Topic 3: Plants

1. Key concept	Plans can be classified in different way Plants have different stages of life cycle.
2. Learning objective	
General	To be able to understand that there are different plants, which grow in different places, and have different shape and structure. Be able to understand that there are different sorts of plants and there are stages in growing plants.
Specific	1) To be able to indicate various plants in field 2) To be able to discuss to classify various plants in groups 3) To be able to explain the reason why various plants are classified 4) To be able to sow seeds 5) To be able to describe necessary steps for a land to germinate.
3. Activities involved	Excursion/Field trip to observe different plants Observation (using magnifying lenses) and findings Group discussion and self expressions Presentation Transplanting Recording growth of plants
4. Activity purpose	To let children find out the variety of plants in different shape and structure and growing plants in real

Before Getting Started

Self-check list for Teachers	☐ Can I distinguish plants according to 'classification' of plants? ☐ Do I know the place where children can find variety of plants safely?
Background information for teachers	
All kinds of plants	There are over 380,000 different kinds of plants, and they are found in all but the very coldest parts of the earth. There are plants in the oceans, too. We recognize most plants easily, because they are green. The color comes from green pigment called chlorophyll. Plants range in size from tiny single-celled algae to giant redwoods and Australian eucalyptus trees that reach more than 100 meters. Some plants live for just a few weeks; others live for thousands of years. Seaweeds are marine plants. They do not have proper roots and stems. Instead they have a holdfast, a root-like structure that attaches them to rocks, and fronds that bend with the currents. Classification is the method by which living things are grouped into categories based on their appearance and the natural relationships between them. Plants can be divided into groups. Algae, which include seaweeds, are the simplest plants. Mosses and ferns are primitive land plants. Conifers are a group of large, cone-bearing plants. The most advanced plants are the flowering plants. Their flowers produce seeds and fruit. They include the broad-leaved trees.

Flowers

Flowers contain a plant's male and female reproductive organs. Most plants have both male and female organs in the same flower, but a few have separate male and female flowers. Male organs, or stamens, make a powdery yellow dust called pollen. Female organs include the stigma and ovary, To make a seed, pollen has to travel to the female stigma in another flower. This process is called pollination.

Fruits and Seeds

Once a flower has been pollinated, it can make seeds. First, the petals and stamens wither and drop off. Then the ovary swells in size and starts to change into a fruit. The seeds develop inside the fruit. A seed is a dry structure, with a hard outer covering called the testa. Inside there is a food store and an embryo that will grow into a new plant.

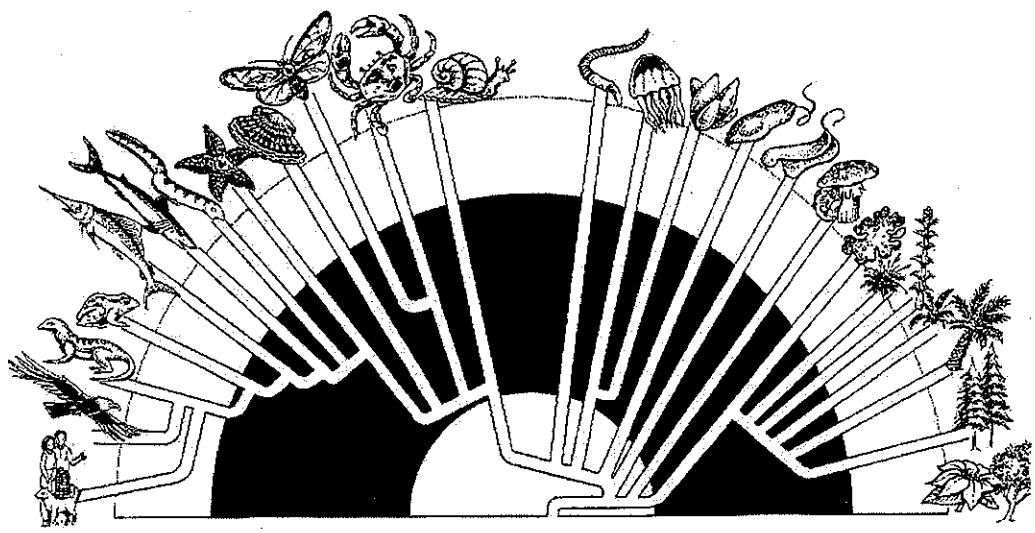
Cones

Conifers produce cones instead of flowers. The cones contain seeds. As the cone dries out, the scales open and the seeds are blown away.

Classifying living things

It is first necessary to understand how life on Earth evolved. The species(kind) of plants and animals alive today have evolved from much earlier kinds of, which are now extinct.
No one knows exactly how many different living things there are on the earth today. Scientists have discovered over two million, but there may be four times as many, mostly microscopic, organisms that are yet to be discovered.

Family tree of Animal and Plants



Systematics and Taxonomy	The scientific study of the diversity of living things and the relationships between them is called systematic. Taxonomy, which is part of systematic, is the study of the rules and procedures of classifying, plants and animals. When classifying a living organism, it is given a scientific name written in Latin so that it can be identified by scientists all over the world. Classification helps us to study and understand the natural world. It also shows how living species are related to species that died out long ago.
Kingdoms and the phylum (plural: phyla)	The individual organisms, called species, can be classed in different levels. The highest level is called a kingdom. There are five kingdoms, animal, plants, fungi, protists and monerans, the animal kingdom is by far the largest. The differences in the structure of organism's cells partly determine to which division the organism belongs. The level below the kingdom is called the phylum (plural: phyla). For example, there are more than 20 different phyla within the animal kingdom. All vertebrates (animals with backbones) belong to a phylum called Chordate.
Class, Family and Spices	Organisms are further divided into smaller levels. Below the phylum comes a level called the class. For example, all mammals belong to the class Mammalian. Below the class is the order. For example, all meat-eating mammals, such as foxes, leopards and otters, belong to the order Carnivore. Then comes a level called the family. Foxes, hyenas and wolves all belong to the family called Canidae. Within the family are subgroups of animals that cannot breed with one another - they can mate, but do not have offspring. Each group is a genus. Within a genus are one or more species.
Extinction and species	Scientists think that the number of organisms today is only a tiny fraction of all the living things that have existed. More than 99 per cent of all the species that have ever existed are now extinct. Animals, plants and other organisms gradually change as the conditions around them alter. In this way, species may evolve into new species, preserving the diversity of the varied family tree of life.

<u>Other Background information for teachers</u>

Following information can be used to select vegetable seeds you use in lessons.

1. Sowing information

States/divisions in upper and lower Myanmar

Name of Plants	Sowing Time	Germination Period
Carrot	September / October	14 days
Cucumber (Rainy)	May / June	5-7 days
Bitter Gourd	June / July	14 days
Chili	May / June	25-30 days

States/divisions in lower Myanmar

Name of Plants	Sowing Time	Germination Period
Egg plant	May / June	5-10 days
Tomato	September / October	25-30 days
Gourd	May / June	30 days
Onion	June / July	30 days

States/divisions in upper Myanmar

Name of Plants	Sowing Time	Germination Period
Radish	October	4 days
Mustard	September / October	14-20 days
Kohlrabi (Knoll Kohl)	May / June	30 days (40 days in hill regions)
Chayote	July / August	30 days

2. Plants growing pattern

●Sowing Transplanting Flowering △Harvesting

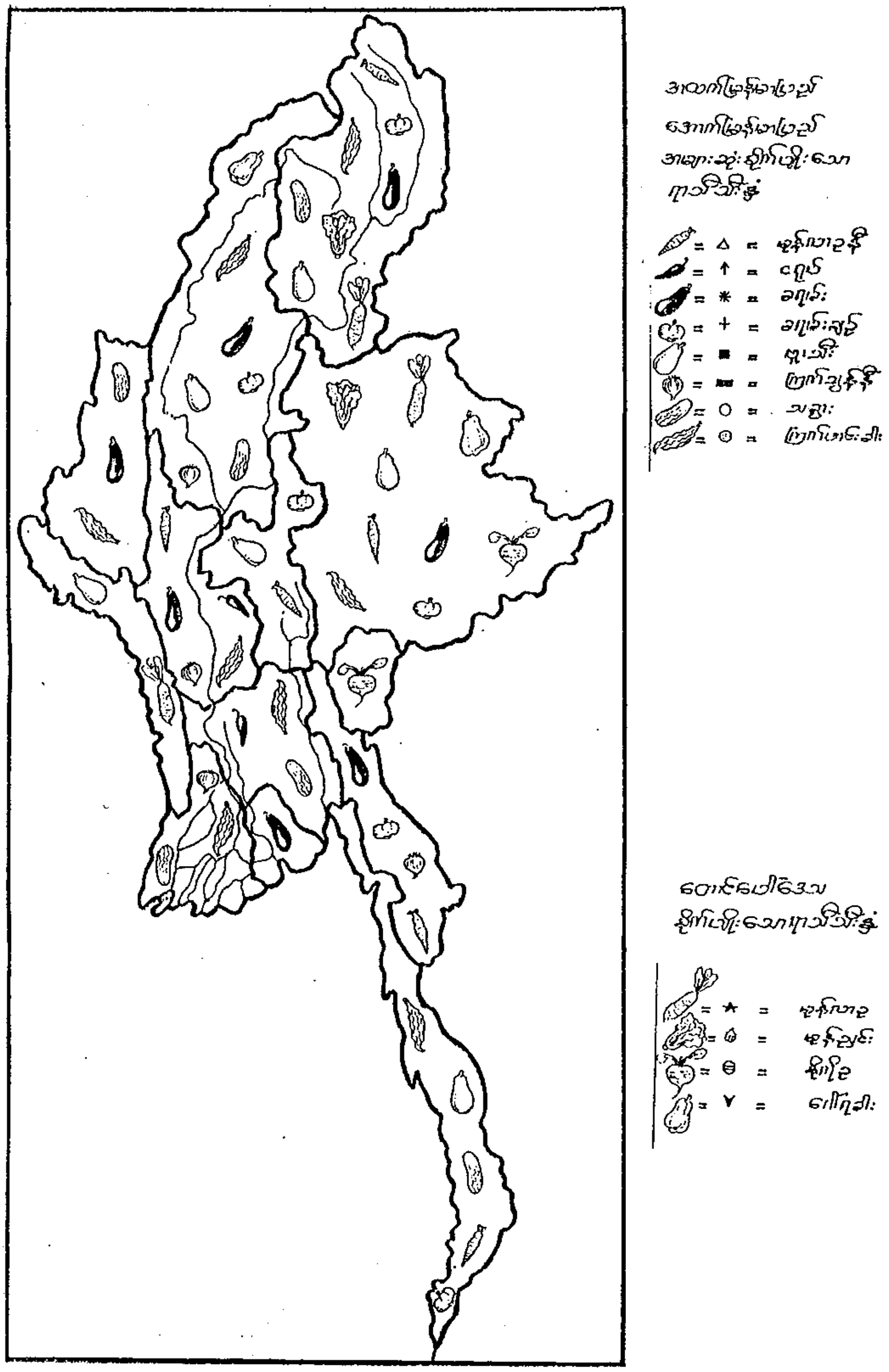
Name of plant	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Bitter gourd		●	(High temp.) (low temp.)		△		
Egg-plant				●			△
Cucumber		●	(hot) (Cold)		△		
Chili		●			△		
Potato (rainy season potato)				●			△
Pumpkin	●			△			
Radish					●		△

3. Plants suitable for bulbs (roots) planting

Onion, gladiolus, potato, ginger, and colocasia (pein)

4. Plants suitable for planting a cutting

Water cress, drum stick, sugarcane, tussiaea, and sweet potato (Germinated stems are used.)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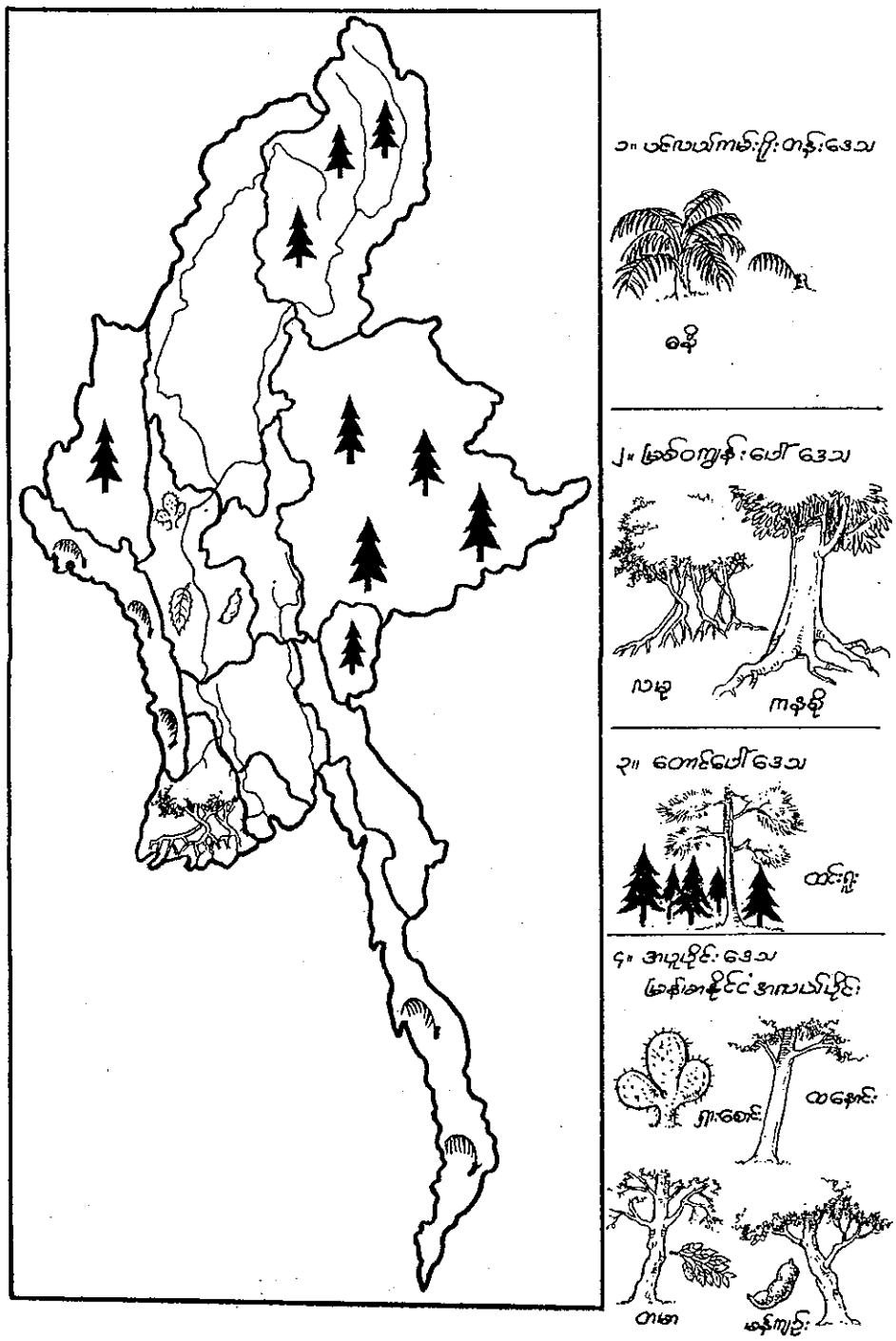
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Lesson Planner

Suggested periods (17)	**Period 1-3**	**Period 4**	**Period 5**
Lesson Topics	Different plants	Different plants	Different plants
Sample lesson plan	3-1		
Specific objective	To be able to indicate various plants in field	To be able to discuss to classify various plants in groups	To be able to discuss to classify various plants in groups To be able to explain the reason why various plants are classified
Introduction **(Motivation/Create interest/Active prior knowledge)**	Giving prior instruction before the trip.	Recall the prior knowledge from the trip through their records, notes and tables and have agreement of the findings with others.	-
Core/Development **(Active engagement with test/task)**	Observe the different trees or plants in different places. Fill the findings in the tables. Discussion with each other what will be presented in the classroom?	Group-wise presentation. Collecting and organizing the facts which are presented.	Review together the collected facts with the tables.
Reinforcement **(reflecting learning)**	When the specified time is over ask them to meet at the specified place and to keep the records, notes and tables, which they have to present their findings in their classroom.	-	Look at the table and review that plants have different form and structure and they have different conditions and places to grow.
Assessment points	Do they participate in the learning process such as observing and touching the plants, sharing their ideas, filling up their thought in the tables? Do they get idea that there are different plants and they are found in different conditions and places? They also have different form and structure.	Do they participate in the learning process such as, sharing the ideas, presenting the ideas on different plants? Do they understand how plants are different in form and structure and in the conditions of places to grow?	Do they participate in the learning process such as sharing the ideas, presenting the ideas on different plants? Do they review the ideas of different plants? Do they understand how plants are different in form and structure and in the conditions of places to grow?
Adaptation of curriculum	The activity of the whole day trip or half-day trip can be arranged by local teachers. In the case of difficulty for teachers to manage, it is possible that teachers can collect the different plants in the school compound ahead before teaching the period 8 and 9.		

Lesson Planner

Suggested periods	Period 7	Period 8	Period 9	Period 10
Lesson Topics	Germination of Seeds	Germination of Seeds	Germination of Seeds	Germination of Seeds
Sample lesson plan	3-2			
Specific objective	To be able to explain how to sow a seed		To be able to describe that a certain steps are necessary for a seed to germinate	
Introduction **(Motivation/Create interest/Active prior knowledge)**	Recall the prior knowledge on how fruit and seeds are related. How many kinds of seeds they have known? -		Let the children summarize their findings from the records. -	
Core/Development **(Active engagement with test/task)**	Let them think and realize how the seed can be sown. How can they take care of the seedlings and what are the conditions necessary for germination? Explanation on how to carry out the experiment and some points to be noticed for the experiment.	Sowing seeds practically. Remind them to take care of the seeds and also to take records on how the seeds are changing.	One from each group must present the findings and the rest must listen carefully.	Teacher and children specify the salient steps according to the findings such as; - cracking of seed - the appearance of the radicle carves on the ground - the carved radicle straightens up and pulls out the seed leaf.
Assessment points	Do they participate in the learning process such as: Thinking on how the fruit and seeds are related, how the seed can be sown, how they can take care of the seedling. Listening to the teacher's explanation. Do they get the idea on how to sow a seed and how to take care of it?	Do they participate in the learning process such as: Working together on sowing seeds? Do they understand how to sow a seed and how to take record on how they seeds are changing?	Do they participate in the learning process such as: Presenting the findings or listening to the presenter? Do they understand how to present and listen on the findings.	Do they participate in the learning process such as: Summarizing or Specifying the salient steps for germination? Do they understand the steps for germination?
Adaptation of curriculum	Not only bean, any kind of seed can be used for this lesson.			

Lesson Planner

Suggested periods	**Period 11**	**Period 12**	**Period 13**
Lesson Topics	Life cycle of plants	Life cycle of plants	Life cycle of plants
Sample lesson plan	3-3		
Specific objective	Be able to describe plants have different stages of life cycle.		
Introduction	Recall the prior knowledge from their experience in school and at home about plants growing		
Core/Development **(Active engagement with test/task)**	Have the children loosen the soil gently and pull out the seedling without any injury. Observe the rooted seedlings and mention the parts. - Draw as they find - Measure the length of the whole plant	Transplant the seedlings from the pot to the ground. Watering the seedlings and then wash their hands.	Decide each and everyone to have responsibility to nurture the grown plants. Assign duty to a couple daily to weed and water. To fill in the given table what they find the changes from the seedlings, both words and figures
Assessment points	Do they participate in the learning process such as : loosing the soil and pull out the seedling? Observing the seedling? Do they mention the plant's parts? Do they draw the plant's figure? Do they measure the length of the plant? Do they identify the plant's parts.	Do they participate in the learning process such as: Transplanting the seedlings to the ground.? Can they carry out transplanting a seedling to the ground.	Do they participate in the learning process such as: listening to the teacher while explaining the duties and responsibilities? - taking record on the changing seedlings? Can they carry out their duties? Can they take record on the changing seedlings
Adaptation of curriculum	Depending on the plans The life cycle may be varied from 2-4 months. Teachers have to choose most suitable plants according to their learning/teaching condition. See Information for teachers page 35-36.		

Lesson Planner

Suggested periods	**Period 14**	**Period 15**	**Period 6 ,16, 17**
Lesson Topics	Life cycle of plants	Life cycle of plants	Assessment/Review
Sample lesson plan	3-3		
Specific objective	Be able to describe plants have different stages of life cycle.		
Introduction	Recall the prior knowledge from their experience in school and at home about plants growing		
Core/Development **(Active engagement with test/task)**	Present their summarized findings to the class while the rest are listening.	Teachers and children together collect the findings from presentation Children review together on the findings.	
Assessment points	Do they participate in the learning process such as: summarizing their findings? Do they present their findings? Do they understand what they are presenting?	Do they participate in the learning process such as: collecting the findings from the presentation? Do they understand plant has different stages of life cycle?	
Adaptation of curriculum	Depending on the plans The life cycle may be varied from 2-4 months. Teachers have to choose most suitable plants according to their learning teaching condition. See Information for teachers page 35-36.		

Activity 1 The study of different plants (Excursion - a half-day program)

Teaching/learning material

Magnifying glass, scissors, shovel, fork, plastic bag, vinyl bag,

Concept Different plants grow in different places and have different shapes and structures.

Preparatory activities.
Go to the forest (or) park and find beforehand the places where the following plants can be found and fix the place in advance to be able to study in groups.
- different large trees
- different shrubs
- aloe or places where similar trees grow
- places where ferns grow. In some regions ferns are called Thit Kat Hmaw Bin. It should collect specimens beforehand where ferns, mushroom and weeds cannot be found in upper Myanmar.
- places where mushrooms grow naturally
- small ditches where weeds grow

Note: It should choose the place where there are plenty of large and small trees with flowers.

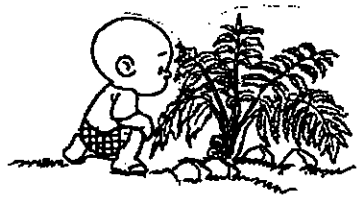
Prior instructions before leaving.
Tell the children that they will be on an excursion to study the different plants. Form children into groups containing (4-8) members. Tell them to bring water bottle, caps, notebook and pencils. Ask them to choose group leader for each group. Remind them to listen to the words of the leader that one has chosen.
Tell them to walk with care, to talk softly and not to go too far from the place where the teacher has instructed. If they agree to the above instruction, tell them that the excursion trip will be going.
Distribute the maps of forest of park to study. Distribute magnifying glass, scissors, shovel, fork, vinyl bags and plastic bags to every group. Tell them one has to control not to lose one's materials. Upon reaching the place to study, cuddle the trees, guess how high they are. By holding the trunk of trees, compare if the barks are similar from one tree to another. Sniff the smell of leaves and compare if the shapes of leaves are similar.
Guess how big the shrubs are.
Tell them to note down in the notebook if one is under the sunshine or under the shadow.
Then,
- What trees are found in the forest or in the park?

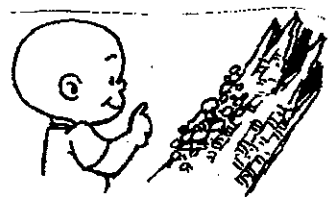
Therefore,
- Presence or absence of aloe or similar trees. They are found in which places.
- And that ferns are found in which places.
- Which trees are found in the small ditches?
- If mushrooms are found, why mushrooms grow in these places etc is asked to explore specially.

To fill in the following table after discussing with each other and the findings on the table will be presented in the classroom to discuss.

Tree's name	Form structure (picture)	Form structure (Explanation)	The condition and place where found (picture)	The condition and place where found (explanation)	Remarks

If the specified time is over, tell them to gather at the specified place and let them start the observation activity.





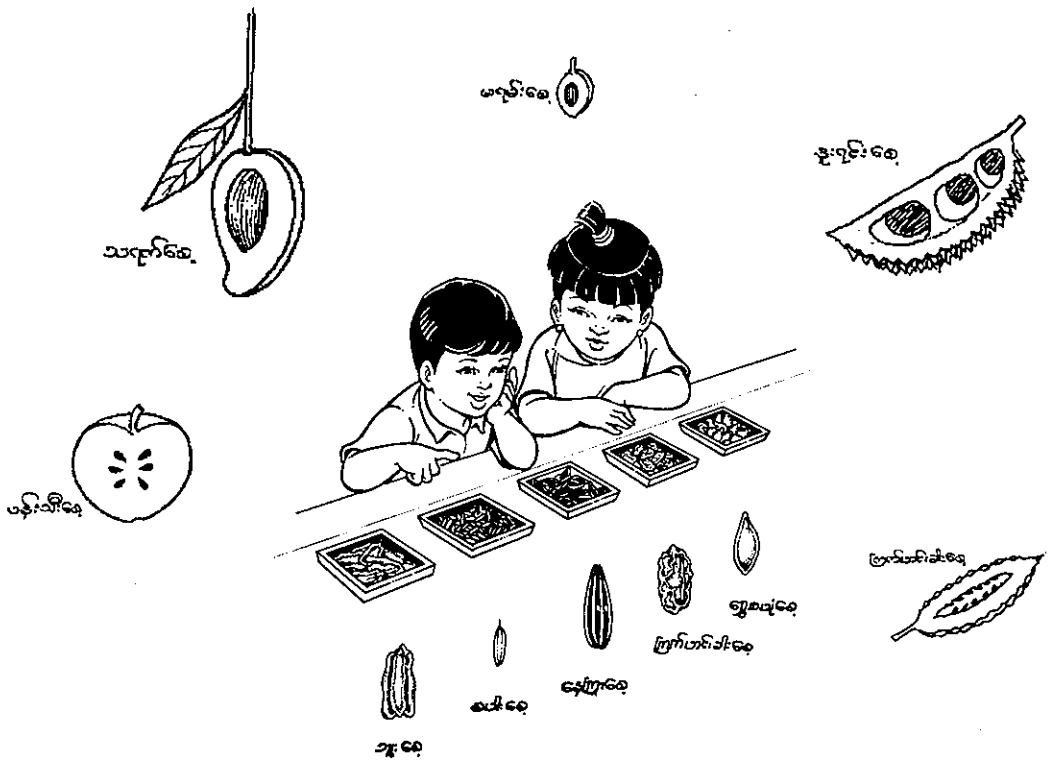
Activity 2 How plants grow

Teaching/learning material

Various seeds or beans (locally available, NOT for eating but for planting)

Concept Experience of children, guessing game.

First show children all the seeds.
Ask children what are they (this is not test so NEVER MIND if children do not know).
Let them see all plants have particular shape.



Activity 3 Looking at germination of seeds 1

Teaching/learning material

Various beans/peas (locally available, even for eating, tissue paper, 5 plats

Concept Plants germination will take particular steps

After Activity 2, Teacher can choose some of beans/peas (beans/peas are better being seen steps) to use this activity.
Let children to prepare following steps.
Preparation by Teacher, however it is highly recommended to do this process with children.

Day 1
1. Put the tissue paper on the plats (plats No1)and wet the tissue with a little water (not too much). Put some beans/peas on the paper.

Day 2
2. Put the tissue paper on the different plats from the Day1 (plats No2) and wet the tissue with a little water (not too much). Put some beans/peas on the paper. Change water of Plate No1(otherwise it starts to sitnk!).

Day 3
3. Put the tissue paper on the different plats from the Day1 and Day2 (plats No3) and wet the tissue with a little water (not too much). Put some beans/peas on the paper. . Change water of Plate No1, No2

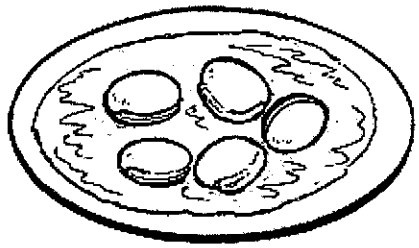
Day 4
4. Put the tissue paper on the different plats from the Day1, Day 2and Day3 (plats No4) and wet the tissue with a little water (not too much). Put some beans/peas on the paper. . Change water of Plate No1, No2 No.3 .

Day5
5. Put the tissue paper on the different plats from the Day1, Day2, Day3 and Day4 (plats No5) and wet the tissue with a little water (not too much). Put some beans/peas on the paper. Change water of Plate No1, No2 No.3 No4.

Day6
6. Teacher show the plats No1 No2 No3 No4 No5 to children to compare No1 (after 5days germination) No2 (after 4days germination) No3 (after 3days germination) No4 (after 2days germination) No5 (after 1day germination).
7. Teacher asks children to draw picture from their observation

Example of 'Observation sheet'

Observation Sheet
Name of plants Date <Children can draw picture here>   Finding



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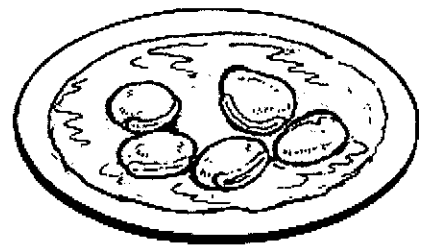

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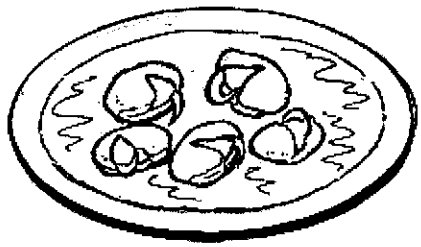

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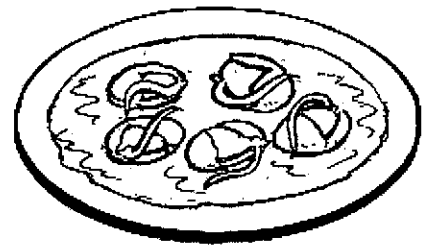

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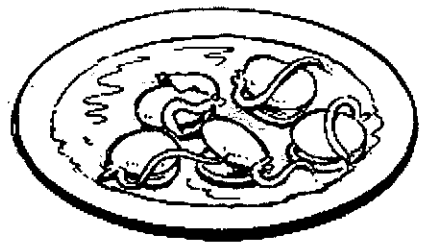

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Activity 4 Looking at germination of seeds 2

Teaching/learning material

Various seeds or beans/peas (locally available, NOT for eating but for planting), some earth (compost type is best), pot or bowl

Concept Plants germination will take particular steps

After Activity 1, Teacher can choose some of beans/peas (beans/peas are better being seen steps) to use this activity.
Let children to prepare following steps.

8. Fill the bowl or pot with earth (or compost). Press it down with fingers. Fill the bowl with water and wait until it has sunk into the earth.

9. Press the beans or peas into the earth.

10. Make rules who take care the bowl/pot will not dry up everyday and record the change of seeds

Tell children continue the lesson after 4-5 days.

Example of 'Observation sheet'

Observation Sheet
Name of plants Date <Children can draw picture here>   Finding

Activity 5 Sawing seeds

Teaching/learning material

Various seeds or beans/peas (Not for eating but for planting), pots or bowls, soil, (it can be planted out-side school garden)

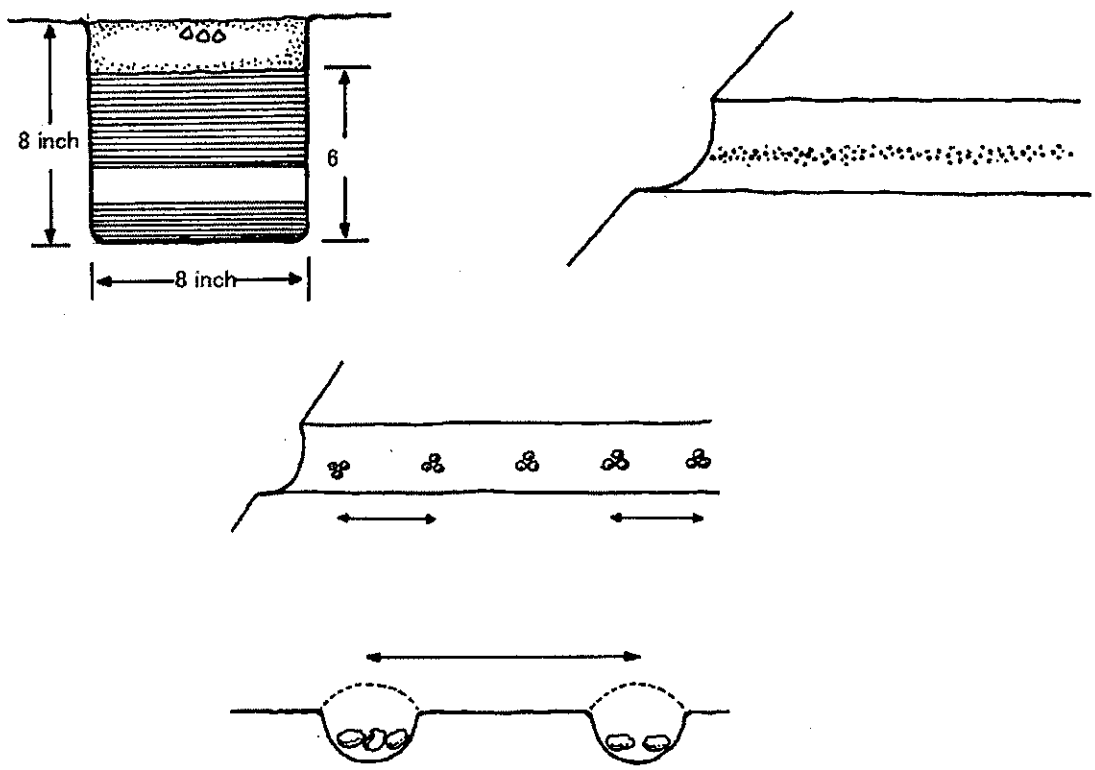
Concept Start to grow plants

First show children all the seeds. Ask children how to saw these plants (this is not test so NEVER MIND if children do not know.)

Teacher demonstrates how to saw seeds

Children saw the seeds in the pots.

Discuss how children can take care of plants and make rules with children, for example 'Day duty' to give water and make observation



Activity 6 Observation-grows of Germination (4-5days after Activity 2)

Teaching/learning material

Pots/bowls from Activity 2, Observation sheet

Concept Check the change of seeds

Teacher asks children about observation they made last 4-5 days (free expression).

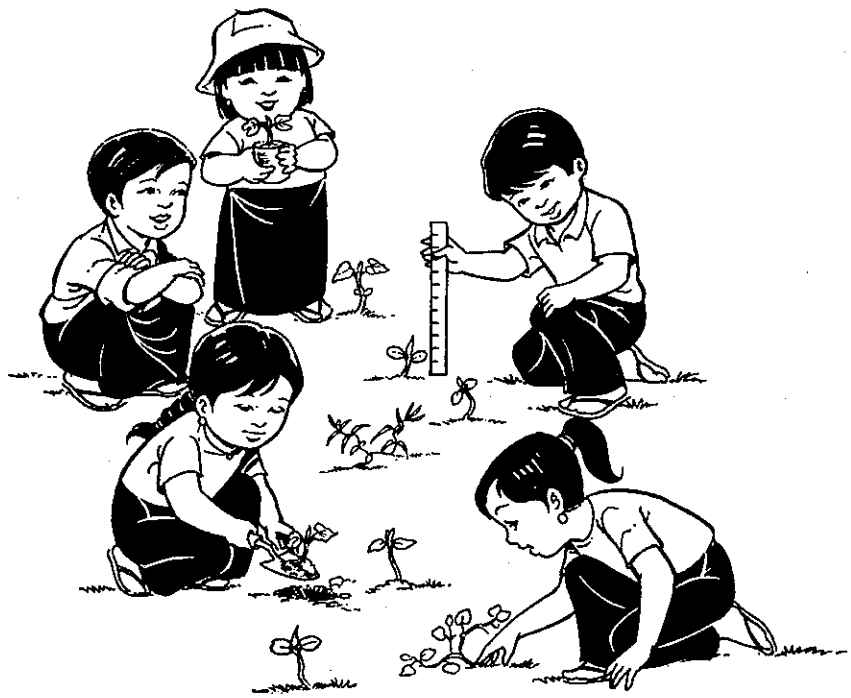
Teacher asks children to observe the spouting seeds.

Ask children

Is the sprout you see will be roots or leaves?

Let children observe carefully and tell them to draw picture.

After drawing pictures, children can plants sprouting beans/peas carefully (not to damage sprout) into transparent plastic bottle (cut the top off).



Activity 7 Observation-grows of plants

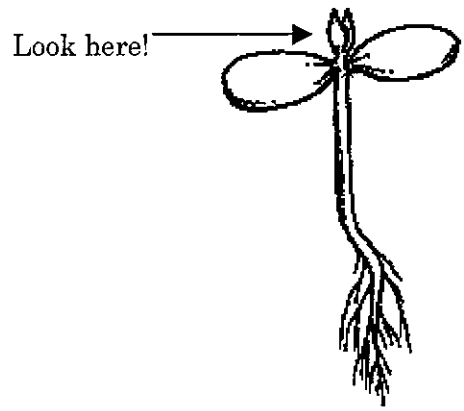
Teaching/learning material

	Plants growing, Ruler, Observation sheet
Concept	Familiarizing children for detail observation of nature (Identifying different growth of plants)

After 2days of Activity 4, children can observe plants. Look for geminated seeds in various stages.

Dig gently by hand a little around seeds in sawed previous lesson and check how seeds look like under ground.

If children find small two leaves, let them observe something (new leaves in fact) is in between two leaves.



Look for plants just geminated and compare number of leaves, shape and color of leaves of various vegetable.

Discuss with children what they found from observation.

Discuss how children can take care of plants and make rules with children, for example 'Day duty' to give water and make observation

Activity 8 Observation-grows of plants 2

Teaching/learning material

	Plants growing, Ruler, Observation sheet
Concept	Familiarize children for detail observation of nature (Checking growth comparing to previous observation)

After 2weeks of Activity 4, children can observe plants.

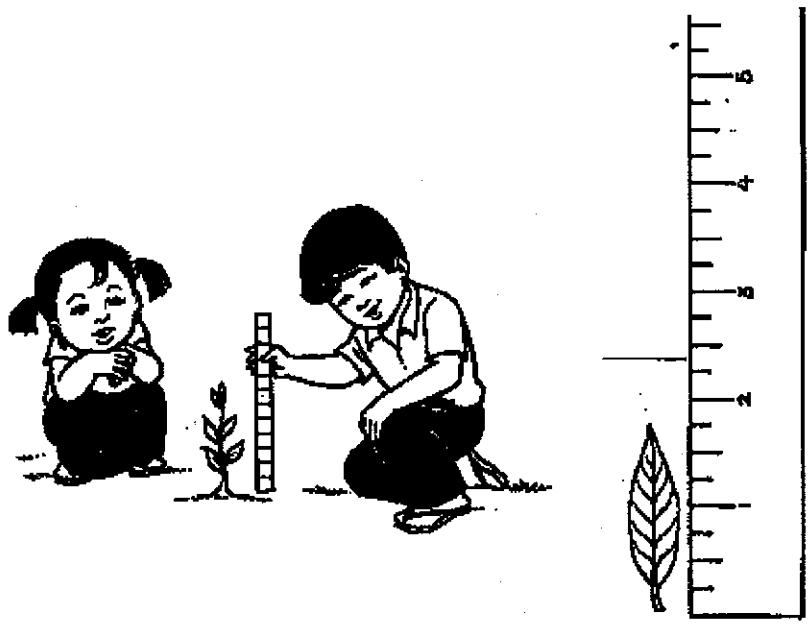
How long are they?

How many leaves do they have?

How big are the stems of plants?

How do they look, make drawing?

Discuss with children what they found from observation.



Activity 9 Observation of plants structure

Teaching/learning material

Plants growing, Ruler, Observation sheet

Concept Plants have particular structure

Teacher asks children about observation they made last two weeks (free expression).

Teacher asks children to observe the plants in the plastic bottle (Children can also observe roots).

Teacher takes out plants carefully from other pots/bowl and let children to observe roots.

(Plants like cucumber, gourd, tomato, green- paper had better make seedling in pots/bowls and be transplanted for better growth, so use these plants for this activity.)

Let children observe carefully the construction of plants;

1. Which parts are roots, leaves and stems?
2. How is the proportion of leaves from top to bottom and how roots are developed

Teacher tells children to draw pictures

After drawing pictures, children can discuss about their observation.

After all, children can plant to bigger pots/bowls or ground.

Activity 10 Observation of growth of plants 3

Teaching/learning material

Concept Plants make flower and they produce fruits/seeds

After 2weeks of Activity 4, children can observe plants.

How long are they?

How many leaves do they have?

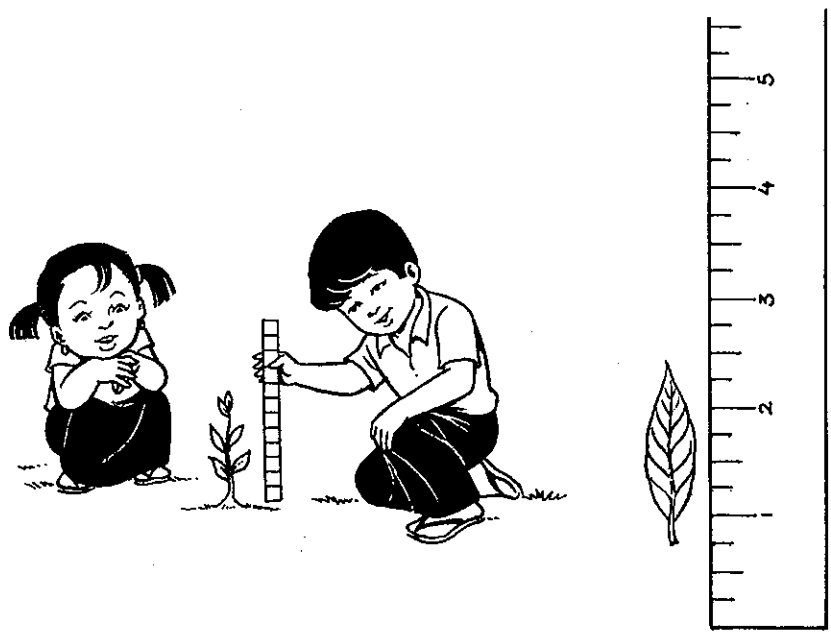
How big are the stems of plants?

Discuss with children what they found from observation.

After the discussion, teacher lets children to see flowers (and if already seeds/fruits are formed also them) and discuss;

1. Where are buds, flowers and (fruits/seeds)?
2. How big are they?
3. What are formed first, buds or flowers or fruits/seeds?

After the discussion, teacher lets children to draw pictures from their observation.



Activity 11 Observation of growth of plants 4

Teaching/learning material

Plants growing, Ruler, Observation sheet

Concept Plants produce fruits/seeds and they will be next generation.

After starting flowing, children can observe plants.

How long are they

How many leaves do they have?

How big are the stems of plants

Discuss with children what they found from observation.

Teacher asks children draw pictures

After that children can also observe and count seeds.

Teacher asks;

1. Do these seeds look as same as seeds we planted first?
2. How many seeds did you get?
3. What can we get if we plant again these seeds next season?

After growing plants, children realize all steps of plants' Life Cycle'.

* Seeds can be used for next year classes. Teacher can also tell children, that these seeds help younger ones for next year classes.

Activity 12 Growth of plants

Teaching/learning material

Observation sheet

Concept Plants grow, make flower and they produce fruits/seeds

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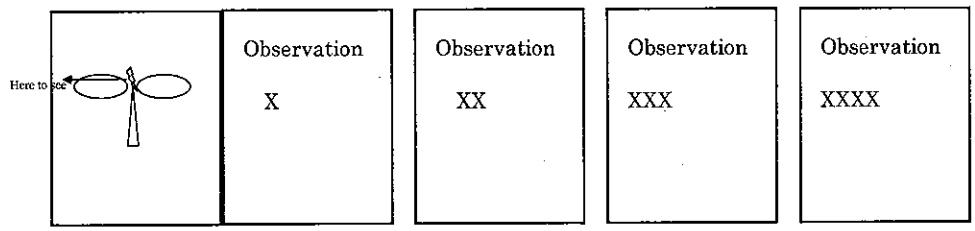
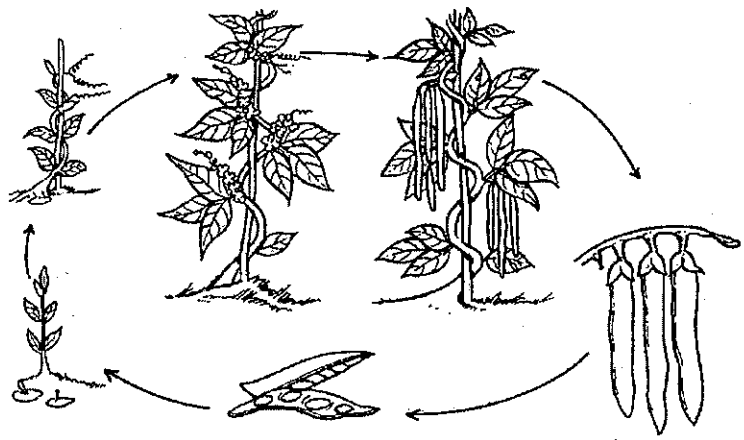
Teacher asks children to overview all observation sheets from germination to forming seeds.
And compare them to see the growth pattern of plants.
Children can also present their observation.
It is important for children to listen others observation and express their vision as well.
Children understand `Life cycle' of plants.





Lesson Plan 3-1

Lesson topic: Different plants.
Learning objectives: Be able to describe differently that plants grow in different places and have various forms and structures
Teaching/learning materials: The specimens, which they collect, and tables that they filled their findings from the excursion, notes or records
Teaching period: 70 Min
Teaching procedure

Learning Activities	Time	Teaching/ learning materials	Points to be noticed
Introduction. Children have already been on an excursion trip on (.....). Therefore, they have to make ready the records, notes and tables written what they have found in the excursion to collect and organize one's findings and take agreement to present by one person from each group. A knowledge each group to present for (3) minutes. **Group-wise presentation.** - - - - -	15		Teacher has to record group-wise presentation on the blackboard.
Teacher and students collect and organize together the presentations. -There are various trees in a forest or in a park. For example: Some trees are large trees The children's heights are only in the foot of tree. The branches, leaves, flowers and fruits are found luxuriantly. It is thought that the roots are under the ground because some parts of the roots are found on the ground. It is found in every place. The bark of the mango tree is rough whereas the gold-mohur tree is smooth. - Some trees divide into many branches and become shrubs. Some shrubs are very big. It has branches, leaves, flowers and fruits. - The stem and branches cannot be seen in some trees. Only thick leaves can be seen. For example, Aloe	25		

Learning Activities	Time	Teaching/ learning materials	Points to be noticed
- Some trees grow in cold and shady places. Only the roots and leaves can be seen. They can be found on the rocks and on the trees, E.g.: Fern.			

Tree's name	Form structure (picture)	Form structure (Explanation)	The condition and place where found (picture)	The condition and place where found (explanation)	Remarks

-Some trees grow on decaying leaves and trunks. For example: Mushroom. Also, found on the ox's dung. The significance is that it is not green in color. The stem leaves, and roots cannot be differentiated. - Some trees are found in the small ditches as green weeds. They are only fibrils. The stem leaves and the root cannot be differentiated.			
Review together the collected and organized facts. Review with the following table that plants differ in structure from one tree to another.	25		
Tell them to review according to the stated table that plants have different form and structure and that they have different conditions and places to grow.	5		
Conclusion: According to the observation, discussion and review conclude by reviewing that plants have different form and structure and have different conditions and places to grow.			
Tell the children to write down the above concept in the notebook.			

Lesson Plan 3-2

Lesson topic: Germination of seeds
Learning objectives: Be able to describe the steps necessary for germination of seed.
Teaching/learning materials: Various seeds, bean seed, earthen pots, blank bottles of mineral water, plastic bowls, forks, shovels, markers, notebooks.
Teaching period: 3 periods in the classroom and 1 period outside, total 4 periods.
Teaching procedure

Learning activities	Time	Teaching/ learning materials	Points to be noticed.
In the classroom **Introduction:** Let the children tell the fruits they have ever eaten. Ask, among these fruits, what else is left? Let the children tell the seeds as far as they know. Teacher differentiates into groups the seeds that the children say. By depicting with the pictures, children will remember the lessons they have learnt.	10		Avocado, Mango, Arian Jack fruit, Durian , Apple, Pear, Tomato Gourd, Pumpkin, Cucumber, bitter gourd
How can these seeds be sown? Let them tell as much as they remember. Ask,' how will you take care of the seedlings' and 'the conditions necessary for germination of seed?'	10	Wheat, paddy, Italian millet, walnut, coconut seeds	Sowing inside furrows By broadcasting seeds Sowing according to the depth of the earth. When the seeds sprout into seedlings, it is necessary to replant them systematically.
Core/development: Explanation on the facts necessary to carry out experiment. Make (4-8) groups of children and give each group 3-5 seeds of lablab bean or pumpkin seed, gourd seed, bitter gourd seed. Besides, give them one earthen pot, fork, small shovels, water bowls, and blank mineral water bottles. Tell them the following facts to notice and methods. - First, to fill the earthen pot with soil. When the soil is prepared, place the seed just beneath the surface of the soil and cover with a small amount of soil. - To water that plant; it is not to water directly from the bowl but to use the blank bottle of mineral water. The blank mineral water bottle is cut 2/3 with a knife and make holes beneath with iron nails. Water is to pour down from these tiny holes. After planting, to water and examine daily The significant facts found have to be filled in the record stated below. Group name (or) Number (.....)	15		It needs appropriate water, air, and sunlight for a seed to germinate. Help the children in cutting and making holes of the blank water bottle, Remarks and significant facts have to be recorded daily. If there is no significance, write nil.

Date	Record of Changes found	Illustration of the changes found

Then check the children if they are ready with the earthen pot, fork, shovel, piece of blank mineral water bottle with holes. If they are complete, they will have to go to the place specified beforehand inside the school compound.

Learning activities	Time	Teaching/ learning materials	Points to be noticed.
To carry out filling soil into the earthen pot, watering and sowing seeds. The sown pots are to mark with a marker group (1), (2) etc. and place in a row. Tell them that watering, recording, and drawing are to carry out together on the following days. It is to conclude by saying, 'after about a week, it will be discussed again together with the filled in records in the classroom.'	25	A certain place inside the school compound outside the classroom.	
After about a week **In the classroom** The program to present to the class the records made by the student groups. By holding the records, one person from each group will go in front of the class and present.			Teacher will record the significant facts on the blackboard.
Remarks: It is important to listen quietly by all students.	15		Since it is inside the seed cover it is to tell that it is called a seed leaf.(cotyledons)
Presentation - - - -	15		To ask the difference between a seed leaf and the leaves appear again. (The seed leaf is thicker, the leaves appear again is normal)
Teacher and students collect and organize the findings. - It is found that the seed is cracked after about two days. - After about 5 days, a white thing comes out. - After about 6 days (or) a week, the white thing elongates as a curve over the ground. - By measuring with a ruler, it is found to be 1/2" in height and it is noticed that the color also changes to green. - Over a week, the green curve straightens out and thick pair of leaves inside the seed covers reaches on the ground. - Will tell up to the thick leaves it is 11/2" long. Then after about one or two days, the next pair of leaves appear again. Teacher and students specify the salient steps according to findings. 1. The seed cracks after about two days. 2. Radicle appears after about 5 days. 3. After about 6 or 7 days, the radicle curves on the ground and the color changes from white to green. 4. After a week, the radicle carries the seed leaf inside the seed cover on to the ground and become a seedling.	5 10		The earthen pots and seedlings should be kept for use in the next lesson.
Conclusion: According to the review, steps are necessary for a seed to germinate and these steps are: 1. Cracking of seed. 2. The appearance of radicle 3. The radicle curves on the ground and 4. The curved radicle straightens and pulls out the seed leaf Therefore, Conclude by saying that for a seed to germinate it needs steps. Let the children write the described steps and draw pictures in their notebook.			

Lesson Plan 3-3

Lesson topic: Life cycle of plants
Learning objectives: Be able to describe plants have different stages of life cycle.
Teaching/learning materials: *Plants that have been sow, small shovels, fork, treated land, water, empty drinking bottle* with hole, measuring tape
Teaching period: 5 periods inside the classroom Outside classroom observation :In the morning/afternoon daily (It is to study throughout the life cycle of plant)

Learning procedure

Learning procedure	Time	Teaching/ Learning Materials	Points to be noticed
Preparatory activities Before starting this lesson, it has to be arranged to use the seedlings and soil in the pots that have been obtained in the previous lesson. Soils have to be prepared for the children to transplant the *former seedlings in school compound. Making furrows,* making the soil loosen, putting a little manure beforehand and watering have to be carried out. It has to be arranged to be able to grow by groups. In case of requiring supports or trellis, bamboos have to be collected beforehand.	15		Making furrows to be ready to grow Set the place for growing by group respectively.
Inside classroom It has been known that there are steps required for the germination of the seeds. Tell the children that those seedlings will be studied. ▸ Have the children loosen the soil gently with fork and pull the seedlings slowly so as to be able to root out them from the soil without injuring. ▸ *Let the children observe the rooted seedlings* by handling gently. ▸ Ask them to draw as they find. ▸ By showing the part of root, ask the children, "What is this part called?" ▸ By showing the part of stem, ask the children, "What is this part called?" ▸ By showing the part of leaf, ask the children, "What is this part called?" ▸ After the children know that a plant contains parts like root, stem and leaf, ask them to measure the length of the whole plant, root and stem with measuring tape and note down the measurements separately. Have the children count the number of leaves. ▸ Ask them, "What else does a plant have besides root, stem and leaf?" ▸ Teacher has to lead the questioning until the answers of "flower", "fruit" etc. come out.	20		Have the children know that *the parts of a plant are root,* stem and leaf. **Measurement** The length of whole plant = (-----) The length of stem = (-----) The length of root = (------) The number of leaf = (------)

<table>
<tr><th>Learning procedure</th><th>Time</th><th>Teaching/ Learning Materials</th><th>Points to be noticed</th></tr>
<tr><td>Tell them it has to be continued to observe what will happen to the seedlings so that those will have to be transplanted from the pot into the ground of school compound.
Then rooted plants of one's group have to be grown gently at the set place where the soil has already been got ready to grow respectively.
Instruct the children to do watering after plantation, then, to wash their hands and to get together in the classroom.

When getting to the classroom, pick firstly the children who will take the responsibility to nurture the grown plants.
Assign duty to a couple daily and tell that weeding and watering has to be done daily.
Tell them to fill in the mentioned table on the day one has been assigned duty.
For example,
- how many inches stem becomes bigger
- how many inches plant becomes higher
- how many new leaves sprout
- bud begins to shoot out
- flower begins to blossom
- plant begins to bear fruits etc.
Tell them that daily findings of distinct processes have to be filled in, illustrations have to be drawn, and measurements also have to be described.
Instruct them to carry out with care and respect and take a break.

After 2-4 months later,
Tell the students to present about the plants that they transplanted on the date of (-------); to select one representative for each group; to present in case of distinctiveness for special presentation with one's records and one group will have seven minutes to present.
Presentation by group

Collecting the findings of the teacher and students
It will be found that the following points will be included.
- Plants become grown up and the number of leaves becomes increased day after day.
- Flowers blossom
Flowers become larger: become dry/have fallen</td><td>5
30
15
15
5
35
10</td><td></td><td>Arrange beforehand to grow the plants 2 feet interval approximately.

For example,
Monday=Ko Ko and Nyi Nyi
Tuesday=Phyu Phyu and WinWin
Wednesday=Sandar and Thidar
Thursday=Aye Ko and Bo Bo
Friday=Tun Tun and Ba Myint
Saturday = Gardener
Sunday = Gardener

Record the distinct points on the blackboard.</td></tr>
</table>

Date	Distinct process (Picture)	Distinct process (Explanation)	Remark

Learning procedure	Time	Teaching/ Learning Materials	Points to be noticed
- Plants bear fruits - Fruits become bigger and bigger day after day and then dry up and seeds are obtained etc. Teacher and students review together on the their findings. To form a plant after germination, - plant becomes grown up gradually - flowers blossom - fruits are born - seeds are obtained through fruits - seeds are able to germinate to form plants again Tell the children the seeds that are obtained now will be stored for the third grade students of next year to grow again.	5		
Conclusion Ask the children to tell that different stages of life cycle are necessary to form a plant as the steps are needed in germination. Then, have the children to draw illustrations of the required different stages of life cycle based on the plants they have grown. Ask them to mention the dates of lifecycle in accord with the stages as well.	20		

Assessment (Different plants)

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Does s/he take interest in the facts related with different plants	Is s/he able to relate the shape of different plants with the different places where they are found	Is s/he able to carry out the activity? (Taking care of the plants and record the studying records)	Is s/he able to understand the different shapes of plants and the condition of places where they grow
Is s/he motivated to *learn about the* plants	Does s/he able to relate *the different plants and* the different places where they grow		Is s/he able to *understand the* relationship between the different shapes of plants and the different places where they grow
Does s/he like studying different plants			

This lesson contains many observations.

Achievement test can be made by assessing the children's skills in observation.
- test the attitude of children
- test the activity of children

Test the activity of children.
To hug the trees and guess how high they are.

Smell the scent of leaves. Compare if the shape of the leaves are the same.

1. Observing nature
2. Observing different shapes of plants
3. Observing the growing of plants in different places.

Oral assessment

1. Can you tell that plants have different shapes?

Written assessment

1. Have you found the different facts in structure among plants?
   (Children can use their studying records)

Message to Teachers

1. Interested in observing plants.
2. Observing correctly the different basic facts by using the five senses; For example (leaf, stem, shrub) shape, touch, the place and region grown
3. Observation by relative thinking
4. Exploration by relative thinking.

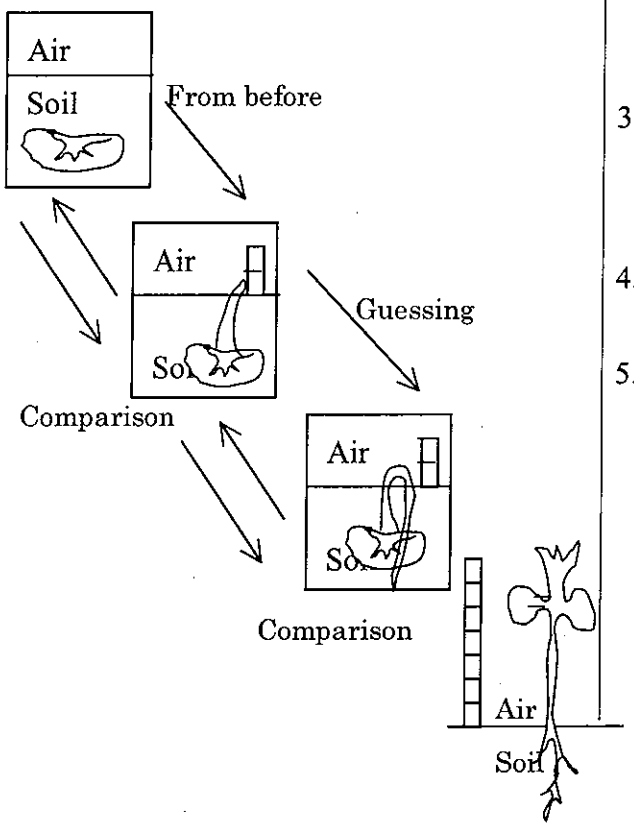
Assessment (Germination of seeds)

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Does s/he take interest in planting trees	Is s/he able to relate the consecutive changes in germination of seed	Is s/he able to perform the activities (taking care of the plants and studying records, recorded picture)	Is s/he able to understand the conditions to germinate from seed and the conditions of germination
Is s/he motivated to learn in relation with plants	Does s/he able to relate the germination of seed with the system to grow		Is s/he able to understand the relationship between the germination of seed and systematic growing
Does s/he like growing plants			

This lesson contains many observations. Achievement test can be made by assessing the children's skills in observation.
- test the attitude of children
- test the activity of children

Test the activity of children



Message to Teachers

1. Interested in observing the germination of seed of the nature of plant.
2. Observing correctly the different basic facts and the changes found by using the five senses (putting the seed inside the soil pot, after preparing the soil, putting the seed just below the soil, watering by using the cut fresh water bottle)
3. Observation by relative thinking.
   - What has happened before and what happens now? (Previous experience-comparison by observation)
4. Observation by relative thinking.
   - What happens now? (Thinking the process)
5. Observation by relative thinking.
   - What will happen? (The ability to guess)

Assessment (Lifecycle of plants)

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Does s/he take interest in the development of a plant? Is s/he motivated to learn in relation with plants? Does s/he like the life cycle of a plant?	Is s/he able to relate the changes of steps in the life cycle of a plant to grow? Is s/he able to relate the life cycle of a plant with looking after the plant?	Is s/he able to perform the activities (Taking care of a plant to grow and recorded picture of study)?	Is s/he able to understand the condition of the development of a plant and its changes in life cycle? Is s/he able to understand the relationship between the life cycle of a plant and the significant processes of a plant?

Oral assessment/Group discussion

1. Tell the parts found in a seedling.
2. What do you call the part where there is a root?
3. What do you call the part where there is a stem?

Message to Teachers

Examining the ideas of children in relation with the structure and parts of a plant.

Measurement of a plant.
The whole plant.
Stem
Root
Total number of leaves (relative discussion)

Recording in the table daily the growing of plants in turns

Recording the growth of a plant.

Grade 3

Chapter 2 Matter

Topic 4: Matters in environment

1. Key concept	Matter has three states (solid, liquid, and gas)
2. Learning objective	
General objective	Be able to understand that there are three states of matter, for example: there are solid things, liquid things, and gases around us.
Specific objective	1) Be able to sort things in environment out into 3 states 2) Be able to explain what solid, liquid and gas are.
3. Activities involved	Naming the three states Sorting out things into 3 states Create simple definitions
4. Activity purpose	Understanding three states by thinking of things around them and sorting them out. Try to find similarities in the same state and come up with their own definition.

Before Getting Started

Self-check list for Teachers	☐ Can I mention general definitions of 3 states?
Background information for teachers	
Solid	A state of matter in which there is a three dimensional regularity of structure.
Liquid	A state of matter between a solid and a gas. A liquid forms a level surface and assumes the shape of its container. Its atoms do not occupy fixed positions as in a solid, nor do they have freedom of movement as in a gas. Unlike a gas, a liquid is difficult compress since pressure applied at one point is equally transmitted throughout.
Gas	In a form of matter, such as air, in which the molecules move randomly in empty space, filling any size of shape of container into which the gas in put. A cubic center of air at room temperature contains 30 trillion molecules moving at an average speed of 500 meters per second.

Lesson Planner

Suggested period (4)	**Period 1**	**Period 2**	**Period 3 4**
Lesson topic	Identifying of three states	Characteristics of 3 states	**Assessment/Review**
Sample lesson plan	4-1	4-1	
Specific objective	Be able to sort things in environment out into 3 states	Be able to explain what solid, liquid and gas are.	
Introduction (Motivation/Create interest/Active prior knowledge)	Think about the materials around our lives.	Let us observe the given materials and sort out, solid, liquid and gas.	
Core/Development (Active engagement with test/task)	Activity 1	Activity 2	
Assessment points	Observation of Activity: Is everybody is encouraged to speak out about his/her idea? Do they have their own ideas about 3 states?; Do they participate in the lesson?; Do they agree or disagree others' ideas?	Observation of Activity: Do they all positively participate in the activity? Do they say their ideas in the group?; Do they discuss well in the group? Do they question one another? Do they do something different with the given materials?	
Adaptation of curriculum	Encourage pupils to mention definitions of matters with their words, and then compare those with the definitions on the text books. Due to the physical characteristics, liquid and gas are kept in the containers or bags, which are solid. Let us not confuse pupils about those materials. Let us explain clearly about the gas by explaining gas as well as other gases. Otherwise, pupil might think gas means air.		

Activity 1 3 states of matters

Teaching/learning material

Concept All matters are either Solid, Liquid, or Gas

Ask children what materials they know in each states.

Classroom discussion
Write down the answers in the table as follows at this time, it is not necessary to write correct answers, just encourage children to express their opinion. It is important for all children to speak out.

	Solid	Liquid	Gas
Material			

Activity 2 Classifying materials

Teaching/learning material

Plastic, Milk, Oil, Paper, Wire, Ice, , Shell, Bubbles, Cloth, Soap water, Stone, etc

Concept

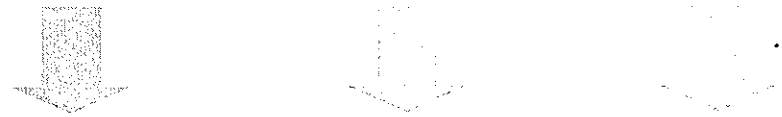
Let us sort many kinds of materials into solid, liquid and gas. (All matters are either solid, liquid or gas)

Form groups in the classroom. Each group is given many kinds of materials. Children in the group discuss which material can be classified as solid, liquid and gas.

	Solid	Liquid	Gas
Material			

After classifying all materials to 3 states, ask students to mention simple properties for each state.

	Solid	Liquid	Gas
Properties			



Simple definition Simple definition Simple definition

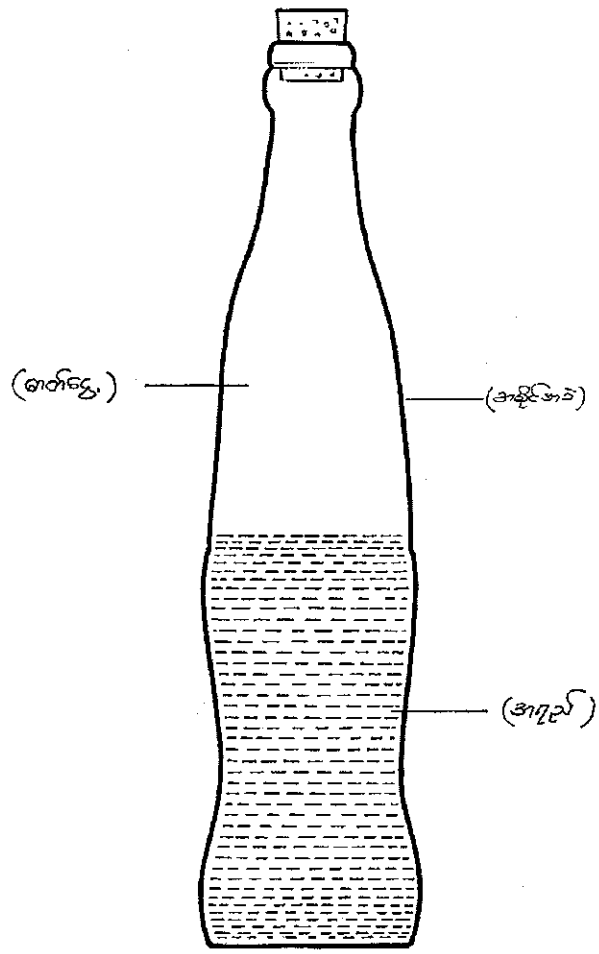
Encourage students to think of their definition for each state. Then let us compare them to the definitions on the text books.

Activity 3 Three states in a bottle

Teaching/learning material

Concept All matters are either solid, liquid or gas

Let us prepare an empty bottle and put water in it to the half as the picture below shows. After asking children to draw the same picture on their notebook, ask them what state it has.



Lesson Plan 4-1

Lesson topic: Objects in the environment
Learning objectives: Be able to sort things in environment out into 3 states
Be able to explain what solid, liquid and gas are.
Teaching/learning materials: Water, bottle, ball, oil, a packet of shampoo, metal, cotton, milk, orange juice, paper cup
Teaching period: 70 minutes
Learning procedure

Learning activities	Time	Teaching/ Learning Materials	Teacher's attitude and important points
Introduction Tell the objects found in your school, or at home, or inside/outside the school or classroom. E.g. Metal, water, oil, stone, air Teacher asks The example which is solid, which is liquid, and which gas is. Teacher asks The topic I am going to teach you today is "Objects in the environment"	10	Blackboard Different kind of object will be given	Have the children tell individually. Solid | Liquid | Gas - - - - - - - - - - - - - - - - - - Entitling the lesson "Objects in the environment"
Development/Core Teacher distributes the materials to the children groups. Ask children to touch and observe them. Encourage children in groups to identify solid materials. Encourage children in groups to identify liquid materials. Encourage children in groups to identify gas. After their sorting materials out, ask children to think of these questions below in group. What is solid? What is liquid? What is gas? After discussion, ask them to present the result of the discussion.	5 5 5 5 15	Ball, ribbon to tie hair, plastic hairgrip, shampoo, cotton string used to tie hair, oil, empty bottle, milk, orange juice Have individual student hold the object and tell.	Solid | Liquid | Gas - - - - - - - - - - - - - - - - - - Teacher records what they told. Solid | Liquid | Gas - - - - - - - - - - - - - - - - - -
Conclusion After hearing the result of group discussion, teacher facilitate children to understand that, **Solid can be held and has definite shape,** **Liquid cannot be held and has no definite shape,** **and Gas cannot be seen by eyes and cannot be held.**	10	Write the meanings on the blackboard - - - - - - - - -	Solid can be held and it is not possible to change its shape. Liquid cannot be held and it is possible to change its shape. Gas cannot be seen by eyes and held.

Learning activities	Time	Teaching/ Learning Materials	Teacher's attitude and important points
Additional information How many kinds of the conditions of objects in the environment? Three kind What are those? (Solid, liquid, gas)			So there are solid, liquid and gas in the environment.
Teacher draws the picture of a bottle on the blackboard. (Refer to Activity 3) Distribute the sheets of paper to each child and have them draw the picture on it. Have the children look at the picture of the bottle and write what are inside the bottle and what can be seen. After that group leaders have to bring those paper sheets.	10	The bottle filled with water to half.	
Group leaders have to keep the experimental materials.	5		

Assessment

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Is s/he interested in objects around our lives? Is s/he interested in observing the given objects? Does s/he cooperate with other pupils to carry it out?	Is s/he able to think most things are solid, liquid or gas? Is s/he able to find common characteristics in objects of the same state? Is s/he able to imagine a object which has 2 or 3 states together?	Is s/he able to treat given objects with care and instruction? Is s/he able to observe the objects carefully? Is s/he able to observe and sort out the given objects into 3 states? Is s/he able to present the common characteristics of 3 states?	Does s/he understand all objects can be identified/categorized as solid, liquid or gas? Does s/he understand what solid, liquid and gas are?

Oral Assessment/Group Discussion

1. Mention any object which is solid around our lives.
2. Mention any object which is liquid around our lives.
3. Mention any object which is gas around our lives.
4. How would you identify the object is solid?
5. How would you identify the object is liquid?
6. How would you identify the object is gas?
7. How would you describe the solid?
8. How would you describe the liquid?
9. How would you describe the gas?

Written assessment

1. Write down any solid object around our lives.
2. Write down any liquid object around our lives.
3. Write down any gas object around our lives.
4. What are common in solid objects?
5. What are common in liquid objects?
6. What are common in gas objects?

Messages to teachers

- Let us make sure that all of children are actively participating in the activities. In the group work, it can happen that only a few members do the activities but the rest do nothing and watch.
- Let us try to show pupils as many examples as possible. They are many objects which have 3 states all together in it. For example, the closed bottle can have the liquid and gas inside and the bottle itself is solid.
- Encourage pupils to mention their ideas about solid, liquid, and gas. In that case, it is not preferable for teachers to say right or wrong.
- Let us try to learn with pupils to discover something new.

Topic 5: Properties of matters

1. Key concept

Matter has observable properties

2. Learning objective

General objectives

1) Be able to understand the properties of solid, liquid and gas

Specific objectives

1) Be able to know that solid has weight
2) Be able to explain that matters have weight which does not change when it breaks
3) Be able to explain that weights of different materials are different even when they have the same volume
4) Be able to explain that liquid can change its shape. (liquid has no definite shape)
5) Be able to explain that liquid has weight and volume
6) Be able to explain that increase of volume of liquid brings increase of its weight
7) Be able to explain that the weights of different liquids are different even when the volumes of liquids are the same
8) Be able to explain that air occupies space (air has volume)

3. Activities involved

Use of simple balance for solid
Use of simple balance for liquid
Feeling the space occupied by air (using a plastic bag)
Balloon rockets

4. Activity purpose

Make sure weight and volume of each state with using balance and other materials.

Before Getting Started

Self-check list for Teachers

- ☐ Am I sure that solid has volume and weight?
- ☐ Am I sure that liquid has volume and weight?
- ☐ Am I sure that gas has volume and weight?
- ☐ Am I sure about the concept of density?

Background information for teachers

Does air (gas) has weight?

The answer is Yes. For example, the weight of 1 liter of air is 1.2 g. However, it is very difficult to show it in the classroom. We can not measure the weight of air which is kept in a balloon or bag in the air, since objects are in the air. Suppose that you are in water, such as in the river, pond, sea or bath with a glass. You keep the glass in the water, which means the glass is filled with water. Then, do you think you can feel the weight of water, you may feel the weight of glass but not water in the glass.

In order to measure the weight of air (gas), we need to remove air in closed space and set the measuring device and air in the container in the space. Then, we can measure the weight of the air.

Does air has volume?

Yes, Let us use any plastic bag and put the air in it. When you close it and make it a balloon, you can see the air is occupying some space. If the air is not occupying the space, the plastic bag is not going to be boosted. The volume of gas is comparatively easy to change. It can be changed by temperature and pressure (force).

Does liquid has volume?

Yes, liquid can occupy the space, which means it has volume. The volume of the liquid can be changed by the temperature and pressure. For example, the liquid in the cylinder can be pushed and pulled with the piston and its volume is decreased and increased.

What is the concept of density?

Have you ever thought which is heavier cooking oil or water? You might answer Oil! because it looks heavier. Let us put some oil drops on the water. What would you see? Oil floats, doesn't it. Is this because the water is a lot and oil is a little? Let us put some water drops on the oil. Water goes down to the bottom and it does not float. Let us think why this is happening. This is simply because the weight of water in the unit volume is different that of oil in the same volume.

Another example, which is heavier, sugar or salt when they are put in the same size of container (same volume). How about sesame and rice? Each has a specific weight against certain volume, what is the idea about density.

Lesson Planner

Suggested period (7)	**Period 1**	**Period 2**	**Period 3**
Lesson topic	Weight of solid	Weight and volume of solid	Shape of liquid
Sample lesson plan	5-1	5-2	5-3
Specific objective	Be able to know that solid has weight	Be able to explain that matters have weight which does not change when it breaks Be able to explain that weights of different materials are different even when they have the same volume	Be able to explain that liquid can change its shape. (liquid has no definite shape) Be able to explain that liquid has weight and volume
Introduction **(Motivation/Create interest/Active prior knowledge)**	Which material is heavier? How about sugar and salt in the same volume?	When the shape changes, does its weight change?	What is the shape of water?
Core/Development **Active engagement with test/task**	Activity 1 and 2	Activity 3 and 4	Activity 5 and 6
Assessment points	Observation of Activity:	Observation of Activity:	Observation of Activity
Adaptation of curriculum	Activities introduced look fairly simple, but it could be difficult for children to connect the topic concepts with the activities. Teachers need to carefully explain the topic and introduce the activity. Since most of the activities mentioned are on the text books, let us effectively use the text books to introduce the activities and to make sure the results of the activities for reinforcement.		

Lesson Planner

Suggested period	**Period 4**	**Period 5**	**Period 6 7**
Lesson topic	Weight and Volume of liquid	Volume of gas	**Assessment/Review**
Sample lesson plan	5-4	5-5	
Specific objective	Be able to explain that increase of volume of liquid brings increase of its weight Be able to explain that the weights of different liquids are different even when the volumes of liquids are the same	Be able to explain that air occupies space (air has volume)	
Introduction **(Motivation/Create interest/Active prior knowledge)**	More water is heavier than less water. But Oil and water, which is heavier?	How can we feel the air? It is there?	
Core/Development **Active engagement with test/task**	Activity 7 and 8	Activity 9	
Assessment points	Observation of Activity:	Observation of Activity:	
Adaptation of curriculum	Activities introduced look fairly simple, but it could be difficult for children to connect the topic concepts with the activities. Teachers need to carefully explain the topic and introduce the activity. Since most of the activities mentioned are on the text books, let us effectively use the text books to introduce the activities and to make sure the results of the activities for reinforcement.		

Activity 1 Weight of solid (Hand balance and balance)

Teaching/learning material

Apple, Orange, Water in a bottle, an iron bar, a book, balance (hand-made)

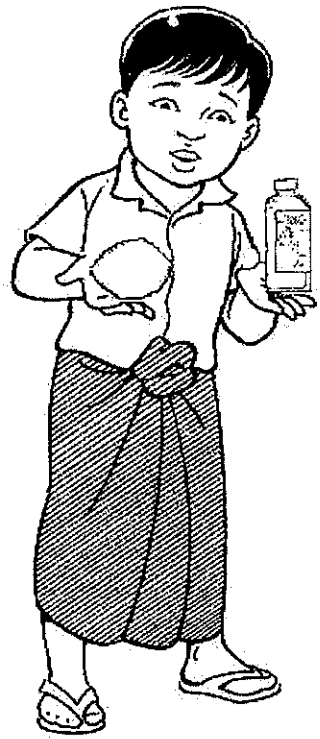
Concept Solid has weight

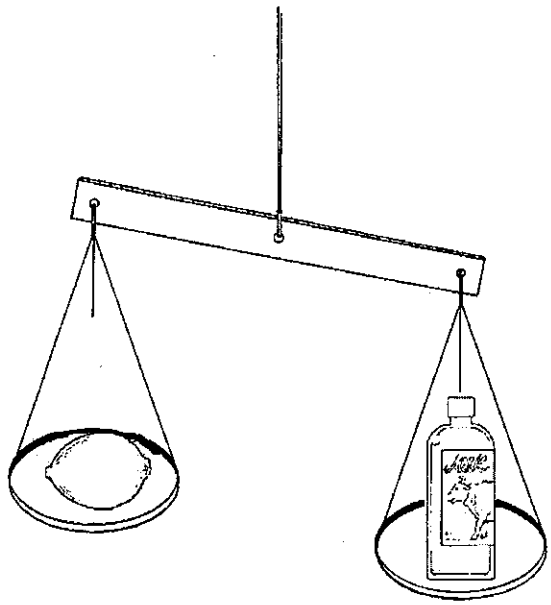
Prepare the balance, which has the 2 plates at both ends. Use the same plates in order for the bar to stay horizontally to the ground.

Let us observe what happen when a material is put on one side, Is it showing that the material has the weight?

Let us compare the weights of a lot of materials by using your both hands and the balance.
1. Take two objects on your hands and think which is heavier.
2. Repeat doing that until you hold all materials, and then you rank them according to your feelings.
3. Take two objects on the balance and see which is heavier.
4. Repeat doing that for all materials, and then rank them again.
5. Compare the rank that was previously made?
6. Who could measure the weights of materials best?

Ranking (with Hand balance)		Ranking (with a balance)	
1		1	
2		2	
3		3	
4		4	
5		5	





Activity 2 Weight of solid 2

Teaching/learning material

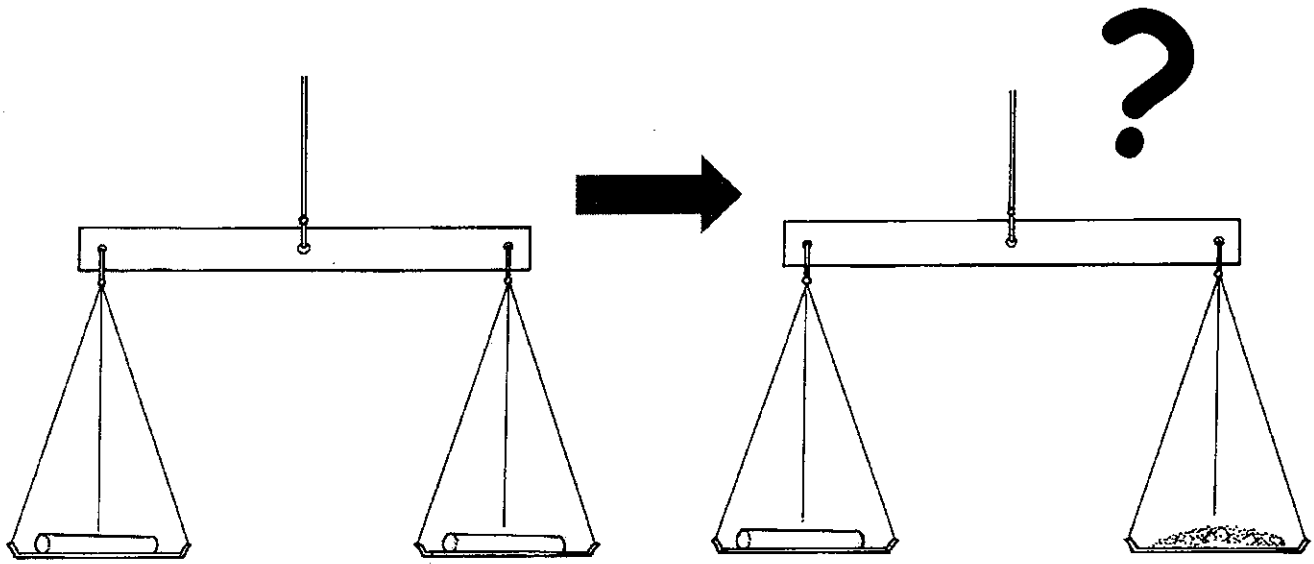
Balance, 2 pieces of chalk, 2 pieces of paper

Concept Weight of solid does not change even when its shape changes

Before staring the activity, let us explain what we will do to children and encourage children to predict what will happen.

1) Put papers on both sides of the balance
2) Let us put one piece of chalk on one side of balance and another on the other side.
3) Make sure that the balance is kept horizontal.
4) Ask children what will happen to the weight of chalk if we break it into small pieces.
5) Encourage to think and choose 3 options below
   - ◆ It gets lighter
   - ◆ It gets heavier
   - ◆ It is the same (no change in weight)
6) Do not forget to ask reasons why they choose the option.
7) Let us take one chalk with paper and break it into small pieces. But do not lose any pieces from the paper.
8) Put the small pieces on the paper on the balance again.
9) Let us see what happens.

In general, the weight of chalk does not change before and after breaking. The balance will be kept horizontal.



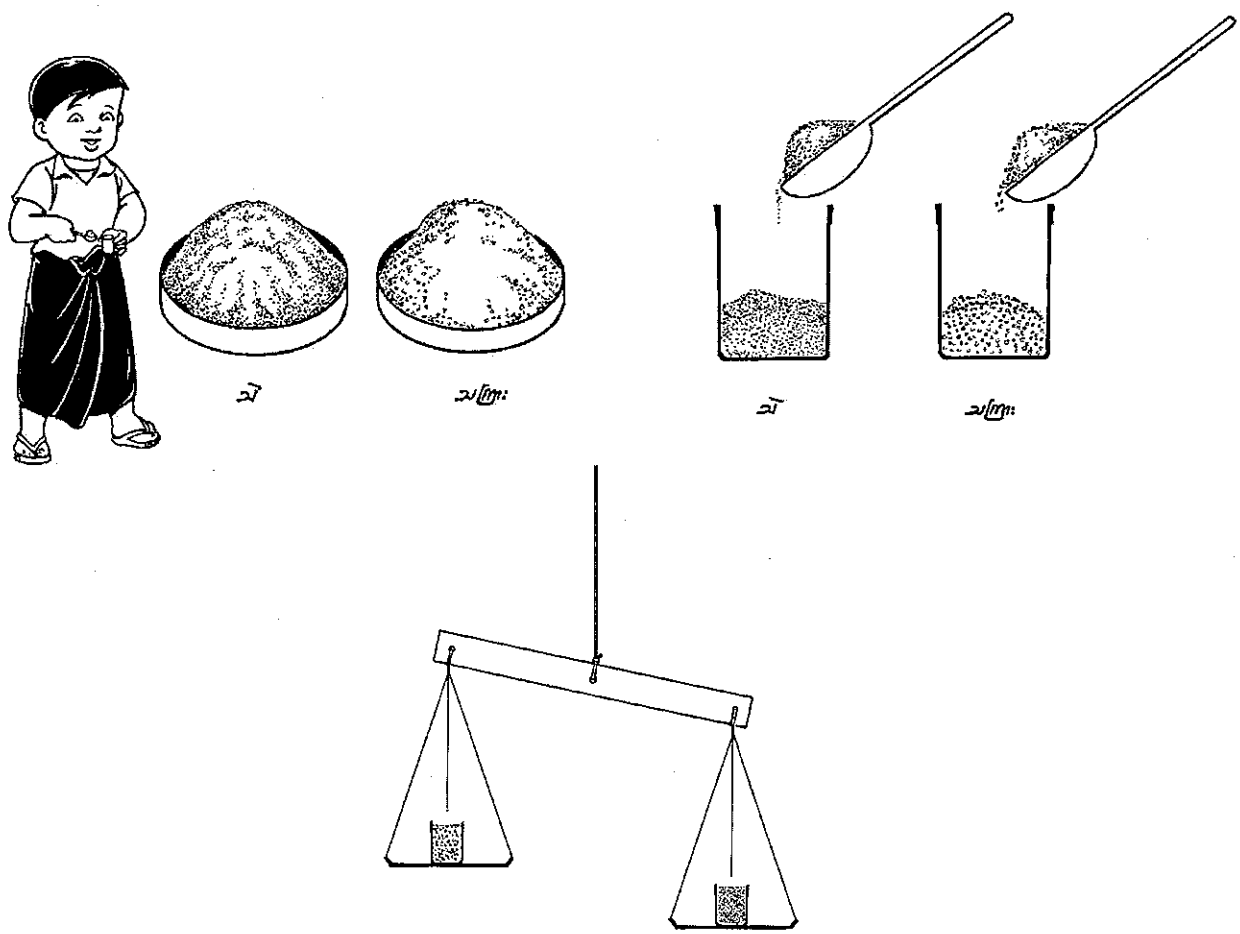
Activity 3 Weight of Solid 3

Teaching/learning material

A balance, 2 film cases (any cases with the same volume), sugar, salt, rice, sand and soil.

Concept 2 materials could be different in weights even when they have the same volume.

1. Prepare some solid materials which can occupy certain small container such as film case, small plastic bottle.
2. Let us fill in the small containers with solid materials.
3. Encourage children which material is the heaviest in the same volume.
3. Using a balance, compare the weights of containers filled with different materials.



Activity 4 Liquid has no definite shape.

Teaching/learning material

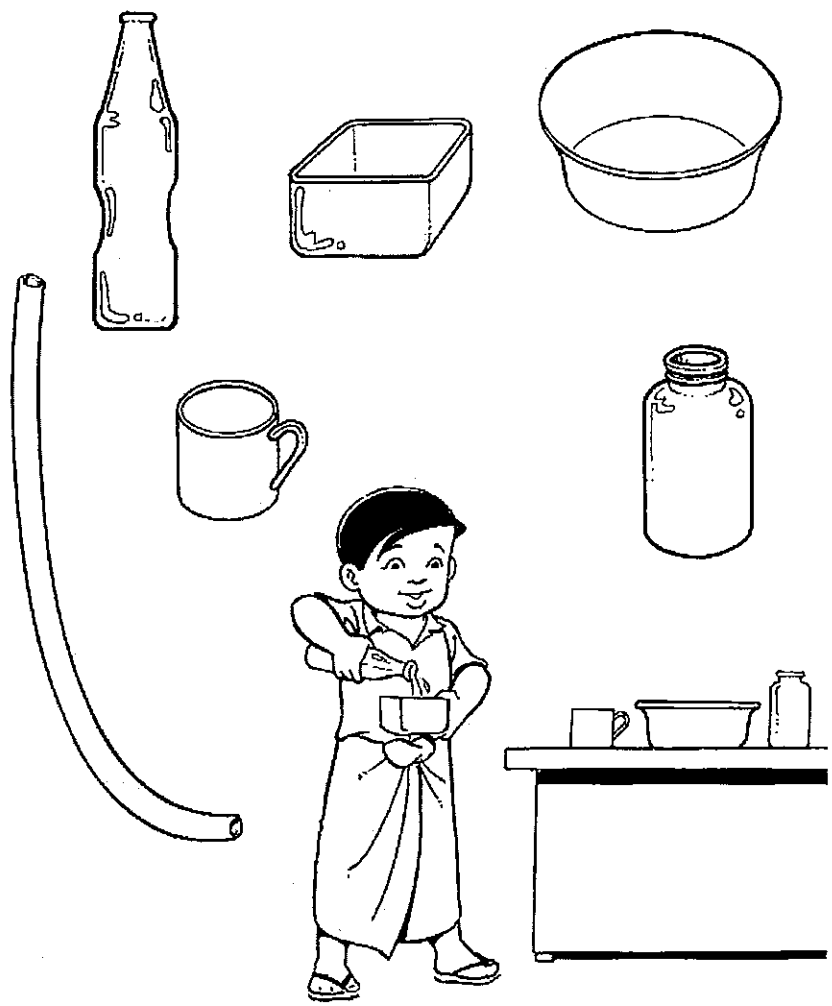
Water, soda bottle, glass, lunch box, tube hose, plastic bottle and other different containers.

Concept Liquid can change its shape according to the container in which liquid is kept.

Let us ask children what is the shape of water.
They will give you very creative ideas. Encourage children to speak out.

Put water into one of container and ask the same question "what is the shape of water?"
Put the water in the container into a different container, then "what is the shape of water now?"
Let's pour water from one container to another continuously.
After that, let's ask children "what was the shape of water?"

By doing activity, children are supposed to understand that liquid(water) has no definite shape, in order words, the liquid (water) can change its shape according to the containers which the liquid is kept.



Activity 5 Weights of Liquid

Teaching/learning material

A balance, 2 plastic cases with the same volume, oil, water, kerosene and other liquids

Concept Liquid has weight. The weight is proportion to the volume.

Let us put 2 empty plastic cases to the balance as the diagram shows.
Is it balanced?

It is important for teachers to encourage pupils to guess what will happen before carrying out

Let us put water into one of the case.

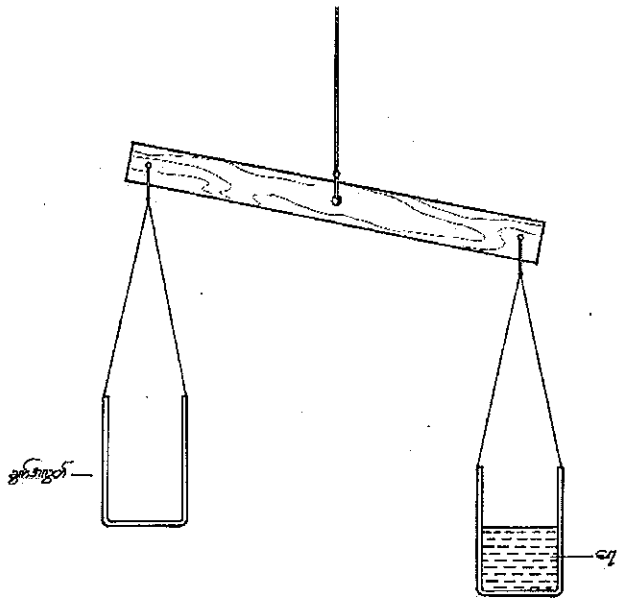
What do you observe?

Next, let us fill both cases with water and place both on the balance.

What do you observe?

Last, let us fill one case with water and fill half the other case with water, then
Place both on the balance.

What do you find?



Activity 6 Weight of liquid 2

Teaching/learning material

A balance, several plastic cases with the same volume, oil, water, kerosene, milk and other liquids

Concept The weights of 2 different liquid are different in the same volume.

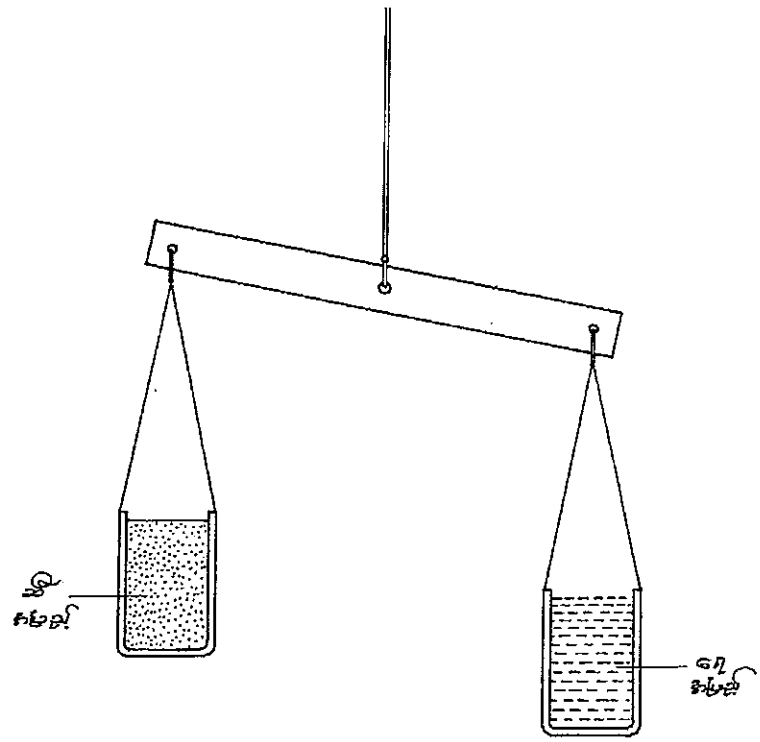
Let us fill plastic cases with 5 types of liquid, such as oil, water, kerosene, milk and others.
By using the same size of plastic case, we can prepare the same volume of different liquid.

The point of this activity is to see which liquid is the heaviest in the same volume.
Before using the balance to see the difference, encourage children to guess which is the heaviest and made the rank of them. (encourage each child to fill in the left column below)

Ranking (Guessing))		Ranking (with a balance)	
1		1	
2		2	
3		3	
4		4	
5		5	

After guessing, let us use the balance to compare 2 different liquids and keep on doing the same with other liquid. Then, make the rank of the heavy liquid (fill in the right column above).

Was your guessing right?



Activity 7 Weight of liquids 3

Teaching/learning material

A balance, 2 glasses, water, sugar

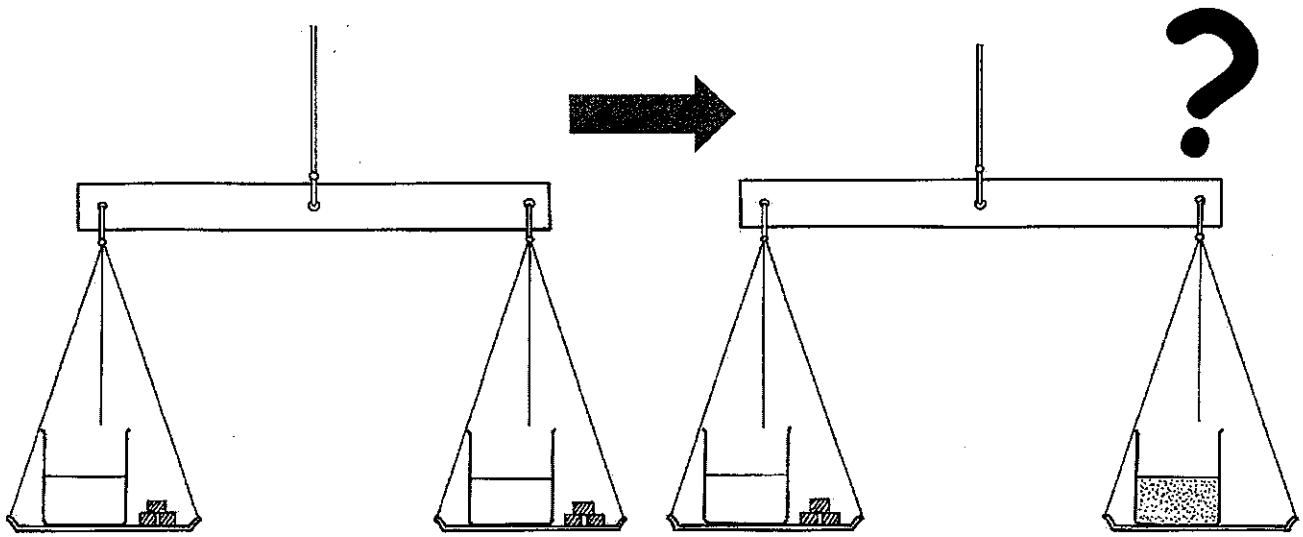
Concept Weight does not change even when solid dissolve in water.

How will the weight of water and solid change when the solid dissolve in water?

Before staring the activity, let us explain what we will do to children and encourage children to predict what will happen.

1) Put the same amounts of sugar on the both sides of the balance
2) Put the same amounts of water in the glasses on the both sides of the balance
3) Make sure that the balance is kept horizontal.
4) Ask children what will happen if sugar on one side is put into the water and make it dissolved.
5) Encourage to think and choose 3 options below
   - ◆ It gets lighter
   - ◆ It gets heavier
   - ◆ It is the same (no change in weight)
6) Do not forget to ask reasons why they choose the option.
7) Remove glasses and sugar from the balances
8) Put sugar into water in the glass and stir it.
9) Put sugar and water in the glass on one side and sugar solution on the other side
10) Observe what happens.

In general, the weight of water and solid does not change even when solid dissolve in the liquid. In this case, even after dissolving the balance will be kept horizontal.



Activity 8 Existence of Gas (Air)

Teaching/learning material

Plastic bag, Balloon, Cotton, Straw, tape

Concept Air exists although it is invisible.

Let us capture the air with a plastic bag.

The plastic bag is like a paper when it is empty. Let us put air in it and close it.
We have air in the plastic bag. Let push and pull the bag and feel the air inside.

Activity 9 Air occupies space (it has volume)

Teaching/learning material

Plastic vessel, glass, water

Concept Air occupies some space.

Put water into the plastic vessel to the half full.

Grasp glass the upside down and there is air inside of glass.

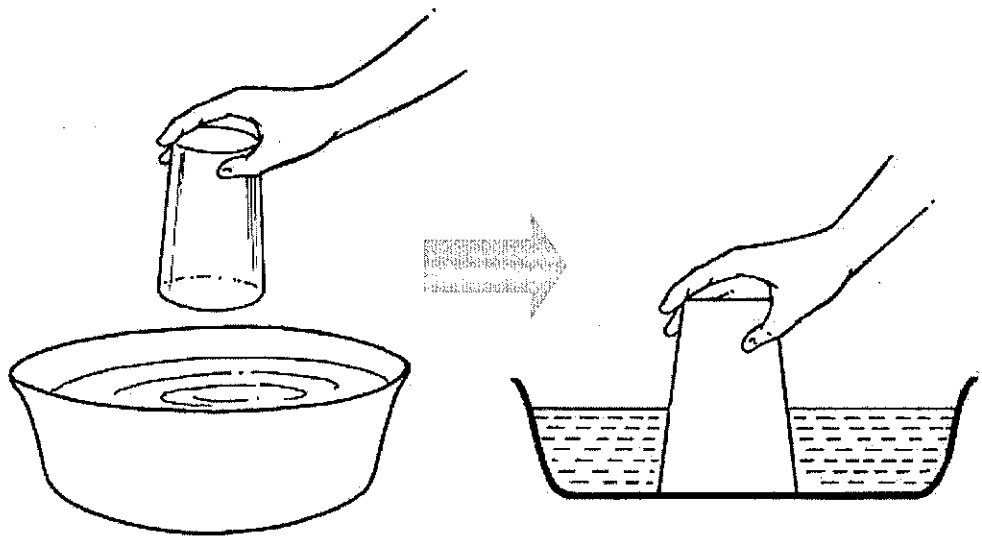
Keep the glass upside down and insert it into water in the vessel.

What happens? Does water come into the glass?

Answer is NO. This activity is to show that air has volume to occupy certain space.

Encourage children to guess what will happen before inserting the glass into water.

Children speak out what they think and why they think so.



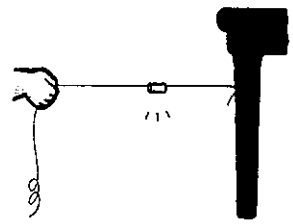
Activity 10 Play with Air (Existence of Air)

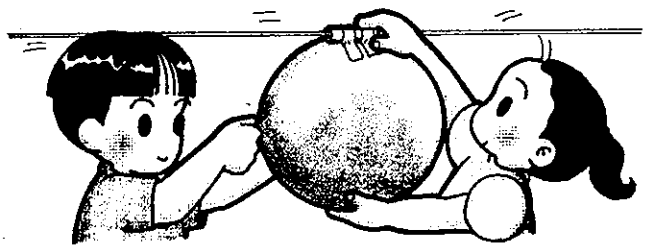
Teaching/learning material

Concept	By making and flying balloon rockets, children feel about the existence of air.

Balloon Rocket

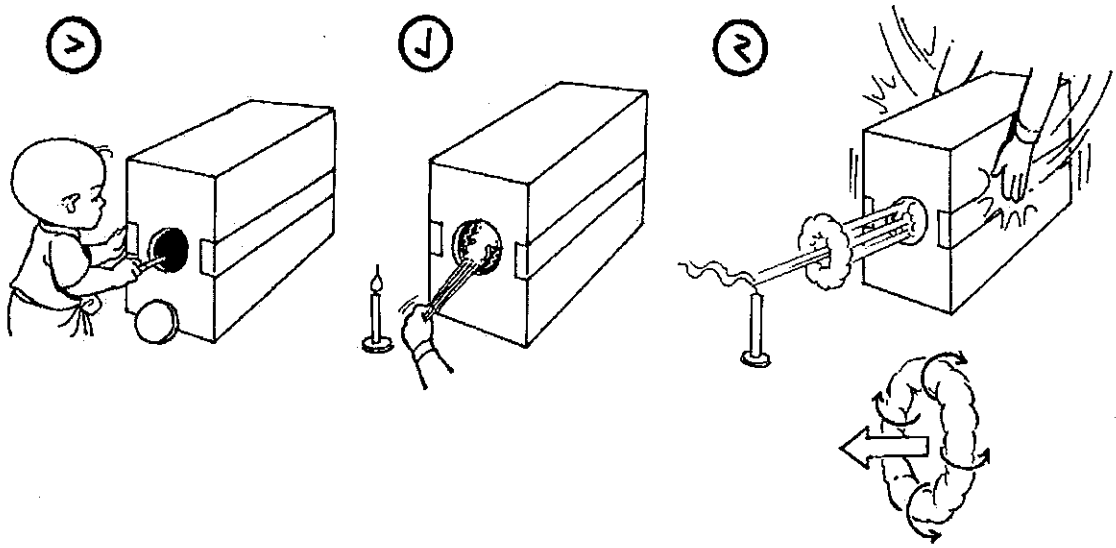
1) Insert a string of thread into the hollow of the straw of 3 cm long.
2) Blow the air into the balloon and fix the straw into which a string of thread is inserted onto the balloon by adhesive tape.
3) The balloon will move when it is released.
4) Distribute the materials
5) Tell the children to try the experiment by groups.





Air gun

1) Close a corrugated carton with tape.
2) Make a hole (diameter 10cm, depending on the size of the carton).
3) Put the smoke of incense sticks into the carton.
4) Let's strongly hit both sides of the carton at the same time.
5) What do you observe?
6) Let's put the candle at the distance of 3m from the carton.
7) Let's try to blow it off by hitting the carton.



Lesson Plan 5-1

Lesson topic: Weight of solid
Learning objectives: Be able to know that solid has weight
Teaching/learning materials: Balance, various materials (orange, apple, notebook, pen, water in a small bottle, stone, wood, etc
Teaching period: 35 Minutes
Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Important points
Introduction Teacher asks the children the questions regarding matters contained in the previous lesson. How many states do the matters have? Ask the children to tell about the solids from their answers as far as they remember.	5		Teacher records the answers of the children.
Development **Activity A** Ask the children whether they have ever handled solids or not. Ask them what kind of things they have ever handled and how do they feel when handling stones and bricks. Let's study about the objects through using a scale. How is the position of scale before putting objects? Let them think how is the position of the scale it will be after putting objects. What will be the position of the scale when a piece of stone is put on one side? Encourage them to think why the position of scale changes.	10		Give time to the children in groups to think. Children's answers will be recorded on the blackboard. The guesses of the children will be recorded.
Activity B (refer to Activity 1) Prepare many materials. We measure the weights of materials by hands and the balance. Make the list of materials according to their weights (the heaviest is the top of the list) You use your hands only. Make the list of materials again by using the balance. Children can compare the weights one by one. Let us see how different the list by hand and the list with using the balance.	10	Various materials, the balance	Children will think by group and each group will present. Teacher can show how to use the balance to children.
Conclusion When the stone is put on one side of balance, that side of the balance goes down because the matter has weight. Each solid has specific weight.			

Lesson Plan 5-2

Lesson topic:	Properties of Solid
Learning objectives:	Be able to explain that matters have weight which does not change when it breaks Be able to explain that weights of different materials are different even when they have the same volume
Teaching/learning materials:	2 plastic cups (or film case), balance, 2 pieces of chalk
Teaching period:	35 Minutes

Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Important points
Introduction Teacher gives children 2 questions. 1. If we break chalk into small pieces, does the weight of the chalk change? 2. Which is heavier, sugar or salt? Children in group think and discuss in the group.	5		Involve all children to think about questions from their experiences.
Development **Activity A (Chalk breaking, refer to Activity 2)** Before doing this activity, let us hear what each group of children say about the question and write them on the black board. 1) Let us put one piece of chalk on the one side of balance and another on the other balance. Put paper between chalk and balance. 2) Make sure that the balance is kept stable (horizontal) 3) Take one chalk and paper and break it into small pieces on the paper. (do not lose any pieces from the paper). 4) Bring small pieces of chalk with paper back to the balance. 5) Observe and ask children what this activity means.	10	Balance, chalk	Prediction is very important before doing.
Activity B (Sugar or Salt, refer to Activity 3) Again, before doing this activity, record what each group says for the question. 1) Let us put two cups on the balance.(one on one side) 2) Make sure that two cups have the same weight and the balance is stable (horizontally kept) 3) Remove two cups and fill one with sugar and the other with salt 4) Put them back on the balance 5) See which is heavier and ask children what this result means. 6) If available, let us compare rice, flower and others.	10	Balance, plastic cup, sugar and salt	Prediction is very important before doing the activity.
Conclusion .The weight of matter does not change even when it is broken down into small pieces or changes its shape. The weights of different solids are different even when they have the same volume.			

Lesson Plan 5-3

Lesson topic: Properties of Liquid
Learning objectives: Be able to explain that liquid can change its shape. (liquid has no definite shape)
Be able to explain that liquid has weight and volume
Teaching/learning materials: Saucer, glass, bottle
Teaching period: 35 Minutes
Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Important points
Introduction Let us discuss about what you have already known. How many kinds of conditions do you know the objects in the environment have? (Encourage the children think by groups) What are those? (.....) Do you know the definition of liquid? (Have the children answer by groups) Entitling the lesson "Liquid"	5	Blackboard	Teacher records the children's answers. Solid, liquid, and gas. The thing that has no definite form and cannot be held in hand is called liquid.
Development **Activity A (refer to Activity 4)** (1) Before experiment, instruct to hold the materials systematically and tell that these materials can be broken and dangerous when dropped. (2) Instruct to keep the materials whenever after one experiment has been carried out. (3) Show three things of saucer, paper cup, and empty drinking bottle. Think which form of the water will appear when you pour the water into each thing. (4) Teacher distributes the materials to the children. (5) Have the children do practically. (6) Discuss on what children found out after their experiment. 1. Flat/ saucer 2.glass 3. tube 4. Square shaped tray 5. soda bottle Are the forms of water in each container the same? Why? The form changes according to the shape of container. Have the children keep the materials systematically.	10		Note down the answers of the children groups on the blackboard. If the container is different, the form of the liquid will not be the same. **Liquid changes its shape** depending on the shape of container in which it is put.
Activity B (1) Show an empty cup and a cup filled with water. Make the children close their eyes and guess the weight of the cups through lifting on their palms and shifting the cups left to right and right to left. Let say. How is it? Teacher records the answers of the children. (2) Distribution of materials. (3) Carrying out the experiment (4) Discussion of the Students. What is in the 1st cup? What is in the 2nd cup?	10		Let the children engage in Brainstorming Is the empty cup light or heavy? Is the cup filled with water light or heavy? Record their answers. Teacher records the answers of the children. - There is water in the cup.

Learning Activities	T	Teaching/ Learning Materials	Important points
What do you find out when you test with the empty cup and the cup filled with water? **Water has weight.** Have the children keep back the materials. **Activity C** (1) Hold an empty glass and a glass filled with water and pour the water into the empty glass. What will happen? How do you think about it? (2) Distribution of materials by group. (3) Have the children take part in doing experiment. (4) Let them discuss again. (5) What is there in the 1st cup? - There is air in it. - There is nothing in it. What is poured into the cup? Water is poured into it. What happens to it? The space inside the cup is full of water. What does it happen? Water enters the cup. How else can you tell? Water occupies the space. Therefore, water in other words liquid can occupy space. Have the children keep the materials. **Conclusion** How many experiments did you carry out today? Three. What did you use in the 1st experiment? What did you find out? Why? What did you use in the 2nd experiment? What did you find out? Why? What did you use in the 3rdexperiment? What did you find out? Why? Therefore, **Liquid changes its shape according to the shape of the container in which it is put.** **Liquid has weight. Liquid can occupy space.** Have the children write the necessary points in the text and notebook.	10		- There is air in the cup. - There is nothing in the cup. The cup filled with water is much heavier than the other. Record the answers of the children. Teacher records the children's answers. **Liquid can occupy space.**

Lesson Plan 5-4

Lesson topic:	Weight of liquid
Learning objectives:	Be able to explain that increase of volume of liquid brings increase of its weight. Be able to explain that the weights of different liquids are different even when the volumes of liquids are the same.
Teaching/learning materials:	Balance, water, oil
Teaching period:	35 Minutes

Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Important points
Introduction. Teacher will ask questions again, on what was taught in relation with the matters in the previous lesson. Tell the states of matters. Tell some liquids and tell what liquid is or how it is? Teacher may say "We will learn about the weight and volume of liquid".	5		Teacher has to record the children's answers.
Development Showing 2 bottles of water (one is filled, and the other is half filled.), teacher ask children which is heavier? All children will answer "the one completely filled". Teacher continues to say "Why do you think it is heavier?" Children will easily say " because it has more water in the bottle" Teacher confirms that "**more volume of water the bottle has, the heavier it becomes**" If the same volume of water is put into two containers, which is heavier? (Children will say both are the same in weight) Then, How about this? If the same volume of different liquids is put into two containers, say water and cooking oil, do you know which is heavier?	10	Two bottles (same size), water	Teacher does not have to say one is filled and the other is half filled. Just show both of them to children.
Activity A (refer to Activity 6) Prepare different kinds of liquid as many as possible, then let us compare which is the heaviest when the volume is the same. Teacher can show different liquids to children and ask them to guess and make the rank of liquid heaviness. After making sure all children make the rank, start the experiment with the following steps. 1. Fill one cup with one liquid 2. Fill another cup with another liquid. 3. To measure which is heavier with using a balance. 4. Continue 1-3 with other liquids available. 5. Make the rank and compare it with the rank children guessed.	15	Different kinds of liquids. (water, oil, milk, kerosene, etc) two same-sized cups	Children will be asked to discuss and present in groups. Children's answers will be recorded on the blackboard.
Conclusion Main points of this lesson are; **The more the volume is, the heavier it is when the liquid is the same, and** **Even when oil and water (different liquids) have the same volume, their weights are different.**	5		

Lesson Plan 5-5

Lesson topic: Existence of Air
Learning objectives: Be able to explain that air occupies space (air has volume)
Teaching/learning materials: Big plastic bag, small plastic bag, glass, tray/bowl, straw of 3 cm long, balloon, adhesive tape, and a string of thread
Teaching period: 70 minutes (2 periods)
Learning procedure

Learning Activities	Time	Teaching/ Learning Materials	Important points
Introduction What do plants and animals that you have already learnt in Grade Two need for their survival? Ask individually. Have you ever seen air out of water, air and sunlight? How have you seen it? Have you seen it by naked eyes? If that so, how do you know it exists? Is it possible to catch air by hands? Try it. If that so, let's catch air. The lesson for today is " Existence of air". Let's have experiment on it.	5		Teacher writes "water, air and sunlight" on the blackboard. Record the answer of individual student. Entitling the lesson.
Development **Activity A (refer to Activity 8)** The teacher holds the plastic bag and asks children," What is it inside?" Teacher traps air inside the plastic bag, then goes around and lets the children groups test it. What is it in the bag? There is air in it. Have the children squeeze it and ask why it becomes smaller. Teacher distributes each plastic bag by groups. At first, teacher shows children how to trap air inside the bag. Have the children groups trap air. Have each group run around playing with the bags in which air has been trapped. Then ask them about their findings.	15	Small plastic bag Big plastic bag	There is air in the environment. There is air everywhere. Encourage children to say whatever they found.
Activity B(refer to Activity 9) Showing a glass and water in the tray, ask children what will happen if the glass is put in water upside-down? Encourage children to discuss in group and speak their ideas. Teacher can also show some options with illustrations for children to choose.	10	Glass, water in the tray/bowl	

Learning Activities	Time	Teaching/ Learning Materials	Important points
1. Water comes in the glass 2. A little of water comes in the glass. 3. Water does not come in the glass at all. 4. Water comes in and get higher than the level of water outside. Encourage children to choose and ask them why they think so. Then, teacher can demonstrate it in front of children.	10		The answer is 3. Water does not come in the glass at all. After showing the demonstration, ask children why water is not coming into the glass.
Activity C (refer to Activity 10) Teacher tells the names of materials for experiment. Teacher carries out the experiment first. 1) Insert a string of thread into the hollow of the straw of 3 cm long. 2) Blow the air into the balloon and fix the straw into which a string of thread is inserted onto the balloon by adhesive tape. 3) The balloon will move when it is released. 4) Distribute the materials 5) Let the children perform the experiment by groups. 6) Have them think. 7) What do you find out? 8) What do you know? 9) What happens?	20	Balloon, straw of 3 cm long, adhesive tape, a string of thread of 3 m long	If this experiment is difficult, let us do at least Activity 8 and 9.
Conclusion Teacher may ask children "Did you feel the air today? When put air in the plastic bag, what did you find it? Was it soft or tight?" Let us think about the tires of vehicle. Do you know what inside is? As you may know, air is put inside of tires. As we have experienced, the main point for today is **air (gas) can occupy space/ air has volume.**	10		Do not get confused that air does not equally mean gas. Air is the specific name of gas which we commonly have in our environment. <u>Reference</u> Air is in fact mixture of oxygen (21%), nitrogen(78%), carbon dioxide(0.03%), and other gases.