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SCIENCE



Primary 5

Term 1

Name:.....

Class:.....

School:.....

Supervised by: Central Administration for Curriculum Development

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Introduction



Dear Student,

We are pleased to present this Science book to you as your companion on an exciting journey to explore the world around you and understand natural phenomena and everyday life through observation, investigation, and critical thinking.

This book has been designed in accordance with modern educational approaches that emphasize learning science by gradually building scientific knowledge. You will begin with facts, observations, and hands-on experiences, then progress toward scientific concepts and principles. Therefore, you will find a variety of activities, questions, and learning situations that encourage you to observe, classify, compare, collect data, and draw conclusions independently under your teacher's guidance.

The book begins with objects and phenomena that are familiar to your daily life, then gradually moves from the concrete to the abstract and from the simple to the more complex. Its carefully sequenced and connected scientific content integrates different fields of science to help you build a solid and meaningful scientific understanding.

The book also highlights the importance of inquiry-based learning and hands-on investigation while taking individual differences into account. It connects science with everyday life, environmental issues, society, health, and safety. Through a wide range of engaging activities, it develops your logical, critical, and creative thinking skills while encouraging cooperation, communication, and respect for others' opinions.

This book aims to develop a positive scientific mindset based on curiosity, accuracy, scientific integrity, and perseverance. It also helps you appreciate the role of science and scientists in improving human life while promoting the values of sustainable development through conserving natural resources, energy, and water, and protecting living organisms and the environment.

Every effort has been made to ensure that the language of this book is clear and easy to understand, and that its illustrations and activities are attractive and motivating. We hope that studying science will become an enjoyable and meaningful experience that inspires you to love science and prepares you to contribute positively to building a better future.

We wish you every success.

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Let's Learn Together!

Characters:



Brainy



Smarty



Genius

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TERM 1

Primary 5 Science

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1-1 Bones and Muscles



What happens to our muscles when we bend and stretch our arms?

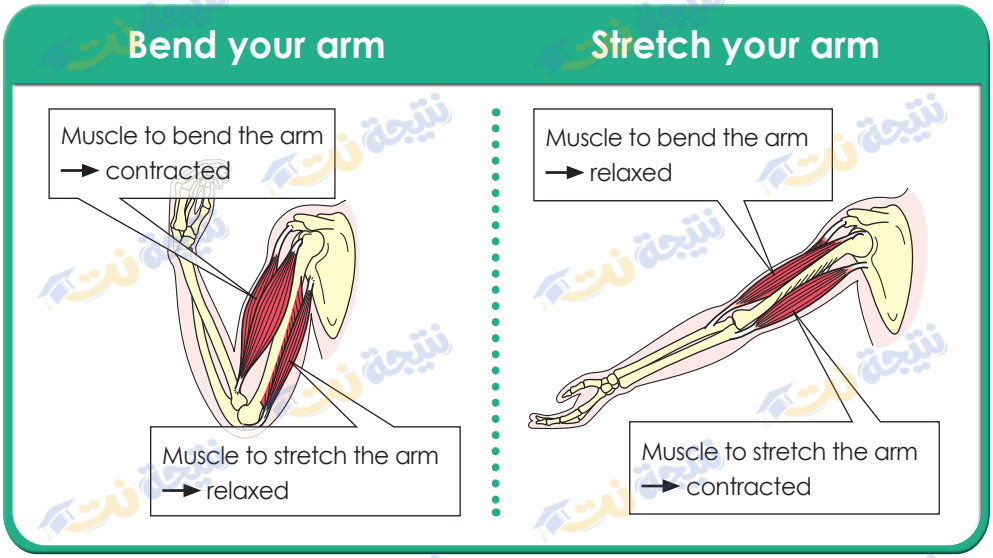


When you bend your arm, your biceps gets hard and bulges.
Let's all try it!

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Point! Contracting and Relaxing of Muscles

- The human body has hard, strong **bones** and flexible **muscles**.
- Muscles are soft parts inside our bodies. They pull our bones to help us move.
- The human body can move because muscles contract and relax. When you flex, your muscle **contracts** and gets **hard**.
  - **When bending the arm:** The **inner** muscle of the arm contracts, and the **outer** muscle relaxes.
  - **When stretching the arm:** The **outer** muscle of the arm contracts, and the **inner** muscle relaxes.
- The bending part of the arm is where the bones connect. This part is called **a joint**.



Warm Up Let's observe our own muscles!

Let's observe how muscles move in our own arms.

1 **Bend:**
Bend your arm strongly to flex your biceps. Touch the inner and outer muscles with your other hand. Which one is harder?

2 **Stretch:**
Stretch your arm out straight. How did the hardness of the muscle change?

3 **Discovery:**
- Let's feel how two muscles are working in turns when you move your arm.
- Observe what happens to your muscles when you hold something heavy.

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1-2 Structure of Bones



What are the functions of bones, and how are they connected?



Bones are very hard, but only the joints Enable Them To bend freely.
Is there a mechanism so bones don't rub against each other ?

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Point! Bones and Joints

Bones are very hard.

Bones **support the body** and protect organs like the brain and heart.

Joint:

The part where bones connect. Joints have **cartilage**, which **acts as a cushion** between the ends of the bone, so that bones do not rub directly against each other and protect bones from wear out

Warm Up Let's find joints!

Let's see how many joints (bending parts) you can find in your body.

1 Arms and hands:

Shoulders, elbows, wrists, and fingers.

How many joints are there in your fingers?

2 Legs:

Let's also bend your waist, knees, and ankles.

3 Notice the movement:

The elbow joint can only bend in one direction, but the shoulder joint can rotate around. Let's observe how the movement differs depending on the joint.





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Try

1 (1) When you bend your arm, what happens to the inner muscle (the biceps)? Choose the correct answer from below.

A: It relaxes and becomes thin.

B: It contracts and becomes thick and hard.

(2) Choose the correct word from below to fill in the blank about how muscles move bones.

relaxing / contracting / expanding

Muscles pull bones and move the body by ( ).

2 (1) What do you call the place where two bones meet and allow movement?

(2) Which statement correctly explains the movement of joints?

A: All joints in the body can be rotated in any direction.

B: The direction and range of bending are determined by the location of the joint.

(3) Fill in the blank with the correct word.

Joints have ( ), which acts as a cushion so that bones do not rub directly against each other to help prevent wear out.

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Exercise

1 (1) Which is correct about the state of the muscles when you stretch your arm?

A: The outer muscle contracts, and the inner muscle relaxes.

B: The inner muscle contracts, and the outer muscle relaxes.

(2) Which statement correctly explains the movement of the human body?

A: Muscles move the body by "pushing" the bones.

B: Muscles move the body by "pulling" the bones.

2 (1) Which of the following is NOT a role of bones?

A: Supports the body firmly.

B: Protects important organs like the brain and heart.

C: Can contract and move by itself, just like muscles.

(2) What do you call the part in joints that acts as a cushion so bones don't rub against each other?

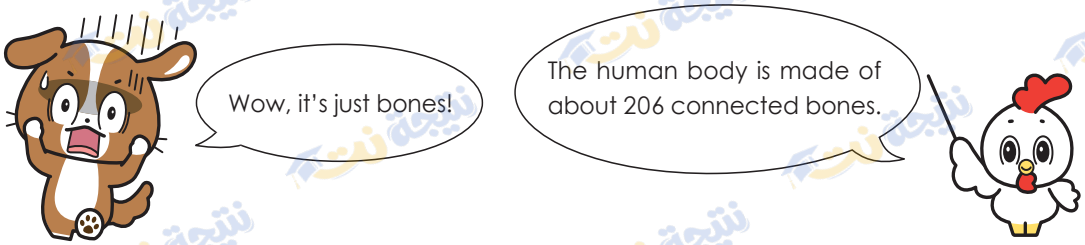
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1-3 Whole Body Skeleton

Chapter 1 ····· Bones and Muscles



How are all the bones in the body connected to support the body?



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Point! Skeleton that Supports the Whole Body

The structure where many bones combine to make the shape of the whole body is called **the skeleton**.

- **Skull:** Wraps and protects the soft brain like a helmet.
- **Ribs:** Protect the heart and lungs in a cage-like shape.
- **Backbone:**
  Acts as the pillar of the body and **supports the whole body**. The backbone is made of many small connected bones, to give the body flexibility so you can bend your body in different directions.



Warm Up Let's touch and check your own bones!

Feel the bones from the surface of your body and imagine their shapes.

❶ Touch your head:

You can feel it's hard no matter where you touch. This is the strong bone structure that protects the brain.

❷ Touch your chest:

Take a deep breath and touch your chest.
You can feel many thin bones located under the skin.

❸ Touch your back:

If you touch the middle of your back, you can feel bumpy bones lined up vertically. This is the backbone.



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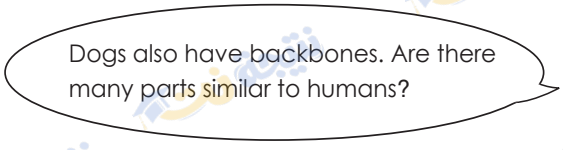
1-4 Animal Bodies

Chapter 1 ····· Bones and Muscles





Do other animals' bodies have the same bone and muscle mechanisms as humans?





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Point! Similarities about Animal Bones and Muscles

Animals like dogs, cats, and rabbits also move their bodies using bones and muscles, just like humans.

- **Similarities in skeletons:**

  Many animals have **backbones** like humans, and they also have **joints** in their front and back legs (limbs).

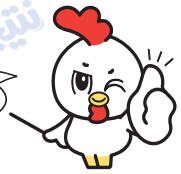
- **Differences in movement:**

  Depending on how the animal lives, like running fast or flying in the sky, the length of the bones and how the muscles are attached are slightly different.

- **Mechanism:**

  All of these animals move by their muscles **contracting** and pulling their bones.

The shapes are different depending on the animal, but the mechanism of moving the body with bones and muscles is very similar to humans.



Warm Up Let's find the joints of humans and animals!

Look at picture books or illustrations and compare the bone structures of humans and other animals.

❶ **Look at a dog's front legs:**

Where is the part that corresponds to a human "elbow"? It is located higher up from the ground.

❷ **Look at a rabbit's back legs:**

Let's find the part that corresponds to a human "knee". Rabbits have very long bones to make it easy to jump.

❸ **Discovery:**

If you focus on the joints (bending parts), you can see that the body structures of humans and animals have things in common.



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Try

1 (1) What do you call the framework of bones that forms the shape of the body?

(2) Which important organs do the ribs protect in a cage-like shape? Choose two correct answers.

A: Brain

B: Heart

C: Lungs

D: Stomach

2 (1) Choose the correct words from below to fill in the blanks about how animals move their bodies.

① [muscles / skin]

② [bones / hair]

Animals like dogs and horses also move by (①) contracting and pulling (②), just like humans.

(2) What does the difference in bone length and shape among animals depend on? Choose the correct answer from below.

A: Body color

B: How they live (how they run, fly, etc.)

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Exercise

1 (1) Fill in the blank with the correct word.What is the main role of the skull?

To protect the ( ).

(2) Which of the following sentences is correct about the backbone? Choose the correct answer from below.

A: The backbone is made of one long, unbendable bone.

B: The backbone is made of many small connected bones, so you can bend your body.

2 (1) Which statement correctly explains the structure of a dog's front legs? Choose the correct answer from below.

A: It has joints (bending parts) just like humans.

B: It is made of one connected hard bone and does not bend anywhere.

(2) Which statement correctly explains the body structure of animals? Choose the correct answer from below.

A: The reason bone shapes differ by animal is that each is adapted to specific types of movement.

B: The mechanism of muscles moving bones follows completely different rules for humans and animals.

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Chapter 1 Enrichment corner:
Biomechanics (How the Body Moves) of the Desert Runner, "The Camel"

1 The Secret of the "Ship of the Desert": Bones and Muscles

Camels can carry heavy bags and keep walking for dozens of kilometers in the super-hot desert. The secret to their amazing stamina lies in the special shape of their bones and muscles that we learned about in Chapter 1.



- **Shock-Absorbing Knee Calluses:**

When a camel sits on the ground, the joints that touch the ground have thick skin called calluses that are several centimeters thick. Inside these calluses, the places where the bones connect are protected by very soft, cushioning tissue. This keeps the impact on their joints as low as possible.



- **Shape-Shifting Toe Bones:**

The bones in a camel's toes spread out wide to the sides the exact moment they step on the ground. Because of this, the area touching the ground becomes wider to spread out their body weight. This stops their feet from sinking into the soft sand.

▼Camel's toe bones



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2 Look at the hump on a camel's back. People used to say, "It is full of water," but when we look at it with a scientific eye, we can see it has a very important job to move their muscles.



- **The Hump is Actually Fat:**

The inside of the hump is not water, but a big lump of nutrients called fat. Camels break down this fat to make energy, keeping their muscles moving during long trips.

- **A Design to Let Heat Escape:**

If a camel had fat all over its body, the fat would act like a warm blanket and trap the heat inside. By gathering all the fat on its back, the camel can feel the wind on the rest of its body to easily let its body heat escape. This clever design helps its muscles work perfectly, even in the extreme heat.

To survive in the harsh desert environment even when there is no food, camels store nutrients as fat inside their humps!



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2-1 Changes over a Year

Chapter 2 ····· Changes in the Seasons









How do plants change throughout the year?



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Point! A Plant's Yearly Cycle

Plants grow and change their appearance significantly depending on seasonal temperature.

- Summer (When the temperature is **high**):
  Seeds **sprout**, grow their stems tall, spread their leaves wide, and produce **flowers**.
- Winter (When the temperature is **low**):
  Plants start to wither, but they produce **seeds** for the next generation. They wait for the next warm season.

▼A Tomato's Yearly Cycle



Warm Up Let's observe a plant yearly cycle!

Let's check the order of how a luffa changes.

1 Check with pictures and encyclopedias:

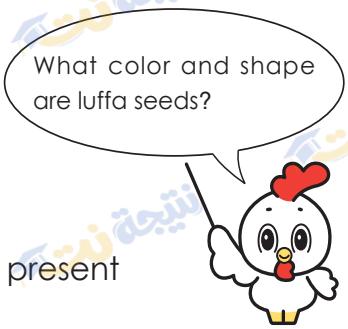
- Let's look at the order of when the seeds were planted, when the flowers bloomed, and when the fruit turned brown.
- Let's find out the seasons when the flowers bloom and the fruits grow.

2 After withering:

- Let's focus on the fact that plants don't just "wither and die", but they produce seeds to continue their life cycle the following year.

3 Discovery:

- Let's research the yearly cycles of other plants and present our findings.



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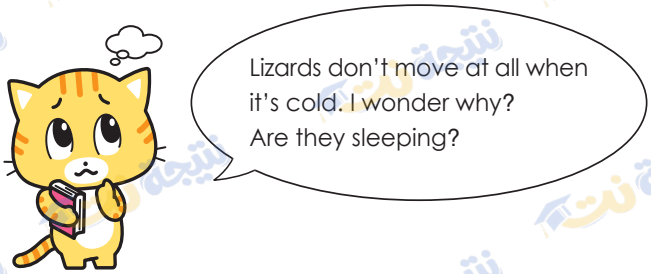
2-2 Animals and Temperature

Chapter 2 ····· Changes in the Seasons





How do the activities of animals like lizards change when the temperature changes?



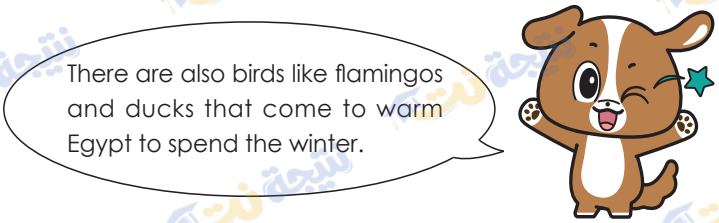
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Point! Temperature and Animal Activity

The activities of animals like lizards, snakes, and frogs change significantly depending on the temperature.

- **When the temperature is high:**
  They become more active, moving quickly to find food or escape danger.
- **When the temperature is low:**
  Their body movements become **slow**, and they do not move much.
- **During cold winters:**
  They stay still **in the soil** or in rock crevices to conserve energy. This is called **hibernation**.

Many animals are active, grow, and reproduce during **warm** seasons. When it gets cold, they survive the winter in various ways.



Warm Up Let's predict animal movements!

Let's think and discuss where and what animals are doing depending on temperature changes.

1 Daytime in summer:

A lizard is basking in the sun on a sunny rock. Let's discuss why.

Why doe the lizard prefer to stay in this place?

2 Cold winter days:

Even if you search the park or the desert, you can't find any lizards.

Where do you think they went?

3 Comparison:

Let's discuss why humans can run even when it's cold, while lizards are affected by the temperature.

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Try

1 (1) When does a luffa plant seed and start growing fast? Choose the correct answer from below.

A: When the temperature gets lower

B: When the temperature gets higher

(2) What is left behind after the luffa withers in the winter to produce the next generation?

2 (1) When do lizards become most active? Choose the correct answer from below.

A: When the temperature is high

B: When the temperature is low

(2) How do lizards and similar animals often spend their time during the cold winter? Choose the correct answer from below.

A: Moving around actively.

B: Staying still in the soil or in rock crevices.

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Exercise

1 (1) Choose the correct words from below to fill in the blanks about summer plants.

① higher / lower

② produce / scatter

In summer, the temperature gets (①), so many plants spread their leaves wide and (②) their flowers.

(2) Which is the correct order for a plant's yearly cycle? Choose the correct answer from below.

A: Fruit grows → Flowers bloom → Seeds sprout

B: Seeds sprout → Flowers bloom → Fruit grows

C: Seeds sprout → Fruit grows → Flowers bloom

2 (1) Choose the correct words from below to fill in the blanks about temperature and animal activity.

low / high

Lizards and other animals become slow when the temperature gets (①), and they can move quickly when the temperature gets (②).

(2) What is it called when animals stay still to conserve energy during the cold winter?

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Chapter 2 Enrichment corner: *Desert Wisdom, the Fennec Fox and Traditional Clothes*

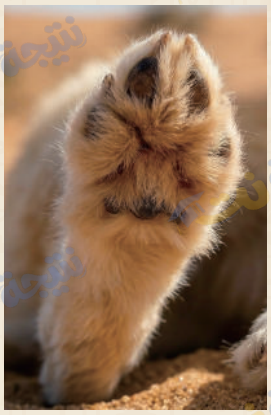
1 The Smallest Hunter, the "Fennec Fox," and Its Heat Release System

The fennec fox is the smallest fox in the world. It is the champion of adapting to temperature changes and controlling body temperature that we learned about in Chapter 2.

- **Giant Ears Act Like a "Radiator":**
  A fennec fox's ears are unusually huge compared to its body. Under the skin of these ears, tiny blood vessels spread out like a net. By bringing warm blood to its ears and letting the desert wind blow on them, the fox cools down its body perfectly, just like an air conditioner.



- **"Heat-Blocking Hair" on the Bottoms of Their Paws:**
  During the day, the desert sand gets extremely hot. The fennec fox has long hair on the soles of its paws, just like wearing socks. This hair works as a shield to protect its feet from the hot sand.



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2 Smart Tricks: Traditional Clothing and Beating the Heat

The "Galabeya" is a traditional piece of clothing from Egypt. Let's think about why it is so loose and baggy, based on what we learned about temperature in Chapter 2.



- **Using Air Movement (Convection):**
  There is a wide, open space between the Galabeya and the person's body. When the sun warms up the cloth, the air inside becomes lighter and floats up, and fresh air comes in from the bottom hem. This creates air circulation that helps sweat evaporate faster and takes away body heat.



- **The Connection Between Color and Heat:**
  A white Galabeya reflects the sunlight to reduces the heat, while a black Galabeya makes the air inside move even faster, which gives it more power to dry sweat.

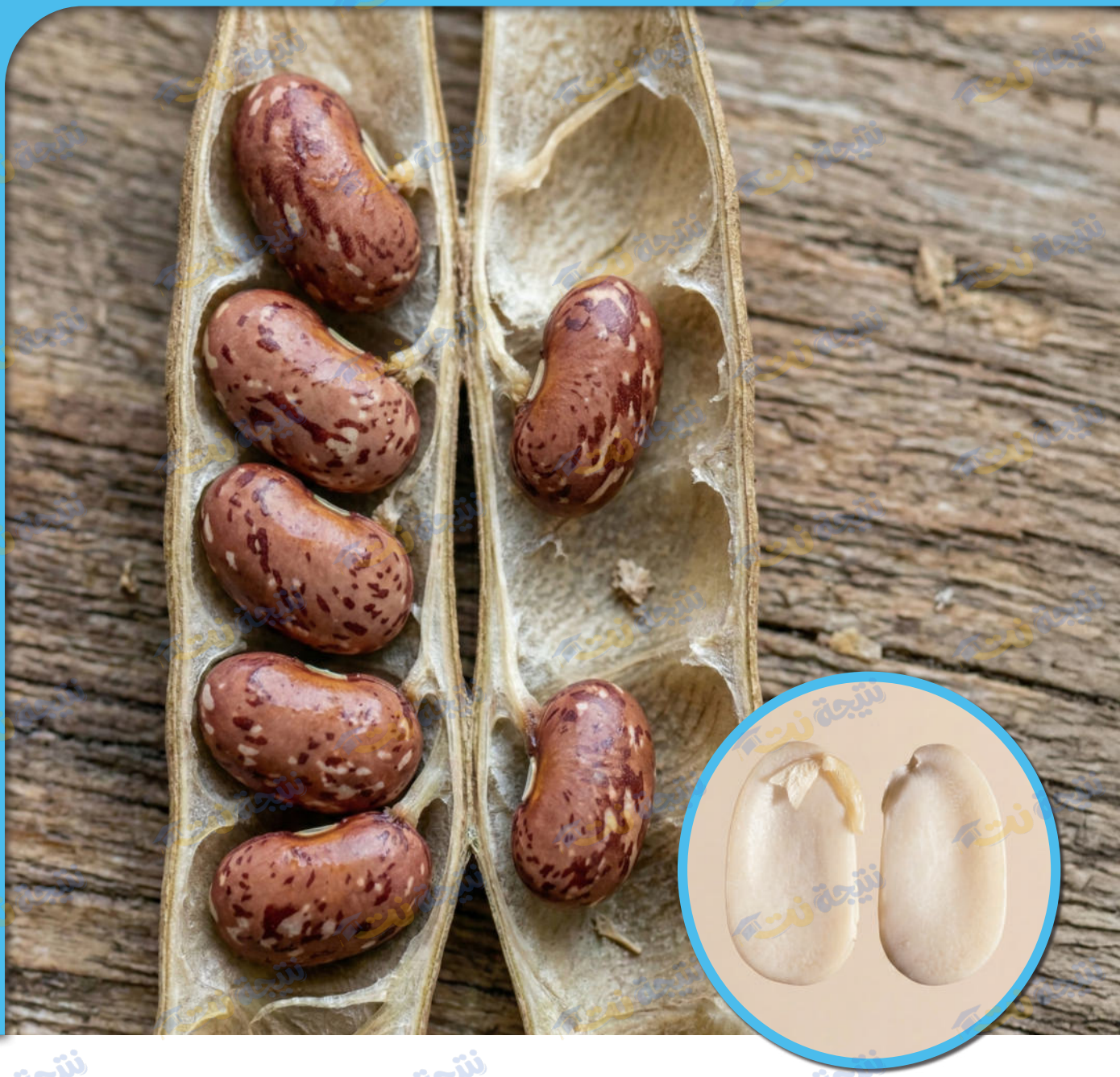


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3-1

Inside the Seed

Chapter 3 ····· Conditions for Germination



What is inside a kidney bean seed, and where is the nutrition for growth?

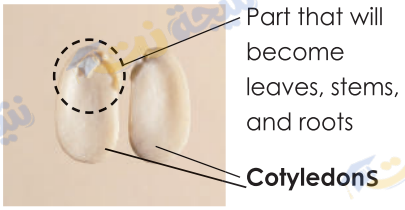


There is something like a tiny sprout inside the seed!

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Point! Structure and Nutrients of a Seed

- When a plant seed sprouts, it is called **germination**.
- Inside the seed, there is **a part that will become a new plant** and **a part that stores the nutrients** needed for the sprout to grow.
  - **Cotyledon**:
    The part that makes up most of seeds like kidney beans. It is packed with **starch**, which becomes the nutrient for germination.



- Iodine test for starch:
  When you put **iodine solution** on starch, the color changes to **blue-black**.

Warm Up Let's dissect and check the seed!

Let's observe kidney beans closely and find the secret of germination.

Steps

1. **Peel the coat:** of a kidney bean seed: soak the kidney bean seed and each half is called cotyledon. in water overnight to make it soft, and split it in half.
2. **Observe:** Look closely inside with a magnifying glass and find the embryo, which will become the "sprout" in the future.
3. **Apply iodine solution.**
   Place half of the non germinated seed in a small, dish, then add one drop of iodine solution to the inner surface of the cotyledon. Notice the colour change, if the colour turns dark blue this indicates the presence of starch, which is stored food inside the seed.
4. **Discovery:**
   Cut the cotyledon of a seed that has germinated and grown for a few days, add a drop of iodine solution on it, and observe if the color changes.



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3-2 Water and Germination

Chapter 3 ····· Conditions for Germination



Is water necessary for seeds to germinate?



When I grew plants, I gave them water after planting the seeds!

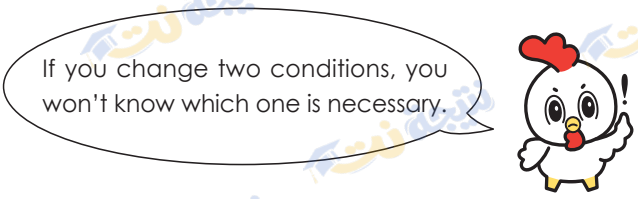
How can we find out if water is necessary?



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Point! Comparing under the same conditions

- When investigating one condition, change **only the condition you want to investigate**, and keep all other conditions **the same**.
- How to investigate if water is necessary for a seed to germinate
  - **Condition to change:** **Presence or absence of water**.
  - **Conditions to keep the same:** Temperature, Air (Yes), Brightness.



Warm Up Do seeds need water to sprout?

Let's grow kidney beans by dividing them into two environments.

1 Things to prepare:

- Kidney bean seeds
- 2 plastic cups
- Pieces of cotton

2 Change the condition:

- Put cotton in the 2 cups and place a few kidney beans on each.
- Moisten the cotton in cup **A** with plenty of water, and leave cup **B** dry.

3 Observe:

Leave the 2 cups in the same warm place for a few days, and observe the seeds every day to see which one sprouts.

[Caution]

- Be careful not to give too much water so that the seeds can touch the air.
- Be careful not to let cup **A** run out of water during the experiment.



A: Moistened with water **B:** Dry

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Try

Answer The Following Questions

1 (1) What do you call the part inside a kidney bean seed that contains the nutrients (starch) needed for growth?

(2) Write the name of the chemical used to check if there is starch.

(3) What is it called when a plant seed sprouts?

2 (1) Choose the correct answer. In the experiment investigating the relationship between water and germination, which is the "condition to change" between the two cups?

A: Presence or absence of water

B: Presence or absence of air

C: Temperature (high or low)

(2) In the experiment investigating the relationship between water and germination, which cup will sprout?

A: The cup that was not given water

B: The cup that was given water

C: Neither sprouts

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Exercise

1 (1) Choose the correct answer. What color does the kidney bean cotyledon change to when iodine solution is added?

A: Red

B: Blue-black

C: Green

(2) Choose all correct answers about kidney bean seeds.

A: Cotyledons do not contain nutrients (starch).

B: Inside the seed, there is a part that will eventually become roots and stems.

C: Starch becomes the nutrient for germination.

(3) In the experiment investigating the relationship between water and germination, choose all correct answers for the "conditions to keep the same" between the two cups.

A: Temperature of the place to put them

B: Amount of water

C: Brightness

2 Is water necessary for seed germination?

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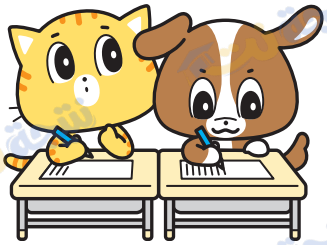
3-3 Air and Germination

Chapter 3 ····· Conditions for Germination



Is air necessary for seeds to sprout?

Will they sprout even if they are submerged in water?



It looks like they can't breathe underwater.

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Point! Air and Germination

Seeds are alive just like humans, and they **need air** to germinate.

How to experiment by blocking air

- **Condition to change:** Exposed to air or not exposed to air.
- **Conditions to keep the same:** Temperature, Brightness, Water.

Warm Up Let's compare exposed to air or not!

Let's check if they sprout when there is water but they are not exposed to air.

❶ Things to prepare:

- Kidney bean seeds
- 2 beakers
- Pieces of cotton

❷ Change the condition:

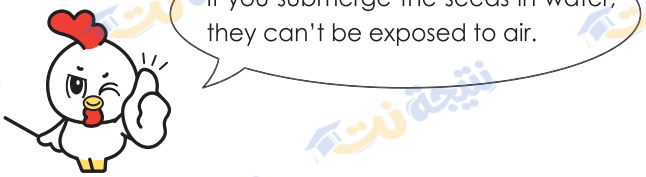
- Put cotton moistened with water in beaker **A**, and place a few kidney beans.
- Put water in beaker **B** until the seeds are completely submerged so that they are not exposed to air.

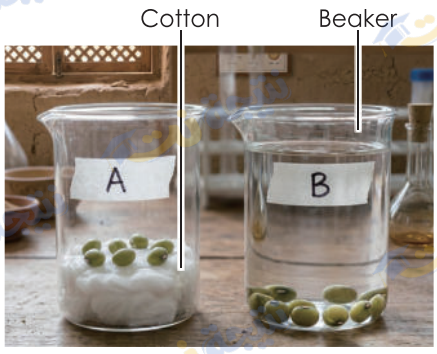
❸ Observe:

Leave them in the same warm place for a few days, and observe the seeds every day to see which one sprouts.

[Caution]

- Be careful not to let the water run out in both **A** and **B**.



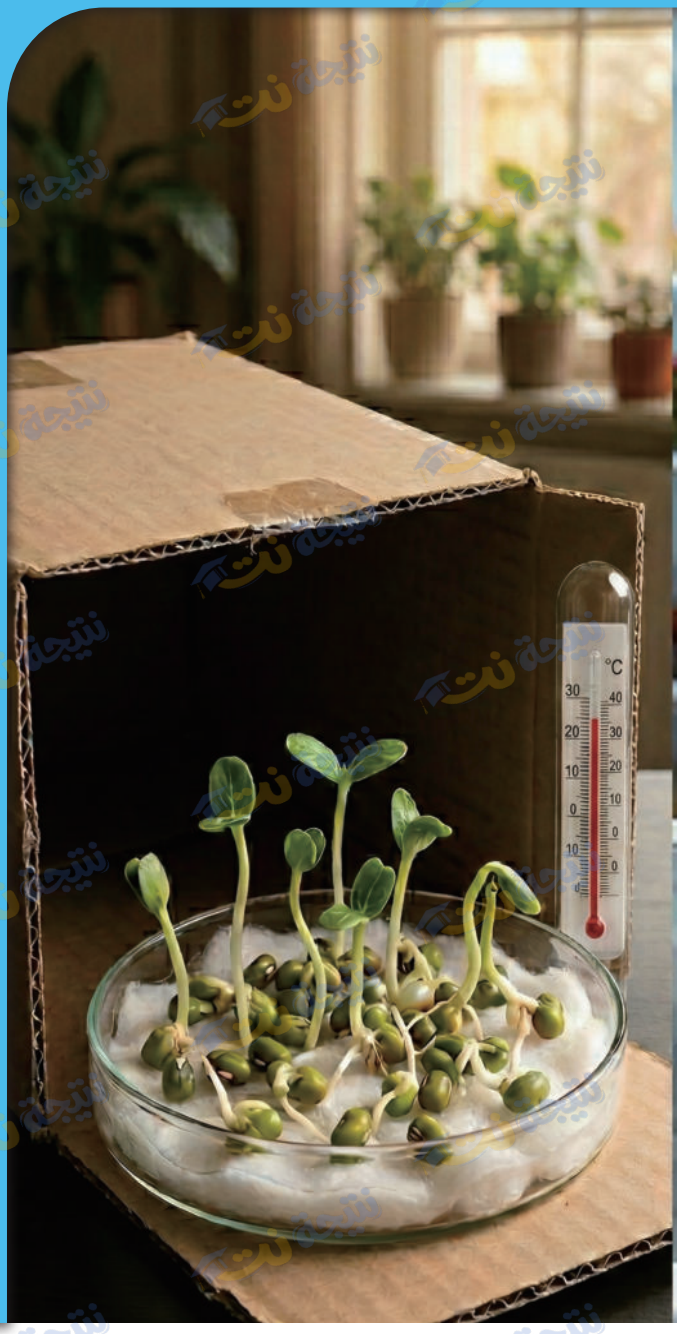


A: Exposed to air **B:** Not exposed to air

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3-4 Temperature and Germination

Chapter 3 ····· Conditions for Germination





Is there a proper temperature for seeds to sprout?

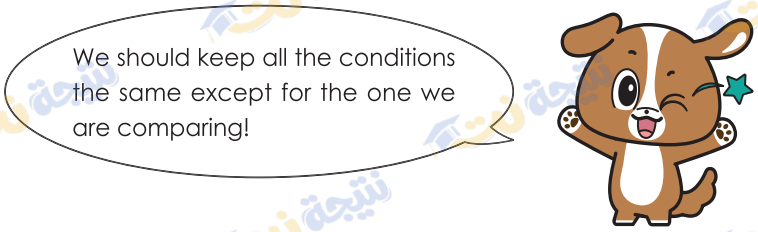


What will happen if we put seeds in the refrigerator when they have both water and air?

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Point! Temperature and Germination

- Seeds need an appropriate temperature (warmth) to germinate.
- How to investigate if temperature is necessary for seeds to germinate
  - **Condition to change:** Temperature
    Compare when placed in a warm place and when placed in a cold place.
  - **Conditions to keep the same:** Water, Air, Brightness.



Warm Up *Let's compare between seeds in warm and cold places!*

Make the conditions for water and air the same, and let's check only the difference in temperature.

❶ Things to prepare:

- Kidney bean seeds
- 2Plastic cups
- Cotton
- Cardboard box
- Refrigerator
- Water
- Wooden blocks

❷ Change the condition:

- Put cotton moistened with water in 2 cups, and place a few kidney beans on each.
- Place cup A in a warm place, and put cup B in the refrigerator.
- Since it is dark inside the refrigerator, cover cup A with a cardboard box to make it dark so that there is no effect from light. At this time, place wooden blocks under the cardboard box to make a gap for air to enter.

❸ Observe:

After a few days, check which one has germinated.



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Try

1 (1) Choose the correct answer.In the experiment investigating whether air is necessary for germination, what do you do with the seeds in cup B to compare conditions?

A: Submerge them in water

B: Place them in a dry place

C: Put them in the refrigerator

(2) In the experiment investigating whether air is necessary for germination, choose all correct answers for the conditions to keep the same in cups A and B.

A: Place both in a place with air

B: Place both in a place with the same temperature

C: Give water to both

(3) In the experiment investigating the relationship between temperature and germination, which is the "condition to change" between the two cups?

A: Presence or absence of water

B: Presence or absence of air

C: Temperature (high or low)

2 Why didn't the seeds put in the refrigerator germinate? Fill in the blank with the correct word.

Because the ( ) was too low.

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Exercise

1 (1) What is the reason why the seeds submerged in water did not germinate? Choose the correct answer from below.

A: Because the water was cold.

B: Because they were not exposed to air.

C: Because there was no nutrients in the water.

(2) Write down what you learned from the experiment investigating whether air is necessary for germination.

2 (1) In the experiment investigating the relationship between temperature and germination, why did you cover the seeds placed in a warm place with a box?

A: To make the temperature even higher

B: To keep the light conditions the same as the refrigerator

C: To prevent them from being exposed to air

(2) Which statement correctly explains the relationship between germination and temperature?

A: Seeds germinate even in a place as cold as ice.

B: An appropriate warmth is necessary for seeds to germinate.

C: Germination and temperature have no relationship.

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3-5 Summary of Germination

Chapter 3 ····· Conditions for Germination









Let's summarize the three conditions needed for germination that we learned from the experiments so far.



Water, air, and an appropriate temperature are all needed for germination!

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Point! 3 Conditions Necessary for Germination

From the results of the experiments so far, we found that the following three conditions are necessary for seeds to germinate.

❶ **Water** ❷ **Air** ❸ **Appropriate temperature**

If even one of these conditions is missing, the seeds will not germinate.

Sunlight and fertilizer are needed for growth after germination, but not for germination itself.



Warm Up Let's summarize the experiment results in a table!

Let's review the experiments and check the secret of germination.

❶ **Fill in the results:**
Complete the table below and confirm that they did not germinate if any condition was missing.

❷ **Conditions for further growth:**
Predict what is necessary to grow further after germination.

• Water and Germination

Condition to change (Condition to investigate)	Conditions to keep the same		Result (Yes / No)
	Temperature	Air	
Give water	Room with the same temperature	Exposed	
Do not give water			

• Air and Germination

Condition to change (Condition to investigate)	Conditions to keep the same		Result (Yes / No)
	Water	Temperature	
Exposed to air	Same amount of water	Room with the same temperature	
Not Exposed to air			

• Temperature and Germination

Condition to change (Condition to investigate)	Conditions to keep the same		Result (Yes / No)
	Water	Air	
Warm room	Same amount of water	Exposed	
Cold inside the refrigerator			



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Try

(1) Write down all three conditions necessary for seed germination.

(2) Fill in the blank with the correct word.

In the experiment investigating the relationship between temperature and germination, the "condition to change" between the two cups is the ( ).

(3) Seeds were placed on moistened cotton and put in the refrigerator. Will these seeds germinate?

Exercise

(1) Which statement correctly explains the conditions for germination?

Choose the correct answer from below.

A: If even one of the three conditions is missing, it will not germinate.

B: As long as there is water, it will germinate regardless of air or temperature.

(2) Fill in the blank with the correct word.

Sunlight and ( ) are needed for growth after germination, but not for germination itself.

(3) Seeds were placed on moistened cotton in a completely dark box in a warm room. Will these seeds germinate?

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What shapes and colors of seeds do familiar plants have?



Wheat



Sunflower



Chickpea



Cotton



Date Palm



Corn

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4-1 Sunlight and Growth

Chapter 4 ····· Conditions for Growth



Do plants need sunlight to grow healthy?



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Point! Sunlight and Growth

Plants **need sunlight** to grow healthy after they germinate.

The role of sunlight:

By getting sunlight, plants make their own **food** needed for growth. Plants that get sunlight have **dark green** leaves and grow **thick, strong** stems.

How to check if plants need sunlight to grow

- **Condition to change:** **Presence or absence of sunlight**.
- **Conditions to keep the same:** Water Air Temperature, Fertilizer , type of soil and type of plant.

Warm Up *Let's compare between plant's growth with and without sunlight!*

Prepare 2 seedlings (young plants) of about the same size and check the effect of sunlight.

1 Things to prepare:

- 2 kidney bean seedlings
- A box like cardboard

2 Change the condition:

- Put pot A in a place that gets a lot of sunlight.
- Cover pot B with a dark box to block the sunlight.

3 Observe:

- Grow them for about a week keeping the water and temperature conditions the same, and compare the leaf colors and stem thickness.

[Note]
If the soil gets dry, don't forget to water them.



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4-2 Fertilizer and Growth



Do plants need fertilizer (nutrients) to grow bigger?



Both are getting sunlight.

The one with fertilizer is very tall!



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Point! Compare with the same conditions

- Plants need fertilizer in the soil to grow bigger and stronger.
- The role of fertilizer:

  Along with water and sunlight, plants absorb **nutrients** from the fertilizer so their leaves and stems **grow even bigger**.
- How to check if plants need fertilizer to grow
  - **Condition to change:** **Presence or absence of fertilizer**.
  - **Conditions to keep the same:** Water, Sunlight, Air, Temperature, type of soil and type of plant



Warm Up Let's see the difference with fertilizer!

Observe the difference in growth with and without fertilizer in the same environment.

1 Things to prepare:

- 2 kidney bean seedlings
- Fertilizer

2 Change the condition:

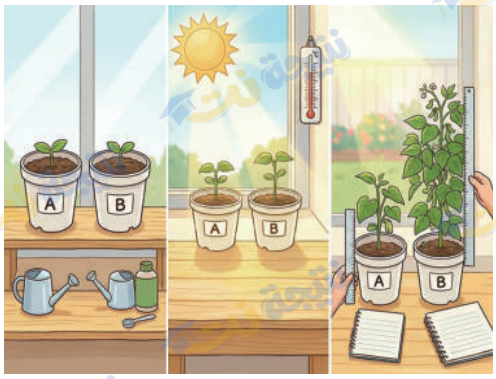
- Give only water to pot A. Give water mixed with a fixed amount of fertilizer to pot B.

3 Keep sunlight and temperature the same:

- Put both pots in the same place that gets a lot of sunlight.

4 Record the growth:

- Measure the plant height every few days and summarize the difference in how they grow.



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Try

1 (1) Choose the correct words from below to fill in the blanks.

① whitish / dark green / yellowish

② long and thin / thin and weak / thick and strong

Plants grown with lots of sunlight get (①) leaves and grow (②) stems.

(2) What is the "condition to change" between the 2 pots in the experiment to check the effect of sunlight?

2 (1) Choose the correct answer

Seedlings grown with fertilizer ( ) than seedlings grown without it.

A: grow bigger / B: grow smaller / C: die quickly

(2) Which TWO are the "conditions to keep the same" in the experiment to check the effect of fertilizer? Choose two correct answers.

A: Amount of fertilizer

B: How sunlight hits

C: Amount of water

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Exercise

1 (1) Choose the correct answer.Which correctly describes a seedling grown without sunlight?

A: Leaves grow big and stems grow thick.

B: Leaves become yellowish and stems grow thin and long.

C: It does not grow at all.

(2) Choose the correct explanation about the relationship between sunlight and plants from below.

A: Plants can continue to grow healthy without sunlight, as long as they have water.

B: Plants need sunlight to grow strong.

(3) Which is NOT an effect of fertilizer on a plant?

A: Stems grow taller.

B: The number of leaves decreases.

C: The whole plant grows bigger.

2 Fill in the blanks with the correct words about what plants need to grow.

Plants make nutrients by getting light from the (①), and absorb (②) to grow their bodies even bigger.

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Chapter 3&4 Enrichment corner:
The "Magic Seeds" That Travel Through Thousands of Years

1 The Time Capsule of Life Sleeping in the Pyramids

In Egypt, there is an example that tests the conditions for germination (growing from a seed) we learned about in Chapter 3.

- **Pharaoh's Gift:**

Wheat seeds from over 3,000 years ago are sometimes found inside the tombs of ancient Egyptian kings. Recently, scientists discovered that "starch," which is the energy source needed to germinate, is still left inside these seeds!



- **The Survival Strategy of "Sleeping":**

Plants can stop their activity and just "sleep" as long as the 3 conditions for germination (water, air, and the appropriate temperature) are not met. The extremely dry air in Egypt stopped the seeds from rotting, allowing them to wait thousands of years for the future.



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2 The Science of the Nile River's "Black Soil"

Ancient Egypt was called the "Gift of the Nile." The secret behind this name lies in the soil of the Nile River and the "nutrients" for plant growth that we learned about in Chapter 4.



- **Natural Liquid Fertilizer:**

Every year, floods brought fine, nutrient-packed soil (called silt) scraped from the high mountains of Ethiopia. This soil piled up on the flat lands, creating the "richest farmland in the world" where plants could grow well without any artificial fertilizer.

- **The Journey of Stones:**

Big, sharp stones from the upper part of the river travel thousands of kilometers. By the time they reach the lower part of the river, they change into fine mud. The power of this flowing water creates soft, loose soil that makes it super easy for plant roots to stretch out and grow.



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5-1 Structure of a Luffa Flower

Chapter 5 ····· From Flower to Fruit





What are the differences between luffa flowers?



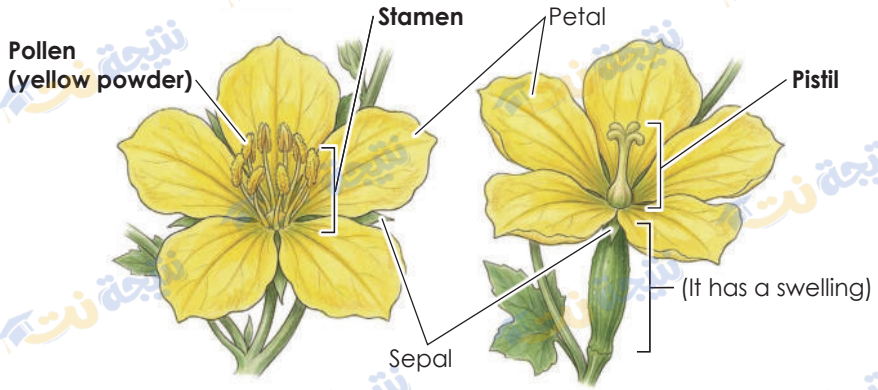
Luffa flowers are not all the same. It looks like there is already a small fruit under the flower on the left!

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Point! Male Flowers and Female Flowers

Luffa and pumpkin plants have two types of flowers on one plant.

- Male flower: It has a **stamen** in the center and makes yellow **pollen**.
- Female flower: It has a **pistil** in the center and a swelling at the base of the flower that will become a fruit.



Warm Up Let's tell the two flowers apart!

Let's find out the differences between male and female flowers of luffas and pumpkins.

1 Look at the base of the flower:

- Check if there is a small fruit-like swelling just below the petals.

2 Look inside:

- Look closely to see if the part in the center of the flower is a "stamen" with powder on it or a "pistil" with a split tip.

3 Write on a record card:

- Let's tell them apart by calling the flower with a swelling a "female flower" and the flower without it a "male flower".
- Write about each flower on a record card.

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Try

(1) Which luffa flower has a swelling at the base that will become a fruit?

(2) What do we call the part in the male flower that makes the yellow powder?

(3) What is the yellow powder from (2) called?

Exercise

(1) Choose the correct answer about luffa flowers from below.

A: Both a stamen and a pistil are in one flower.

B: The male flower has a stamen, and the female flower has a pistil and a swelling.

C: The male flower has a pistil, and the female flower has a stamen and a swelling.

(2) What will the swelling at the base of the female flower become in the future?

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5-2 How to Use a Microscope

Chapter 5 ····· From Flower to Fruit



How should we operate a microscope to make tiny pollen look bigger so we can see it clearly?



Let's learn how to use a microscope!

▼Magnified view of a loofah flower and pollen



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28

Point! How to Use a Microscope

It makes things that are hard to see with your eyes or a magnifying glass bigger so you can look at them in detail.

Prepared slide:
Something you want to observe, held between two pieces of glass to make it easy to look at.



How to make a prepared slide

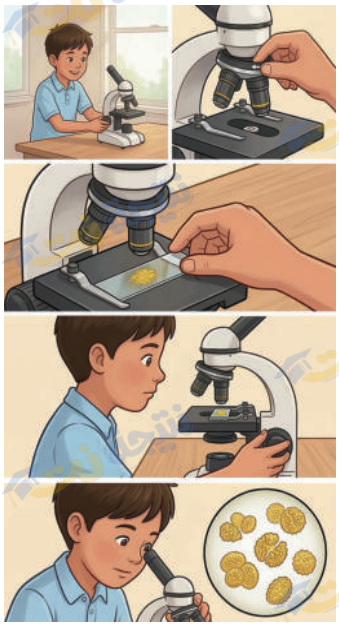
1. Put the thing you want to observe on a **slide**. If you need water, drop 1 or 2 drops.
2. Slowly lower the **cover glass** from one side so air bubbles do not get in.
3. Gently soak up the extra water around the edges with filter paper.

Names of microscope parts



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How to operate the microscope



1. Put it in a flat, **bright** place away from **direct sunlight**.
2. Set the objective lens to **the lowest** magnification.
3. Look through the eyepiece lens and adjust the angle of the **reflector** to make the view bright.
4. Put the prepared slide on the stage.
5. While looking from the side, turn the adjustment knob to bring the prepared slide and the objective lens as **close together** as possible.
6. Look through the eyepiece lens and adjust the focus while moving the objective lens away from the prepared slide.

<Reason> To prevent the objective lens from hitting the prepared slide and breaking it.

How things look in a microscope



- In a microscope, the object you are observing appears **upside down and left-to-right reversed**.

Because of this, you move the object in the **opposite direction** to the direction you want it to move.

Magnification and how things appear

- When using Low magnification... The field of view is **wide**. and The view is **bright**.
- When using High magnification... The field of view is **narrow**. and The view is **dark**.
- Start observing with **low magnification**, then change to **high magnification**.

<Reason> The field of view is wider at low magnification, making it easier to find what you want to observe.

- Microscope magnification

= **Eyepiece lens magnification × Objective lens magnification**

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Warm Up *Let's look at pollen!*

Let's observe luffa pollen closely using a microscope.

❶ Preparation:

- Collect pollen from the stamen of a male luffa flower.
- Set up the microscope in a flat, bright place.

❷ Make a prepared slide:

- Put the pollen on a slide, drop a few drops of water, and gently place a cover glass over it.

❸ Decide the magnification level:

First, start with the shortest "low magnification" objective lens.

❹ Adjust the focus:

- While looking from the side, turn the adjustment knob to bring the prepared slide and the objective lens as close together as possible.
- Look through the eyepiece lens and adjust the focus while moving the objective lens away from the prepared slide.

❺ Write on a record card.

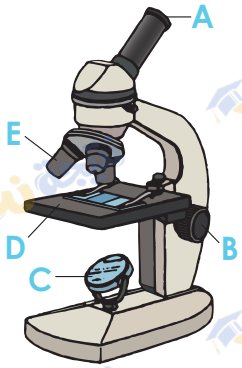


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Try

(1) Fill in the blanks with the correct names for parts A to E in the picture on the right.

A ( ) B ( )
C ( ) D ( )
E ( )



(2) When the eyepiece lens is 10× and the objective lens is 40×, what is the magnification of the microscope?

(3) When observing, do you start with low magnification or high magnification?

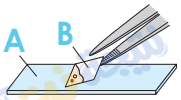
Exercise

(1) Fill in the blanks with the correct words to complete the sentence about where to use a microscope.

The microscope is used in a flat and , (①) place where direct (②) does not hit.

(2) Fill in the blanks with the correct names for A and B in the picture showing how to make a prepared slide.

A ( ) B ( )



(3) About how to use a microscope, put the following steps in the correct order.

A: Adjust the focus while slowly widening the space between the prepared slide and the objective lens.

B: Adjust the reflector to make the whole view bright.

C: Put the prepared slide on the stage.

D: Turn the adjustment knob little by little to bring the prepared slide close to the objective lens.

The correct order ( ) → ( ) → ( ) → ( )

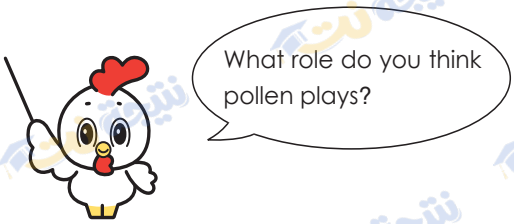
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5-3 Pollination and How Fruits Grow

Chapter 5 ····· From Flower to Fruit



What conditions are needed for a flower to become a fruit?



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Point! The Role of Pollination

- When pollen from a male flower attaches to the tip of a pistil in a female flower, it is called **pollination**. To become a fruit, pollination is necessary.
- For plants with male and female flowers like luffas, **bugs** like bees carry pollen to pollinate them.
- After pollination, the base of the **pistil** becomes a **fruit**, and **seeds** are made inside. After that, the seeds sprout and grow, passing on the plant's life.

Warm Up Let's uncover the secret of how fruits grow!

Let's compare two female flowers to see if pollination is really necessary.

❶ Preparation:

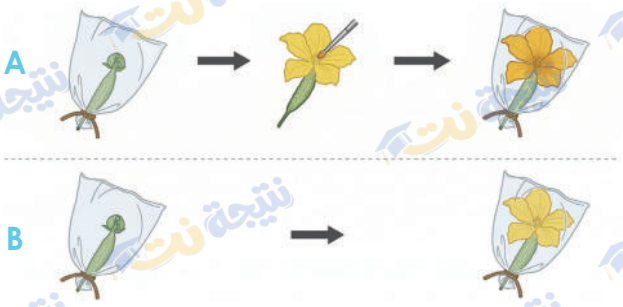
- Buds of female luffa flowers (two that look like they will bloom tomorrow)
- A male luffa flower
- Paper bags
- A brush or a cotton swab

❷ Experiment:

① Put bags over the two female flowers.

② When the flowers bloom, take the bag off female flower A, and put the pollen from the male flower directly onto its pistil. After that, put the bag back on.

③ A few days later, when the flowers wither, take off both bags and check how the fruits grow.



❸ Summarize the results:

- Let's discuss together which flower grew a fruit.

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Try

(1) What is it called when pollen attaches to the tip of a pistil?

(2) Choose the correct order of changes after pollination from below.

A: Pollination → The swelling at the base grows → Seeds are made inside the fruit

B: Seeds are made inside the fruit → Pollination → The swelling at the base grows

C: Pollination → Seeds are made inside the fruit → The swelling at the base grows

Exercise

(1) What carries pollen for luffa plants to pollinate? Fill in the blank with the correct word.

Bugs like ( ).

(2) What happens to a female flower that is not pollinated? Choose the correct answer from below.

A: The fruit slowly grows bigger.

B: It turns yellow, and the fruit falls off without growing.

C: It just becomes a seed as it is.

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Review & Practice

Let's solve review questions about how plants grow.

(1) In a common flower structure, which is the correct order from the outside? Choose the correct answer from below.

A: Pistil → Petal → Sepal

B: Sepal → Petal → Pistil

(2) Which luffa flower has a "swelling" at the base that becomes a fruit, the male flower or the female flower?

(3) What do we call the yellow powder made at the tip of the "stamen" in a male luffa flower?

(4) When adjusting the focus with a microscope, in which direction do you turn the adjustment knob while looking through the lens? Choose the correct answer from below.

A: The direction to bring the objective lens closer to the prepared slide.

B: The direction to move the objective lens away from the prepared slide.

(5) What is it called when pollen from a male flower attaches to the tip of a pistil in a female flower?

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6-1 Stages of Human Growth



Humans live, grow, and reproduce. How do humans grow?



When you walk around town, you can see all kinds of people, from babies to seniors!

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Point! Continuity of Life and Growth

- Reproduction is one of the ways for life to continue and for the species to be preserved. Through reproduction, humans remain on Earth, and life continues across generations.
- **Growth** is a change that happens to living organisms like humans, animals, and plants. As time passes, their bodies become **bigger**, **stronger**, and more complex. The human body does not stay small, but continues to change through clearly defined stages.
- Features of the Main Stages of Growth
  - **Infancy**:
    This stage starts at birth, after spending about 9 months inside the mother's body. Infants are very small and completely depend on their mothers for food, care, and protection.
  - **Childhood**:
    This is the stage when humans start walking, talking, and going to school. Their **bones and muscles** get stronger.
  - After childhood, human growth continues through **youth**, **adulthood**, and **old age**.

Warm Up Let's trace the path of growth!

Do you remember your size when you were smaller? Were you the same size as you are now? What changed, and why?

1. **Put in order:**
   Observe the people around you, and record the stages of growth by putting them in the correct order.
2. **Discuss:**
   Discuss with your classmates and explain the features of each stage of human growth (such as infancy and childhood).



3. **Draw yourself:**
   Which stage are you in right now? Draw yourself in your notebook and summarize what you can do now compared to when you were in infancy.

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6-2 Similarities between Parents and Children



Why do family members look alike?



Have you ever been told, "You look like your father or mother"?

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Point! Connection of Life and Parents' Role

- Every human life begins from a **father** and a **mother**.

- Parents' Role

  Parents take good care of and protect their children until they grow up.

- Similarities between Parents and Children

  Children look like their parents because they **inherit features** from their father and mother.

Warm Up Let's find similarities and differences in the family!

Look at this photo and discuss with your classmates.



Can you find any features that are common to them?

- What features does a boy share with his mother?
- What features does a girl share with her father?

Let's describe the similarities and differences among them.

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6-3 Conditions for Healthy Growth



What do we need to grow well?



What helps a little baby grow big? Let's find the secret to growing bodies strong and healthy!

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Point! 3 Conditions for Healthy Growth

To grow strong and healthy, we need to pay attention to three important conditions.



❶ **Healthy Diet**:
Get the **nutrients** your body needs by drinking milk and eating vegetables and fruits after washing them well.

❷ **Enough Sleep**:
While you sleep, your brain rests and your body is built.

❸ **Proper Exercise**:
Moving your body makes your heart and **muscles** stronger.

Warm Up *Let's give advice for building a healthy body!*

What advice would teachers and doctors give you to grow strong and healthy? Let's think with your friends.

❶ **Think of advice**

Imagine you are a teacher or a doctor, and discuss with your friends to give them "advice for healthy growth."

- What is your advice about diet?

(Example: Let's eat _____ every day!)

- What is your advice about sleep?

(Example: Let's go to bed by ____ o'clock at night!)

- What is your advice about exercise?

(Example: Let's play _____ during break time!)

❷ **Reflect on your life**

- Are you following the 3 conditions for healthy growth well right now? Reflect on your life and decide on one thing you want to try hard to do from now on.
- Present what you have decided.

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Try

(1) Which is the correct order for the stages of human growth? Choose the correct answer from below.

A: Childhood → Youth → Infancy → Adulthood → Old Age

B: Infancy → Childhood → Youth → Adulthood → Old Age

C: Infancy → Youth → Childhood → Adulthood → Old Age

(2) What do you call the stage right after birth when they completely depend on mother's milk and mother's care?

(3) Who does a human life begin from? Choose the correct answer from below.

A: Brothers and sisters

B: A father and a mother

C: Teachers and friends

(4) Why do children look like their parents? Choose the correct answer from below.

A: Because they always live together.

B: Because they eat the same things.

C: Because they inherit features from their parents.

(5) What are the necessary conditions to grow strong and healthy? Choose all correct answers.

A: Eating a healthy diet

B: Watching TV all day

C: Staying up late at night

D: Getting enough sleep

E: Getting proper exercising

(6) What is the important role of getting sleep? Choose the correct answer from below.

A: It allows the brain to rest and helps build the body.

B: It makes the heart and muscles stronger.

C: It fills up the stomach.

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Exercise

(1) Which of the following is the correct feature of the "childhood" stage? Choose the correct answer from below.

A: They are completely dependent on their mother.

B: They start walking and talking, and go to school.

C: Their body is the smallest, and they cannot move by themselves.

(2) What changes happen to the body of a living organism during "growth"? Fill in the blanks with the correct words to complete the sentence.

As time passes, the body becomes (①), (②) and more complex.

(3) What is the important role parents play for their children to pass on human life? Choose the correct answer from below.

A: Take care of children until they grow up.

B: Go far away before children grow up.

C: Go to school and study instead of children.

(4) Match each of the following actions to the correct condition for healthy growth (Healthy Diet, Enough Sleep, Proper Exercise).

① Drinking milk and eating vegetables and fruits.

② Moving the body to make the heart and muscles stronger.

③ Resting well at night to rest the brain and build the body.

(5) If you only eat snacks every day, stay up late at night, and don't exercise, what do you think will happen to your body's growth? Think and write about the reasons as well.

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7-1 Animals that Give Birth to Babies

Chapter 7 ····· Animal Growth and Reproduction













How are animal babies born?



Do all animals hatch from eggs?

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Point! Growth of Cats and the Continuity of Life

The way new life is born differs depending on the animal. Some animals are born as babies, and some hatch from eggs.

Cats belong to a group of animals that give birth to **babies** and feed their young with their milk.

Birth and Care of Kittens

- The mother cat carefully carries her babies inside her body for a certain period of time, and gives birth to them when they are ready. After birth, the mother cat cleans the kittens' bodies and gently raises them by giving them **mother's milk** until their bodies become strong.
- Kittens are very small at first, but they look exactly like their father and mother.

Then, they grow as time passes.

Animal babies are usually born from a **father (male)** and a **mother (female)** through a process called **reproduction**. This is very important to preserve each type of animal and human, and to continue life on Earth.

Warm Up Let's think about how cats grow!

Discuss the following questions about the growth of cats with your classmates.

1. Are all cats the same size?
2. Have you ever seen a kitten grow? What changes did you notice?
3. Have you ever seen other animals change their shape as they grow? How did they change?
4. Do cats give birth to babies or lay eggs?
5. Have you ever seen a mother cat taking care of her kittens?
6. Do all animals give birth to babies just like cats do?



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7-2 Animals that Lay Eggs



How are baby fish born?

Cats give birth to babies, but what about the fish living in the river? Let's explore how fish pass on life!



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Point! Growth of Fish and the continuity of Life

Unlike cats, fish do not raise their babies inside their bodies.

A mother fish releases many **eggs** into the water.

After a certain period of time, babies hatch from the eggs released in the water. This is called **hatching**. Very small fish come out of the eggs and start swimming.



Reason for Laying Many Eggs

A mother fish releases a huge amount of eggs into the water. This is to make sure that many small fish can **survive** even in the open water.

Reproduction is the ability of living organisms to create new individuals of **the same** kind as themselves, ensuring their survival and **continuation** on Earth.

Warm Up Let's think about the secrets of baby fish!

Let's discuss the differences between cats and fish with your classmates.

1 Compare:

Cats give birth to only a few babies at a time, but fish lay countless eggs. Why do you think there is such a difference?

2 Observe and think:

Do the baby fish that just hatched from eggs look like their parents? Let's imagine.



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7-3 Comparing Animals and Preserving the Species

Chapter 7 ····· Animal Growth and Reproduction



Let's compare what kinds of animals are around us.



We learned that different animals have different ways to pass on life. Let's classify the animals around us!

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Point! Preserving the Species

- Reproduction leads to **preserving the species**

- prevent the important animals on Earth from decreasing, countries set up **nature reserves** to protect animals so they can safely pass on life and increase their numbers.

- Examples of Nature Reserves in Egypt

▼Ras Mohammed National Park



▼White Desert National Park



Warm Up Let's record and compare animals!

Let's compare how the animals around us grow and pass on life.

❶ Organize the information about how they give birth to their babies and where they live in a table.

❷ For the 4th row, think of another animal example by yourself and fill it in.

Animal	How they give birth to babies	Where they live	Similar animals
Cat	Give birth to babies	On land	Dog
Chicken	Lay eggs	On land	Duck
Fish	Lay eggs		

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Try

(1) How do cats have their babies? Choose the correct answer from below.

A: They grow from seeds like plants.

B: They lay eggs.

C: They give birth to babies.

(2) What do newborn kittens drink to grow?

(3) How do fish like Tilapia reproduce? Choose the correct answer from below.

A: They give birth to babies.

B: They lay eggs.

C: They reproduce by dividing.

(4) What do you call it when baby fish come out of eggs?

(5) Group the following animals into "Animals that give birth to babies" and "Animals that lay eggs".

[camel / snake / cat / frog]

① Which animals give birth to babies?

② Which animals lay eggs?

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Exercise

(1) What do you call it when a new life is born from a father (male) and a mother (female)?

(2) Where does a mother cat protect and raise her babies until they are born? Choose the correct answer from below.

A: In the water.

B: In the soil.

C: Inside her own body.

(3) Which is the correct reason why fish lay a huge amount of eggs in the water? Choose the correct answer from below.

A: Because the water is safe, so it is easy to raise them even if they lay many.

B: To make sure that as many small fish as possible can survive in the open water.

C: To give them as a present to other fish in the water.

(4) What kind of ability is "reproduction" for living organisms? Fill in the blanks with the correct words to complete the sentence.

The ability of living organisms to create new individuals of the (①) kind as themselves, ensuring their (②) and continuation on Earth.

(5) What do you call the places protected by countries so that animals can safely pass on life and their species will not decrease? Choose the correct answer from below.

A: Amusement parks

B: Museums

C: Nature reserves

(6) Name one "animal that lays eggs" that you know, and write down where it lays its eggs (Example: in water, on land, etc.).

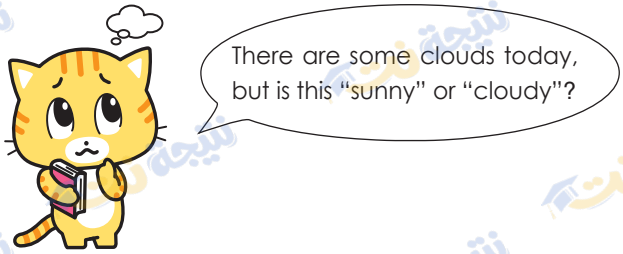
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8-1 Clouds and Weather

Chapter 8 ····· Changes in Weather



When we look up at the sky, how do we decide if it is "sunny" or "cloudy"?



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Point! Cloud Cover and Weather

We use **the cloud cover** to determine the weather. If we consider the whole sky as "8", we use numbers **from 0 to 8** to show how much of the sky is covered by clouds.

- When the cloud cover is 0 **to 6:** **so the weather is Sunny**
- When the cloud cover is 7 **to 8:** **so the weather is Cloudy**

*No matter the cloud cover, if it is raining or snowing, the weather is "rainy" or "Snowy".

When the weather changes, the cloud cover increases or decreases, and the clouds change their shapes.

Warm Up *Let's check the cloud cover and decide the weather!*

Let's look at the sky and determine what the weather is now.

1 Divide the sky:

Imagine dividing the whole sky into 8 blocks.

2 Count the clouds:

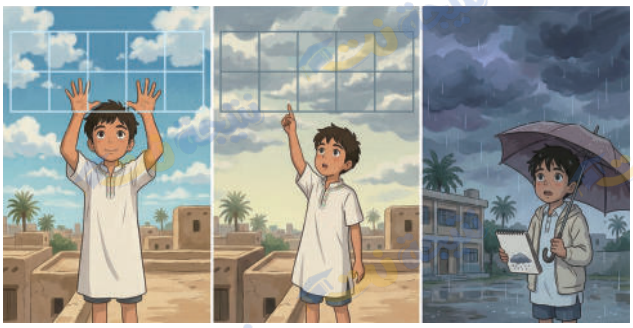
Check how many blocks are covered by clouds (the cloud cover).

3 Determine the weather:

If the cloud cover is "6" or less, write down "Sunny". If it is "7" or more, write down "Cloudy".

4 Discovery:

What color are the clouds on a rainy day? Let's compare them with a sunny day.



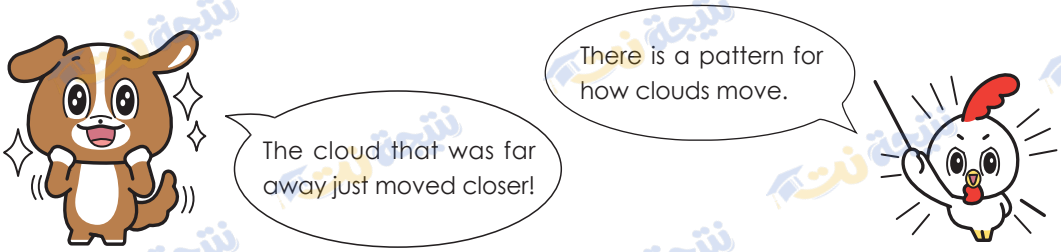
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8-2 Cloud Movement

Chapter 8 ····· Changes in Weather



Which way do the clouds in the sky move?



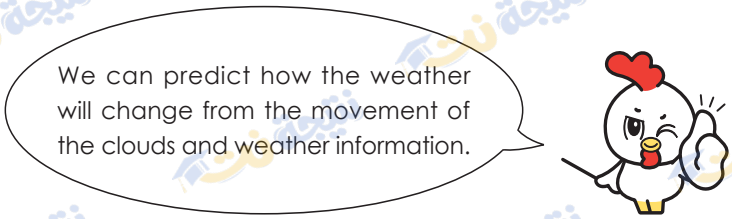
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Point! Observe the Cloud Movement

- Clouds move with the wind. There is a pattern for their movement.
- Pattern of movement

  In places like Egypt and Japan, clouds generally move **from west to east**. The weather also changes **from west to east** as the clouds move.
- **Tips for observing cloud movement**

  Use **things that don't move**, like buildings or trees, as **reference points** to check which way the clouds moved over time.



Warm Up Let's follow the clouds!

Let's use a compass to check the rule of cloud movement.

1 Choose a reference point:

Choose one reference point that doesn't move, like a window frame or a faraway tower.

2 Check the directions:

Use a compass to find which way is west and which way is east.

3 Observe over time:

Observe every 15 minutes to see from which side of the marker the clouds appear and to which side they disappear.



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Try

1 (1) When we consider the whole sky as "8", what do we call the proportion of the sky covered by clouds?

(2) You checked the cloud cover and it was "5". What is the weather at this time? Choose the correct answer from below.

A: Sunny

B: Cloudy

C: Rainy

2 (1) Fill in the blank with the correct word.

When checking the direction clouds move, it is easier to understand if you choose a ( ) like a tree or a building to observe.

(2) In most cases, which direction do clouds move? Choose the correct answer from below.

A: From east to west

B: From west to east

C: From north to south

D: From south to north

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Exercise

1 (1) When the weather is determined as "cloudy", what is the minimum cloud cover? Choose the correct answer from below.

A: 1 or more

B: 6 or more

C: 7 or more

(2) Fill in the blank with the correct word.

Whether the cloud cover is "0" with no clouds at all, or "6" with quite a few clouds, both types of weather are called ( ).

2 (1) Which statement correctly explains cloud movement and weather change? Choose the correct answer from below.

A: When there are clouds in the west that look like they will bring rain, those rain clouds will soon come here.

B: When rain clouds are seen in the east, those rain clouds will come here right away.

(2) Which is an incorrect method for observing cloud movement? Choose the correct answer from below.

A: Observing clouds from inside a moving car.

B: Observing every 15 minutes to see which side of a reference point the clouds appear from and disappear to.

C: Placing a compass on the ground and watching clouds pass over a building.

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8-3 Weather Forecast



How can we predict tomorrow's weather using satellite images?



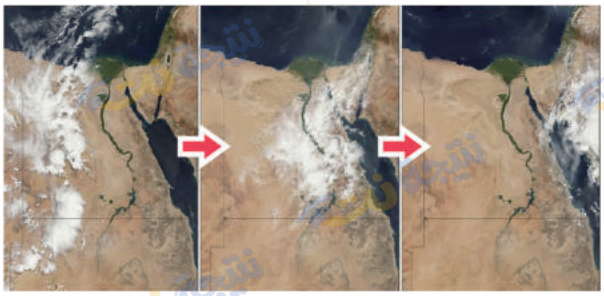
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Point! Satellite Images and Forecasts

Using pictures taken from space by weather satellites, we can see cloud conditions over a wide area. The white parts in the satellite images are **clouds**.

Weather Forecast

- **Weather forecast**: It tells us the future weather by combining cloud movement and wind conditions.
- If clouds in the west come closer, the weather will get **worse**. On the other hand, if there are no clouds in the west, we can predict that **sunny weather will continue** for a while.



Warm Up Let's predict the local weather!

Let's look at a satellite image of the area where you live and think about tomorrow's weather.

❶ Look for clouds:

Look for a big white mass (clouds) on the west side (left side of the map).

❷ Think about the movement:

Remember that clouds move from west to east, and predict where those clouds will be tomorrow.

❸ Make a forecast:

Discuss with your friends whether tomorrow's local weather will be "sunny" or "cloudy (rainy)", and give reasons.



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Try

(1) What do the white areas in the pictures taken by weather satellites represent?

(2) A big mass of clouds is coming from the west. What do you predict tomorrow's weather will be? Choose the correct answer from below.

A: The weather will get worse (cloudy or rainy).

B: Clear, sunny weather with no clouds will continue.

Exercise

(1) Choose the correct answer What is an important principle when predicting weather changes?

A: Clouds always move randomly, so we cannot predict.

B: Use the rule that clouds move from west to east.

C: Predict by watching the movements of birds and animals.

(2) When there are no clouds at all over Egypt in the satellite image, what is the current weather likely to be?

A: Sunny

B: Cloudy

C: Rainy or Snowy

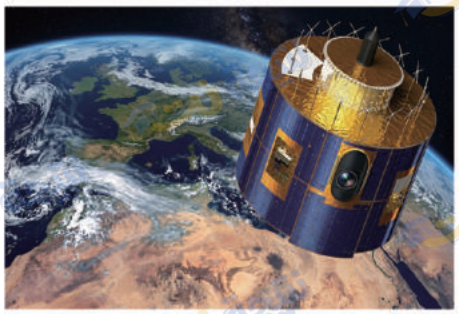
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Let's Expand!

How are weather changes observed?

1 Weather Satellite

The weather satellite "Meteosat" observes the weather in Europe and Africa and collects data on the air and ocean from about 35,800 km above the equator.

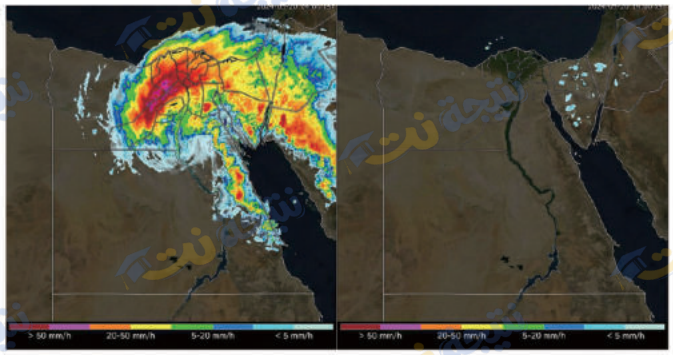


2 Weather Radar

A device that uses radio waves to observe "where and how heavily it is raining or snowing" in real time.

It is used for short-term weather forecasts and disaster prevention information.





Based on the movement of rain clouds shown on the weather radar, we can predict the amount of rain 1 hour or 3 hours later.

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Chapter 8 Enrichment corner: Reading the Desert Sky: Egypt's Clouds and Weather

1 Clouds Over the Nile Seen from a Satellite

We usually imagine the sky in Egypt to be sunny all the time, but if we look at the cloud cover we learned about in Chapter 8 with a scientific eye, we can discover something new.

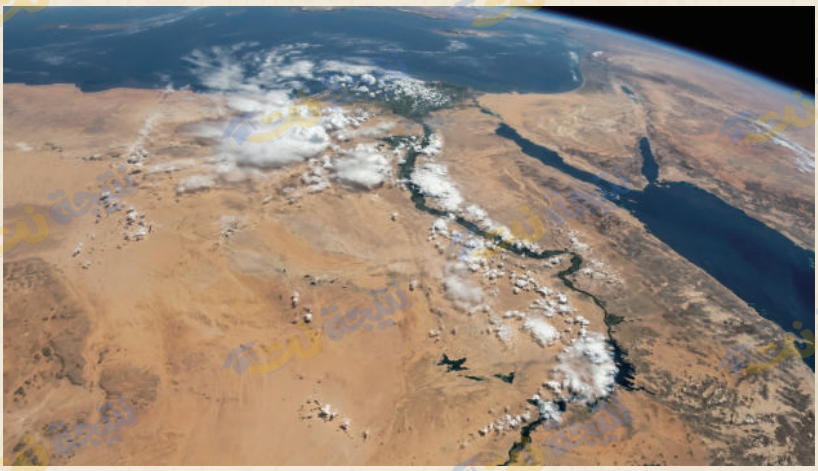
• The Key to Weather, Cloud Cover:

If we think of the whole sky as 8, Egypt usually has almost no clouds (0 to 1). However, in winter, the area near the Mediterranean Sea gets more clouds, and it sometimes even rains.



• Patterns Revealed by Satellite Images:

The clouds around Egypt also usually move from the west to the east. By using videos from artificial satellites (like Meteosat), we can accurately predict how the clouds coming across the desert will move.



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2 The Special Desert Weather, "Khamsin"

Egypt has a very special weather event. It is a hot and dry sandstorm called "Khamsin" that blows between winter and summer.

- **The Effect of Low Pressure:**

A strong low-pressure system coming from the west stirs up the sand of the Sahara Desert. When this happens, the sky is covered with sand instead of clouds, and the temperature goes up very quickly.



- **The Moist Air Made by the Nile River:**

Even though it is in the middle of the desert, only the area around the Nile River has a lot of water vapor (water in the air). This makes it a special place where clouds can easily form. Thinking about how the river changes the weather is one of the most fun parts of learning science in Egypt.



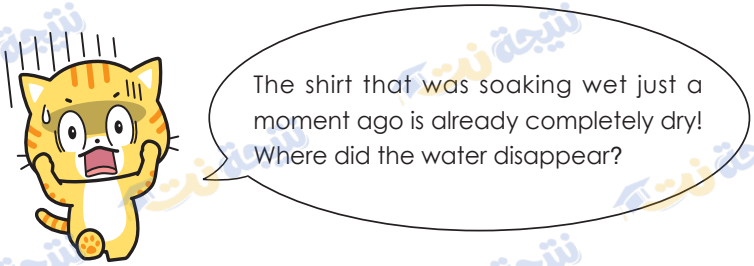
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9-1 Water Evaporation

Chapter 9 ····· Water Cycle



Why does the water in puddles and wet laundry dry up?



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Point! Water Evaporation

The process of water changing into invisible **water vapor** from its surface is called **evaporation**. The water in the laundry and puddles doesn't just disappear; it changes its state and is released into the air.

Evaporation happens faster when the **temperature is high**, when it is **sunny**, and when **there is wind**.

Warm Up *Let's investigate where the water goes!*

Observe things around you and watch how water evaporates.

1 Predict:

- Remember what happens to a puddle after the rain when the sun comes out.
- Predict which will dry faster when you hang a wet cloth in the sun and in the shade.
- Predict if water will evaporate even if you put a lid on a container filled with water.

2 Experiment:

Things to prepare

- Two beakers (or plastic containers)
- Plastic wrap
- Rubber bands



1. Put the same amount of water into two beakers.
2. Put a lid on only one beaker with plastic wrap and secure it with a rubber band.
3. Compare the amount of water after 2-3 days.

3 Summary:

Summarize what you learned about water evaporation from the results of the experiment.

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9-2 Water in the Air

Chapter 9 ····· Water Cycle



Where do the water drops that form around a cold glass come from?



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Point! When Water Vapor Turns Back into Water

- The air contains invisible **water vapor**, and when it is cooled, it turns into **water**.
- The process of invisible water vapor in the air **cooling** and changing into liquid water is called **condensation**.
- In nature, water evaporates into **water vapor** and condenses back into **water**.

Warm Up *Let's investigate how water drops form!*

Observe the water on the surface of the beaker.

1 Things to prepare:

- Beaker
- Ice
- Plastic wrap
- Rubber bands

2 Experiment:

❶ Put ice in the beaker, and cover it with a lid using plastic wrap and a rubber band.

❷ Mark the water level and let it sit for a while.

3 Observe:

- Small water drops will start to form on the surface of the beaker.
- Make sure that the water drops on the surface did not leak from inside the beaker.

4 Discovery:

- Discuss if there are other examples of condensation around you.



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Try

1 (1) What do you call the process of water changing from its surface into invisible water vapor?

(2) Under what weather conditions does laundry dry quickly? Choose the correct answer from below.

A: A day when the temperature is high and it's sunny.

B: A day when the temperature is low and it's heavily cloudy.

C: A rainy day.

2 (1) What do you call the process of water vapor in the air cooling and changing into liquid water?

(2) Why did water drops form on the outside of a glass filled with ice water? What was cooled? Choose the correct answer from below.

A: The water inside the glass.

B: The water vapor in the surrounding air.

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Exercise

1 (1) Which is the correct explanation for why the water in the puddle disappeared? Choose the correct answer from below.

A: The water disappeared by magic.

B: The water turned into water vapor and went out into the air.

C: It was all absorbed into the soil.

(2) Choose the correct word from below to fill in the blank.

visible / invisible

The process of water changing into ( ) water vapor from its surface is called evaporation.

2 (1) Which of the following is an appropriate example of condensation? Choose the correct answer from below.

A: Water turns into ice when put in a freezer.

B: Hot water in a pot boils and steam comes out.

C: On a cold winter morning, the room's window glass becomes white and foggy, and water drops form.

(2) Choose the correct words from below to fill in the blank.

rises / falls / stays the same

The invisible water vapor in the air appears as water drops when the temperature ( ).

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9-3 Where Does Water Go?

Chapter 9 ····· Water Cycle









How does the water on Earth go around?



River water flows into the sea, right?

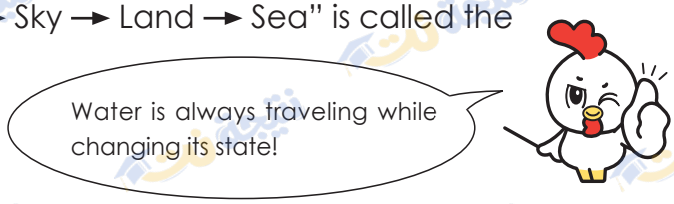
Why don't we see water evaporate?



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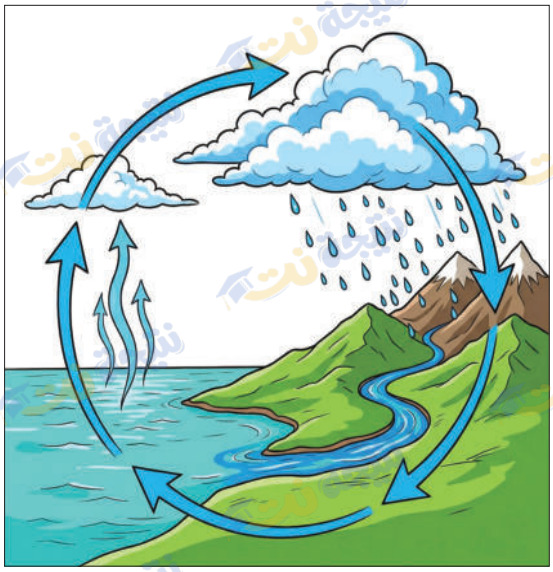
Point! The Water Cycle

- The water on Earth moves in a continuous cycle while changing its state.
- **Evaporation**:
  The process of water changing into an invisible form and going up into the air.
  Water in the sea and rivers is warmed by the sun, evaporates from the **surface**, and goes up into the sky.
- The water that goes up into the sky becomes clouds, falls to the ground as rain, becomes a river, and returns to the sea again. In this way, the journey of water going around "Sea → Sky → Land → Sea" is called the **water cycle**.



Warm Up Let's trace the journey of water!

Look at the illustration and check the order of the water's journey.



1 Start at the sea:

Sea water turns into water vapor due to the heat of the sun.

2 Journey in the sky:

It is cooled high in the sky to become clouds, and eventually falls as rain.

3 Journey back to the sea:

The water that falls on the ground becomes a river and returns to the sea.

4 Discovery:

Let's discuss and summarize what we learned about the water's journey.

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Try

(1) Fill in the blank with the correct word.

Water going around from sea → clouds → rain → river → sea is called the water ( ).

(2) Choose the correct answer When water from the sea and rivers goes up into the sky, what shape does it take?

A: It stays as visible water.

B: Hard ice.

C: Invisible water vapor.

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Exercise

(1) Choose the correct answer for the correct order of the water cycle from below.

A: Evaporates from the sea → Flows into a river → Rains → Returns to clouds

B: Evaporates from the sea → Becomes clouds → Rains → Returns to the sea

C: Rains → Evaporates from the sea → Returns to the sea → Becomes clouds

(2) Choose the correct answer. When water goes up into the sky and evaporates, what is needed?

A: Heat from the sun (warmth)

B: Coldness of a pitch-black night

C: Light from the stars

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Chapter 9 Enrichment corner:
Water That Disappears and Comes Back: The Nile's Water Cycle

1 The Blessing of the Nile Evaporated by the Sun

In Chapter 9, we learned that water evaporates and turns into water vapor (water in the air). Egypt's strong sun carries an incredible amount of water from the Nile River up into the sky every single day.

- **A Giant Laboratory for Evaporation:**

Egypt's dry air has a high capacity to absorb water vapor. The reason why laundry dries so quickly, and why the water level of the Nile River decreases gradually, is due to evaporation.

- **When Invisible Water Vapor Condenses (Turns into Drops):**

Even though it is hot during the day, the desert gets very cold at night. The water vapor in the cooled air turns into tiny water drops on plants, which is called condensation. This is a very important source of drinking water for the little living things in the desert.



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2 The Water Journey Around Africa

The water flowing in Egypt is actually a part of the "Earth's huge water cycle" that arrives from countries far away to the south.

- **From the Sea to the Clouds, and Then to the Nile:**

Water that evaporates from the Mediterranean Sea and the Red Sea turns into clouds, and brings heavy rain to the high mountains of Ethiopia and Sudan. That water becomes a river again and travels all the way down to Egypt.



- **Controlled by the Aswan High Dam:**

Humans control this amazing water cycle at the Aswan High Dam. While calculating how much water disappears because of evaporation, people carefully conserve the water needed for farming for the whole year.



- **You Are Also a Part of the Cycle:**

The water you drink will also evaporate into the sky someday, and become rain for someone else. Taking good care of water means protecting the cycle of life on our Earth.

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How to Do Science: Fair Tests

The most important thing in 5th-grade science is to make it a "fair test" by keeping conditions the same, so you can compare the results correctly.

Conditions to change and conditions to keep the same:

When you want to see how something affects an experiment, you change only the condition you want to test and keep all other conditions the same.

Example 1 **When investigating what seeds need to germinate:**

- **Testing "Is water needed?":**
  Condition to change: Presence or absence of water.
  Conditions to keep the same: Temperature, Air, Brightness, etc.

- **Testing "Is sunlight needed?":**
  Condition to change: Presence or absence of sunlight.
  Conditions to keep the same: Temperature, Air, Water, etc.

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How to Use Observation Tools: The Microscope (Review)

We use it to see very small things, like tiny eggs or parts of plants.

Names of microscope parts



How to operate the microscope

1. Put it in a flat, **bright** place away from **direct sunlight**.
2. Set the objective lens to **the lowest** magnification.
3. Look through the eyepiece lens and adjust the angle of the **reflector** to make the view bright.
4. Put the prepared slide on the stage.
5. While looking from the side, turn the adjustment knob to bring the prepared slide and the objective lens as **close together** as possible.
6. Look through the eyepiece lens and adjust the focus while moving the objective lens away from the prepared slide.

   <Reason> To prevent the objective lens from hitting the prepared slide and breaking it.

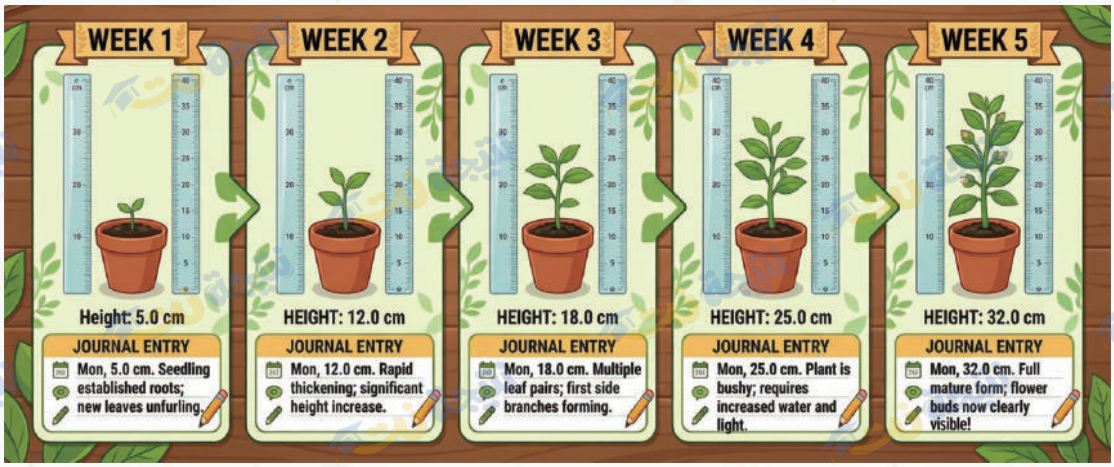
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Recording Observations and Experiments: Tracking Changes

In 5th grade, we use charts and graphs to track things that happen over a few days, like how plants grow or how invisible weather changes.

Record of Plant Growth:

- Observe the plant after it sprouts and record changes by focusing on the number of leaves, the height of the stem, and its color.
- Use iodine solution to check if there is starch inside the seeds or leaves, and draw a sketch of what you see.



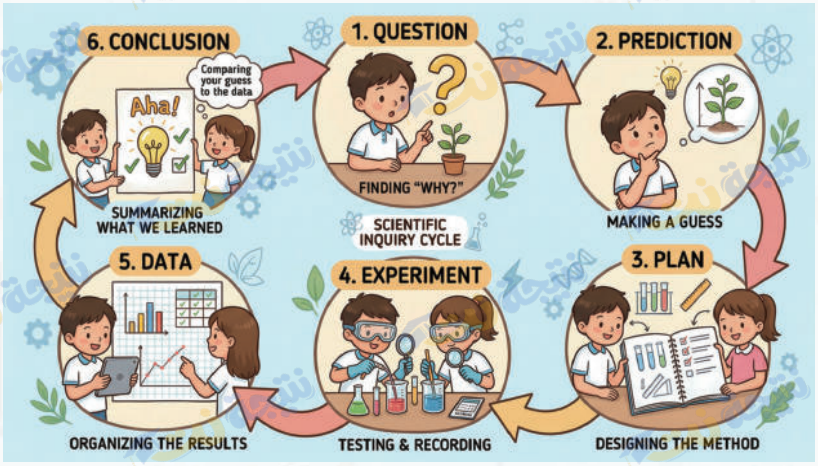
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How to Do Science (Scientific Inquiry Cycle)

Let's learn the "professional way" to solve mysteries.

6 Steps of Inquiry

1. **Question:**
   Find questions like "Why?" or "How?".
2. **Prediction:**
   Make a guess about the answer based on your past experiences.
3. **Plan:**
   Decide which conditions to compare and which to keep the same, and plan your experiment method.
4. **Experiment & Observation:**
   Use your tools correctly and write down the results on your record card.
5. **Data (Results):**
   Organize what you investigated into tables or graphs.
6. **Conclusion:**
   Compare your prediction with the results and summarize what you learned.



- **Tips for a Fair Test**
  When comparing something, change only the condition you want to test, and keep all other conditions exactly the same.

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The Ministry of Education and Technical Education dedicates this book with love to the students, teachers, and families of the Arab Republic of Egypt

SCIENCE



Primary 5

Term 1

Name:.....

Class:.....

School:.....

Supervised by: Central Administration for Curriculum Development

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