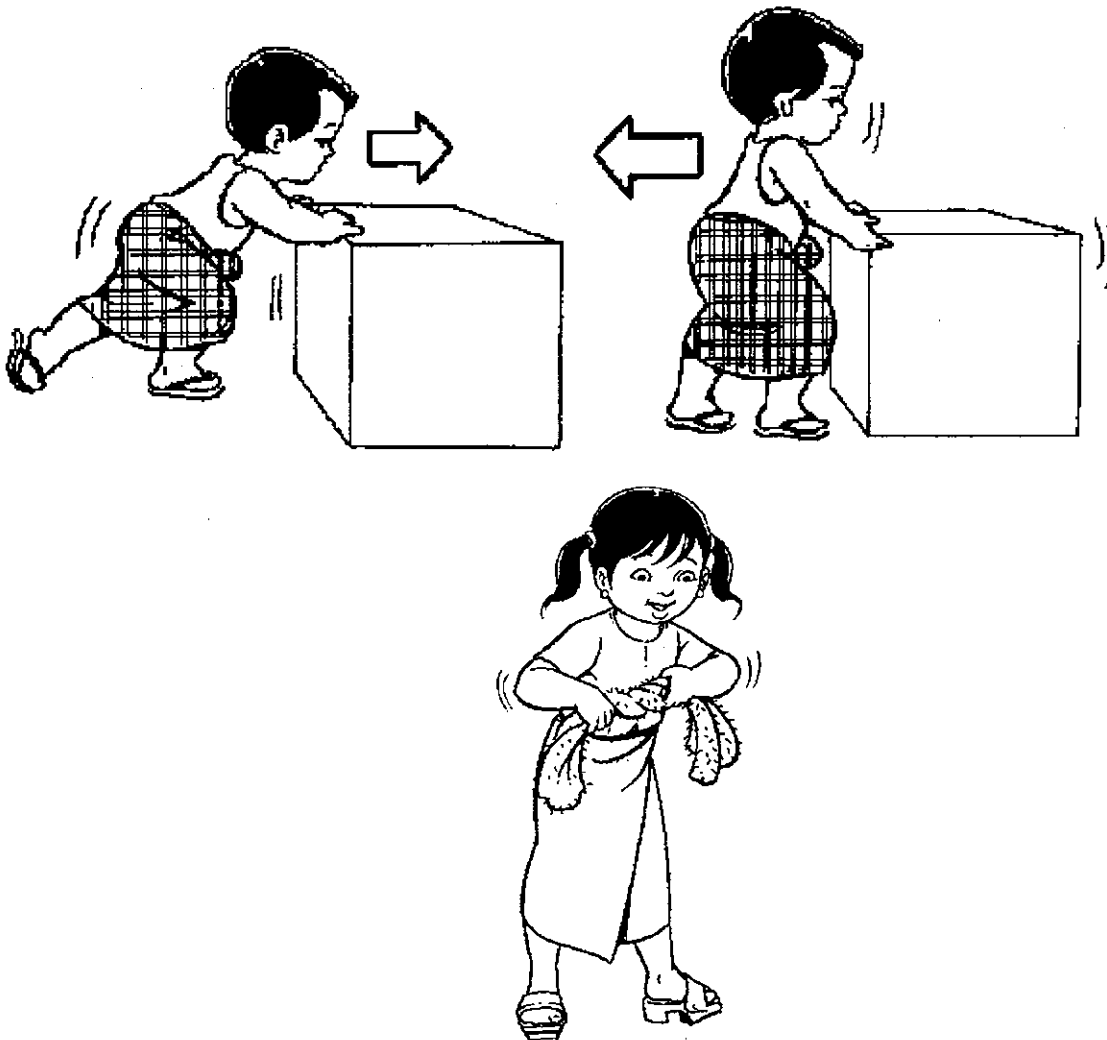
Teacher asks children

'What do you feel when your friend pushes or pulls?'

Children can feel Force but it is not visible.

So teacher must clarify what 'Force' is as when push or pull or twist 'force' is being added.

Teacher can show to twist a towel. The towel gets 'Force' .



**Activity 2 What will happen when force is added 1**

**Teaching/learning material**

Sponges, rubber bands, spring

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**Concept** Force can change the shape of materials.

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Teacher distributes sponges, rubber bands and spring to each group.

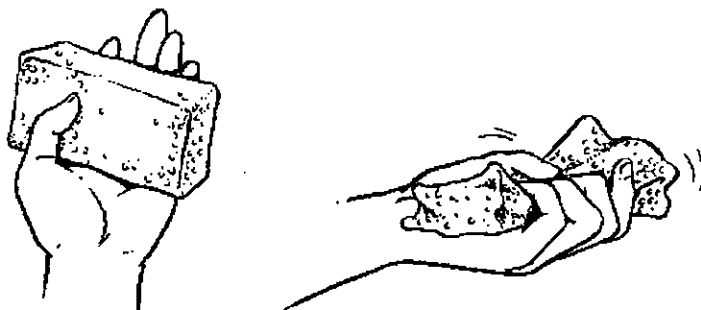
Let children observe how shapes of sponges change when they push and return when they stop pushing.

Teacher asks children

'How do you change the shape of sponges?'

Children may answer 'by gripping /pushing.'

Teacher lets children recognize when they add 'Force' sponges, they change shapes.



**Activity 3 What will happen when force is added 2**

**Teaching/learning material**

Sponges, rubber bands, spring

**Concept** Force can change the shape of materials.

Let children observe how shapes of rubber bands change when they pull return when they stop pulling.

Teacher asks children

‘How do you change the shape of rubber band?’

Children may answer ‘by pulling’.

Teacher asks children

‘If you pull more strongly, how does the shape of the rubber band change?’

Children may answer ‘It will be longer’

Let children pull a spring horizontally and vertically then let them observe the change of shapes of springs. Teacher asks children

‘How do you change the shape of springs?’

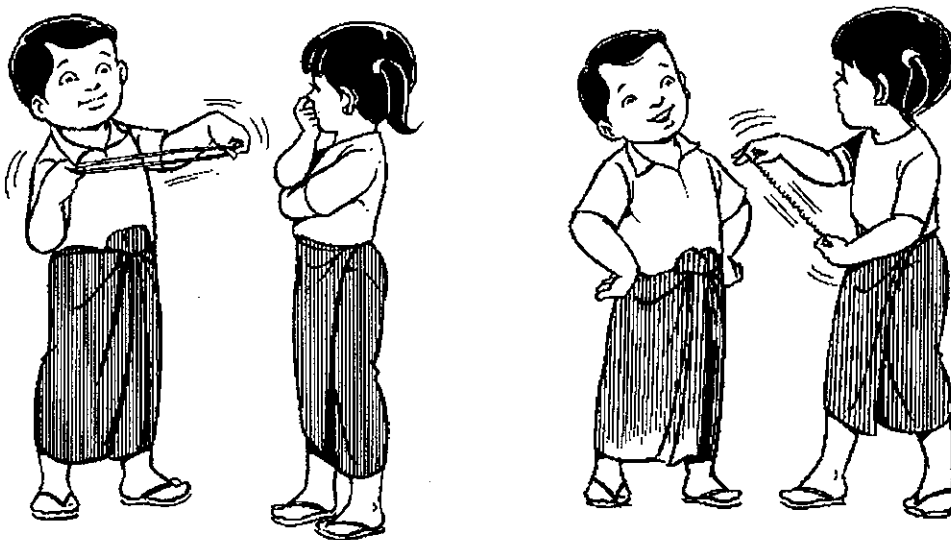
Children may answer ‘by pulling’.

Teacher asks children

‘If you pull more strongly, how does the shape of the spring change?’

Children may answer ‘It will be longer’

Teacher lets children recognize when they add ‘Force’ sponges, rubber bands and spring change shapes and if ‘Force’ is stronger, change of shape is greater.





**Activity 4 What will happen when force is added 3**

**Teaching/learning material**

Springs, rubber bands, two wooden blocks (or stones) heavier and lighter, thread

**Concept** Force can change the shape of materials.

Teacher distributes two wooden blocks (or stones) heavier and lighter and thread and asks children to hang a lighter wooden block (or stone) at the one end of spring, and let them observe change of shapes of springs by comparing with their original shapes.

Teacher asks children;

‘Why do you observe change of shapes of springs when they hang a piece of wood (or stone) ?’

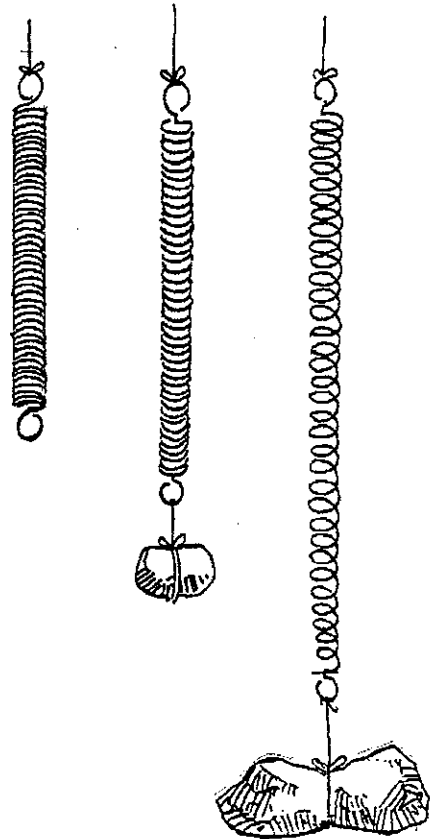
Children may answer ‘there is force’.

Teacher asks children to hang a heavier wooden block (or stone) at the one end of spring, and let them observe change of shapes of springs by comparing with their original shapes.

Teacher asks children;

‘How is the spring if you hang heavier wood (or stone)? Does it become longer or shorter?’

Children may answer ‘longer’.



**Activity 5 What will happen when force is added 4**

**Teaching/learning material**

Rubber bands, two wooden blocks (or stones) heavier and lighter, thread

**Concept** Force can change the shape of materials.

Teacher asks children to hang a lighter wooden block (or stone) at the one end of rubber band, and let them observe change of shapes of rubber bands by comparing with their original shapes.

Teacher asks children;

‘Why do you observe change of shapes of rubber bands when they hang a piece of wood?’

Children may answer ‘there is force’.

Teacher explains that wooden blocks get force from the earth. This is called **gravity**.

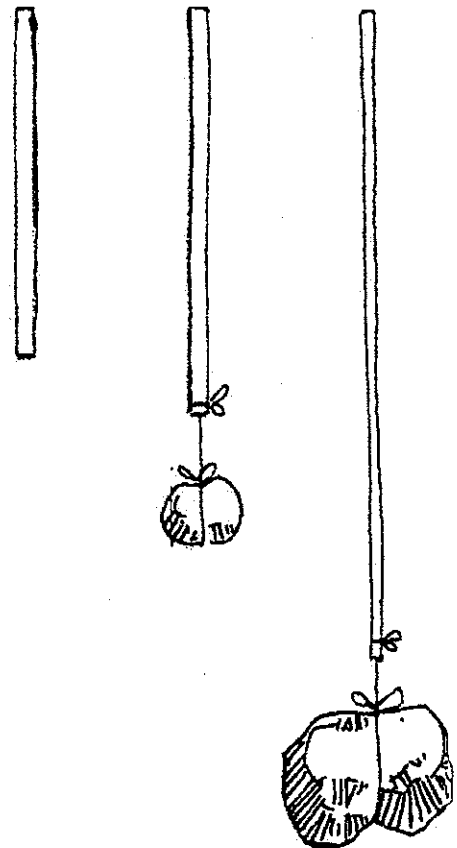
Teacher asks children to hang a heavier wooden block (or stone) at the one end of rubber band, and let them observe change of shapes of rubber bands by comparing with their original shapes.

Teacher asks children;

‘How is the rubber band if you hang heavier wood (or stone)? Does it become longer or shorter?’

Children may answer ‘longer’.

Teacher let children recognize when they put heavier rubber bands and springs become longer. Therefore it is greater gravity from the earth.



**Activity 6 What will happen when force is added 5**

**Teaching/learning material**

wooden block (or stones) for each group, thread

**Concept** Force can change speed (velocity)/make motion.

Teacher distributes wooden blocks (or stones) tied to thread and asks children to pull them strongly and lightly.

Teacher asks children;

'If you pull the thread what happens?'

Children may answer 'Blocks (or stones) move'.

Teacher asks children

'If you pull strongly, does the stone move quickly or slowly?'

Children may answer 'Quickly'.

Teacher can use also desk to push.

Teacher asks

'If I push this desk what will happen?'

Children may answer 'the desk moves'

Teacher asks children

'If you push strongly, does the desk move quickly or slowly?'

Children may answer 'Quickly'.

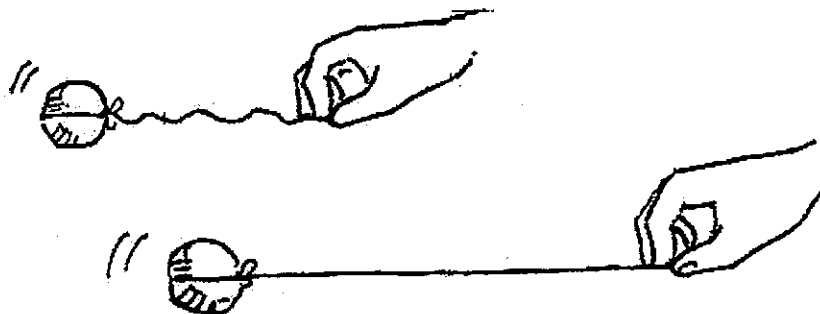
Teacher tells

'Pulling and pushing means giving force. What did you see last time if you push/pull sponges and rubber band/spring?'

Children may answer, 'changing shapes'.

Teacher tells

'This time you can see if you push or pull things move. It means things get speed. So we can also say if you give force things get speed or making motion.'



**Activity 7 Motion is caused by Force**

**Teaching/learning material**

Textbook G4

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**Concept** Force can change speed (velocity)/make motion

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Teacher asks children to see the pictures in the textbook (G4), and asks  
'How is motion created?'

Children may answer

- a) Created by 'Water'
- b) Created by 'Wind'
- c) Created by 'Heat'
- d) Created by 'Machine'
- e) Created by 'Gravity'
- f) Created by 'Electricity'

Teacher let children recognize all motion is caused by force.

**Activity 8 Regular Force/Regular Motion, Irregular Force/Irregular Motion**

**Teaching/learning material**

Textbook (G3)

**Concept**

Regular Force causes Regular Motion and Irregular Force causes Irregular Motion

Teacher explains the picture in the textbook (G3), regular motion and irregular motion.

When they get regular force (so gravity) motion will be regular

When they get irregular force motion will be irregular.

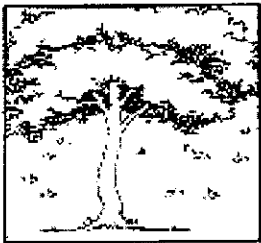


Figure 1

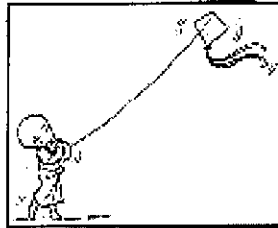


Figure 4

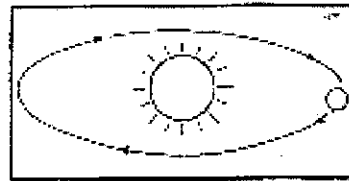


Figure 7

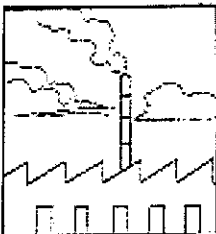


Figure 2



Figure 5

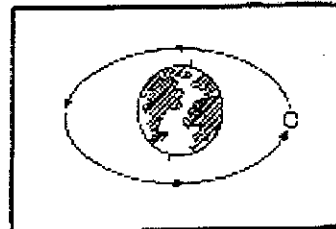


Figure 8

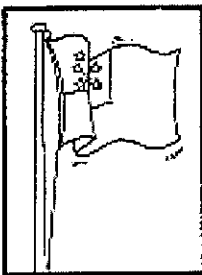


Figure 3



Figure 6

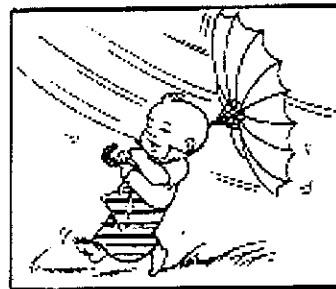


Figure 9



Learning Activities	T	Teaching/learning materials	Points to be noticed.																								
<p>Teacher has to say that when an object is pushed, pulled or twisted, force is used. Though force cannot be seen with eyes, it can be felt.</p> <p>Then the teacher has to ask the following questions:</p> <ol style="list-style-type: none"> <li>1. Holding foam; it is squeezed by using a little force; it is squeezed by using too much force. Ask what will happen to the form?</li> <li>2. Holding the two ends of a rubber band; it is stretched out by using a little force; it is stretched out by using much force. Ask what will happen to the rubber band</li> <li>4. Horizontal position and vertical position of a spring; pulling by using a little force; pulling by using much force. Ask, what will happen to the spring.</li> <li>5. Let the children think and discuss the above questions in groups and let them tell their opinions.</li> </ol> <p>Opinion:</p> <table border="1" data-bbox="196 925 673 1129"> <thead> <tr> <th></th> <th>Using a little force</th> <th>Using much force</th> </tr> </thead> <tbody> <tr> <td>Foam</td> <td></td> <td></td> </tr> <tr> <td>Rubber band</td> <td></td> <td></td> </tr> <tr> <td>Spring</td> <td></td> <td></td> </tr> </tbody> </table>		Using a little force	Using much force	Foam			Rubber band			Spring			<p>15</p>	<p>It is the guessing stage</p> <table border="1" data-bbox="979 959 1456 1158"> <thead> <tr> <th></th> <th>Using a little force</th> <th>Using much force</th> </tr> </thead> <tbody> <tr> <td>Foam</td> <td></td> <td></td> </tr> <tr> <td>Rubber band</td> <td></td> <td></td> </tr> <tr> <td>Spring</td> <td></td> <td></td> </tr> </tbody> </table>		Using a little force	Using much force	Foam			Rubber band			Spring			
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<p>Then the teacher</p> <ol style="list-style-type: none"> <li>1. Distribute each group, foams. Let them study the foam by handling. Ask them to squeeze the foam by using a little force. And ask them to squeeze by using much force. Let them study what happens to the foam</li> </ol>	<p>15</p>	<p>Foam</p>	<p>It will be recorded whatever the children say on the blackboard. Let them recognize that when foam is squeezed by using a little force, it contracts a little and when foam is squeezed by using much force, it contracts more.</p>																								





**Lesson Plan 8-2**

Lesson topic: Motion caused with force  
 Learning objectives: Be able to describe that there are various reasons that cause motion.  
 - The falling of objects from higher place to lower place is due to gravitational force of the earth.  
 - Force causes slowness and fastness in motion.  
 Teaching/learning materials: Stone (or) wood block, thread, and rubber band.  
 Teaching period: 70 minutes  
 Teaching/Learning procedure

Learning Activities	Time	Teaching/learning materials	Points to be noticed.
<p align="center"><b>Introduction.</b></p> <p>Teacher asks children to retell the contents on 'force.'                      Children will retell as far as they remember.</p>	5		
<p align="center"><b>Development/Core</b></p> <p>Have you ever dropped things from above? (Yes.....)                      Have you ever thrown off things that you hold in your hands? (Yes.....)                      Where did those things fall?                      They fell below. On the ground.                      Have you ever seen anything that dropped off from the trees? (Fruits, flowers, leaves)                      Which one reaches to the ground first? (Fruit .....)                      Which one reaches to the ground last? (Leaf .....)                      Although a light object and a heavy object differ in time to reach the ground what do you think why they fall below.                      Children will give different answers (.....)</p>	10		<p>Teacher has to record the children's saying on the blackboard by not saying either right or wrong</p>
<p>Teacher will distribute each group with two different sized stones attached to a thread, and a spring.                      - Let them study the original shape of a spring.                      - Ask them to hang a small stone attached to a thread to the end of a spring. Then ask them to study again the shape of a spring.                      Again:                      Ask them to hang a larger and heavier stone attached to a thread to the end of a spring. Then, let them study again the shape of the spring.                      Let the children do the experiments. Then, ask them to bring out their findings.                      Findings:</p> <div style="border: 1px solid black; width: 200px; height: 40px; margin-left: 20px; margin-top: 10px;"> <p align="center">-</p> <p align="center">-</p> </div> <p>Afterwards the teacher will gather the springs.</p>	15	Stone (wooden block), spring.	<p>Either stone or wood block can be used as one wish. When the small stone is hung from a spring the spring elongates a little and the diameter of the spring becomes a bit smaller. Let them know it was due to the force of the stone. Children's findings will be recorded on the blackboard</p>

Learning Activities	Time	Teaching/ learning materials	Points to be noticed.
<p>Findings:</p> <div style="border: 1px solid black; width: 280px; height: 45px; margin: 5px 0;"> <p style="margin: 0;">-</p> <p style="margin: 0;">-</p> </div> <p>Teacher will distribute rubber bands to each group.</p> <ul style="list-style-type: none"> <li>- Ask them to study the original shape of the rubber band</li> <li>- Ask them to hang on the end of the rubber band a small stone attached to a thread.</li> </ul> <p>Then, ask to study again the shape of a rubber band.</p> <p>Again, ask them to hang on the end of the rubber band a large stone attached to a thread. Then, the shape of rubber band will be asked to study again.</p> <p>Children will be asked to do experiments and will be asked to bring out their findings:</p> <p>Findings:</p> <div style="border: 1px solid black; width: 360px; height: 65px; margin: 5px 0;"> <p style="margin: 0;">-</p> <p style="margin: 0;">-</p> </div>	15	Rubber bands	<p>When a larger stone is hung from a spring, the spring elongates more. The diameter of the spring becomes smaller and the shape is changed. Let them know that it was due to the force of the stone</p> <p>The children's findings will be recorded on the blackboard.</p> <p>When a small stone is hung from a rubber band the rubber band elongates a little and the diameter of the rubber band becomes smaller. Let them know that it was due to the force of the stone.</p> <p>When a large stone is hung from a rubber band, the rubber band elongates more. The diameter of the rubber band becomes much smaller. The shape of the rubber band changes. Let them know that it was due to the force of the stone.</p>
<p>Let the children write down the above concept in their book. Group leaders have to gather the experimented materials and hand over to the teacher.</p> <p>Then the teacher continues to ask, if the table is pushed what will happen?</p> <p>The answer (the table moves) will be given.</p> <p>Ask, if the table is pushed with much force, will it move a little or more?</p> <p>The answer (it will move more) will be given.</p>	5		<p>Children's findings will be recorded on the blackboard.</p>



**Lesson Plan 8-3**




Lesson topic: Motion caused by various forces  
 Learning objectives: Be able to describe that there are various reasons that cause motion.  
 - Force of water, force of wind, heat energy, and force of gravity, mechanical and electrical power can cause motion.  
 Teaching/learning materials: Pictures contained in the textbook  
 Teaching period: 35 minutes.  
 Teaching/learning procedure:

Learning Activities	Time	Teaching/learning materials	Points to be noticed.
<p style="text-align: center;"><b>Introduction.</b></p> <p>In previous lesson, we have learned by using force things can change shapes and move. Teacher asks children tell example how things move with force.</p> <p style="text-align: center;"><b>Core/Development</b></p> <p>Teacher asks to open the textbook. Let them observe and study the pictures containing in the textbook and let them discuss the following contents.</p> <p>1. Why do the spinning of propeller blades inside the water and the moving of wooden raft and bamboo raft from one place to another occur?                      Let the children discuss in groups and ask them to bring out and tell the discussed facts. (.....)                      Then, ask the children to tell</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">Objects can be made to move with the force of water.</p> </div> <p>2. Why do the sailing of boats and the spinning of propeller blades in the wind occur?                      Let the children discuss in groups and ask them to bring out and tell the discussed facts. (.....)                      Then, ask the children to tell</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">Objects can be made to move by the force of wind.</p> </div> <p>3. Why do motorcars, trains, and airplane move?                      Let the children discuss in groups and ask them to bring out and tell the discussed facts. (.....)</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">Objects can be made to move by the force of heat</p> </div> <p>Then, ask the children to tell</p> <p>4. Why can the water be drawn on with the water pump and why can objects be carried with a winch.                      Let the children discuss in groups and ask them to bring out and tell the discussed facts. (.....)</p>	<p style="text-align: center;">5</p> <p style="text-align: center;">4</p> <p style="text-align: center;">4</p> <p style="text-align: center;">4</p>		<p style="text-align: center;">Record what the children say on the blackboard.                      Let them recognize that objects can move due to the force of water.</p> <p style="text-align: center;">Record what the children say on the blackboard.                      Let them recognize that objects can move due to the force of wind.</p> <p style="text-align: center;">Record what the children say on the blackboard.                      Let them recognize that heat is obtained from combustion of fuel such as gasoline, diesel and natural gas.</p> <p style="text-align: center;">Record what the children say on the blackboard.                      Let them recognize that falling down of objects is due to the gravitational force of the earth</p>

Learning Activities	Time	Teaching/ learning materials	Points to be noticed.
<p>Then, ask the children to tell</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Objects can be made to move by the force of machines.</p> </div> <p>5. Why does a chalk drop off from the hands and why do fruits fall down from the tree? Let the children discuss in groups and ask them to bring out and tell the discussed facts. (.....)</p> <p>Then, ask the children to tell</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Objects fall down due to the gravitational force of the earth.</p> </div> <p>6. Why do the fans rotate and why can we move, without having to climb up and down, with the use of escalators? Let the children discuss in groups and let them bring out and tell the discussed facts. (.....)</p> <p>Then, ask the children to tell</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Objects can be made to move by the force of electricity.</p> </div>	<p>4</p> <p>4</p>		<p>Let them recognize that objects can move by different machinery.</p> <p>Record what the children say on the blackboard. Let them recognize that motion occurs due to electricity.</p> <p>Record what the children say on the blackboard. Let them recognize that motion occurs due to electricity.</p>
<p style="text-align: center;"><b>Conclusion:</b></p> <p>Ask them to review that the force of water, wind, gravity, energy of heat, mechanical and electrical power can cause different motions.</p> <p>Therefore, conclude by letting them say, the different causes of motion are force of water, force of wind, force caused by heat, force of machine, force of gravity and force of electricity.</p> <p>Ask them to write down the above concept in the notebook.</p>	<p>6</p>		

**Lesson Plan 8-4**

Lesson topic: Regular motion and Irregular motion.  
 Learning objectives: Be able to describe that there are regular motion and irregular motion  
 Teaching/learning materials: Picture charts.  
 Teaching period: 70 minutes.  
 Teaching/learning procedure:

Learning Activities	Time	Teaching/learning materials	Points to be noticed
<p><b>Introduction:</b>                      In the previous lessons, you've already known that all motions are caused by force.</p>	5		
<p><b>Core/Development:</b>                      Tell the different kinds of motion. (refer to the previous lesson plans)                      Teacher asks, 'what did you study in motion due to water?'                      (The spinning of propeller blades due to the force of water and the floating of wood and bamboo rafts by the force of water.)                      Draw sketches on how propellers spin and how wood and bamboo rafts float with arrows.                      Drawing sketches:</p>	4		
<p></p>	4		<p>Let the children recognize that propellers spin one-sided according to the force of current.</p>
<p>- What did you study in motion due to air?                      (Sailing by the force of wind, and the spinning of propellers by the force of wind)                      Draw sketches on sailing by force of wind and the spinning of propellers by force of wind with arrows.                      Drawing sketches:</p>	4		<p>Let the children know that wood and bamboo rafts float down-stream and that they drifted from higher region to lower region one sided. Let the children know that the sails can move to different directions by the force of wind.</p>
<p></p>	4		<p>Let the children know that propeller spins to one side by the force of wind.</p>
<p>- What did you study in motion due to heat?                      (Heat is obtained from combustion of gasoline, diesel and natural gas and the heat thus obtained can move motorcars, train and aero plane)                      Draw sketches on how they move with arrows.                      Drawing sketches:</p>	4		<p>Let the children know that motorcars, trains, and airplane move to various directions/</p>
<p></p>	4		<p>Let the children know that water can be pumped on to various directions with a water pump.</p>
<p>- What did you study in motion due to machine?                      (Draw on water with water pump, carrying objects by a winch)                      Draw sketches on how water is pumped on and how objects are carried by a winch with arrows.                      Drawing sketches:</p>			

Learning Activities	Time	Teaching/ learning Materials	Points to be noticed
<div style="border: 1px solid black; height: 50px; width: 100%;"></div>			Let the children know that a winch can carry objects to various directions.
<p>- What did you study in motion due to gravitational force of the earth? (Dropping of chalk, falling of fruits from trees) Draw sketches on how they move with arrows: Drawing sketches:</p>	4		
<div style="border: 1px solid black; height: 50px; width: 100%;"></div>	4		Let the children know that dropping of chalk and falling of fruits goes to one direction.
<p>- What did you study in motion due to electricity? (Electric fan, escalator) Draw sketches on how they move with arrows.</p>			Let the children know that propeller blades of fan spin to one side.
<div style="border: 1px solid black; height: 50px; width: 100%;"></div>	10		Let the children know that escalator can move to various directions
<p>Then, the teacher will ask children to tell about their sketches in relation with motion in groups.</p> <p>Teacher will make a table on the blackboard.</p>			
<div style="border: 1px solid black; padding: 5px;"> <p>Motion due to water - Motion due to air - Motion due to heat - Motion due to machine - Motion due to gravitational force of the earth - Motion due to electricity -</p> </div>			Let the children know that motions differ from one another that they move towards various directions.
<p>It will be recorded what the children say in the above table. The teacher asks, if you see over all to motion how many kinds can be found in the main. Let the children think and discuss in groups and let them tell in groups. Children's answers:</p>	5		Record the children's answers
<div style="border: 1px solid black; height: 50px; width: 100%;"></div>			Let the children know that there are regular motion and irregular motion in the motion of objects.





**Assessment (Motion)**

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Does s/he take interest in the experiment?	Does s/he able to guess and find out answer from the experiment?	Is s/he able to carry out the experiment?	Is s/he able to distinguish the characteristic of force?
Is s/he motivated to perform the activities?	Is s/he able to relate force with motion from the activities?	Does s/he able to communicate in relation with that topic to the teacher and friends (Can s/he listen to others opinion, can s/he present her/his ideas clearly)?	Is s/he able to understand that we have to use force to make movements?
Does s/he like the experiments?	Is s/he able to relate force with changes in the shape of objects?	Does s/he able to make experiments with some instruments?	Is s/he able to understand that force can change the shape of objects?
	Is s/he able to relate the presence of gravitational force with the experiment?		Is s/he able to understand that the world of us has gravitational force?
	Is s/he able to relate force with changes in speed of objects?		Is s/he able to understand that force can change the speed of objects?

**Oral assessment/Group discussion**

1. What will you find if you push a static object?
2. What will you find if you pull a static object?
3. What will you find if you hold the two ends of a cloth and twist?
4. Hold and squeeze the foam with your hand by using a little force or too much force. What will happen to the foam? Why?
5. Hold the two ends of a rubber band with your hands and stretch it out using a little force or too much force. What will happen to the rubber band? Why?
6. Hold the two ends of a spring with your hands and stretch it out by using a little force or too much force. What will happen to the spring? Why?
7. Have you ever dropped or thrown out the things you hold in your hands. Where do these things go?
8. Hold the heavy object and light object and drop simultaneously. Where do these things go?
9. From the experiment, stretch out the two ends of the rubber band with force. Change this position to vertical position. In the vertical position, release one end of the rubber band and hang a heavy stone. What will happen to the rubber band because of that stone? Why do you think it happened like that?

According to question 1, 2, 3,  
When objects are pushed or pulled motion develops; let them think that the hand has to exert force to cause motion like that.

According to question 4, 5, 6  
Let them think that force can change the shape of objects by comparing shapes of foam, rubber band, and spring after a little force or too much force is applied with the original shape.

According to question 7, 8  
In dropping of things or throwing out of things and dropping simultaneously the heavy object and light object, let them know that all objects dropped below (or) on the ground.

According to question 9  
Ask them to study the shape of the rubber band when a heavy stone is hung in the vertical position. Let them know that the change in shape of the rubber band was due to the force of the stone. This force of stone is the pulling force of the earth to the stone. Let them think that this force is called the gravitational force of the earth.

10. From the experiment Force can move the objects.  
Can force change the speed of objects?

**Written assessment**

1. What are the types of forces?
2. Can the force change the shapes of objects?
3. Why do the objects and materials drop below?
4. Can force change the speed of objects?

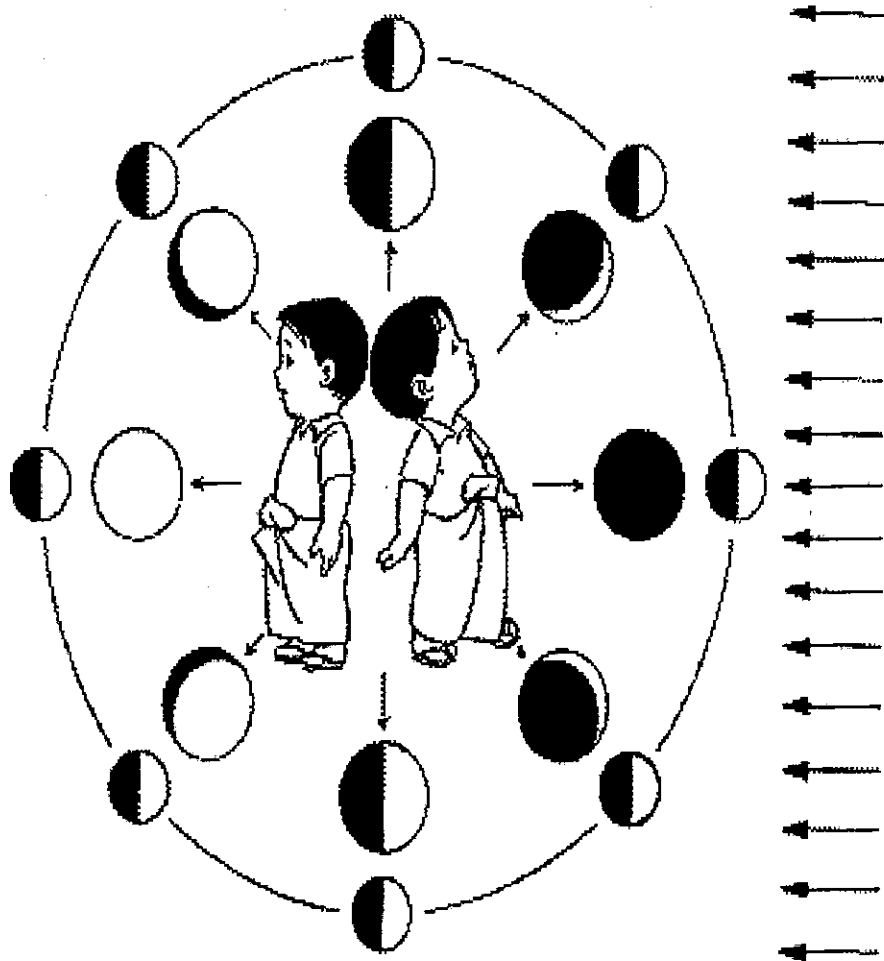
According to question 10

Depending on the extent of force it can change the speed of objects. Speed is the rate of movement of object.

1. The types of forces are pushing force, pulling force and twisting force.
2. Force can change the shape of objects. Depending on the extent of force, the changed shapes of objects are different.
3. Objects and materials drop below due to the gravitational force of the earth.
4. Force can change the speed of objects.

# Grade 4

## Chapter 4 The earth and space



**Topic 9: Weather**

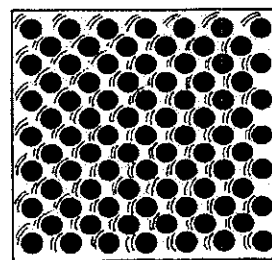
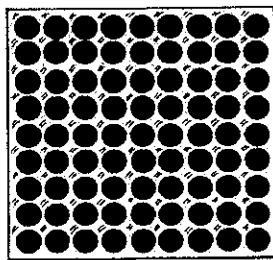
<p><b>1. Key concept</b></p>	<p>A thermometer measures temperature.</p>
<p><b>2. Learning objective</b></p>	<p>There are different temperatures and these may be measured.</p>
<p><b>General</b></p>	<p>1) Be able to know that temperature is measured with a thermometer. 2) Be able to know that different temperatures can be recorded as a graph.</p>
<p><b>Specific</b></p>	<p>1) Be able to read the temperature on the thermometer 2) Be able to explain that temperature changes day and night 3) Be able to explain how air gets warm 4) Be able to describe that temperatures are different in different places 5) Be able to make a graph showing temperatures and places 6) Be able to describe that temperatures are different in different counties</p>
<p><b>3. Activities involved</b></p>	<p>Learning(practicing) how to use a thermometer Measuring temperatures every 30 minutes Measuring temperatures at high and low places Making a diagram with temperatures in different regions in Myanmar Making a diagram with temperatures in different cities all over the world.</p>
<p><b>4. Activity purpose</b></p>	<p>To promote deeper understanding of key concepts To attract interests of children To stimulate imagination and creativity of children</p>

**Before Getting Started**

<p><b>Self-check list for Teachers</b></p>	<p><input type="checkbox"/> Do I know how to read a thermometer? <input type="checkbox"/> Do I know the difference between Celsius and Fahrenheit? <input type="checkbox"/> Do I know how sun gets air warm? <input type="checkbox"/> Do I know the general climate in Myanmar?</p>
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**Background information for teachers**

<p><b>Temperature</b></p>	<p>Temperature is the degree or intensity of heat of an object. Temperature is also the condition that determines whether it will transfer heat to another object or receive heat from it. Temperature is also defined as a measure of the average kinetic energy possessed by the atoms or molecules of which it is composed. Let us think about the atoms in 2 pieces of metal which are cold and hot.</p>
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**Celsius and Fahrenheit**

Celsius is the most common scale to show the temperature in our life. Fahrenheit is commonly used in some countries only. For example, the melting point of water is 0 Celsius and the boiling point is 100 Celsius. In Fahrenheit scale, the melting point of water is 32 Fahrenheit and the boiling point is 212 Fahrenheit.

Both show the degree of temperature and there is a formula to connect them. When you want to change Celsius to Fahrenheit, use

$$^{\circ}\text{F} = \left( \text{C}^{\circ} \times \frac{9}{5} \right) + 32$$

When you want to change Fahrenheit to Celsius, use

$$\text{C}^{\circ} = \left( \text{F} - 32 \right) \times \frac{5}{9}$$

Additionally, Kelvin is more commonly used in chemistry and physics. Transforming from Celsius to Kelvin is done by adding 273.15 to the degree of Celsius. Kelvin is in fact starting from absolute zero, which is 0 kelvin or -273.15 Celsius. At absolute zero, every material is the solid and not having any kinetic energy.

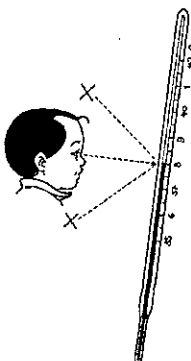
$$\text{Kelvin} = \text{C}^{\circ} + 273.15$$

**How does air get warmer?**

We can live because we can get heat and light from sun. Let us think how sun gets air warm. Do you agree that light and heat of sun get air warm while they are going through air? Or, do you agree that air is warmed by the ground which gets light and heat from sun? Both are right, but the latter case is much more influential.

From your experience, which do you feel hotter when you are on the paved (tarmac) road or you are on soil. You feel hotter on the paved road. This is because the paved road is easy to get hot by sun, therefore the air on the road is heated by the paved road. Have you seen a mirage? That happens due to light and heated air. Where have you seen the mirage? Was it on paved road or soil ground?

**What is inside thermometer?**



There are many kinds of thermometer. The most common one which we often see is a liquid-in-glass thermometer. You might have seen the thermometer which has silver or red color liquid inside. Silver liquid is mercury, which is metal. Red color liquid is ethanol (alcohol) with dye. Petroleum with dye is used as well. When liquids inside get heat, the liquids expand and lines of liquid get longer.

**Lesson Planner**

Suggested period (6)	Period 1	Period 2	Period 3	Period 4	Period 5 6
<b>Lesson topic</b>	Temperature	How the air gets warm	Different temperatures 1	Different temperatures 2	<b>Assessment/ review</b>
<b>Sample lesson plan</b>	9-1	9-2	9-3	9-4	
<b>Specific objective</b>	Be able to read the temperature on the thermometer.  Be able to explain that temperature changes day and night	Be able to explain how air gets warm.	Be able to describe that temperatures are different in different places  Be able to make a graph showing temperatures and places	Be able to describe that temperatures are different in different counties	
<b>Introduction (Motivation/Create interest/Active prior knowledge)</b>	Do you know your body temperature?	Do you know how sun gets air warm?	Where is the hottest and coldest area in Myanmar?	Remind the previous lesson	
<b>Core/Development (Active engagement with test/task)</b>	Activity 1& 2	Activity 3	Activity 4	Activity 5	
<b>Assessment points</b>	<b>Observation of activities:</b> Do they participate in learning activities? Do they get the meaning of experiment? Do they discuss well? Do they draw conclusion? Do they positively discover anything extra from experiments?	<b>Observation of activities:</b> Do they participate in learning activities? Do they get the meaning of experiment? Do they discuss well? Do they draw conclusion? Do they positively discover anything extra from experiments?	<b>Observation of activities:</b> Do they participate in learning activities? Do they get the meaning of experiment? Do they discuss well? Do they draw conclusion? Do they positively discover anything extra from experiments?	<b>Observation of activities:</b> Do they participate in learning activities? Do they get the meaning of experiment? Do they discuss well? Do they draw conclusion? Do they positively discover anything extra from experiments?	
<b>Adaptation of curriculum</b>					

**Activity 1 Practice measuring temperature with a thermometer**

**Teaching/learning material**

Thermometer, glass, hot water and water

**Concept** Temperature can be measured with a thermometer.

Let us practice how to measure temperature with a thermometer.

- 1) Put hot water and cold water in two cups respectively
- 2) Carefully put thermometer in the hot water and wait until inside line of thermometer stops moving.
- 3) Read the measure (temperature) on the thermometer
- 4) Put the thermometer in the water and wait until the line inside thermometer stops
- 5) Read the temperature
- 6) Mix both water, put thermometer and until the inside line of thermometer stops
- 7) Read the temperature



**Activity 2 Measure temperatures at different places**

**Teaching/learning material**

Thermometer

**Concept** Temperatures are different from place to place and they change in a day

Let us periodically measure temperatures inside and outside.

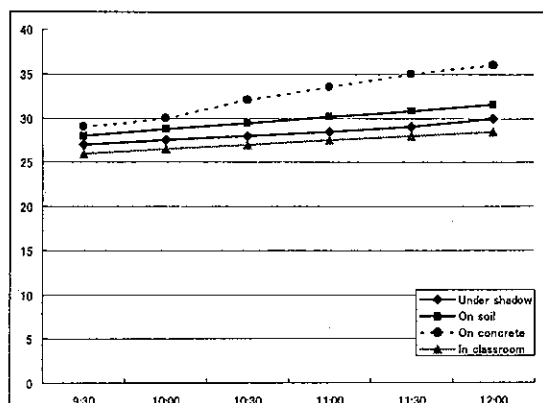
Teacher can draw the table below on the black board.

Place		9:30	10:00	10:30	11:00	11:30	12:00
<b>Outside</b>	Under shadow						
	On the soil (under sun)						
	On the pave/concrete (under sun)						
<b>Inside</b>	in the class room						

Encourage children to predict where and when will be hottest and coldest as well.

Do not forget to tell children to keep the thermometer about 1 m high from ground and wait several minutes until inside line of thermometer stops moving.

When it is difficult to start at 9:30, teacher can change the starting time and even periods. After filling in the table, let us try to make a chart below if possible. By making a diagram, we can easily see how the temperatures change.





**Activity 3 Measuring temperatures at different places 2 (how the air gets warm)**

**Teaching/learning material**

2 thermometers, bamboo(2m long)

**Concept** Air is warmed by ground that is warmed by sun.

This activity is to understand how air is warmed by measuring temperatures at different heights. Please refer to “Before getting started” in this topic. This activity better be done when weather is clear and sun shines.

To prepare this activity is very easy. We fix one thermometer at the 30cm from the end of bamboo and fix the other thermometer at the other end.

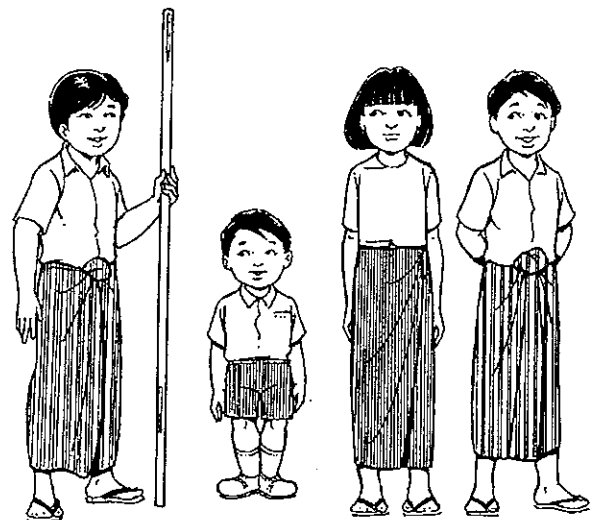
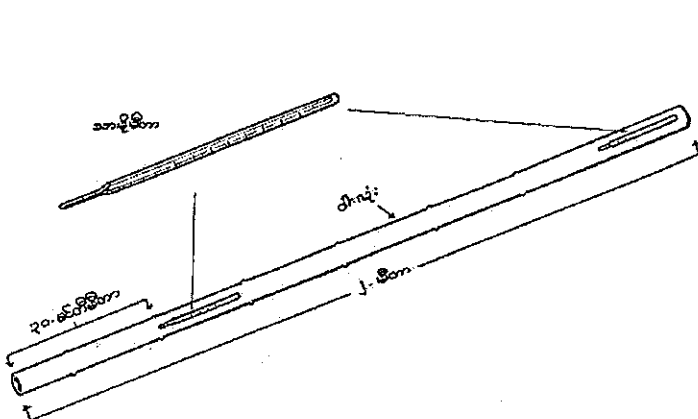
We take temperatures at 3 outside places. Those are “under shadow”, “on the soil/grass (under sunlight)” and “on the pave/concrete (under sunlight)”.

Place		High (1.7-2m)	Low(30 cm)
Outside	Under shadow		
	On the soil (under sun)		
	On the pave/concrete (under sun)		

Before putting this activity into practice, children predict which place is hottest and coldest. And also, encourage children to address why they think so.

After putting this activity into practice, teacher may ask some questions to children.

1. Why temperature at high place is lower than one at low place, although the high place is closer to sun?
2. Why temperature on the concrete is higher than soil?



**Activity 4 Temperatures at different areas in Myanmar**

**Teaching/learning material**

Newspaper, Radio, TV etc.

**Concept** Temperature can be different at different areas in Myanmar

This activity is for children to understand temperatures of various areas can be very different even the same time.

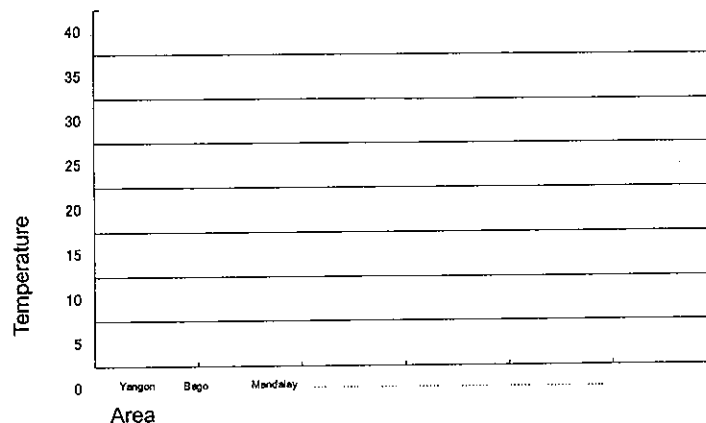
There are several medias to get the information of temperatures, such as newspaper, radio weather forecast and television weather forecast. Easy one could be newspaper or radio. If the information was not available, use the data below.

Place	Temp	Place	Temp
Myitkyina	27.8	Magway	30.7
Loikaw	26.1	Mandalay	31.4
Hpa-an	29.4	Mawlamyine	28.6
Falam	21.0	Sittwe	28.7
Monywa	31.5	Yangon	29.5
Dawei	28.0	Taunggyi	25.3
Bago	28.9	Patheingyi	30.0



\* data source: Statistical Yearbook 2001, Average temperature in May

Teacher draws the rough map of Myanmar and put the temperature at proper areas/cities. Then, try to plot the temperatures on the graph below



**Activity 5 Temperatures at different areas over the world**

**Teaching/learning material**

Newspaper, Radio, TV etc.

**Concept** Temperature can be different at different countries over the world.

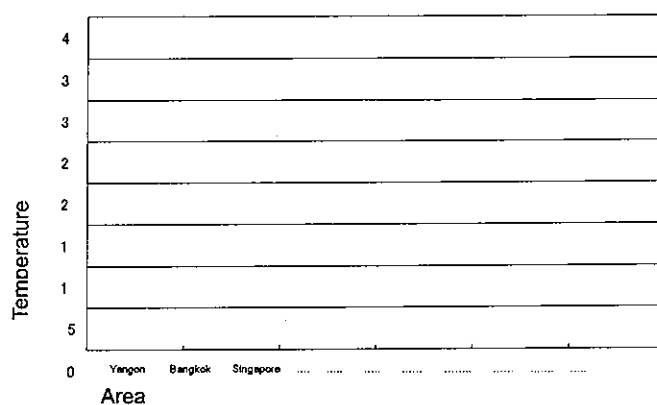
This activity is for children to understand temperatures of various countries can be very different even the same day and same time.

There are several medias to get the information of temperatures, such as newspaper, radio weather forecast and television weather forecast. Easy one could be newspaper or radio. If the information is not available, use the data below.

Place	Temp.	Place	Temp.
Myanmar (Yangon)	34	U.S.A (Washington D.C.)	9
Thai (Bangkok)	34	UK (London)	11
Singapore	31	France (Paris)	10
India (New Delhi)	29	Germany (Berlin)	9
China (Peking)	8	Italy (Rome)	16
Japan (Tokyo)	19	Kenya (Nairobi)	27
Philippines (Manila)	31	South Africa (Johannesburg)	25
Malaysia (K.Lampur)	33	Brazil (Sao Paulo)	25
Viet num (Hanoi)	29	Argentina (Buenos Aires)	28
Australia (Canberra)	27	Mexico (Mexico city)	24

Weather Forecast for 8<sup>th</sup> of November, 2003 (Source: Weather asahi.com)

Then, try to plot the temperatures on the graph below



**Lesson Plan 9-1**

Lesson topic           Temperatures at different places  
 Learning objectives   Be able to read the temperature on the thermometer.  
                               Be able to explain that temperature changes day and night  
 Teaching/learning     3 cups, water, hot water, thermometer  
 materials  
 Teaching period       70 minutes (2 period)  
 Teaching/Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Points to be noticed
<p style="text-align: center;"><b>Introduction</b></p> <p>Teacher discusses the following questions with children.                      How is the weather today?                      Is it hot or cold?                      How was yesterday?                      Which do you like a cold day or a hot day?                      Which is hotter, day or night?                      Which is hotter, morning or afternoon?                      Have you ever been sick?                      If you have fever what would you do?                      How do you measure your fever?                      Can you read the thermometer?                      Do you know the normal temperature of a man?</p>	5		<p>Record the children's answers on the blackboard.</p> <p>The normal temperature of a man is 37 C° / 98.6 °F.</p>
<p style="text-align: center;"><b>Core or Development</b></p> <p><b>Activity A (refer to Activity 1)</b>                      Teacher distributes three cups and one thermometer each to every group.</p> <p>Put water into the first cup and measure its temperature.                      Children read by themselves.                      Put warm water into the second cup and let them measure it.                      Put hot water into the third cup and let them measure it.                      After reading the temperature from the three cups, let them write down in their notebooks.                      Teacher observes whether they can read it correctly or not?                      If they cannot read correctly, teacher may teach them precisely again.</p>	15		<p>Tell the children to hold the thermometer carefully because it can be broken easily; not to play with these thermometers as well as not to hit them; to keep the reader's eyes straightly to the numbers when reading it; not to see either from the above or below.</p> <p>When you handle the thermometer you should not hold from the bottom where there is mercury, you should hold firmly from the top.                      Teacher has to put cold water, warm water and hot water</p>

Learning Activities	Time	Teaching/ Learning Materials	Points to be noticed
<p><b>Activity B (refer to Activity 2)</b> This activity is to periodically measure temperatures at 4 places, such as under shadow, on the soil (under sun), on the concrete (under sun) and inside of classroom.</p> <p>Teacher can draw the table shown “Activity 2” Children predict of which place temperature will be higher and how temperatures change as time goes.</p> <p>Teacher allocates work for children in groups. Group 1 and 2 for <i>under shadow (outside)</i> Group 3 and 4 for <i>on the soil (under sun)</i> Group 5 and 6 for <i>on the concrete (under sun)</i> Group 7 and 8 for <i>inside of classroom</i></p> <p>After measuring temperatures, let us fill in the table and see which place is the hottest and how those temperatures have changed as time goes.</p> <p>It is also highly recommended to draw a graph which makes us easily understand the hottest/lowest places and their changes with time.</p> <p style="text-align: center;"><b>Conclusion</b></p> <p>After getting the result, encourage children to talk about their findings from the table or graph. Any finding could be appreciated. The main point in this lesson is that <b>temperatures are different at various places and temperatures change as time goes.</b></p>	<p>15</p> <p>10</p> <p>15</p> <p>10</p>		<p>It is good to do this activity when weather is very clear.</p> <p>After prediction let children try out by themselves.</p> <p>To measure temperature, let us hold the higher point of thermometer and keep it as high as 1 m from the ground/floor. It is better to wait for 3 minutes.</p> <p>This activity takes an half day, but it is very important for children to measure and see how temperature changes.</p> <p>If it is difficult to measure every 30 minutes. Let us do it every hour.</p>

Place		9:30	10:00	10:30	11:00	11:30	12:00
Outside	Under shadow						
	On the soil (under sun)						
	On the pave/concrete (under sun)						
Inside	in the class room						

**Lesson Plan 9-2**

Lesson topic           How air gets warm  
 Learning objectives   Be able to explain how air gets warm  
 Teaching/learning materials   Bamboo (longer than 2 m), 2 thermometers, rubber bands  
 Teaching period       35 minutes  
 Teaching/Learning procedure

Learning Activities	Time	Teaching/Learning Materials	Points to be noticed
<p style="text-align: center;"><b>Introduction</b></p> <p>You have known that sun is very important for us to live. Have you ever thought that how the sun gets the air warm? Okay, many good ideas! Let us check which one is good.</p> <p>Today's lesson is to study how sun gets the air warm.</p> <p style="text-align: center;"><b>Development</b></p> <p>In order to check how the air gets warm, we need to use thermometer again to measure temperatures at different height.</p> <p><b>Activity A (refer to Activity 3)</b>                      This activity is to measure temperatures at 30cm and 170 cm above ground at 4 different places.</p> <p>Teacher distributes a bamboo of 2 meter long, two thermometers and some rubber bands to every group. Teacher asks them to tie each thermometer at the top and 30 cm from the bottom of the bamboo with rubber bands as shown in Activity 3.</p> <p>Teacher also draws the table shown in Activity 3 on the black board. Teacher may assign or children can select the place to take temperatures.</p> <p>Children proceed to the selected place with 2 thermometers on the bamboo to measure temperature and come back with the result to fill in the table.</p> <p>After filling in the table, let us see it and talk about findings. Ask children why lower places have higher temperatures, etc.</p> <p style="text-align: center;"><b>Conclusion</b></p> <p>By looking at the table, let us conclude the lesson that the air is warmed by the ground which becomes hot due to sun.</p>	<p>10</p> <p>10</p> <p>10</p> <p>5</p>	<p>Bamboo ,                      thermometer,                      Rubber band</p>	<p>Encourage children to speak out their ideas. Let us list up their ideas on the black board.</p> <p>Give them enough time to think about it with their experiences.  <i>Most of children think air gets warm since sun lights go through air.</i></p> <p>This activity needs to be done when weather is clear.</p> <p>Ask children to handle thermometers with care since they are very easy to break.</p> <p>Children can select places but make sure that 4 places are covered anyhow. Teacher tells children to keep the stand and wait for 5 minutes to get more accurate temperatures.</p> <p><b>Lower places have higher temperatures.</b> What does this mean? This means the ground become hot due to sun first and the hot ground can warm the air. For example, some times we can not walk on the marbles or stones at pagodas since they are too hot. Can you touch the body of the car which is exposed under sun for several hours?</p>

**Lesson Plan 9-3**

Lesson topic Different temperatures at different areas in Myanmar  
 Learning objectives Be able to describe that temperatures are different in different places  
 Be able to make a graph showing temperatures and places  
 Teaching/learning materials Newspaper/radio, Illustration of the map of Myanmar  
 Teaching period 35 minutes  
 Teaching/Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Points to be noticed
<p style="text-align: center;"><b>Introduction</b></p> <p>Teacher asks children which area is the hottest and coldest in Myanmar.</p> <p>Today's lesson is about to see different temperatures at various regions in Myanmar. By the way, if you want to know temperatures in Myanmar, what would you do? Where can you get those information?</p>	5		<p>It is expected that children say many places they know as hot and cold places.</p> <p>List up what children say as hot places and cold places.</p>
<p style="text-align: center;"><b>Development</b></p> <p>Let us use newspaper as information source. Teacher can show the newspaper which shows temperatures of various areas in Myanmar.</p> <p><b>Activity A (refer to Activity 4)</b>                      Let us make a table which shows names of places in Myanmar and temperatures of today (or certain day).</p> <p>Give newspaper to children and encourage them to read the temperatures in various areas. Then, teacher fills in the table on the black board. After filling in the table, let us discuss</p> <ol style="list-style-type: none"> <li>1. Which regions are higher in temperature?</li> <li>2. Which regions are lower in temperature?</li> <li>3. Why the temperature is higher or lower?</li> </ol>	10		<p>Children may answer "TV", "Radio", "newspaper" etc.</p> <p>Teacher draws the blank table on the blackboard.</p> <p>Children copy the table on their notebook.</p>
<p>If teacher can draw the rough map of Myanmar on the blackboard, let us write the temperatures on the map. Let us make a graph on the blackboard as well.</p>	10		<p>If teacher can draw the map in the big paper before the lesson, that would be better and save time. It is not necessary to draw a very exact or beautiful map at all.</p>
<p style="text-align: center;"><b>Conclusion</b></p> <p>Let us see the table and map (and the graph) and realize that there are differences in temperatures even in the same day.</p>	10		<p>Temperatures are subject to altitudes, weather, geographical features and other factors.</p>

**Lesson Plan 9-4 (additional lesson to lesson plan 9-3)**

Lesson topic Different temperatures at different areas over the world  
 Learning objectives Be able to explain that temperatures are different in different countries  
 Teaching/learning materials Newspaper/radio, globe  
 Teaching period 35 minutes  
 Teaching/Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Points to be noticed
<p align="center"><b>Introduction</b></p> <p>Do you remember the last lesson about the temperatures at various places? Today, we will see the temperatures in different countries.</p>	5		
<p align="center"><b>Development</b></p> <p><b>Activity A (refer to Activity 5)</b>                      If you have newspaper or information booklet which show temperatures in different countries, let us use it as information source. But if you do not have it, let us use temperatures shown in Activity 5.                      Children should also check the location of cities.</p>	10		<p>Children copy the table on their notebook.</p>
<p>Teacher draws the blank table on the blackboard and fills temperatures of various countries in the table.</p>	10		<p>Let us show temperatures of countries around Myanmar and countries far from Myanmar as well.</p>
<p>After finishing, encourage children to observe the table and speak out their findings. Teacher can show the globe and the rough position of those countries. It is good for children to notice that countries closer to equator have higher temperatures.</p>			<p>Appreciate any ideas and opinions from children.</p>
<p>After that, let us make a graph showing the country and its temperature. By looking at the graph, children can more clearly see the differences of temperatures among countries.</p>	5		<p>Bar graph is more recommended than line graph in this case.</p>
<p align="center"><b>Conclusion</b></p> <p>Let us see the table and graph. Children are expected to realize that there are differences in temperatures among countries over the world.</p>	5		



**Assessment**

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Is s/he interested in thermometer?	Can s/he think that hotness and coldness are shown with numbers as temperature?	Can s/he measure the different temperatures with the thermometer?	Does s/he understand the thermometer shows the temperature?
Is s/he motivated in doing activities?		Can s/he observe and record properly?	Does s/he understand that temperature changes day and night?
Is s/he interested in measuring temperature?	Can s/he think why inside line of thermometer become longer and shorter?	Can s/he catch how temperature changes from the graph?	Does s/he understand how air gets warm due to sun?
Is s/he interested in thinking how sun gets air warm?	Can s/he think the sun warms air of the earth?	Is s/he able to communicate with teacher and friends?	Does s/he understand different temperatures can be observed in different places?
	Can s/he think of the meaning of graphs?		

**Oral Assessment/Group Discussion**

1. What is the thermometer for?
2. Mentions important things when you measure temperature with a thermometer.
3. Why thermometer can show the temperature?
4. What is your findings and observations through the activity (measuring temperatures every 30 minutes at various places)
5. Explain why the lower place is hotter than higher places especially under the sunlight.
6. Explain how air gets warm during day time.
7. Did you hear/read the weather forecast from any media? If yes, mention information you got from it.

**Written assessment**

1. By which instrument can the temperature be measured?
2. Explain why temperature is low in the morning and it is high in the noon.
3. Explain why temperature is higher on the paved/concrete ground than on the soil/grass.
4. Draw the graph with the information
5. What do you find in the graph you draw?

**Message to Teachers**

It may be good to give some very simple question like "What do you use when you want to measure temperature?" or "By which instrument can the temperature be measured?" 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.

<b>Topic 10: Erosion</b>	
<b>1. Key concept</b>	Erosion influences landscape and our life
<b>2. Learning objective</b>	
<b>General Objective</b>	To Be able to describe that soil erosion occurs due to the running water and wind
<b>Specific Objectives</b>	1) To be able to tell how erosion looks like 2) To be able to show where we can find erosion 3) To be able to tell type of erosion (by wind and by water) 4) To be able to explain how erosion starts and how to avoid
<b>3. Activities involved</b>	Excursion Discussion Story telling with charts
<b>4. Activity purpose</b>	To let children aware for reality of Erosion

<b>Before Getting Started</b>	
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<b>Self-check list for Teachers</b>	<input type="checkbox"/> Do you find some place to show effect of erosion for children? <input type="checkbox"/> Can you explain how erosion affects our life?
<b>Background information for teachers</b>	
<b>What is soil erosion</b>	<p>Since there are several different definitions of erosion, we will first clarify what we mean by erosion here. .</p> <p>There are really two types of erosion, natural and accelerated erosion, also called man-made erosion.</p> <p>Natural erosion is going on all the time; the weathering of mountains, hills etc. caused by the influences of nature.</p> <p>New landscapes are formed, but the process is very slow.</p> <p>'Man-made erosion occurs when people cause the soil to become susceptible to be carried away by rain or wind.</p> <p>Cutting trees and burning vegetation are examples of practices that destroy the natural protection of the soil.</p> <p>This book is about man-made water erosion.</p> <p>Another important factor is soil degradation that is the decline of soil as a consequence of people using the land.</p> <p>Soil degradation and erosion overlap. Soil degradation is a wider term, erosion being but one form soil degradation, others are: pollution, salination, etc.</p>

**River At Work**

Many rivers start in hills and mountains as small, fast-flowing streams. As the water rushes downhill, it cuts deep valleys through the land. In the middle part of a river, the water flows more slowly in a wide, flat valley. The river curves from side to side in loops called meanders. Where it meets the sea, a river drops, or deposits, the mud and soil it carries and may build up a flat tongue of land called a delta.

The flow of rivers power to change the shape of the land. But water on its own is not strong enough to wear land away. It is all the boulders, pebbles and grains of sand carried along by the water that give a river its cutting force. Sometimes, however, swirling water may split rocks apart by forcing air into cracks in the rock. Some rocks may also be eaten away by chemicals carried in water.

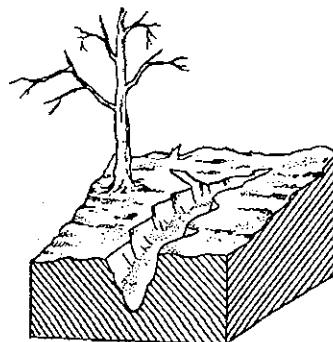
**The seriousness of the Erosion problem**

Every minute, an estimated 10 hectares of agricultural land is lost throughout the world. In some areas, very little occurs, in others than 200 tons of soil disappears every year, from 1 hectare (20 lorry loads!). On average about 50 tons of soil per hectare is each year. The soil lost is the top layer, which is the most fertile part soil.

It seems that the seriousness of the erosion problem can be measured amount of soil lost from one hectare. This is not always so simple. Especially in hilly areas the depth of the fertile topsoil may vary considerably from one place to another within short distances. There is no cause for alarm if the depth of soil is a few meters, but if there are only a few centimeters before reaching the subsoil or bare rocks. It can be concluded that the seriousness of the erosion problem differs not only on a wide scale, but locally as well. For two farmers living on the same mountain slope, the situation may be quite different.

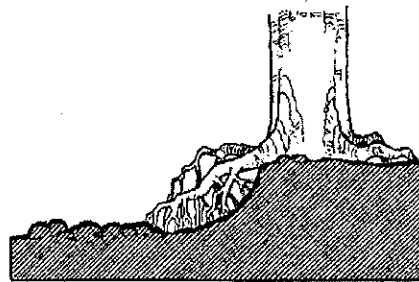
**Symptoms of erosion  
Gullies**

Gullies are deep fissures occurring in the soil and being caused by large quantities of water that have to be transported in a short time. Gullies are sometimes many meters deep.



**Rills** Rills are fissures in the soil, which resemble a small gully (to about 30 cm deep). A rill may run into a gully. A system is formed which tends to expand in an upslope direction.

**Exposed root system** Root systems of plants have the ability to retain soil. In trees, the fine ramifications of the root system are important for this. If the topsoil layer is washed away, then the roots are exposed. Thus for annual crops we can determine roughly how much soil is washed away in a growing season



**Pedestal** Pedestals are seen when soil under grass clumps, roots and small stones is staying in place while the soil in between is washed away. Stones and the like protect the soil against the erosive force of the, rainfall and eventually come to lie on a little mound of soil (see Figure 3). Pedestals are particularly found under the drip area of leaves (mainly trees).



**Stones on the surface** If a whole layer of soil is washed away stones will often remain behind. The force of the water is not strong enough to carry the stones away. The finer particles are removed. If the soil is very shallow, bare bedrock may become exposed; the loose soil is washed away.

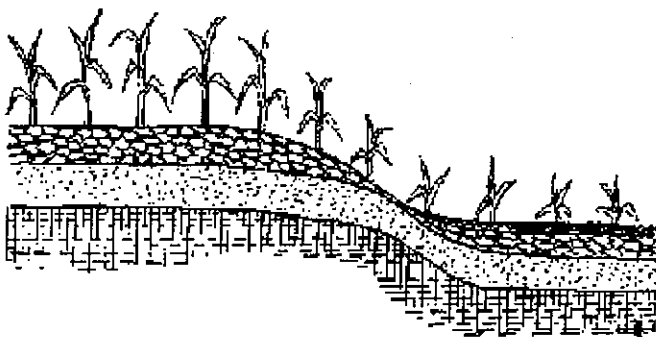
**Landslides** In areas with steep slopes. Landslides may occur, for example along cattle tracks. For various reasons the stability of a soil can be lost and a large amount of soil slides down the slope. The phenomenon can be observed too if the walls of a gully are undermined by the water stream.

In road building too, steep side slopes often collapse in heavy rainfall.

The above examples all indicate that soil displacement has taken place and this is not always easy to see. Irregularities such as rills can be straightened out with the plough, and the crop hides a lot too. Throughout the seasons different characteristics will catch the eye too.

**Layer of soil** A fine layer of soil is often noticed in the lower lying parts of the field. This has been deposited by water, which flows more slowly or has stopped flowing altogether. This can be observed too in irrigation furrows and is almost certain to have come from the field in question.

It is a sign that a form of erosion is going on in which as yet no great quantity of soil is being transported over a long distance. Erosion is probably still in a preliminary stage. Yet, this fine layer of soil material may be 10 to 30 centimeters deep in places and may cover the emerging crop over dozens of square meters.



**Lesson Planner**

<b>Suggested periods (11)</b>	<b>Period 1</b>	<b>Period 2</b>	<b>Period 5</b>
<b>Lesson topic</b>	Soil Erosion 1	Soil Erosion 2	Causes of erosion 1
<b>Sample lesson plan</b>	10-1	10-1	10-2
<b>Specific objective</b>	To be able to tell how erosion looks like	To be able to show where we can find erosion	To be able to tell type of erosion (by wind and by water)
<b>Introduction (Motivation/Create interest/Active knowledge)</b> <b>prior</b>	Recall the children's prior knowledge from their closet surrounding or their past experiences and link them with the lesson.	—	Giving children some important messages for how to work on these activities
<b>Core/Development (Active engagement with test/task)</b>	Observing some given picture to get the ideas. Then discuss it. Predict the causes of why the soil structure of riverbank is changed?	Experiment on running water carry some soil. Compare the findings from the experiment and the given pictures. Q&A	Experiment on running water carry soil, in the same way wind carry soil.
<b>Assessment points</b>	Do they participate in the learning processes such as experimenting their ideas, observing and discussing with each other, and giving prediction of their thought? Do they notice the loss of soil from its original form? Do they get aware of soil erosion?	Do they participate in the learning processes such as doing the experiment, thinking and sharing their findings and communicating with each other? Do they know or understand running water carry soil along with them?	Do they participate in the learning processes such as doing the experiment, thinking and sharing their findings and communicating with each other? Do they understand running water carry soil along with them? Do they understand wind carry soil along with them?
<b>Adaptation of curriculum</b>	We can use the other activities, which can easily be seen by children that running water and wind carry soil away from its original form.		

**Lesson Planner**

Suggested periods	Period 6	Period 7	Period 8 and 9	Period 3 4 10 11
<b>Lesson topic</b>	Causes of erosion 2	Erosion can be prevented	Extra Activity	<b>Assessment/ Review</b>
<b>Sample lesson plan</b>	10-3	10-4		
<b>Specific objective</b>	To be able to explain how erosion starts	To be able to explain how erosion can be prevented	To be able to explain how erosion starts	
<b>Introduction (Motivation/Create interest/Active prior knowledge)</b>	Recall the prior knowledge form the previous 3 periods	Giving children some important messages for how to work on these activities	Recall the prior knowledge form the previous periods	
<b>Core/Development (Active engagement with test/task)</b>	Presenting their findings to the class. Discussion on the findings. Observing and discussing on some given picture of deserts.	Experiment on spraying water to the mound of soil with some sticks Activity 5+6. Observe and discuss how it differ from the activity 1 (Spraying water to the mound of soil) Present the findings	Excursion Activity 3	
<b>Assessment points</b>	Do they participate in the learning processes such as presenting their findings, expressing their ideas, and discussing with each other? Do they understand the causes of soil erosion are running water and wind	Do they participate in the learning processes such as doing the experiment, thinking and sharing their findings and expressing their ideas? Do they understand how erosion can be prevented?	Do they participate in the learning processes such as doing the experiment, thinking and sharing their findings and expressing their ideas?	
<b>Adaptation of curriculum</b>	We can use the other activities, which can easily be seen by children that running water and wind carry soil away from its original form.			

**Activity 1 How erosion happens**

**Teaching/learning material**

Soil, Watering can(water hose), (Box if you practice in classroom),  
small leaves

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**Concept**      Running water can cause soil erosion

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Teacher prepares to make a mound of soil.

Teacher ask children

‘What will happen if I spray water?’

Children answer their prediction.

Teacher asks,

‘If I spray much water or little water, is there any differences?’

Teacher writes following answer on the board.

1. No difference
2. Little water goes faster and remove more soil
3. Little water goes faster and remove less soil
4. Much water goes faster and remove more soil
5. Much water goes faster and remove less soil

Children can choose answer and raise their hands, when teacher asks.

Teacher demonstrates to put leaves on soil (leaves can show how fast water runs clearly) and spray water on first a little water and next much water on the mound.

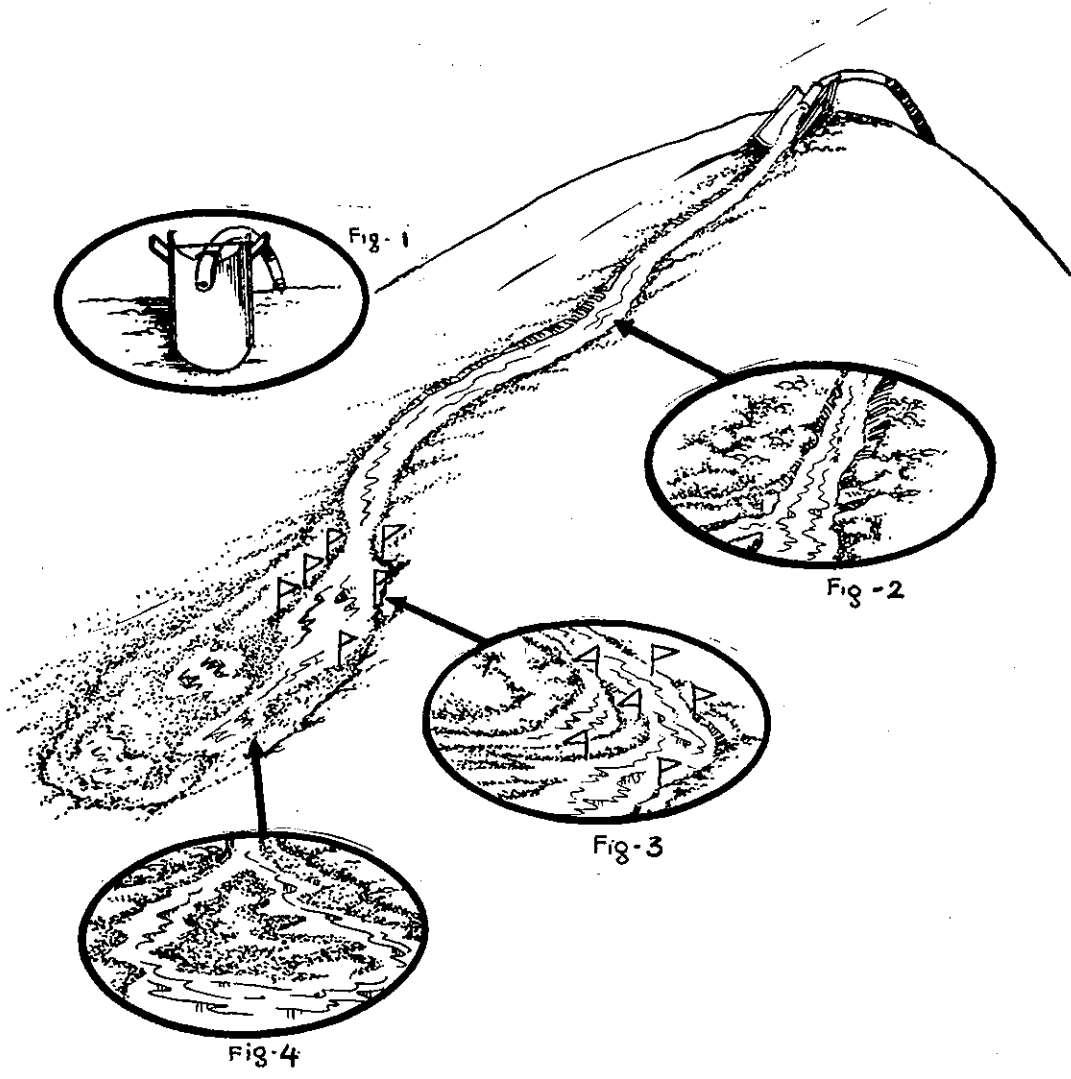
Teacher tells children,

‘Watch carefully to see how the water finds the quickest way down the slope and how much sand and gravel it carries.’

After observation the Teacher tells children,

‘The phenomenon in which soil is removed by water called erosion (soil erosion) in nature.’





**Activity 2 Type of soil erosion**

**Teaching/learning material**

Books, Pictures and etc to show type of soil erosion

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**Concept** Naturally erosion is caused various reasons

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Teacher tells children,

‘The phenomenon in which soil is removed by water called erosion (soil erosion) in nature.’

‘Soil erosion can be caused by wind and heat as well’.

If possible show children the photo of deserts.

**Activity 3 Field excursion: Seeing erosion in real field**

**PREPARATION BEFORE THIS LESSON**

Teacher must check the place (should not be very far from school) where children can observe soil erosion. As the same time, teacher must notice various safety codes for excursion to avoid accidents. It is recommended to take children under supervision of more adults, so if other teachers are not available ask some of parents to join the trip.

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**Concept**      Naturally erosion is seen and it is common problem

---

**In the classroom**

Teacher tells children to go out to the field to see erosion.

Teacher must tell children safety codes rules, and children must learn by heart.

‘Do walk in the queue’

‘Do not go farther than what teacher said’

‘Do not touch the thing more than teacher asks’

‘Listen to teacher any case’

Etc.

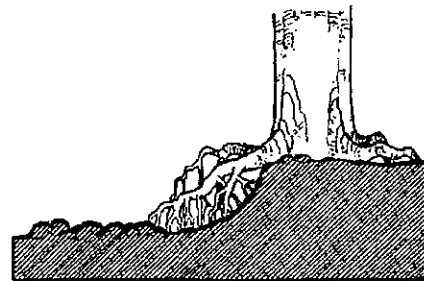
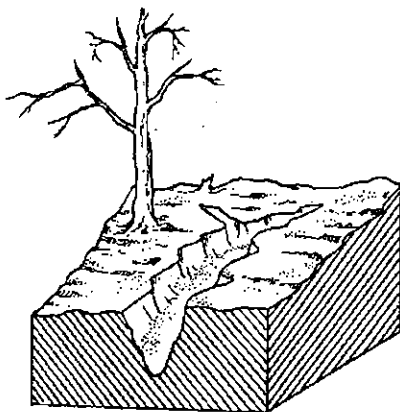
If children agreed on the rule, go out and see the erosion.

**In the field**

Teacher shows erosion points and asks children to think how it happened.

Teacher has to lead children to experience with previous lessons.

Lesson to Teacher in any cases.



**Activity 4 'How erosion can happen'**

**Teaching/learning material**

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**Concept**      Erosion will happen when top soil is removed

---

Teacher and children conduct 'role play' to see how erosion occurs.

1. Teacher asks 10 children from each group to come out in front of the class and line up in pairs to form about 5 pairs.
2. Then let three children queue up holding one's loin by another.
3. Teacher tells the children pairs in the queue that they have to role-play as soil and tell the remaining three children to act as the flow of water.
4. Let the queue of three children rush through the pairs of children in the line.

Teacher asks children

"What has happened?"

Teacher tells children that just like the same manner, topsoil is lost due to the flow of water.

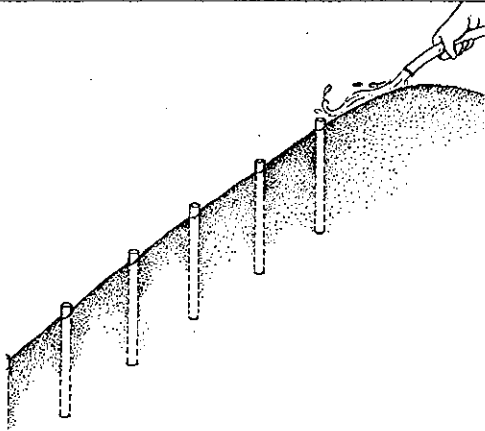
This is typically seen as 'Erosion'. If the topsoil is eroded, natural state will be changed or damaged with the possible loss of topsoil.

**Activity 5 How erosion happens and prevent**

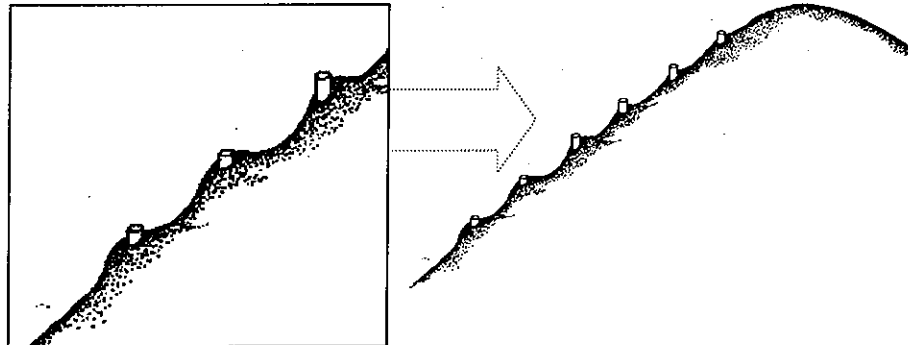
**Teaching/learning material**

Soil, Watering can, Box (if you practice in classroom), some small wooden sticks (length about 4inch)

**Concept** Running water can cause soil erosion, but something to prevent erosion



Teacher prepares to make a mound of soil and take some sticks drawing a line across each stick 1 inch from one end. Teacher places in the soil so that only 1inch of each stick can be seen.



Teacher ask children

‘What will happen if I spray water?’  
Children answer their prediction.

Teacher asks children  
‘Do you remember the Activity1 experiment?’  
Is wooden stick with and without make difference, if I spray much water?’

Teacher writes following answer on the board.

1. No difference
2. With wooden stick more soil is removed
3. With wooden stick less soil is removed

Children can choose answer and raise their hands, when teacher asks.

Teacher demonstrates to spray water on the soil  
Teacher asks children what they have seen.

**Activity 6 Discussion :How erosion happens and prevent**

**Teaching/learning material**

Paper

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**Concept**      Running water can cause soil erosion, but something to prevent erosion

---

After **Activity 5**, Teacher can bring the discussion how to prevent 'Erosion'.  
In Activity 5, children see with sticks, less erosion can happen.

Teacher asks children,

'In nature, what will play role as 'sticks' to prevent erosion?'

(Expected answer; sticks, trees)

Teacher tells

'In nature, trees plays most important role for prevention of erosion. As you see in Activity 5, if sticks are there less eroded.'

Teacher can focus the importance of forest; if possible they can read a book about for that.

**Activity 7 Extreme Erosion**

**Teaching/learning material**

Picture(Grand Canyon, Desert tombstone)

**Concept**

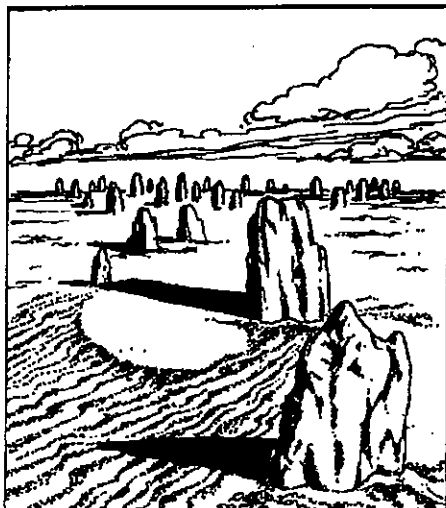
How erosion looks like in extreme cases (in deserts and in Grand Canyon)

Over millions of years, the Colorado River in Arizona, the United States, has carved out a huge channel called the Grand Canyon. (Erosion by river flowing Chart 1)



Grand Canyon

This field of sand-blasted rock pinnacles is in the Nambung National Park in Australia. The wind has worn down the outer layer of rock, leaving only columns and plinths of harder material. The effect is one of a silent, scorching graveyard. (Erosion by wind Chart 2)



Desert Tombstone

**Activity 8 Soil erosion is seen commonly**

Teaching/learning material: Charts 1,2,3,4

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Concept                      Soil erosion is seen commonly

---

Go round to show the picture 1, 2, and 3 one after another to the children group.

Have the children think why the soil structure of the riverbank has changed as in the order of picture 1, 2, 3.and 4.

Let them discuss.

Then, make the children choose the most correct one among the following reasons.

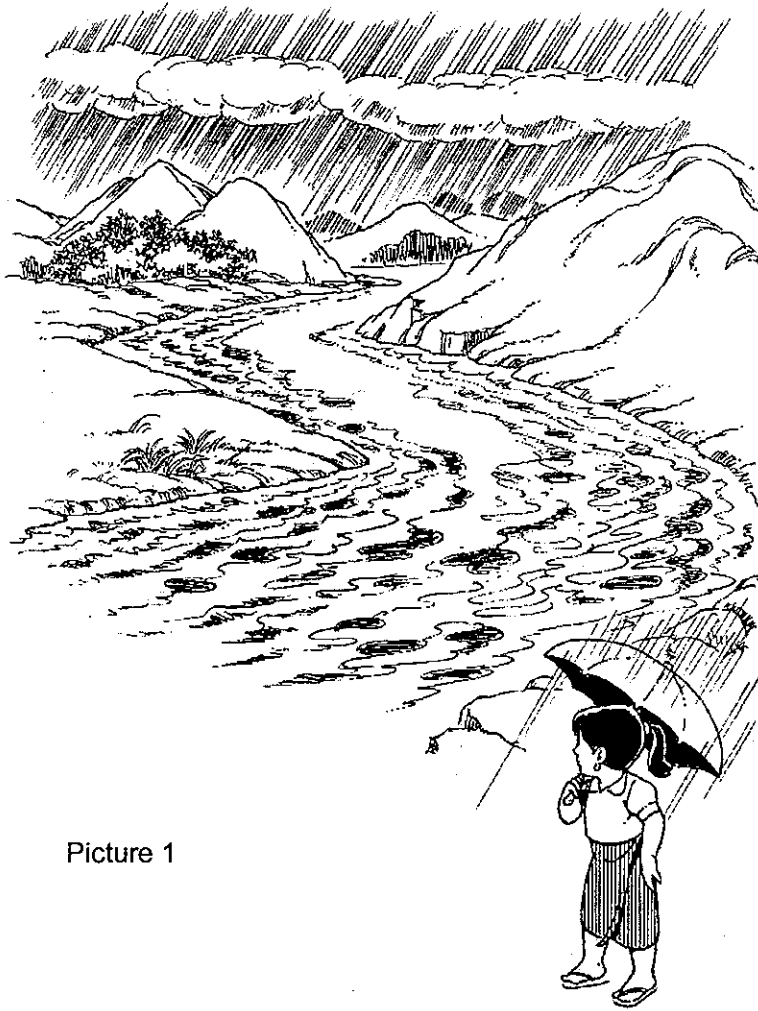
The changes of soil structure/soil losses of the riverbank is due to:

The ground

The running water

Other causes

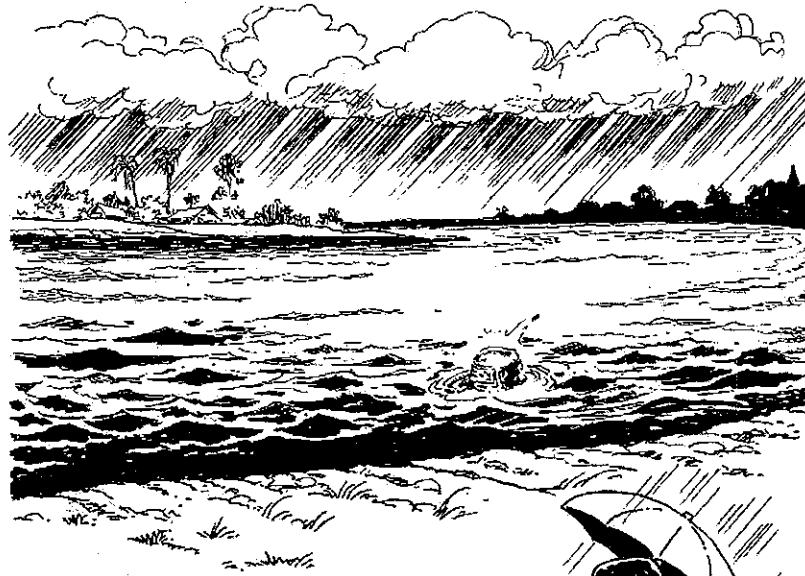




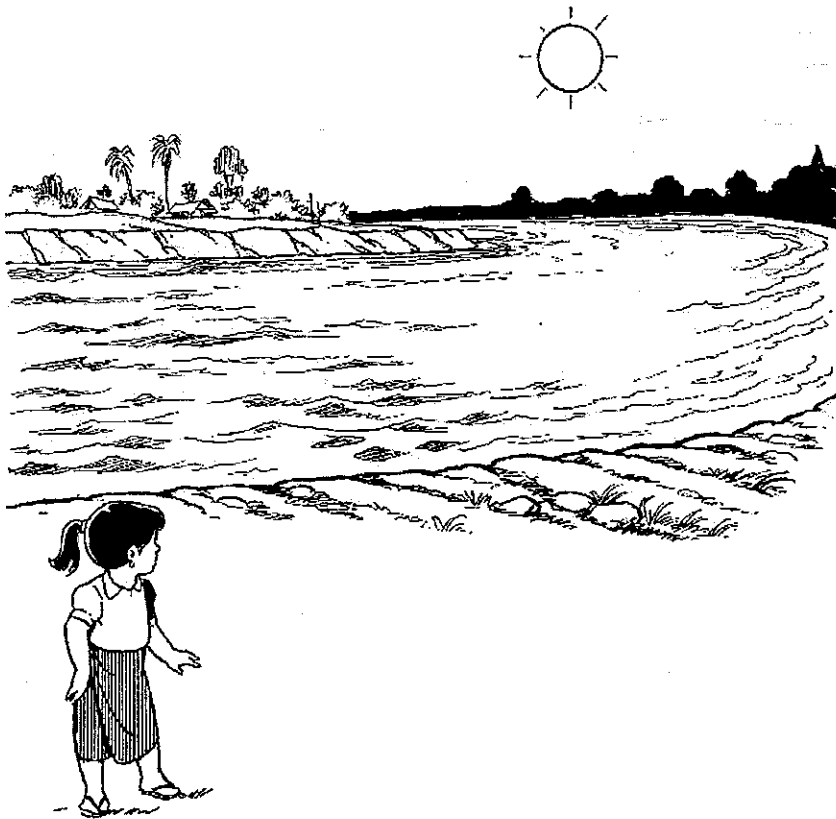
Picture 1



Picture 2



Picture 3



Picture 4

**Lesson Plan 10-1**

Lesson topic: Soil Erosion  
 Learning objectives: Be able to describe that soil erosion occurs due to the running water.  
 Teaching/learning materials: Pictures depicting;  
 (1) A river in rainy season in the hilly region  
 (2) A river in dry season in the hilly region  
 (3) River mouth in rainy season  
 (4) River mouth in dry season  
 (5) Pictures

Teaching period: (70) minutes

Teaching/Learning procedure

Learning activity	T	Teaching/ Learning Materials	Points to be noticed
<p style="text-align: center;"><b>Introduction</b></p> <p>Ask the children if they have ever traveled or not. Ask the children who have the experience of traveling whether they have ever climbed hill or not. How did the soil or rock look when you saw the hillside? Why were they formed like that? Ask the children whether they have the experience of traveling by boat/ ship or not. How did the earth look, when you saw the banks of the river and creek? Why were they formed like that? Why does the unevenness of the land occur in the surrounding of one's school? Teacher will tell that the loss of soil due to various causes is called soil erosion and write the topic of the lesson "Soil Erosion" on the blackboard.</p>	10		<ul style="list-style-type: none"> <li>- There were unevenness, pointed rocks or earth and valley</li> <li>- Due to soil erosion or landslide</li>   <li>- There were unevenness and depressions</li> <li>-Due to eroding of the running water.</li> <li>- As soils are swept along by the flow of water in the rainy season</li> </ul>
<p style="text-align: center;"><b>Development/Core</b></p> <p>To observe the erosion of soil:                  Go round to show the picture (1), (2) (3)(4)one after another to the children group.                  Have the children think why the soil structure of the riverbank has changed as in the order of Picture (1), (2) (3)(4).                  Let them discuss.                  Then, make the children choose the most</p>	10	Picture (1), (2) (3)(4)	Tell it is the picture of the cross-section of a riverbank.

Learning activity	T	Teaching/Learning Materials	Points to be noticed												
<p>correct one among the following reasons. The changes of soil structure/soil losses of the riverbank is due to:</p> <ol style="list-style-type: none"> <li>1. The ground</li> <li>2. The running water</li> <li>3. Other causes</li> </ol> <p>Take the children outside to observe practically how the soils are eroded. Take the children to the place where a water pipe with valve and a mound of soil have been arranged. (Arrange a water bucket and cup in case of where water pipe cannot be available) Remind the children to observe carefully the position of soil before opening the water valve. Let them observe how the water flows as soon as the water valve is turned on. Have them observe carefully what happened to the current water and original soil position. Ask the children to fetch a cup of water from the place where the stream ends. Take the children back into the classroom after the experiment. After the children have their seats, ask them their findings in the experiment.</p>	30	A mound of soil and water pipe with valve	<p>Record the guesses of the children.</p> <table border="1" data-bbox="1086 427 1406 562"> <thead> <tr> <th>Ground</th> <th>Water</th> <th>Others</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Ground	Water	Others									
Ground	Water	Others													
<p>After that, teacher has to show the children the picture in Activity 1 and let them compare with the findings from the experiment. Put the comparisons of the children on the blackboard.</p>	10	Picture from Activity 1	<ul style="list-style-type: none"> <li>- Pathways are formed as the soils have been swept along with the running water.</li> <li>- The faster the speed of the flow, the greater the amount of eroded soil.</li> <li>- A large pond is formed at the place where the force of the stream is the most.</li> </ul> <p>Teacher has to tell the descriptions of Picture from Activity 1.</p>												
<p>How does the water that comes out from the pipe make the ground formed? How is this process called?</p>	10		<p>Soils are drifted along with the stream.</p>												

Learning activity	T	Teaching/ Learning Materials	Points to be noticed
<p>By looking at the water in cup that they took out, let the children to observe whether it is similar to the water that comes out from the pipe.</p> <p>By showing Picture (2) and (4), ask the children which picture it is.</p> <p>Therefore, what happened to the soil or rock in the mountain and bank due to the mentioned flows of water?</p> <p style="text-align: center;"><b>Conclusion</b></p> <p>Teacher has to conclude telling that the loss of soil by running water means the soil erosion.</p> <p>Have the children note down the described concept in the book.</p>		<p>Picture (2) (4)</p>	<p>- Soil erosion in other words soil is eroded by the running water</p> <p>The water in the cup contains soil dusts.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Erosion or loss of soil</div> <p>Tell the description of Picture (2) (4)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">The loss of soil due to the flow of water is called soil erosion.</div>

**Lesson Plan 10-2**

Lesson topic: Causes of soil erosion  
 Learning objectives: Be able to describe the causes of soil erosion  
 Teaching/learning materials: The places where the soils are eroded around the school, notebook, pencil, water cups, fans, papers, pictures depicting some scenes of desert (Scenes of the eroded places)  
 Teaching period: 2Periods  
 Teaching/Learning procedure

Learning activity	T	Teaching/Learning Materials	Points to be noticed
<p style="text-align: center;"><b>Preparatory activities</b></p> <ul style="list-style-type: none"> <li>- Look for the hillsides/slopes and banks (where soil erosion occurred) around the school.</li> <li>- Care has to be taken in case of choosing riverbank or creek bank.</li> <li>- There should be small drains where soils were eroded by the running water at the chosen place.</li> <li>- There also has to be unevenness of the ground, humps and depressions at this place too.</li> <li>- Set in advance the places where the children can observe by the group.</li> <li>- Ask the children to bring hats if there is no shade.</li> </ul> <p style="text-align: center;"><b>Introduction</b></p> <ul style="list-style-type: none"> <li>- Tell the children that they will have to go excursion in order to understand more about soil erosion.</li> <li>- Organize the children into groups of 4-8 children per each group.</li> <li>- Ask the children to bring notebook and pencil.</li> <li>- Assign one group leader per each group.</li> <li>- Give them instructions to be followed and tell the points to be taken care of.</li> <li>- To walk with care (Not to make noise and run because they can be slipped as these places are hillside, slope and water edges.)</li> <li>- Not to go far from the place where the teacher instructs</li> <li>- Not to touch or hold the anything else except the things that the teacher instructs</li> <li>- To listen what the teacher says in any case</li> <li>- If the children agree, have them walk uniformly in a queue. Ask them to bring hats if the sun shines a little.</li> </ul> <p>Going from the school to the place of excursion</p>	<p>5</p> <p>10</p> <p>30</p>	<p>The place where soils are eroded around school (hillside/slope)</p>	

Learning activity	T	Teaching/Learning Materials	Points to be noticed				
<p><b>The excursion schedule</b></p> <p>Have the children observe and note the places where soils are eroded when they get there. Have the children think why it happens like that. Make the children discuss among them. Ask them to think by relating to the former lesson. Have them illustrate one's findings in pictures. Have them write the description on the picture drawn. After drawing the pictures, Have the children pour the water in the cup they brought onto the earth in set places (Hillsides/slopes)</p> <p>- Have them catch again the falling water with the other cups at the foot of the slope. Let them observe how the water they caught in the cup is different from the water in the cup before pouring.</p> <p>- Have the children fan above the earth in the set place (hillside/slope).</p> <p>- Then ask them to place the paper at the foot of the slope. Let them observe what they find on the paper.</p> <p>- Tell the children that they will have to present individually or by group in the classroom.</p> <p>Return from the place of excursion to school</p> <p><b>Discussion in the classroom</b></p> <p>Teacher has to ask the children to present their findings individually or by group. Have them tell about their illustrations and explanations. They will tell that soils are eroded by</p> <ul style="list-style-type: none"> <li>• Running water</li> <li>• Wind</li> </ul> <p>Then, have the children tell their findings from the experiment. Let them think why it happens according to their results. They will answer that finding the soil dusts in the caught water is due to the soils that are eroded by the running water.</p>	<p>10</p> <p>10</p>	<p>Water cups, fans, papers</p>	<table border="1" data-bbox="1139 443 1426 613"> <thead> <tr> <th data-bbox="1139 443 1286 510">Illustration</th> <th data-bbox="1286 443 1426 510">Explanation</th> </tr> </thead> <tbody> <tr> <td data-bbox="1139 510 1286 613"></td> <td data-bbox="1286 510 1426 613"></td> </tr> </tbody> </table> <p>- unevenness of ground                      - depression of ground                      - formation of drains                      - appearance of hump                      - development of sharpness                      - uneven soils are heaping on one side                      - soils are mixing with water and mud are formed.</p> <p>The difference between water in the cup before pouring and the water caught in the cup is:</p> <p>- Soil dusts contain in the fallen water</p>	Illustration	Explanation		
Illustration	Explanation						

Learning activity	T	Teaching/Learning Materials	Points to be noticed
<p>They will answer that falling down of the soil dusts on the paper is due to the soils that are eroded by the wind.</p> <p>Show the picture depicting the scene of a desert. Have the children look at the shifting sand in the picture (1) and ask, "Why does it happen?" Have the children look at the Dessert tombstones in the picture (2) and ask them why it happens.</p> <p style="text-align: center;"><b>Conclusion</b></p> <p>Teacher has to conclude the lesson by telling;</p> <p style="padding-left: 40px;">According to the findings and practical doing, Soil erosion is due to the running water. Soil erosion is caused by the wind.</p> <p>Ask the children to note down the mentioned concept in the book.</p>	5	<p>Picture 'Grand Canyon' and 'Desert Tombstone'</p> <p>Picture (2)</p>	<p>Soil dusts are put on the paper.</p> <p>Topsoil in the desert is shifted from one place to another as shown by the wind.</p> <p>Topsoil is eroded by the wind and only hard stones are left as desert tombstones.</p>



**Assessment**

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Is s/he interested in the fertile topsoil?	Is s/he able to relate the erosion of fertile topsoil due to running water?	Is s/he able to carry out the activities? (Recording the records of observation of erosion of fertile topsoil due to running water)	Is s/he able to understand the erosion of fertile topsoil due to running water?
Is s/he motivated to learn in relation with the erosion of fertile topsoil?	Is s/he able to relate the erosion of fertile topsoil due to running water?		Is s/he able to understand the relationship between running water and erosion of fertile topsoil?
Does s/he like to study the erosion of fertile topsoil?			

This lesson contains many observations.

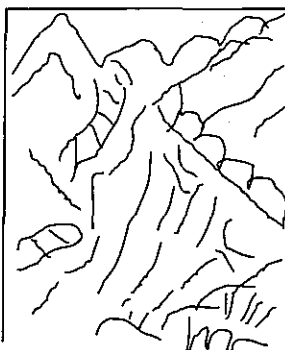
Achievement can be assessed by the skills of children in observation.

- test the attitude of children
- test the activity of children

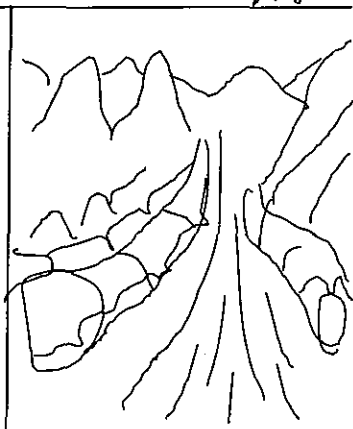
**Test the activity of children.**

Rainy season

How the banks are flooded in rainy season



Summer  
Rocks and soil of the hill banks change in summer due to the running water in the rain season.



**Message to Teachers**

- Interested in observing the erosion of fertile topsoil due to nature and running water.
- Observing correctly the different facts by using the five senses, for example, the development of tracks due to the flowing of soil together with the water current. That the more the acceleration of water current the greater the amount of soil eroded. And that ponds develop where the force of water current is the greatest etc.

**Observation by relative thinking**

What happened before and what happens now? (Comparison with the past experience and observation)

- Observation by relative thinking
- How did it happen like now (Thinking the process)
- Exploration by relative thinking
- What will happen
- Guessing ability

**Important points**

Changes in shape of the banks is due to the loss of soil

1. Observing nature
2. Observation on how the water flows.
3. Observing the carrying of soil by water current
4. Observing water current developed on hill sides
5. Observing the loss of fertile topsoil due to running water.

**Oral assessment/Group discussion**

1. How will you observe and note down the situation of soil before the tap is on?
2. How does a water current flow?
3. What happens to the water current and original texture of the soil?
4. How does the soil become by the water coming out from the tap?
5. How do you call when it happens like that?
6. What happens to the rocks and soils on the banks of the hill due to water currents?

**Written assessment**

1. Draw the loss of fertile topsoil from the experience you have seen?
2. What difference is found between the development of water current and the condition before the running water flows on the ground?

1. Because of soil
  2. Because of water current
  3. Because of other factors
    - Carries the soil along with water current
    - Erosion of fertile topsoil in other words erosion of fertile topsoil due to running water.
    - The water current develops on hillsides erodes so that fertile topsoil is lost.
- The loss of fertile topsoil due to running water is called erosion of fertile topsoil.