National SCIENCE Textbook

Grade 5

Papua New Guinea
Department of Education

From
the People of Japan

JICA

QUIS-ME
We love Maths and Science!
Department of Education & JICA

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NOT FOR SALE'

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National Science Textbook

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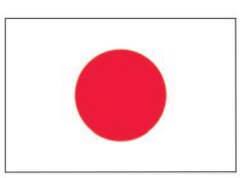


From the People of Japan

Minister's Message

Dear Grade 5 Students,

I am honoured to give you my message in this National Science Textbook. The Government of Papua New Guinea through the National Department of Education has been giving priority to improve standards of learning in the area of Science for many years. A big thank you to the Government and the people of Japan for the continuous support in improving the quality of education in Papua New Guinea.

Students, this Science Textbook was developed by our very own Textbook Writers, Pilot teachers and Curriculum officers who have worked together with the Japanese specialists for three years to complete this Textbook. This is the first of its kind and also the best National Textbook for Grade 5 students in PNG. Do you know why? Because what you will learn from this textbook is comparable with international standards.

This textbook is exciting because it contains a lot of interesting student-centred topics and activities recommended for Grade 5 Science. The photographs, illustrations, charts and diagrams are based on PNG contexts and are interesting and exciting for learning. I am confident that this textbook will motivate you to explore more about Science.

Students, Science is a very important subject because it allows you to explore the things around you by using all your senses. You will have the opportunity to investigate scientific problems by yourself using the Science process skills; make predictions, test predictions and find solutions to the scientific problems.

I encourage you to be committed and to enjoy and love Science, because one day in future you will be a very resourceful person, participating in developing and looking after this very beautiful and resourceful country of ours and improving the quality of living.

I wish you a happy and fun learning experience with this Grade 5 Science Textbook.

Joseph Yopyyopy, MP
Minister of Education

Message from the Amassador of Japan

Greetings to Grade 5 Students of Papua New Guinea!

It is a great pleasure that the Department of Education of Papua New Guinea and the Government of Japan have worked together to publish the national textbooks on science for the first time.

The officers of the Curriculum Development Division of the Department of Education made full efforts to publish this textbook with Japanese science experts. To be good at science, you need to keep studying with this textbook. In this textbook, you will learn many things about science with a lot of fun and interest, and you will find it useful in your daily life. This textbook is made not only for you but also for the future students.

You will be able to think much better and smarter if you gain more knowledge on numbers and diagrams through learning science. I hope that this textbook will enable you to enjoy learning science and enrich your life from now on. Papua New Guinea has a big land mass with plenty of natural resources, and a great chance for a better life and progress. I hope that each of you will make full use of the knowledge you obtained and play an important role in realising such potential.

I am honoured that, through the publication of this textbook, Japan helped your country develop science education to improve your ability, which is essential for the future of Papua New Guinea. I sincerely hope that, through the teamwork between your country and Japan, our friendship will last forever.

Satoshi Nakajima
Ambassador of Japan to Papua New Guinea

SCIENCE...

It's exciting...

It's amazing...

It's fun...

It's Science

Secretary's Message

Dear students,

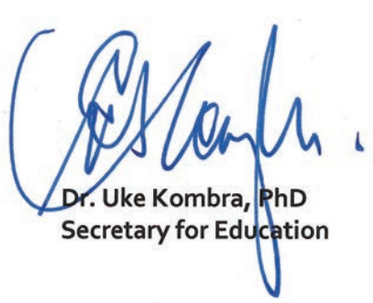
This is your Science Textbook that you will use in Grade 5. It contains a lot of very interesting and enjoyable activities that you will be learning in your daily Science lessons.

In our everyday lives, we come across many situations such as the use of electric circuits in different appliances, food rotting, iron rusting and the list goes on. These situations are real and they contribute to the way we live. By learning Science using this textbook, it will help to address such real-life problems.

This Textbook provides a variety of enjoyable and interesting science activities and ideas. It provides the opportunity for the learner to learn together with the class or as an independent learner. The activities are designed in a way that a scientific problem is identified and the learner will have to solve the problem using the different scientific skills like making predictions, measuring, recording data and communicating the results. These are the important skills needed in order to understand the concepts of the lessons. The use of science process skills will help you to make decisions that will benefit you, your family, your community, your province and the country to improve the standard of living in the 21st Century and beyond.

I encourage you to enjoy learning Science and use the scientific knowledge learned to solve problems and issues that are encountered in the community and country today.

I wish you all the best in studying Science using this Textbook.



Dr. Uke Kombra, PhD
Secretary for Education

Content

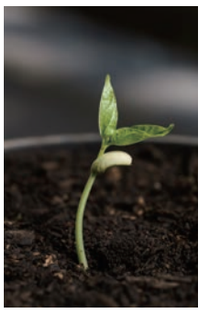
Strand

- Life
- Physical Science
- Earth and Space

How to learn SCIENCE

1 Wonder or Question

- Look carefully at things in nature around you and things in your daily life.
- Realise things that you wonder about.
- Identify the key question in the lesson.



2 Research

- Guess what will happen at the end of the activity.
- Understand the steps of the activity.
- Observe or conduct experiments in the activity.
- Record the result in your exercise book.
- Check if the result is the same with your guess.
- What do you find from the observation or experiment?

Symbols in this textbook

Each symbol gives you an attention about:

- : Key question of the lesson.
- : Activity that you will try.
- : Discussion question with your classmates.
- : Caution and warning.
- : Try it!

with this Textbook

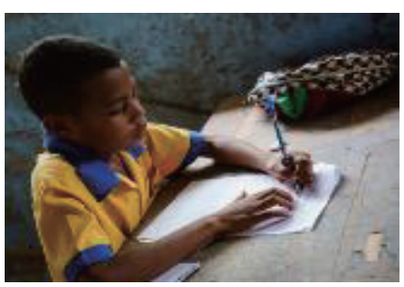
Learn about nature, learn from nature

3 Findings

- Present and share your findings with your classmates.
- Discuss with your classmates to make sure if your findings are correct.
- Make conclusion to the key question.

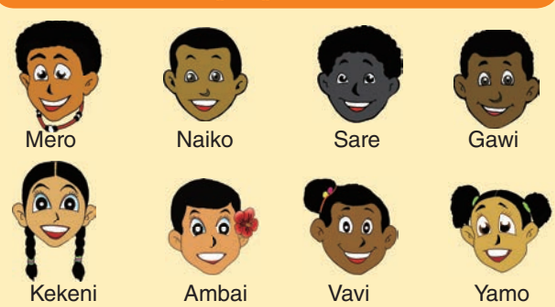
4 Summary

- Read the textbook and confirm what you learnt in the lesson.
- Summarise what you did in the lesson.
- Let's try to use things you learnt in your daily life.



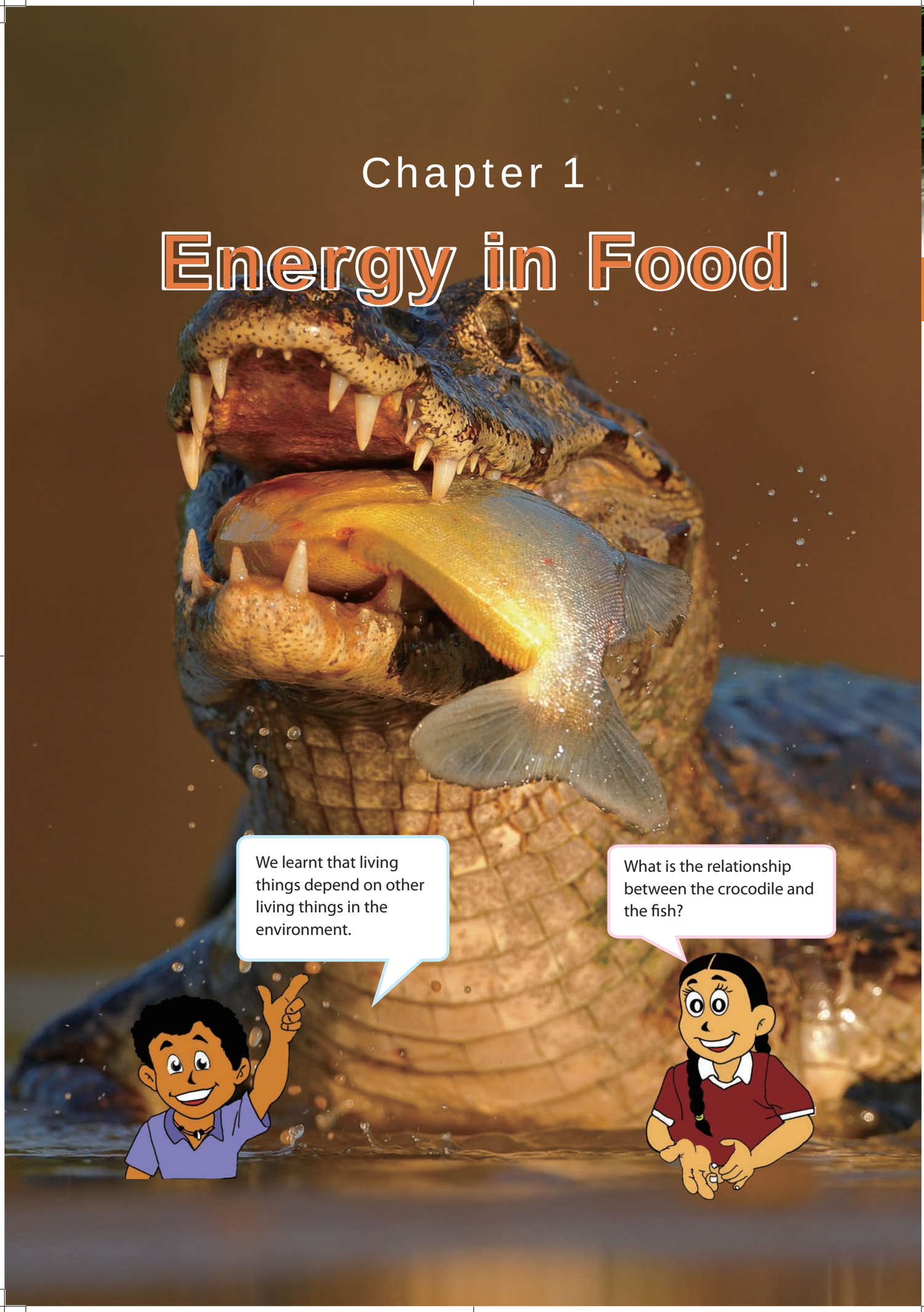
Friends learning together with you

Friends learning together in this textbook



Chapter 1

Energy in Food



1.1 Energy from Food

Lesson 1 Source of Energy in Food

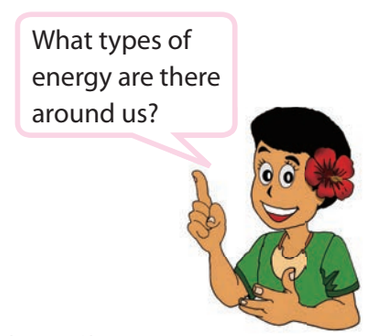
All living things need food. Food provides them with energy. Where does the energy in food come from?

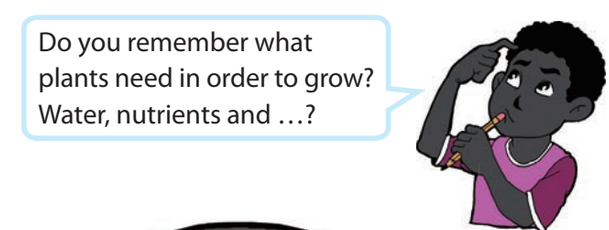
What is the source of energy in food?

Activity : Finding the source of energy in food

What to Do:

1. Study the pictures below. A girl is drinking a glass of milk and is getting energy from the milk.
2. Think about the following questions:
   (1) Where does energy in the milk come from?
   (2) Where does a cow get its energy from?
   (3) Where does the grass get energy from?
3. Share your ideas with your classmates. Discuss where the energy in food comes from.





Summary

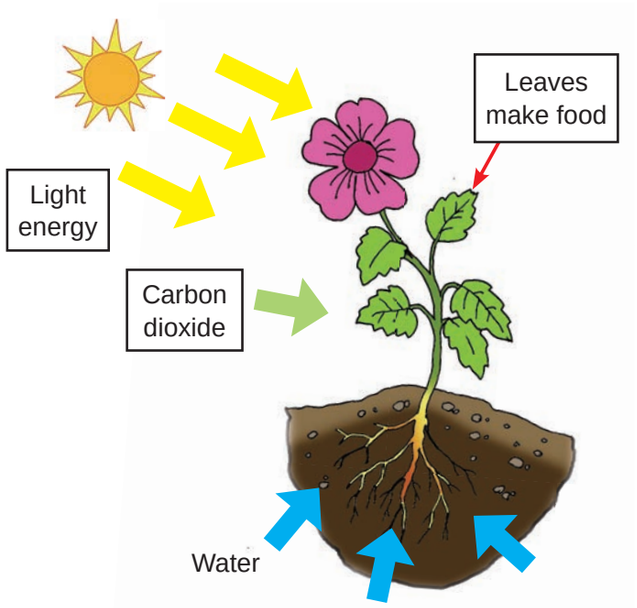
Almost all energy on Earth comes from the Sun.

Our food comes from plants. It is not only human beings who depend on plants directly or indirectly to get energy, but other animals too.

The Sun provides light and heat energy to the Earth. Almost all energy on Earth comes from the Sun.

Energy that comes from the Sun is called **solar energy**.

Plants do not eat food like animals. Plants make their own food by using water, carbon dioxide and light energy from the Sun. **Carbon dioxide** is a colourless and odourless gas produced by people or animals breathing out.



Plants make food by using water, carbon dioxide and light energy.

Plants use some energy in the food they make to survive and grow. Some are stored in the roots, stems and leaves.

Animals cannot make food like plants. They must eat food in order to get energy. Some animals get energy by eating plants as food. Some animals eat other animals that eat plants.

A horse eats plants.

A lion eats a zebra.

Plants get energy from the Sun. Some animals eat plants or animals as food to get energy. The source of energy in food comes from the Sun.

Lesson 2 Food Chains

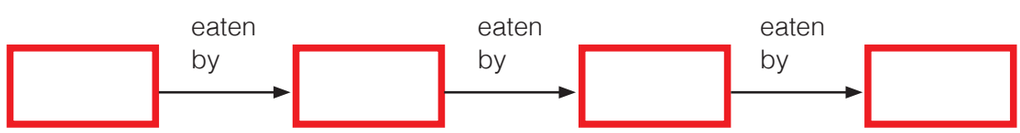
Plants make food by using sunlight. Animals eat the plants to get energy. How do living things depend on each other to get energy in nature?

How does energy flow through food?

Activity : Eat and eaten by

What to Do:

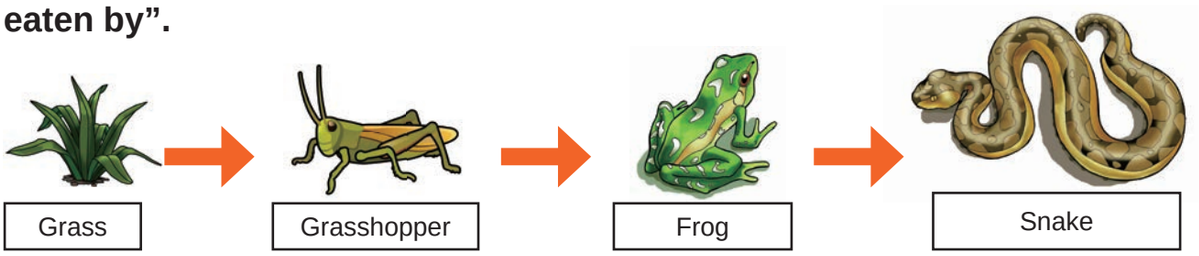
1. Draw a diagram like the one shown below.



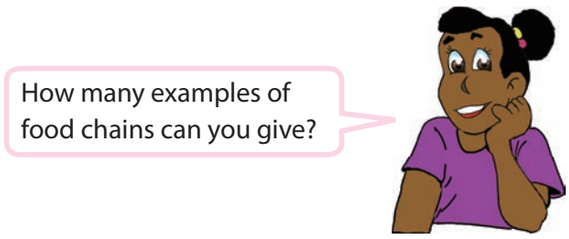
2. Study the picture below and write the name of a living thing in the box, in the order of which living thing is eaten by another living thing.
3. Share your ideas with your classmates. Discuss how living things depend on each other and how energy is transferred in living things.

Result

We found out that grass is eaten by the grasshopper. The grasshopper is eaten by the frog and the frog is eaten by the snake. The arrow means **“is eaten by”.**

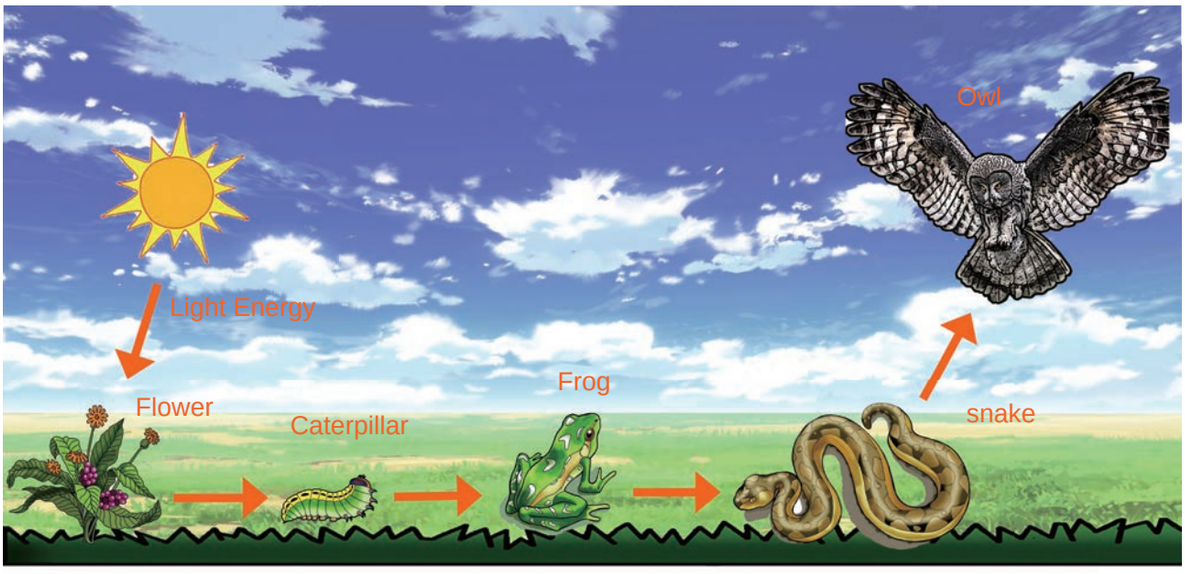


Energy in food is transferred from the grass, to the grasshopper, to the frog and to the snake.



Summary

Plants and animals are linked by the energy they need. For example, plants are eaten by insects. The insects are eaten by frogs and then finally the frogs are eaten by snakes. At each link, energy is being transferred from plants to animals. The path of food energy from the plants to animals is called a **food chain**. In a food chain, the energy flow begins with the Sun because plants get their energy by converting solar energy into food. Food chains only go in one direction. The arrow shows the direction of energy flow.



Lesson 3 Food Webs

A food chain only shows one path of food energy from plants to animals but an environment contains many different types of living things.

How do living things in an environment interact with each other?

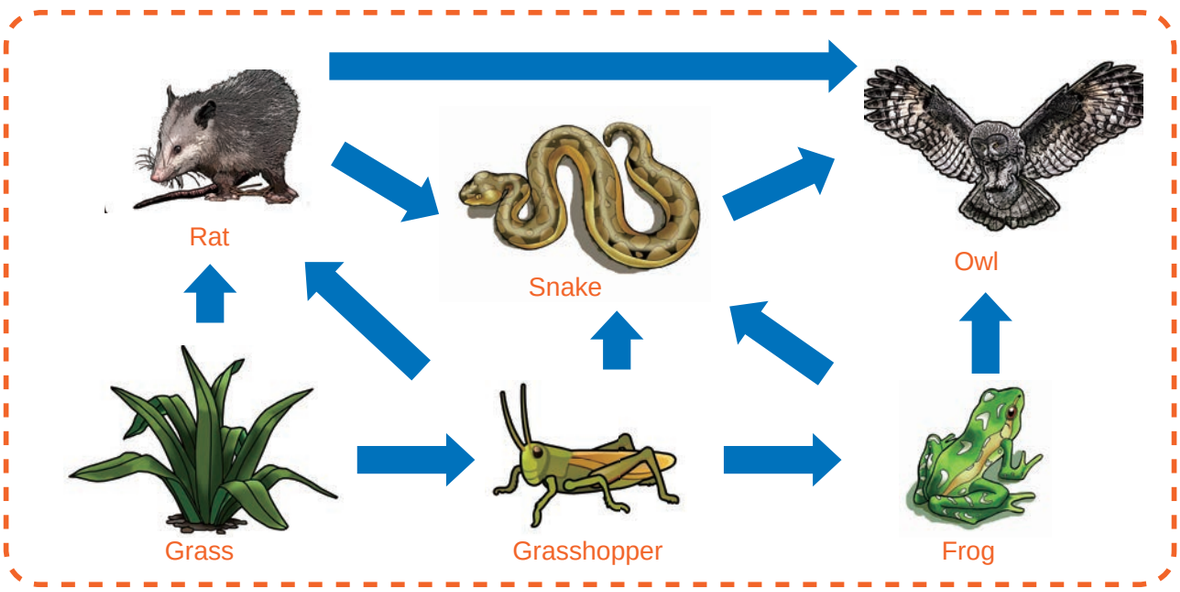
Activity : Who eats what?

What to Do:

1. Study the diagram below. Draw arrows to show how one living thing is consumed by another living thing.
2. Share your ideas with your classmates. Discuss how one living thing is interconnected with other living things.

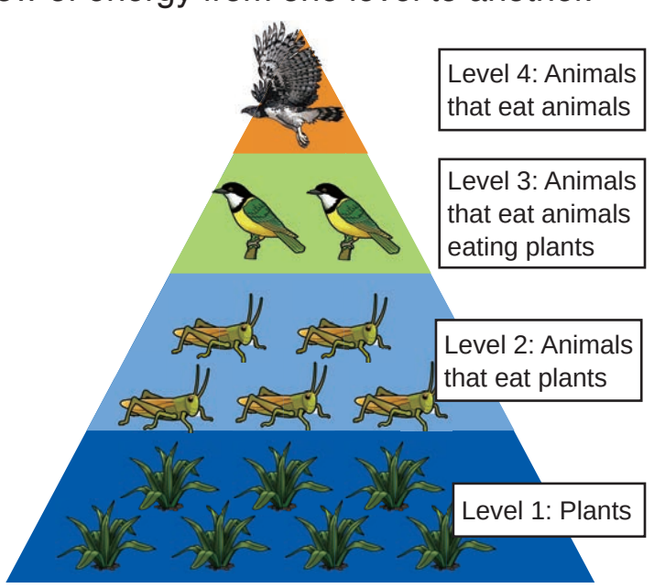
Summary

Most plants and animals are part of several food chains. For example, plants may be eaten by a caterpillar, a cow or some other animals. Snakes may eat a rat, a frog or some other animals. To represent these relationships we use a food web. A **food web** is made up of several food chains linked to each other. A food web shows how plants and animals are interrelated in an environment. It also shows how different food chains interact with one another and overlap.



The food web shows the plant and animals that interact with one another in an environment.

An **energy pyramid** shows the flow of energy from one level to another. Energy flows from the bottom to the top level of the pyramid. Only about 10 percent of the energy is transferred to the next level. Plants make up the base of the energy pyramid. The higher we go up the pyramid, the amount of energy available for use is less and the population of living things or organisms decreases.



Energy pyramid

Summary and Exercise

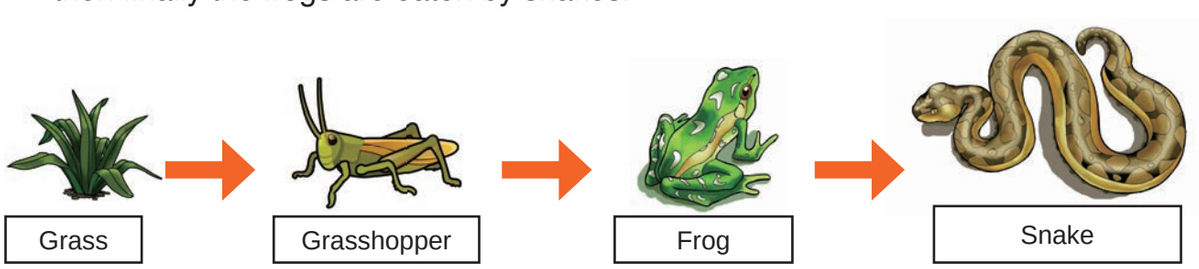
Summary 1.1 Energy from food

Sources of Energy in Food

- Food provides energy to all living things on the Earth.
- The Sun provides light and heat energy to the Earth.
- Plants do not eat food like animals do, but make their own food by using water, carbon dioxide and light energy from the Sun.
- Plants provide food directly or indirectly to animals and humans.
- Animals cannot make food like plants do, so they eat other animals and plants to get energy.

Food Chain

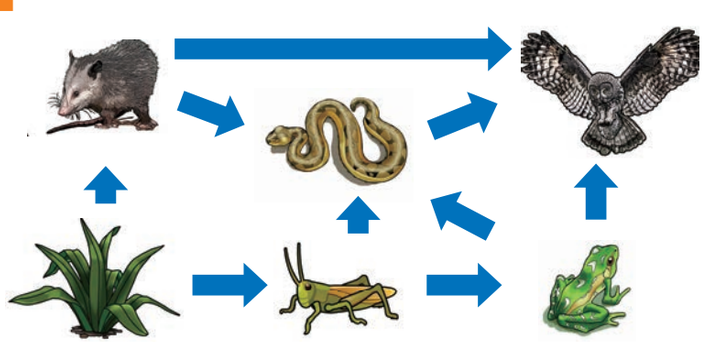
- A food chain is the path of food energy from plants to animals.
- For example, plants are eaten by insects. The insects are eaten by frogs and then finally the frogs are eaten by snakes.



- In a food chain, the path of energy begins with the sun because plants get their energy by converting light energy into food.

Food Web

- A food web is made up of several food chains linked to each other.
- A food web shows how plants and animals are interrelated in an environment. It also shows how different food chains interact with one another.



Summary and Exercise

Exercise 1.1 Energy from food

Q1. Complete each sentence with the correct word.

(1) Food provides _____ for all living things.

(2) Plants get energy from the _____.

(3) The path of food energy from plants to animals is a _____ _____.

(4) A _____ _____shows how plants and animals are interrelated in an environment.

Q2. Choose the letter with the correct answer.

(1) According to the diagram, what does the frog feed on?

A. Grass

B. Grasshopper

C. Snake

D. Snake and grass

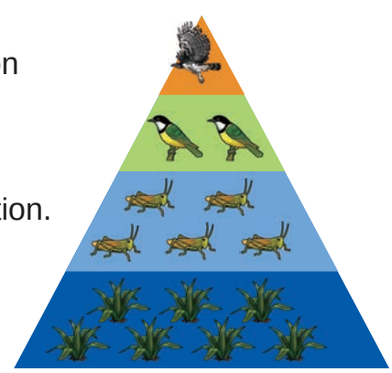
(2) Which of the following is not the correct explanation about an energy pyramid?

A. Plants make up the base of the pyramid.

B. The animals on higher levels are less in population.

C. Energy flows from the bottom to the top level of the pyramid.

D. Snakes are at the bottom level of the pyramid.



Q3. Draw arrows to show the flow of energy in the food chain.

Small birds

Hibiscus

Eagle

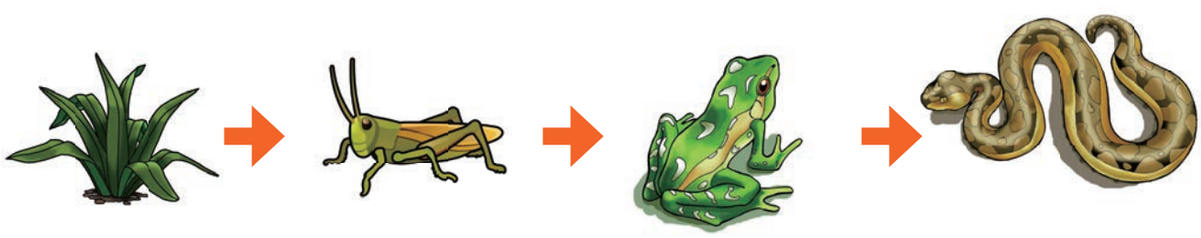
Butterfly

Frog

Q4. What is the difference between a food chain and a food web?

What happens if an organism was removed from a food chain?

If this was a food chain in an environment, where plants are eaten by grasshoppers and the grasshoppers are eaten by frogs and the frogs are eaten by snakes.



If frogs were to die because of some diseases caused by some pollution, there would be an increase in the amount of grasshoppers feeding on the producer or green plants.

This would cause a major problem because grasshoppers would be out of control. They would eat plants and the number of plants which are the basis of the food chain would severely decrease.

On the other hand there would be an effect on the consumers of frogs which are the snakes. They would lose an organism that they feed on which can cause their numbers to decrease.

In other cases there may be several interacting food chains in the environment where there are also other predators like birds. They would feed on grasshoppers but in such case if an organism primarily eats one type of organism which is the food source. They would die off and this would lead to the extinction of the consumer of the organism.

Chapter Test

1. Energy in Food

Q1

Complete each sentence with the correct word.

(1) The Sun provides light and _____ energy to Earth.

(2) Plants make their own food by using water, _____ _____ and light energy from the Sun.

(3) The flow of energy from one level to another is shown as a _____ _____ in which the energy flows from the bottom to the top.

(4) A _____ _____ is made up of several food chains linked to each other.

Q2

Choose the letter with the correct answer.

(1) In a food chain where do plants get the energy from?

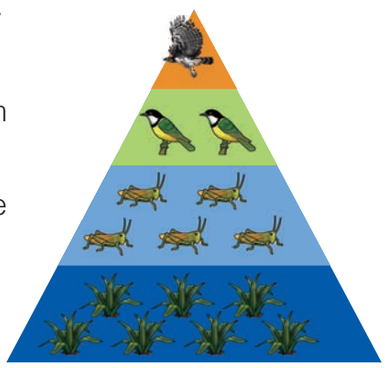
A. Solar energy

B. Animals

C. Insects

D. Other plants

(2) Study the pyramid on the right and identify which statement is true about it.



A. The energy flows from the top to the bottom level of the pyramid

B. Only 10% of the energy is transferred to the next level.

C. Animals make up the base of the pyramid.

D. Plants make up the top of the pyramid.

(3) Which part of the plant makes food for the plant?

A. Root

B. Stem

C. Leaves

D. Flower

(4) Which of the following shows a correct food chain?

A. peanut → rat → snake

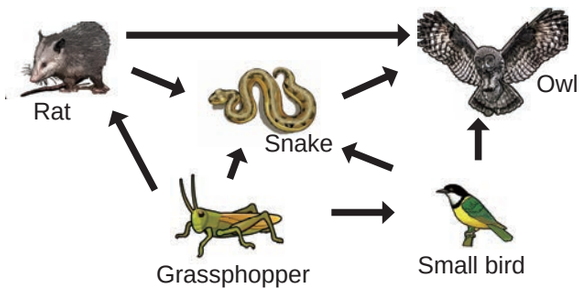
B. grass → snake → eagle

C. peanut → eagle → grasshopper

D. grass → snake → grasshopper

Q3

Study the food web below and answer the following questions.



(1) Which organism eats the snake?

_____

(2) Which organism in the picture would have the largest population?

_____

(3) Which organism in the picture would have the smallest population?

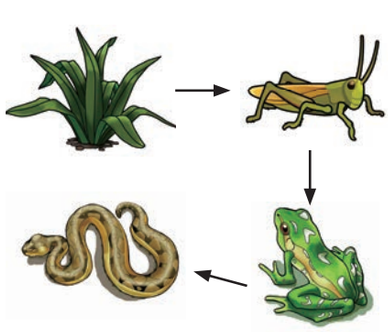
_____

(4) If you are to represent the organisms in the picture as an energy pyramid, what organism would be at the top of the pyramid?

_____

Q4

The picture on the right shows a food chain where a grasshopper feeds on the grass, a frog feeds on the grasshopper and a snake feeds on the frog.



What would happen to the population of grasshopper and snake if all the frogs in the area were killed by chemicals? Write the answer with your reason.

Grasshopper:_____

_____

_____

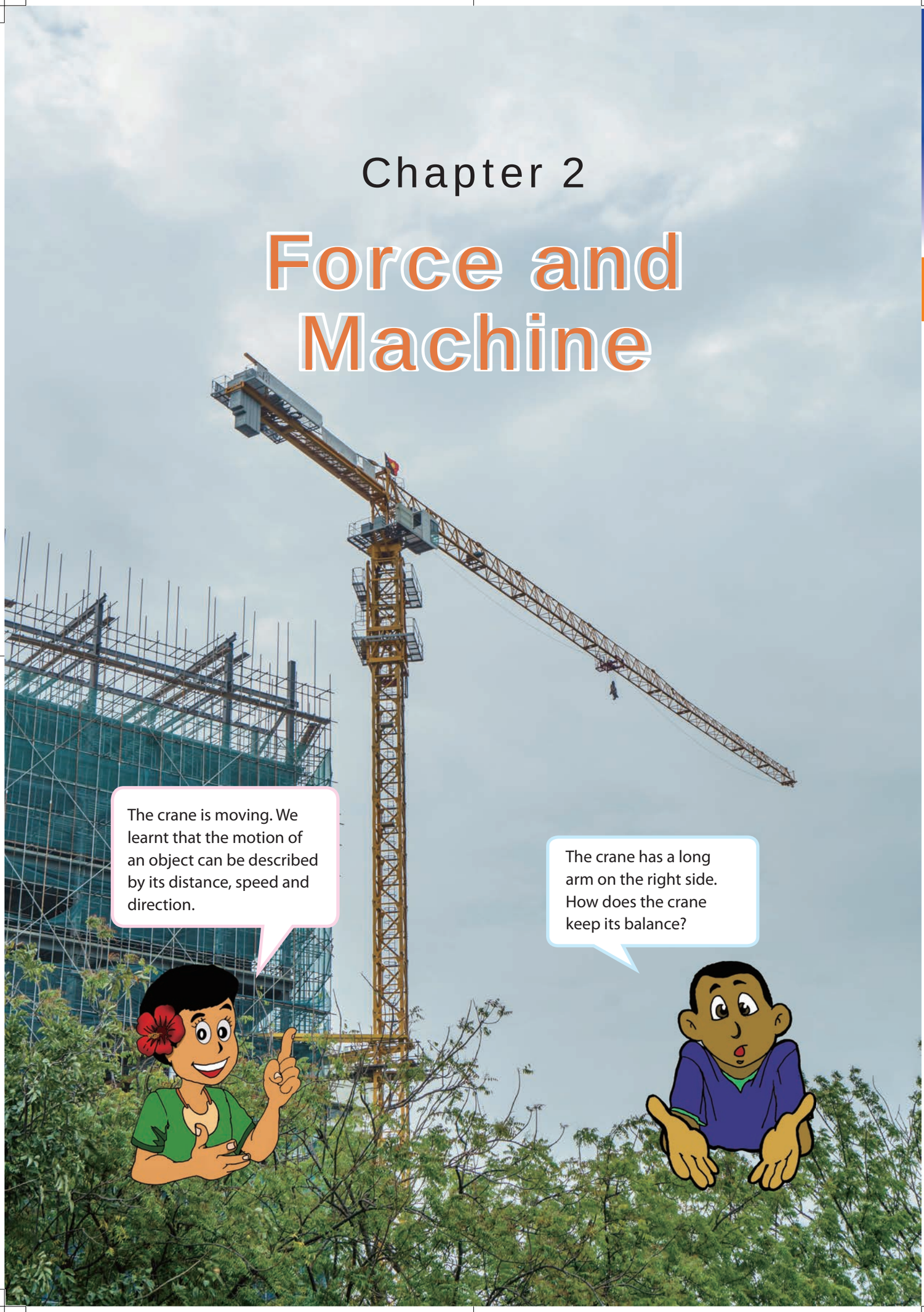
Snake:_____

_____

_____

Chapter 2

Force and Machine



2.1 Change in Motion

Lesson 1 Change in Speed

A force can change the speed of an object. How does the speed of an object change when a force is applied?

How does an applied force change the speed of an object?

Activity : Measuring a motion on an inclined plane

What We Need:

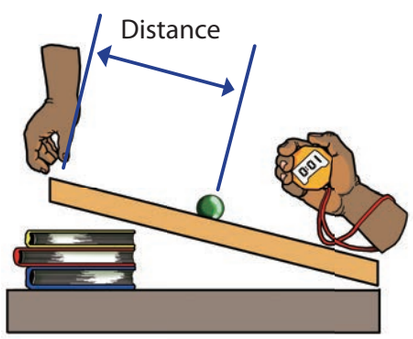
- 2 m rain water gutter, marble, stopwatch, books to stack, ruler

What to Do:

1. Draw a table like the one shown below.

Time (sec.)	Distance (cm) trial 1	Distance (cm) trial 2	Avg.distance (cm)	Speed (cm/sec)
1				
2				
3				

2. Set one side of the gutter on the stacked books to create a ramp.
3. Release the marble from 0 cm and start your stopwatch. Mark the position where the marble reaches for 1 second. Measure the distance and record it in the table.
4. Repeat Step 3. Then take the average of the two distances.
5. Repeat Steps 3 and 4 for 2 seconds and 3 seconds.



6. Calculate the speed of the marble at 1, 2 and 3 seconds.
7. Share your results with your classmate.

Result

We found out that as the marble rolled down the ramp, it speeds up.

Example: Results of activity

Time (sec.)	Distance (cm) trial 1	Distance (cm) trial 2	Avg. Distance (cm)	Speed (cm/sec)
1	19	21	20	20
2	82	78	80	40
3	185	175	180	60

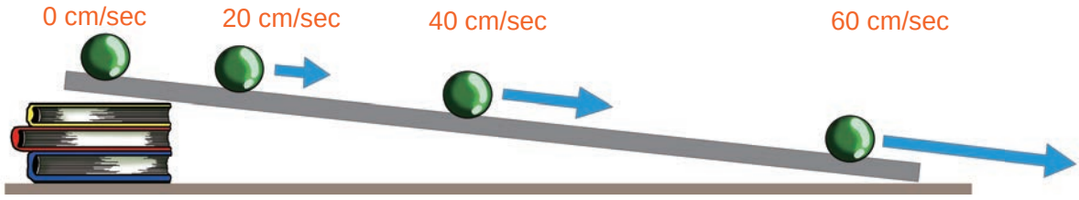
Discussion

Think about the following questions based on your results.

1. What type of force is exerted on the rolling marble?
2. How does the speed of the marble change when the force was applied?

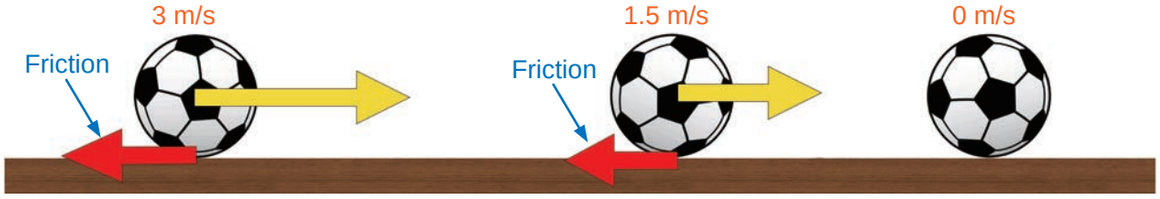
Summary

A force can cause an object to speed up (**accelerate**) or slow down (**decelerate**). For example, **gravity** is the force that pulls one object toward another. When the marble rolls down the ramp, the force (gravity) is always exerted on the rolling marble. As the marble rolls down, it speeds up or increases speed (accelerate).



A marble increases speed as it rolls down the ramp.

Friction is also a kind of force. Friction happens when two surfaces of objects rub against each other. When a ball is rolling on the ground, the force (friction) acts in the opposite direction to the movement of the rolling ball. The ball then decreases speed (decelerate) and finally stops.



A friction makes a moving ball slow down.

Lesson 2 Change in Direction

A force can cause an object to speed up or slow down. What would happen to the direction of a moving object when a force is applied to it?

How does a force change the direction of a moving object?

Activity : Throwing a ball up straight

What We Need:

- a ball

What to Do:

1. Draw a table like the one shown below.

	How does it change?	
	Your prediction	**Your observation**
Speed		
Direction		

2. Predict how the speed and the direction of the ball change when you throw it up straight into the air.
3. Throw the ball up straight in the air. Observe how the speed and the direction of the ball changes. Record your observations in the table.
4. Share your observations with your classmate. Discuss how a force changes the direction of an object in motion.

Result

We found out that as a ball went up in the air, the ball slowed down and its direction was upward. And then the ball stopped in the air. After that, the ball speeded up and its direction was downward as it fell toward the ground.

Example: Results of activity

	How does it change?
Speed	The speed decreases when the ball goes up. Then it stops (Speed is 0). And then the speed increases.
Direction	The direction is upward when the ball goes up. The direction is downwards when the ball falls towards the ground.

Discussion

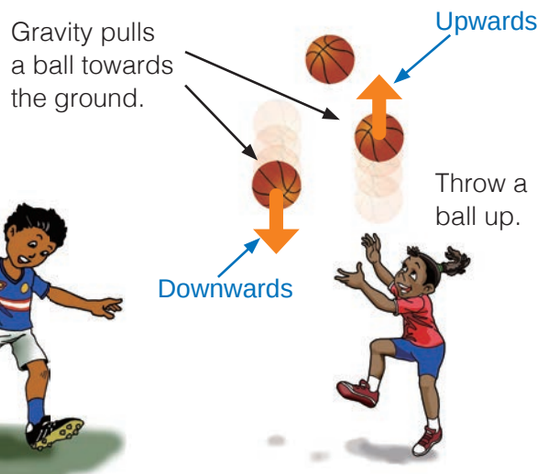
Think about the following questions based on your results.

1. What type of force was exerted on the ball after throwing it?
2. How does the direction of the ball change when the force was applied?

Summary

A force can make a moving object change direction. When we throw the ball up in the air, its direction is upward.
But the gravity changes the direction of the ball to be downwards and the ball falls to the ground.
A good soccer player can control the motion of a soccer ball by applying a force that changes the ball's direction.
If we have a yoyo tied to a thread and we just spin it in a circle, the direction of the yoyo changes.

A soccer player changes the ball's direction by kicking the ball.



Gravity changes the direction of a ball.

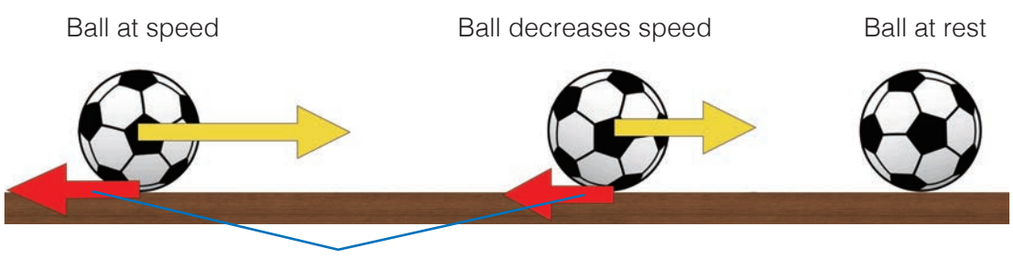
A spinning yoyo tied to a thread changes direction.

Summary and Exercise

Summary 2.1 Change in Motion

Change in Speed

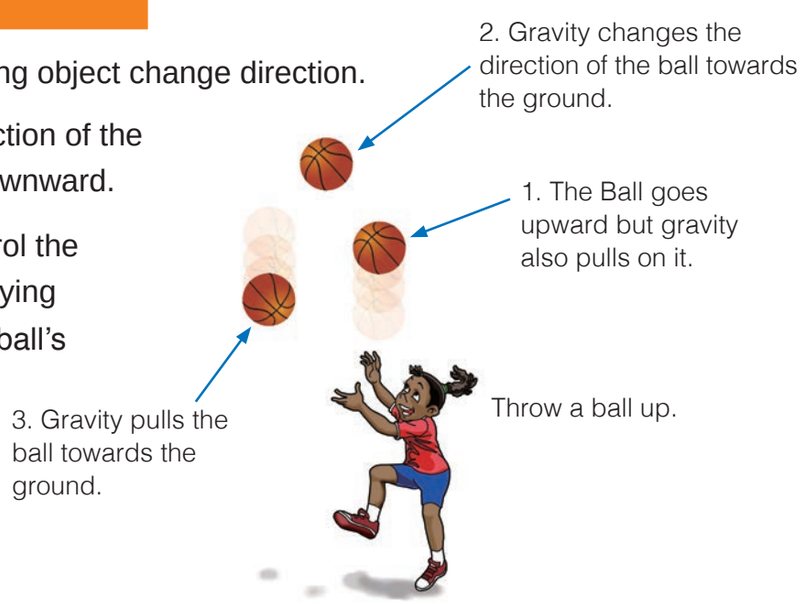
- A force can cause a moving object to speed up (accelerate) or slow down (decelerate).
- Gravity is a force that pulls one object towards another object.
- As an object rolls down a ramp, it increases speed due to gravity.
- Friction is a force that happens when two surfaces of two objects rub against each other.
- Friction always acts in the opposite direction of the moving object. When an object is rolling on the ground, the object decreases speed and finally stops due to friction.



Friction occurs and acts in the opposite direction of the moving ball.

Change in Direction

- A force can make a moving object change direction.
- Gravity changes the direction of the ball moving upward to downward.
- A soccer player can control the motion of the ball by applying a force that changes the ball's direction.



Summary and Exercise

Exercise 2.1 Change in Motion

Q1. Complete each sentence with the correct word.

(1) The force that pulls one object towards another is called _____.

(2) Force that happens when two surfaces rub against each other is called _____.

Q2. Choose the letter with the correct answer.

(1) What happens when the marble rolls down a ramp?

A. It accelerates in speed.

B. It decelerates in speed.

C. Its speed remains the same.

D. It decreases the speed.

(2) Which sentence is <u>true</u> when we throw a ball into the air?

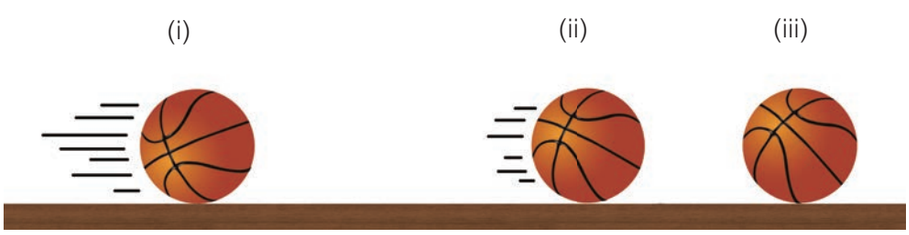
A. The ball does not change its direction when thrown in the air.

B. The ball decreases speed as it falls back to the ground.

C. The speed of the ball is the same when it was thrown in the air.

D. The ball changes direction when gravity acts on it and falls downwards.

Q3. Study the picture and answer the question.



The ball was rolling on the rough ground at position (i) and finally stopped its motion at position (iii). How can you describe the motion of the ball from position (i) to (iii)?

Q4. Mero measured the speed of a moving car every 5 seconds. Look at his record shown in the table on the right. Identify whether the car accelerated or decelerated and explain the reason of you answer.

Time (sec.)	Speed (m/s)
5	10
10	20
15	30

2.2 Regularity of Levers

Lesson 1 Lifting a Load Using a Lever: 1

A **lever** is a simple machine that makes an object move with less force. How can we lift a heavy sand bag with a lever?

How can we lift an object by using a lever with less force?

Activity : Find ways to lift the sand bag easily using a lever

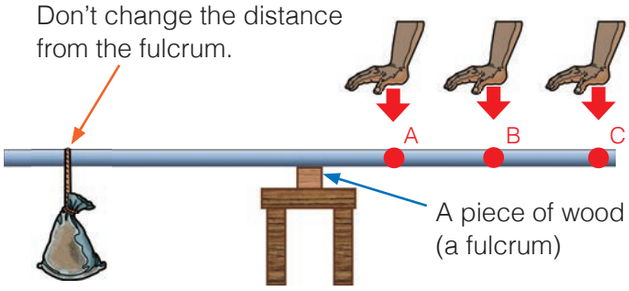
What We Need:

- pole (1.5 - 3 m long), plastic bag with sand, a piece of wood, stool

What to Do:

1. Draw a table like the one on the right in your exercise book.
2. Set up the pole on the piece of wood. Hang the sand bag on one side of the pole as shown in the picture. The distance from the fulcrum to the sand bag should not be changed.
3. Apply force on position A to lift the sand bag.
4. Record how you felt about the amount of force needed to lift the sand bag.
5. Repeat Steps 3 and 4 by applying force at positions B and C.
6. Share your results with your classmates. Discuss the relationship between the distance from the fulcrum and the amount of force applied to lift the sand bag.

Position you applied the force	Amount of force to lift the sand bag (small, medium or large)
A	
B	
C	

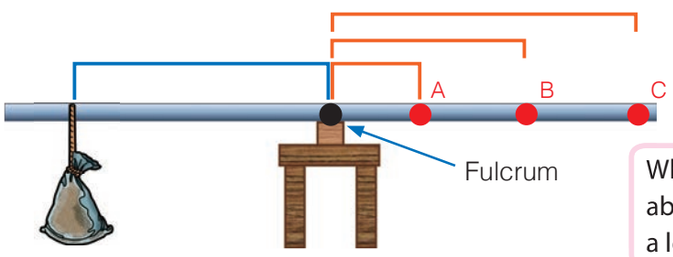


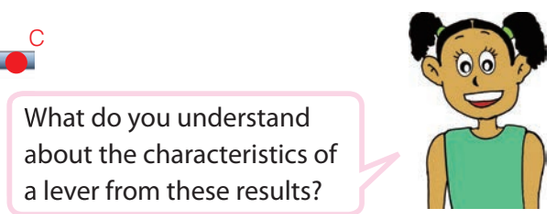
To avoid injury, do not release your hands from the pole suddenly!

Result

We found out that a larger force was needed to lift the sand bag at position A but less force was applied to lift the sand bag at position C when the distance from the fulcrum to the sand bag did not change.

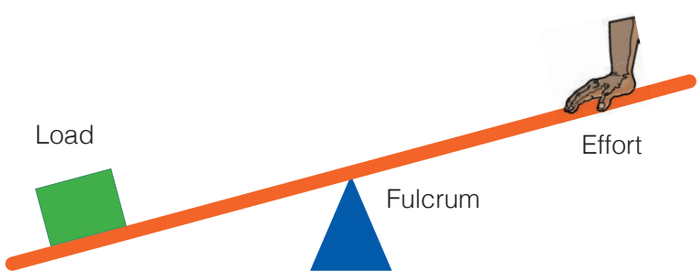
Position you applied the force	Amount of force to lift the sand bag
A	Large
B	Medium
C	Small





Summary

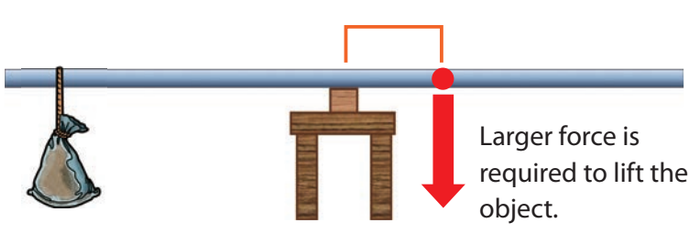
A lever can make our work easier. An **effort** is the force applied to a machine to do work. A **load** is the force applied on the lever by the object to be lifted. Amount of force as an effort required to lift an object depends on its distance from the fulcrum. If effort is applied at a longer distance from the fulcrum, the object is able to be lifted with less effort.



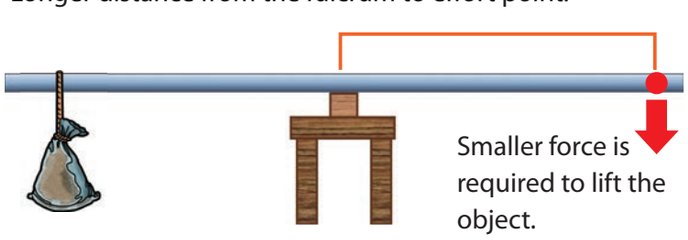
Load, effort and fulcrum of a Lever

Relationship between distance of applied force and load

Shorter distance from the fulcrum to effort point.



Longer distance from the fulcrum to effort point.



Lesson 2 Lifting a Load Using a Lever: 2

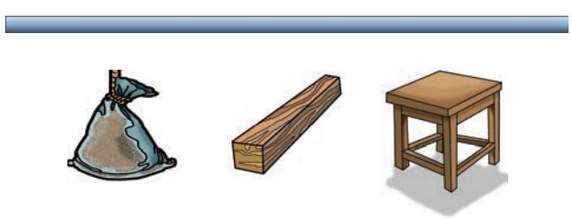
We can move an object with less force by applying the force at a longer distance from the fulcrum of a lever. What is another way to lift an object with less force?

How does the distance from a fulcrum to a load affect an effort?

Activity : Changing distance from fulcrum to a load

What We Need:

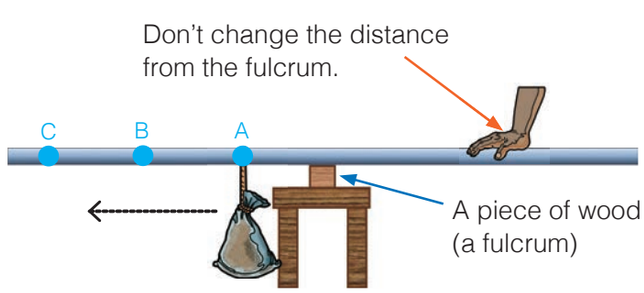
- pole (1.5 - 2 m long), sand bag as a load, stool, piece of wood as a fulcrum



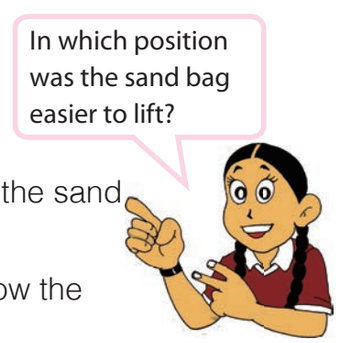
What to Do:

1. Draw a table like the one on the right in your exercise book.
2. Write your prediction to describe the strength of the applied force when the sand bag is lifted at each position.
3. Set up the pole on a piece of wood.
4. Hang a sand bag on position A. Apply force to lift the sand bag.
5. The place where you apply force should not be changed. Record how you feel about the amount of applied force to lift the sand bag in the table.
6. Repeat Steps 3 and 4 by changing the positions of the sand bag from A to B and C.
7. Share your results with your classmates. Discuss how the distance from a fulcrum to a load affects the effort.

Position of a sand bag	Amount of applied force to lift the sand bag	
	Prediction	Result
A		
B		
C		

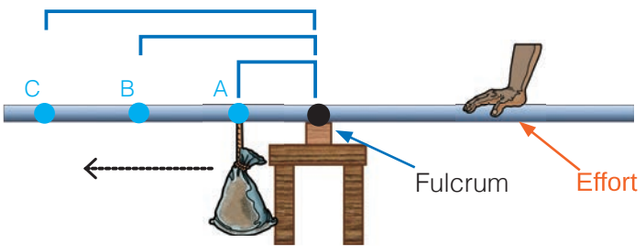


To avoid injury, do not release your hands from the pole.



Result

We found out that in position A, a smaller force was needed to lift the sand bag when the distance from the fulcrum to the effort did not change. But at position C, a larger force was applied to lift the sand bag when the distance from the fulcrum to the effort did not change.



Position of the sand bag	Amount of force to lift the sand bag
A	Small
B	Middle
C	Large

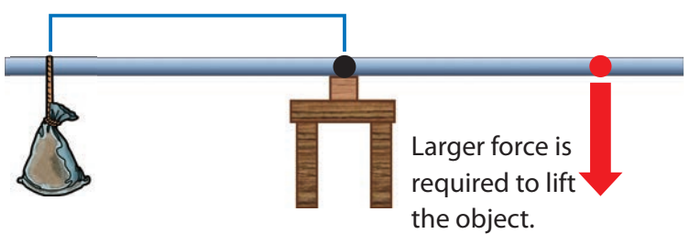
Summary

The amount of force required to lift an object depends on the distance from the fulcrum to the position of the object. If the object is placed at a shorter distance from the fulcrum, the object would be able to be lifted with less effort.

As shown in the picture on the right, we can balance the lever by hanging another sand bag instead of the force applied by your hand. The amount of force can be also expressed by the weight of an object.

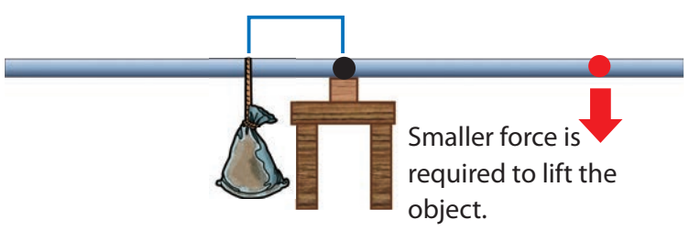
Relationship between Distance of Load and Applied Force

Longer distance from fulcrum to the point of object

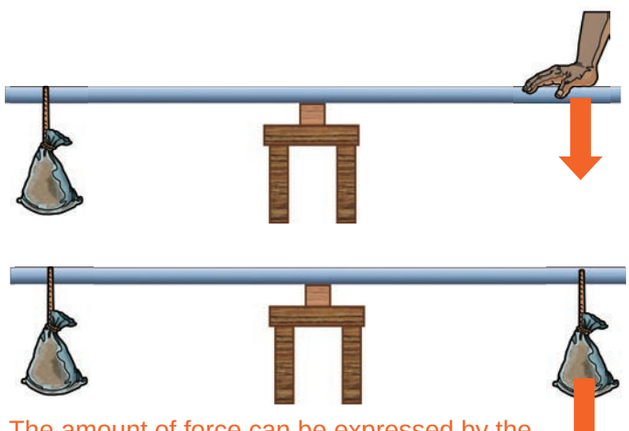


Larger force is required to lift the object.

Shorter distance from fulcrum to the point of object



Smaller force is required to lift the object.



The amount of force can be expressed by the weight of an object.

Lesson 3 Law of Lever to Balance

Look at the picture on the right. The lever is balanced. What will happen if the position of the weights change?

How can we balance a lever?

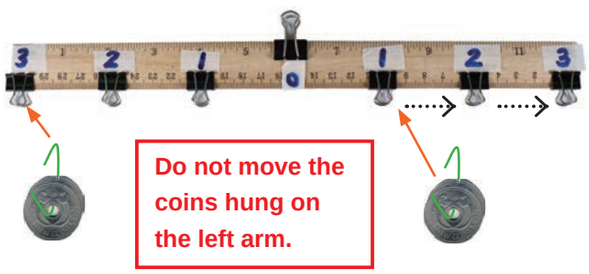
Activity : Finding the rule to make a lever balance

What We Need:

- 30 cm ruler, 7 bulldog clips, 2 paper clips, 8 one kina coins, pen

What to Do:

1. Make a lever by putting a bulldog clip at the centre of the ruler as shown in the picture on the right.



2. Put other bulldog clips on both ends at 5 cm, 10 cm and 15 cm from the centre. Check if the lever is balanced. Label each clip as shown in the picture.
3. Draw a table like the one below in your exercise book.

	Left arm	Right arm		
Distance from the fulcrum	3	1	2	3
Number of coins	2			

4. Hang two one kina coins on the left arm on distance 3.
5. Try to balance the lever by adding a one kina coin every time on the right arm on distance 1. Record the number of one kina coins on the right arm to balance the lever in the table.
6. Repeat Step 5 for distances 2 and 3 on the right arm.
7. Share your results with your classmates.

Result

	Left arm	Right arm		
Distance from the fulcrum	3	1	2	3
as weight	2	6	3	2

We found out that when we hung 6 coins at distance 1, 3 coins at distance 2 and 2 coins at distance 3 on the right arm, the lever was balanced, when we hung 2 coins at distance 3 on the left arm.

Discussion

Based on your results, think about the following question.

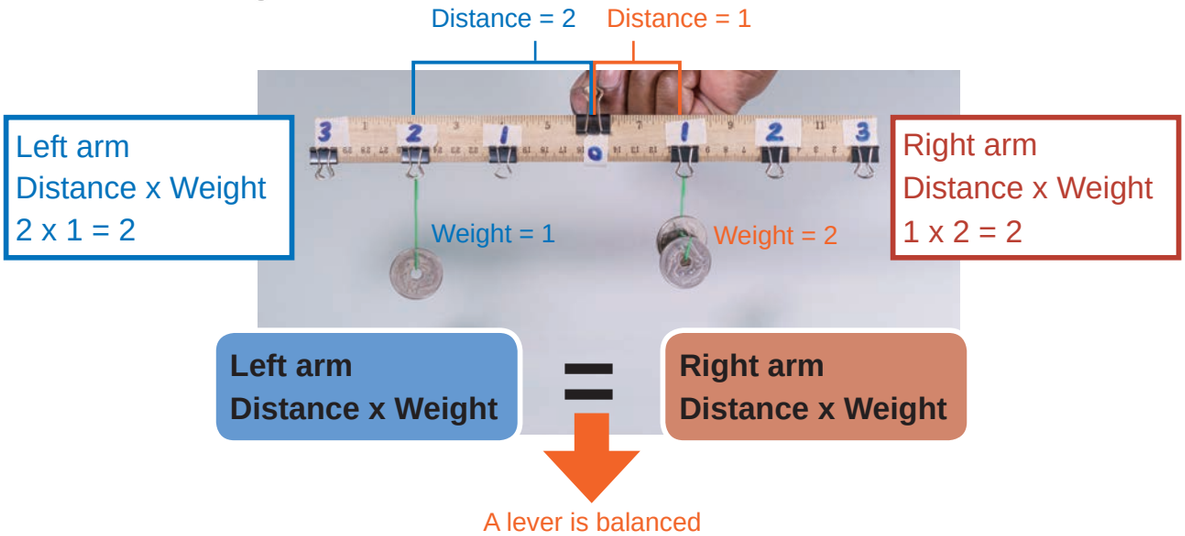
1. What relationship can you find between the distance from the fulcrum and the numbers of coins on the left and the right arm to make the lever balanced?

The sum of the numbers of coins and the distance on left arm (2+3=5) and the right arm (1+6=7) are not equal!

How about multiplying the numbers of coins by the distance from the fulcrum of the lever like….
Left arm: 3 x 2 = 6
Right arm: ????

Summary

A lever is balanced when the product of weights and distance from the fulcrum on the left is equal to the product of weights and distance from the fulcrum on the right arm.



Summary and Exercise

Summary 2.2 Regularity of Levers

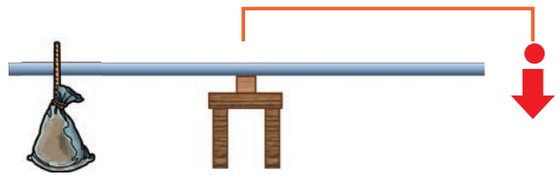
Lifting Load by Using Lever

- A lever is a simple machine that makes an object move with less force.
- The effort is the amount of force applied.
- The load is the force applied on the lever by the object to be lifted.

Lifting Load with Less Effort

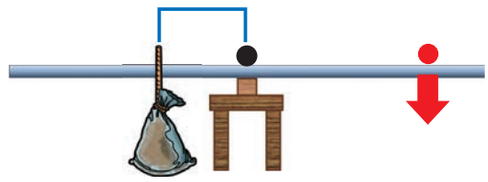
- The amount of force required to lift an object depends on;
  1. The distance from the fulcrum to the effort.
     Lesser effort is needed to lift the load, when the effort is applied further away from the fulcrum.
  2. The distance from the fulcrum to the load.
     Lesser effort is needed to lift the load, when the object is placed at a shorter distance from the fulcrum.

Distance of the effort from the fulcrum is longer



Smaller force is needed

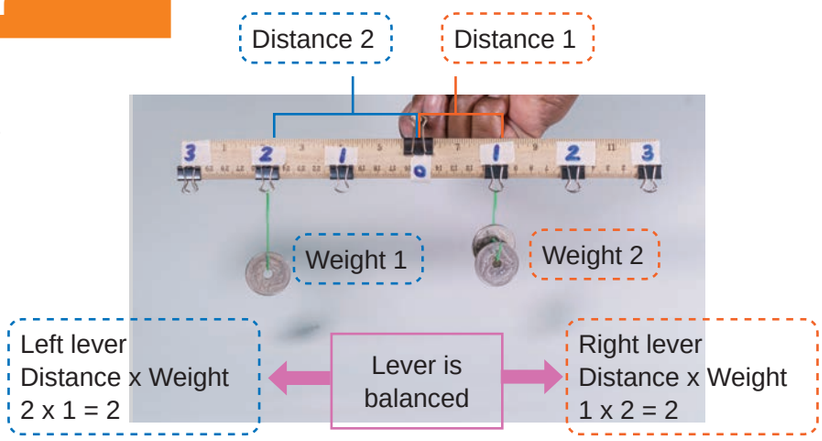
Distance of the load from the fulcrum is shorter



Smaller force is needed

Balancing the Lever

- A lever is balanced when the product of the weight and distance from the fulcrum on the left arm is the same as the one on the right arm.



Summary and Exercise

Exercise 2.2 Regularity of Levers

Q1. Complete each sentence with the correct word.

(1) A simple machine consisting of an arm with a fulcrum is called a _____.

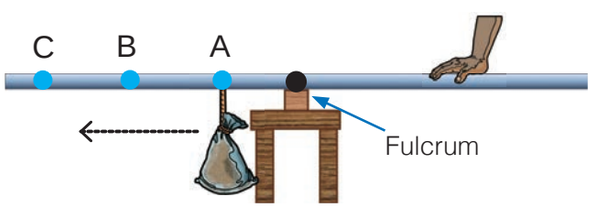
(2) The force applied to a machine to do work is called an _____.

(3) The force applied on the lever by the object to be lifted is called a _____.

Q2. Choose the letter with the correct answer.

(1) Which position of the load on the lever would require less force to lift the object ?

(2) Which position of the load on the lever would require more force to lift the object?



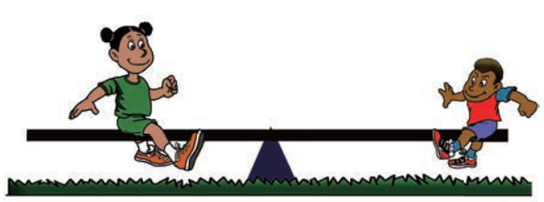
Q3. Answer the following questions.

	Left arm	Right arm			
Distance from the centre	4	1	2	3	4
Number of coins (K1.00 coin)	2				

(1) How many one kina coins would be hung on distance 1 of the right arm to balance the lever?

(2) Four one kina coins were hung on the right arm of the lever. At which distance were the four one kina coins hung to balance the lever?

Q4. Study the picture on the right. A girl and younger boy are playing on a see-saw. The see-saw is balanced. What did the boy and the girl do to balance the see-saw?



LEVERS IN OUR BODY

Levers can be identified by the way the joint and muscles attached to the bone are arranged.

Skull and neck - Nodding your head

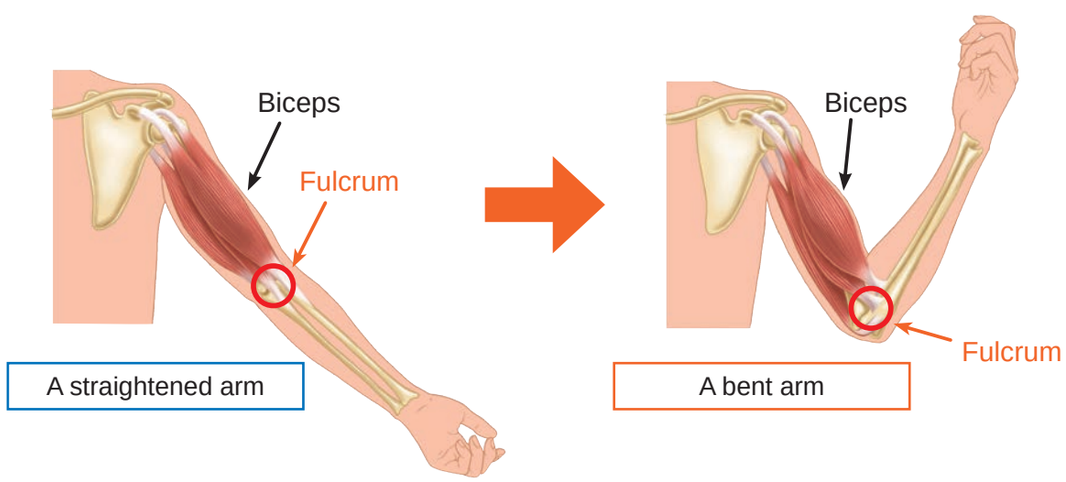
The place where your skull meets the top of your spine is fulcrum. Your skull is the lever arm and the neck muscles at the back of the skull provide the force (effort) to lift your head up against the weight of the head (load). When the neck muscles relax, your head nods forward.

Tip toes - Standing on tip toes

The fulcrum is at your toe joints and your foot acts as a lever arm. Your calf muscles and achilles tendon provide the effort when the calf muscle contracts. The load is your body weight and is lifted by the effort (muscle contraction).

Bent arm – Bending your arm

The fulcrum is at the elbow and the forearm acts as the lever arm. The biceps muscle provides the effort (force) and bends the forearm against the weight of the forearm and any weight that the hand might be holding.



Chapter Test

2. Force and Machine

Q1

Complete each sentence with the correct word.

(1) A force can cause an object to _____ up or slow down.

(2) A force can make a moving object change its _____ and _____.

(3) A force that slows down the movement of an object between two surfaces that touch each other is called _____.

(4) To _____ means that the motion of an object speeds up.

Q2

Choose the letter with the correct answer.

(1) What happens to the speed of an object as it rolls down a slope?
The speed of the object

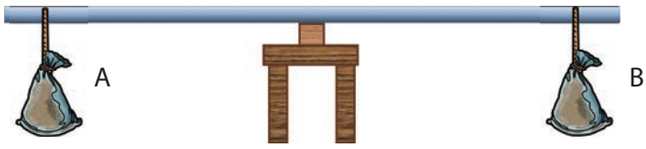
A. remains the same.

B. increases.

C. decreases.

D. decreases then speeds up.

(2) The lever shown below is balanced. The distance from load A to the fulcrum and the distance from load B to the fulcrum are same. Which of the following is true about the diagram?



A. A is heavier than B.

B. A is lighter than B.

C. A and B have different weights.

D. A and B have the same weights.

(3) What is the best reason to explain why a ball comes to a stop after rolling for some time?

A. Because there is no force acting on the ball.

B. Because the ball ran out of force to continue rolling.

C. Because the force of gravity is pulling the ball backwards.

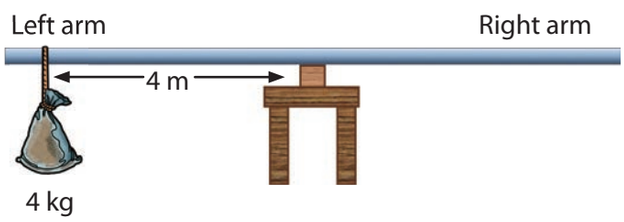
D. Because of the friction force acting between the ball and the ground.

Q3

(1) Study the diagram below.
The ball is moving in the direction to the right. It is decelerating due to friction and will come to a stop. In which direction is the friction force acting on the rolling ball?

_____

(2) If a 4 kg weight was placed on the left arm at a distance of 4 m from the fulcrum:



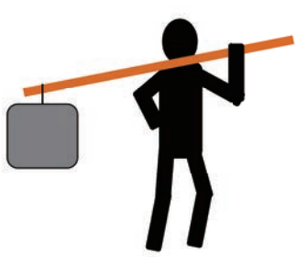
(i) What is the product of the weight and distance on the left arm of the lever? (Ignore its units)

_____

(ii) The lever is balanced when the other weight is hanging on the right arm at the distance of 2 m from the fulcrum. Calculate what would be the amount of weight on the right arm?
Your calculation: _____
_____
Answer: _____ kg

Q4

Kolo wanted to carry a bag of fruits but he struggled to balance the bag on the pole on his shoulder. What must he do to be able to carry the bag on the pole on his shoulder?



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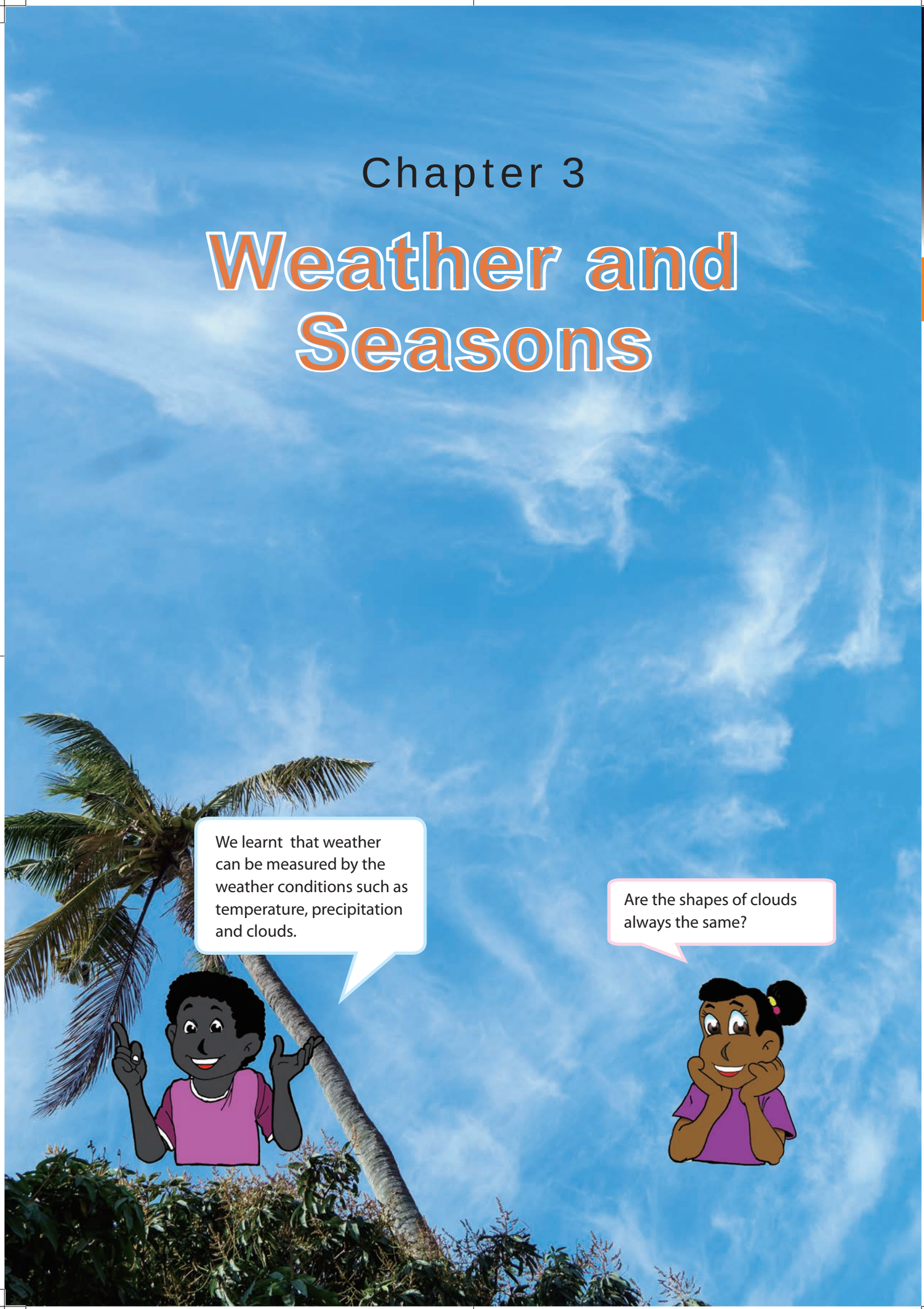
Chapter 3

Weather and Seasons



3.1 Observing Clouds

Lesson 1 Types of Clouds

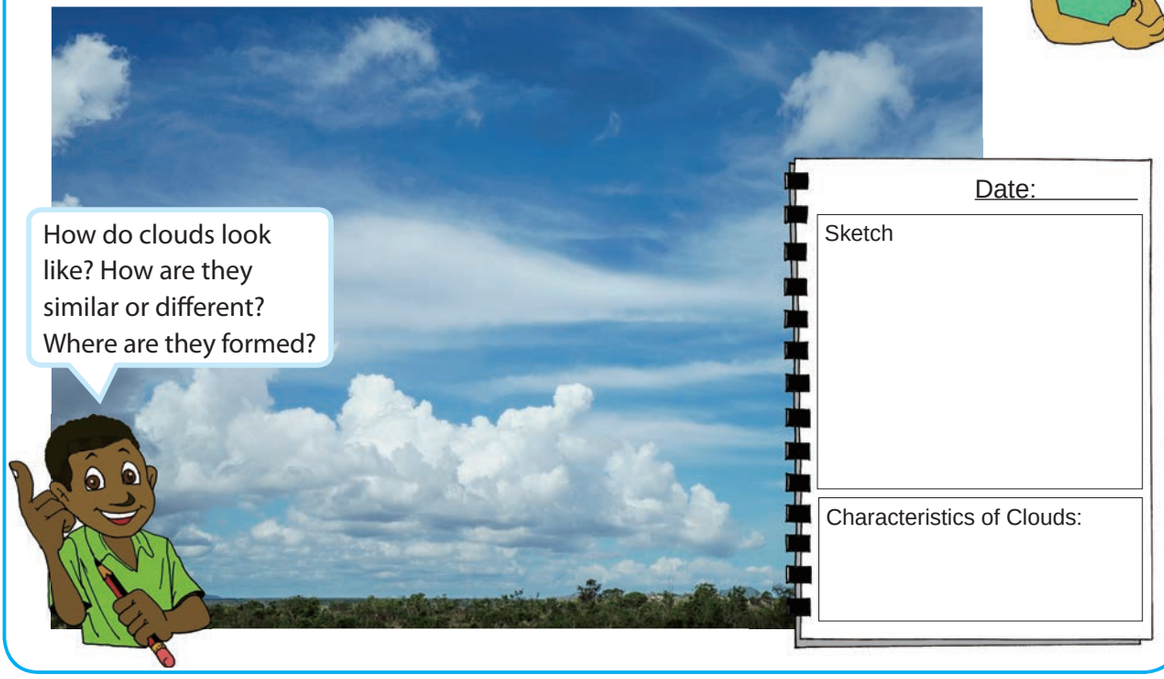
Look at the sky! We see clouds almost every day. Sometimes clouds are white and puffy. Sometimes they are dark and cover the entire sky.

What types of clouds can be observed?

Activity : Observing clouds

What to Do:

1. Go out of the classroom and observe the clouds in the sky.
2. Sketch the clouds in your exercise book.
3. Record the characteristics of clouds such as colour, size, shape and altitude.
4. Share your observations with your classmates. Discuss the types of clouds and their characteristics.

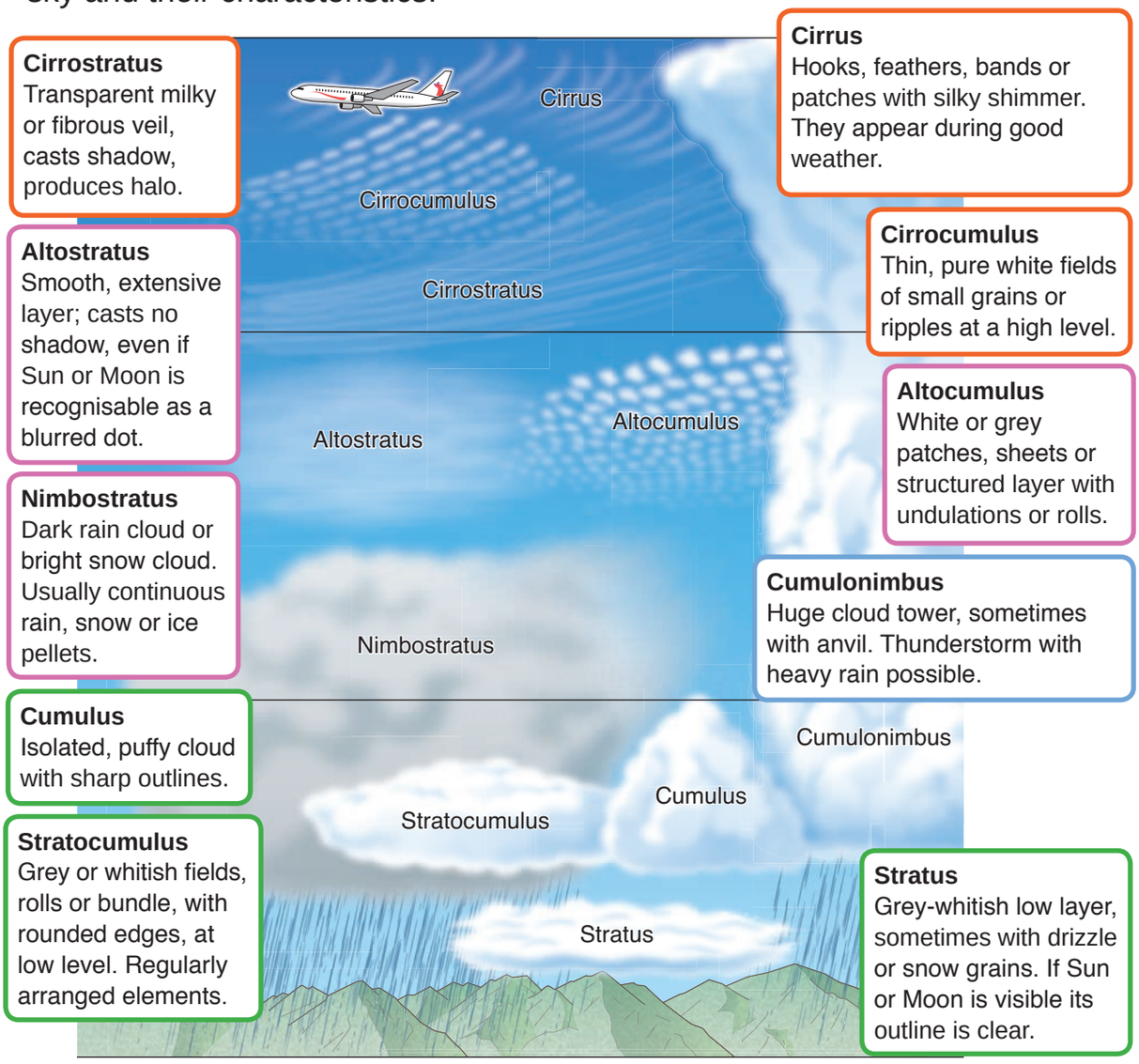


Summary

A **cloud** is made of water droplets or ice crystals floating in the sky. Clouds are classified by where they are formed in the sky. There are ten different types of clouds.

Where clouds are formed in the sky.	Types of Clouds
High Level	Cirrus, Cirrocumulus, Cirrostratus
Middle Level	Altocumulus, Altostratus, Nimbostratus
Low Level	Stratocumulus, Stratus, Cumulus
Range from Low to High Level	Cumulonimbus

The diagram below shows where different types of clouds are formed in the sky and their characteristics.



Lesson 2 Weather Forecast

Weather changes from day to day. It also changes throughout a day. Weather can be forecasted based on the cloud condition. **Weather forecast** predicts the upcoming weather.

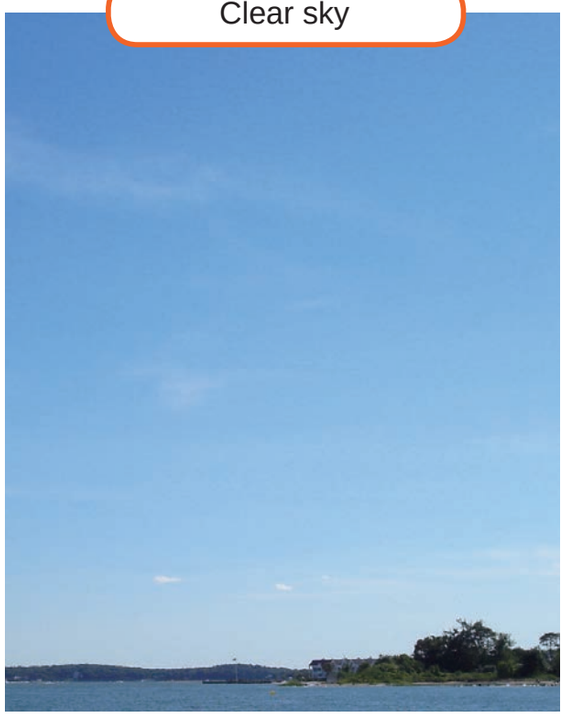
How can we forecast weather?

Activity : Weather and clouds

What to Do:

1. Go out of the classroom and observe the sky on a sunny day and on a rainy day.
2. Sketch the clouds you observed in your exercise book.
3. Identify and name the types of clouds that you observed.
4. Share your observations with your classmates. Discuss the relationship between the types of clouds and the weather.

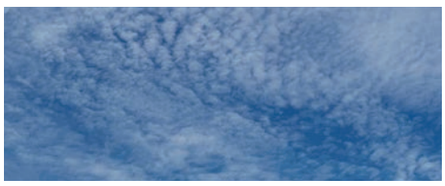
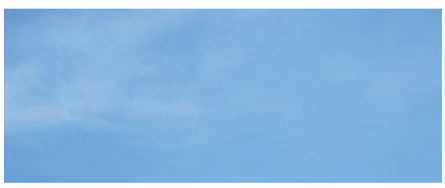
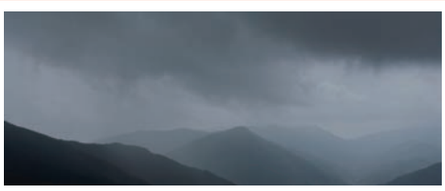
Clear sky



Cloudy sky

Summary

Clouds can help us to predict the weather. When we observe clouds, we can forecast the weather in the hours and days ahead. The types of clouds tell us about the weather. The table below describes the types of clouds that may cause bad weather such as rain, strong wind and lightning.

 **Cirrus:** Cirrus clouds can indicate that a change in the weather will occur within 2 or 3 days.	 **Cirrocumulus:** A storm may come. In tropical regions, that could be a hurricane.
 **Cirrostratus:** Cirrostratus clouds usually come 12-24 hours before a rainstorm.	 **Altostratus:** Altostratus clouds often form ahead of continuous rain.
 **Nimbostratus:** They often produce light to moderate rain. Rain can be long lasting.	 **Cumulonimbus:** These clouds mean thunderstorms, including lightning and heavy rain.

Try it!

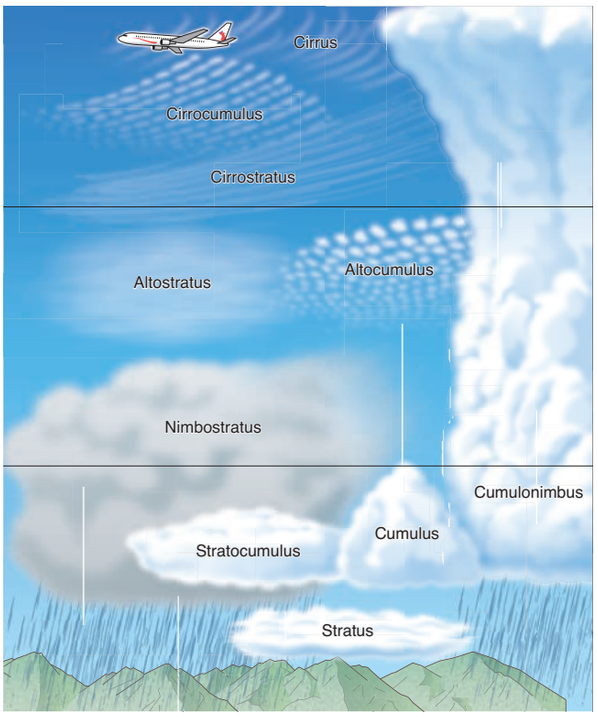
Let's observe clouds to forecast tomorrow's weather based on the types of clouds using the information in the table above.

Summary and Exercise

Summary 3.1 Observing Clouds

Types of Clouds

- A cloud is made of water droplets or ice crystals floating in the sky.
- There are ten different types of clouds.
- Different types of clouds are located at different altitudes in the sky.



Weather Forecast

- Weather forecast predicts the upcoming weather.
- Clouds can help us predict the weather.
- When we observe the clouds, we would forecast the weather in the hours and days ahead.
- The types of clouds tell us about the weather.
  - Cirrus clouds can indicate that a change in the weather will occur within 2 or 3 days.
  - Cirrocumulus clouds suggest that a storm may come. In tropical regions, that could be a hurricane.
  - Cirrostratus clouds usually come 12-24 hours before a rainstorm.
  - Altostratus clouds often form ahead of continuous rain.
  - Nimbostratus clouds often produce light to moderate rain. Rain can be long lasting.
  - Cumulonimbus clouds mean thunderstorms, including lightning and heavy rain.

Summary and Exercise

Exercise 3.1 Observing Clouds

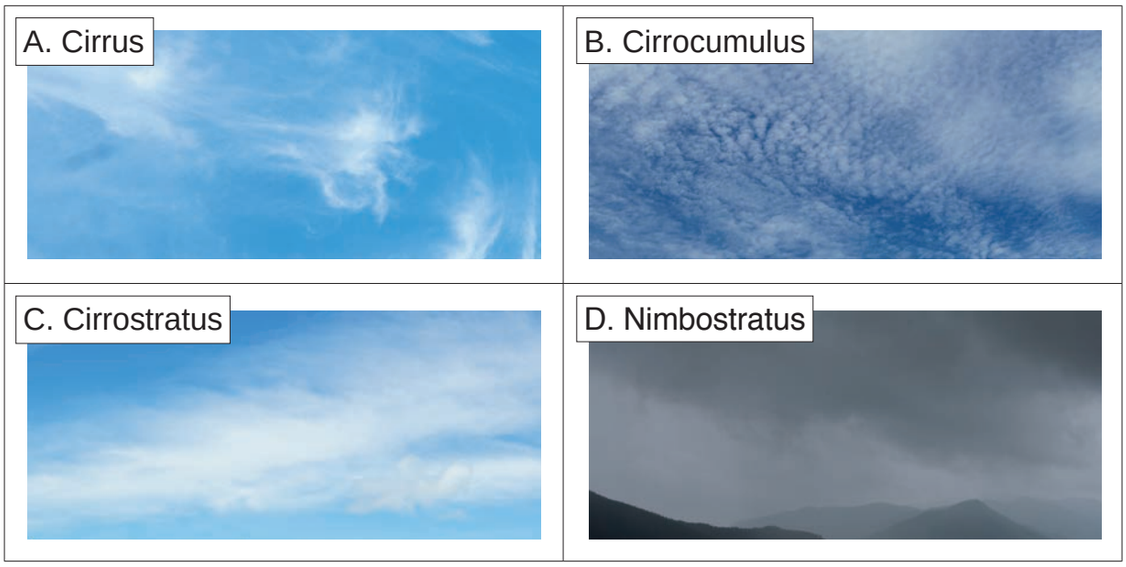
Q1. Complete each sentence with the correct word.

(1) A _____ is made of water droplets or ice crystals floating in the sky.

(2) Different types of clouds are located at different _____ in the sky.

(3) Clouds can help us predict the _____.

Q2. Choose the letter with the correct answer to answer (1) and (2).



(1) What type of clouds indicates that there would be a change in the weather within 2 or 3 days?

(2) Which of the given types of clouds mean there will be light rain to moderate and the rain can be long lasting?

Q3. Look at the picture on the right and answer the following questions.

(1) What is the name of the cloud?

(2) At what level of altitude is this cloud located?

Q4. Alice went outside the house and saw that the clouds looked like hooks and feathers high up in the sky. What do you think her prediction of the weather would be?

3.2 Seasons

Lesson 1 Seasons

It may be 'hot' and said to be a 'dry season' or it may be 'wet' and said to be a 'wet season'. Is season similar to or different from weather?

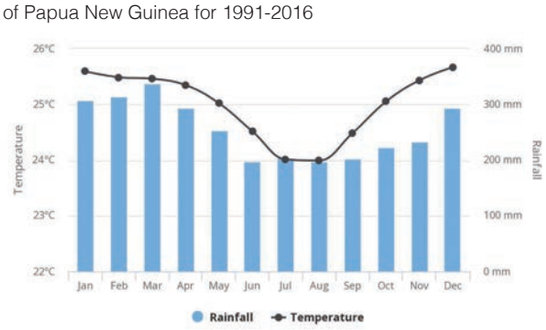
What is a season?

Activity : Seasons in Papua New Guinea

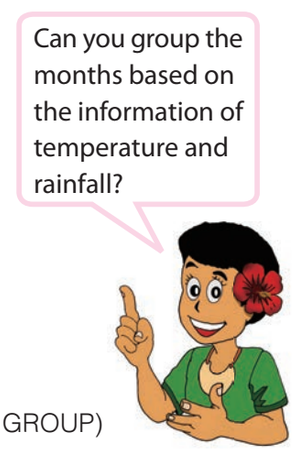
What to Do:

1. Study the graph below. This graph shows average monthly temperature and rainfall of Papua New Guinea from 1991-2016.

Average Monthly Temperature and Rainfall of Papua New Guinea for 1991-2016



(Source: Climate Change Knowledge Portal, THE WORLD BANK GROUP)



2. Think about the following questions.
   (1) Is the temperature the same all year around?
   (2) Which months are warmer with temperatures at 25°C and over?
   (3) Which months are cooler with temperatures below 25°C?
   (4) Does the rainfall occur all year around?
   (5) Which months are drier with less than 200 mm of rainfall?
   (6) How many months are wetter with more than 200 mm of rainfall?
   (7) What patterns of temperature and rainfall are there in PNG?
3. Share your ideas with your classmates. Discuss your answers and the seasons in Papua New Guinea.

Summary

Weather changes from day to day. When weather remains the same for a long period, we call it **season**. Season is a period of the year that is divided by typical weather conditions. Each season has its own weather pattern. There are some months that are very hot or cold. It rains heavily during some months. The seasons change in the same order every year.

In many places of the world, there are four seasons; spring, summer, autumn (fall) and winter. **Spring** is the season that follows winter. The weather begins to get warmer. It often rains in spring, too. **Summer** is the season that follows spring.

Summer is the warmest season of the year with long hours of sunlight. **Autumn (Fall)** is the season that follows summer. The weather slowly gets colder. **Winter** is the season that follows fall. Winter is the coldest season of the year with fewer hours of sunlight. In some places, the coldest weather causes snow, hail and sleet.

Do you know the seasons shown in these pictures?

Some places near the Equator have one hot season all year around or only two seasons; dry season and wet season.

The seasons of Papua New Guinea are quite diverse from place to place, but in general Papua New Guinea has dry season and wet season.

The **dry season** is a time of year when little rain falls. The dry season in PNG is generally from May to October. The **wet season** is the time of year when most of the rain falls. The wet season in PNG is generally from November to April.

Wet season in Papua New Guinea

Lesson 2 Seasonal Changes and Living Things

Seasons change in the same order every year. Each season determines the types of clothes people wear. Do seasons also cause any changes in plants and animals pattern of living?

How do living things change with seasons?

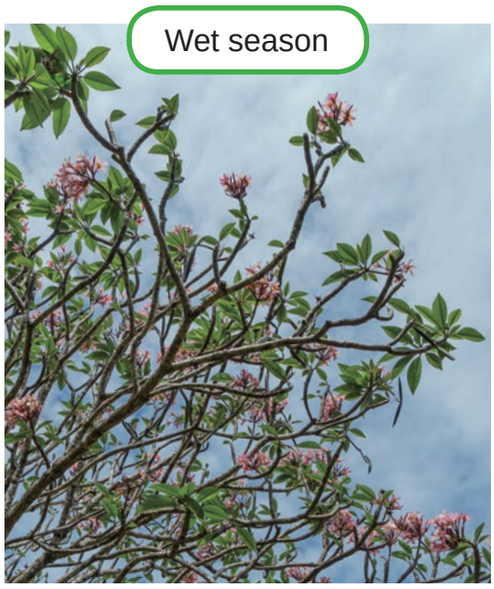
Activity : How are they different?

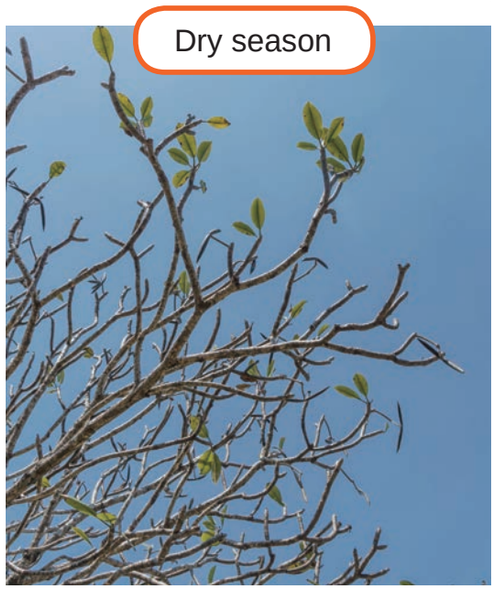
What to Do:

1. Draw a table like the one shown below.

Seasons	How does the tree change with the seasons?
During Dry season	
During Wet season	

2. Study the two pictures below of the same tree. The picture on the left was taken during a wet season and the picture on the right was taken during a dry season.
3. Observe how they look. Are they similar or different? Record your observations in the table.
4. Share your ideas with your classmates. Discuss how plants and animals change with the season.



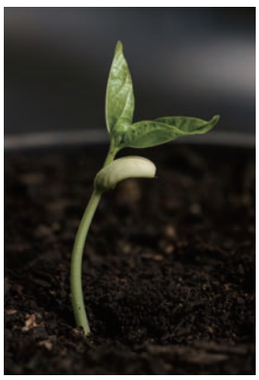


Summary

Changes in seasons cause living things to change. Living things need to adjust with seasonal changes.

Spring

Plant seeds begin to sprout. Buds on trees and shrubs grow. Leaves grow and flowers bloom. Many animals have young in spring.



Plant seed begins to sprout.

A bird has young in spring.

Summer

In summer, many plants grow flowers. Fruits grow from the flowers. Young animals grow and become stronger.

In summer, fruits grow from the flowers.

Autumn (Fall)

Some trees drop their fruits. The leaves of trees change colour and fall to the ground. Some animals move to warm places and others gather and store food.

Winter

Many trees and bushes stop growing or grow slowly. Some animals go into a long, deep sleep. The fur on some animals may get thicker and change colour.

Dry and Wet Season

During dry season, trees lose their leaves and some plants die. Some amphibians and insects will burrow deep into the soil and go into a long sleep until the rains return. As the wet season begins, rain helps plants to bloom and turn green. Animals thrive and have their young.

Rain helps plants to bloom and turn green in wet season.

Summary and Exercise

Summary 3.2 Seasons

Seasons

- A season is a period of the year that is divided by typical weather conditions.
- In many places in the world there are four seasons:
  1) Spring: the weather begins to get warmer.
  2) Summer: the warmest season of the year due to the long hours of sunlight.
  3) Autumn (Fall): the weather gets colder.
  4) Winter: the coldest season of the year due to the fewest hours of sunlight.

- Papua New Guinea and some other tropical countries have only two seasons: Dry and Wet.

Seasonal Changes and Living Things

- Changes in seasons cause living things to change. Living things need to adjust with seasonal changes.

Spring	• Leaves grow and flowers bloom. • Many animals have their young.
Summer	• Fruits grow from the flowers. • Young animals grow and become stronger.
Autumn (Fall)	• Leaves of the trees change colour and fall to the ground. • Some animals move to warm places, others gather and store food.
Winter	• Many trees and bushes stop growing or grow slowly. • Some animals go into a long, deep sleep.
Dry and Wet seasons	• During the dry season, trees lose their leaves and some plants die. • During the wet season, rain helps plants to bloom and turn green.

Summary and Exercise

Exercise 3.2 Seasons

Q1. Complete each sentence with the correct word.

(1) A period of the year that is divided by typical weather conditions is called _____.

(2) Living things need to adjust with seasonal changes in temperature and _____.

(3) Papua New Guinea has _____ season and wet season.

(4) Summer is the _____ season of the year due to the long hours of sunlight.

Q2. Choose the letter with the correct answer.

(1) Which of the following list shows the correct order of seasons?

A. Spring → summer → autumn → winter

B. Summer → autumn → spring → winter

C. Spring → autumn → winter → summer

D. Summer → spring → winter→ autumn

(2) During which season do some animals hibernate or go into a deep sleep?

A. Spring

B. Summer

C. Autumn (Fall)

D. Winter

Q3. Study the picture on the right and answer the question.

What will happen to this plant during dry season?

Q4. Explain why seeds of many plants in Papua New Guinea germinate during wet season.

Why do animals go into a very long sleep during winter?

You are probably aware that some animals fall into a very long sleep during winter, this is called Hibernation. Hibernation is an adaptation that helps many animals conserve energy by remaining inactive and reducing their body temperature for days, weeks or even months at a time.

Typically, animals hibernate in order to survive long periods when food is scarce. Hibernating animals will generally eat a lot of food before hibernation and then survive off the energy stored in their fat.

Hibernating animals can sense seasonal changes. The moment they sense autumn (fall) approaching, they get busy preparing by eating more than usual, the animal builds up extra layers of fat. During hibernation, the animal's body will feed on this fat to keep itself alive. Extra fat also helps the animal to stay warm when they are asleep. They then find a shelter where they will be safe while they are asleep if they want to survive.

Only warm-blooded animals can truly hibernate because cold-blooded animals cannot regulate their own body temperatures. Bears, ground squirrels, woodchucks and groundhogs all hibernate during winter.

This animal has gone into a deep sleep during winter.

Chapter Test

3. Weather and Seasons

Q1

Complete each sentence with the correct word.

(1) Different types of clouds are located at different _____of the sky.

(2) The types of clouds tell us about the upcoming_____.

(3) Some places near the_____have one hot season all year round or only two seasons, dry and wet.

Q2

Choose the letter with the correct answer.

(1) Papua New Guinea has two seasons, what are they?

A. rainy and winter

B. wet and dry

C. spring and dry

D. summer and winter

(2) Which cloud is formed at a range from low to high level altitude and like a huge cloud tower?

A. cirrocumulus

B. cumulonimbus

C. cirrostratus

D. cumulus

(3) What can clouds tell us about? They can tell us about

A. what the upcoming weather will be like.

B. when it will be full moon.

C. what time the sun rises.

D. how many seasons there are.

(4) In which season do leaves of trees start to change their colours and drop to the ground and the nights begin to get colder?

A. Spring

B. Summer

C. Autumn

D. Winter

Q3

(1) What would be the expected weather when the clouds are thin, pure white fields of small grains or ripples at a high alttitude as shown in the picture on the right?

_____

_____

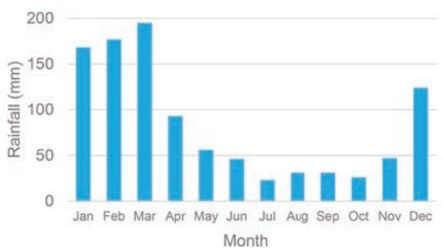
_____

(2) How are plants different in wet and dry season?

_____

_____

(3) The graph on the right shows monthly rainfall in a city. Is it dry season or wet season from July to October?



_____

Q4

(1) What do animals do in Autumn (Fall) to get ready for winter?

_____

_____

(2) Farahlyn observed the sky one day and saw that the clouds looked like hooks, feathers and patches with silky shimmer.

(i) What type of cloud did she see?

_____

(ii) What do you think the weather would be like by looking at those clouds?

_____

_____

_____

Chapter 4

New Matter

4.1 Common Chemical Changes

Lesson 1 How to Tell a Chemical Change

When we burn wood, the wood changes into ash. Burning wood is a chemical change.

How can we tell if a chemical change has taken place?

Activity : Hammering and heating sugar

What We Need:

- 2 sugar cubes, tablespoon, candle, match, hammer, aluminium foil

What to Do:

1. Draw a table like the one shown below.

	Texture	Colour	Smell	Others
Sugar cubes				
Crushed sugar				
During & after heating sugar				

2. Crush the sugar cube with the hammer. Observe the properties of the sugar cube and the crushed sugar.
3. Wrap the spoon with an aluminium foil. Put the crushed sugar onto the spoon and heat the sugar on a lit candle until it changes colour. Observe what happens to the sugar.
4. After cooling down the spoon, observe the properties of the sugar. Record your observations in the table.
5. Share your findings with your classmates.

Wrap the bowl of the spoon with an aluminium foil.

Use a piece of cloth to hold the spoon when heating sugar!

Discussion

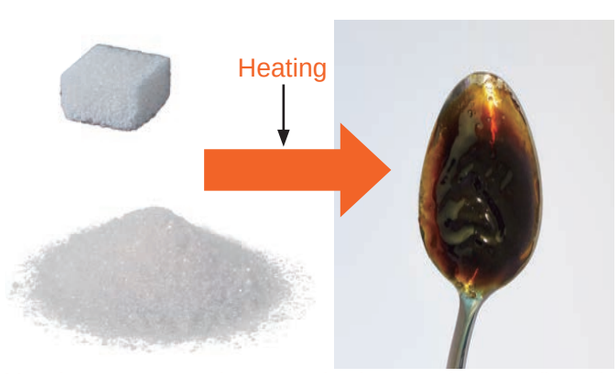
How do we tell a physical change from a chemical change?

1. Think about the following questions based on your results.
   (1) Do the sugar cube and the crushed sugar have the same or different properties?
   (2) Is the crushed sugar a physical or a chemical change?
   (3) Does the sugar after heating have the same properties as the sugar cube?
   (4) Is the heated sugar a physical change or a chemical change? Why do you think so?
2. Talk about how we can tell if a chemical change has taken place.

Summary

A **chemical change** produces new kinds of matter. A physical change does not produce new matter. New matter has different properties. For example, burning is a chemical change. After burning wood, the wood changes into ash. The wood and ash have different properties. Burning wood produces new kind of matter such as ash. Ash is no longer wood.
A chemical change produces gas, odour, heat, light, and changes in colour and state. For example, when sugar is heated, odour is produced, its colour and state changes. Therefore, heating sugar is a chemical change.

Burning wood is a chemical change. It produces ash.



Heating sugar produces melted sugar (caramel) and the colour changes.

Lesson 2 Rusting

When we leave an iron nail outside for some time, it will rust. Why does an iron nail rust? What is rust?

Is rusting a chemical change?

Activity : Properties of rust

What We Need:

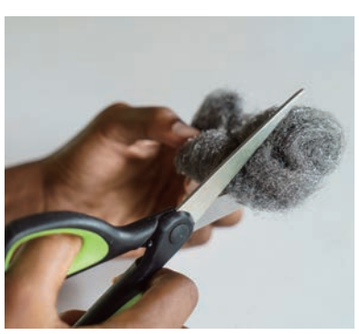
- a piece of dry steel wool, a piece of steel wool dipped in salt water for a week, scissors, hand lens, magnet, A4 paper

What to Do:

1. Draw a table like the one shown below.

Material	Texture	Colour	Magnet
Dry steel wool			
Wet steel wool			

2. Cut the dry steel wool onto the piece of paper. Use a hand lens to observe the properties of the pieces of steel wool. Hold the magnet close to the pieces.
3. Record your observations in the table.
4. Repeat Steps 2 and 3 for the pieces of steel wool that was dipped in salt water for a week.
5. Share your findings with your classmates. Discuss how they are similar or different.



Result

We found out that properties of a dry steel wool were glossy, glory and silver in colour while the properties of a rusted steel wool were rough, dull and reddish brown in colour. The pieces of dry steel wool were attracted by the magnet. Some pieces of wet steel wool were not attracted by the magnet. These results show that a dry steel wool and a wet steel wool have different properties.

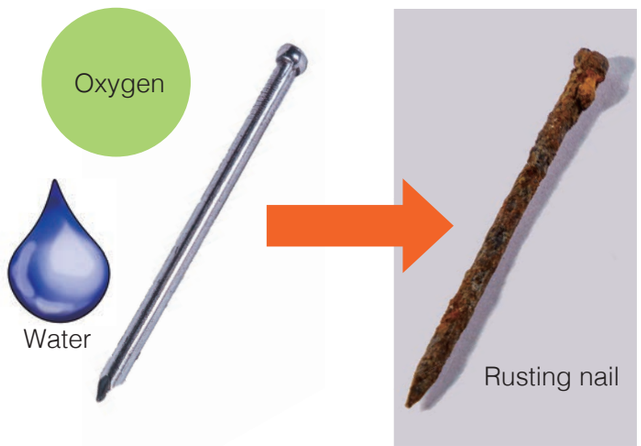
	Texture	Colour	Magnet
Dry steel wool	glossy, glory	silver	attracted
Wet steel wool	rough, dull	reddish brown	some attracted but some are not

Summary

Rusting is a type of chemical change. It usually happens slowly. When iron or steel comes into contact with water and oxygen in the air, rusting happens. We may find brownish patches on the metal parts of cars or ships. Rust is a coating that forms on the surface of iron or steel.

When we leave an iron nail outside in the rain, rust will form on the surface of the nail. Rust has a different property from iron. It is a different kind of matter. Rust is no longer iron. Rusting produces new matter.

Rust on the surface of a ship



Rust has a different property from iron. Iron and rust are different kinds of matter.

Lesson 3 Chemical Changes in Daily Life

When a chemical change occurs in matter, what happens to matter?
What kind of chemical changes take place around us?

How does a chemical change take place in daily life?

Activity : Finding chemical change around us!

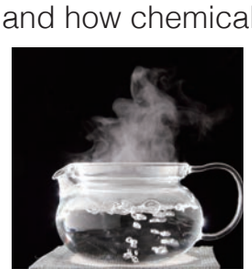
What to Do:

1. Draw a table like the one shown below.

	How do properties of matter change?	Is new matter produced?	Chemical change or Physical change
Burning paper			
Boiling water			
Boiling egg			
Dissolving sugar			
Cutting papaya			
Rotting banana			

2. Study the pictures below. Observe the change in the properties of the matter and record your observations in the table.
3. Share your ideas with your classmates. Discuss where a chemical change occurs and how chemical and physical changes are different.


Burning paper


Boiling water


Boiling egg

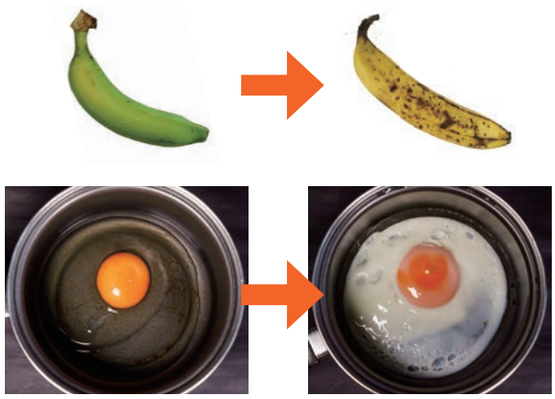

Dissolving sugar in water


Cutting papaya


Rotting banana

Summary

Chemical changes take place all around us. Burning wood, rusting iron nails, cooking food and ripening and rotting fruits are chemical changes. Chemical change also happens in our body. Our body changes food chemically into new matter that it can use as energy.



Rotting and cooking are chemical changes.

Our body changes food chemically into energy that our body can use.

Energy is always involved in a chemical change. Chemical changes take in or give off energy in the form of heat, light, electricity, sound or motion. For example, heat energy can be added when we light a fire or cook food to produce a new kind of matter. Energy is often released when a chemical change takes place. Burning paper gives off energy in the form of heat and light. An explosion of fireworks is a chemical change. When fireworks explode, they produce many loud sounds and lights.

Heat energy is added when cooking food.

An explosion of fireworks gives off sounds and lights.

Summary and Exercise

Summary

4.1 Common Chemical Changes

How to Tell a Chemical Change

- Chemical change produces new kinds of matter that has different properties.
- Burning paper or wood is an example of a chemical change. Ash is the new matter formed after burning.
- A chemical change produces gas, odour, heat or light and changes in colour and state.

Burning paper is a chemical change.

Rusting

- Rusting is a type of chemical change that usually occurs slowly.
- Rusting comes in brownish colour on objects that are made of iron or steel.
- Rust is formed when iron or steel comes in contact with water and oxygen in the air.
- Iron and rust are different kinds of matter because they have different properties.

Chemical Changes in Daily Life

- Chemical change often takes place in our daily lives.
- Chemical change takes in or gives off energy in the form of heat, light, electricity, sound or motion.
- Burning wood, rusting iron nails, cooking food, ripening and rotting of fruits are chemical changes.
- Chemical change occurs in our body by changing food into new matter that can be used as energy.

Summary and Exercise

Exercise

4.1 Common Chemical Changes

Q1. Complete each sentence with the correct word.

(1) Energy is always involved in a _____ change.

(2) The new matter formed after burning wood is _____.

(3) Chemical change produces _____ kind of matter.

(4) Iron and rust have different _____ such as colour and texture.

Q2. Choose the letter with the correct answer.

(1) Which of the following is a chemical change?

A. Boiling water.

B. Tearing of a paper.

C. Sharpening a pencil.

D. Rotting banana.

(2) What happens to an iron nail when it is left outside in the rain for a while?

A. Rust would form on the surface of the nail.

B. The iron nail would not change but remain as iron nail.

C. The nail would go missing.

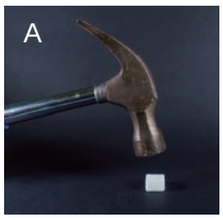
D. The surface of the nail would become shinny.

Q3. Answer the following questions.

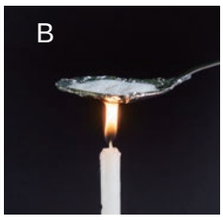
(1) Which of these pictures shown on the right is a chemical change?

(2) What things were produced when the sugar was burnt?

(3) Explain why it is a chemical change.



Crushing a sugar cube



Burning sugar

Q4. Plants take in water and gas called carbon dioxide and absorb sunlight. Then plants make sugar as their own food and give off oxygen gas. What can you conclude about the kind of changes that take place inside a plant to produce sugar and oxygen? Explain your answer.

Change of leaf colours during autumn

In many places of the world there are four seasons; spring, summer, autumn (fall) and winter. During autumn, falling temperatures prompts trees to prepare for winter. In these preparations, some kinds of trees change colour of their leaves dramatically.

Leaves change thier colour during autum.

Most leaves of trees look green because of the pigment they contain which is the chlorophyll. Chlorophyll absorbs sunlight and the light energy is converted to chemical energy through the process of photosynthesis. In addition to the chlorophyll, there are other pigments present in the leaves, which are carotene and anthocyanin. While carotene is yellow, anthocyanin is red. The change in temperature during autumn(fall) causes the trees to cut off supply of water to the leaves. In the absence of water, photosynthesis stops, and the chlorophyll breaks down through chemical change. Therefore, the leaves take the colour of the other pigments, and we can see a change in colour from green to red and yellow.

Chemical change takes place in leaves of trees.

Chapter Test

4. New Matter

Q1

Complete each sentence with the correct word.

(1) Cooking food, rotting banana, burning paper, and rusting iron are some _____ changes in daily life.

(2) Rust is a coating that forms on the surface of iron or _____.

(3) _____ energy is added when cooking food.

(4) A new solid matter produced after burning paper is callled _____.

Q2

Choose the letter with the correct answer.

(1) Which list contains chemical changes only?

A. baking cake, boiling water, tearing paper, cutting mango

B. rotting banana, burning wood, rusting iron, cooking food

C. breaking glass, burning paper, slicing bread, popping pop corn

D. crushed can, squeezing a paper, spoilt milk, rotting mango

(2) Which of the following statements is <u>not</u> true about rust?

A. Rust occurs when iron or steel comes in contact with water and oxygen.

B. Rust has the same property as iron.

C. Rust is a kind of chemical change.

D. Rust comes in brownish colour.

(3) A pair of metal scissors left outdoor was rusted. What evidence shows that a chemical change has taken place?

A. It had a deep scratch.

B. The sunlight has warmed it.

C. The soil has stuck on its surface.

D. It changed to a brownish colour.

Q3

(1) Sandy wants to experiment with some sugar cubes. What should she do to change the sugar cube chemically?

_____

_____

(2) An explosion of fireworks is a chemical change. What three forms of energy does it produce when it explodes?

_____

_____

(3) Think about how an egg changes when it is cooked. Is this a physical change or a chemical change? Explain your answer.

_____

_____

_____

Q4

(1) A silver spoon that has turned black can be made shiny again by rubbing off the black tarnish with silver polish. Is polishing a physical change or a chemical change? Explain your answer.

_____

_____

_____

(2) Explain why the melting ice is not a chemical change.

_____

_____

_____