تغطية اختبار نهاية الفصل منهج انسباير





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موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف الخامس ⇦ علوم ⇦ الفصل الأول ⇦ ملفات متنوعة ⇦ الملف	
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MINISTRY OF EDUCATION

End of Term 1 Exam Coverage

Grade 5 General – Science

Academic Year 2026-2027

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Q1 : Unit 1 - Module: Matter

Lesson 1: Identify Properties of Materials

Define a physical property as a characteristic of matter that can be observed or measured without changing the material.

(Page 11)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Physical Properties (Practice Q1) · Page 11):

A physical property is a characteristic of matter that can be observed or measured without changing the material into a new substance. Observing physical properties—such as color, hardness, reflectivity, conductivity, magnetism, solubility, mass, or volume—helps identify materials while keeping the identity of the matter the same.

Key Ideas from the Student Book:

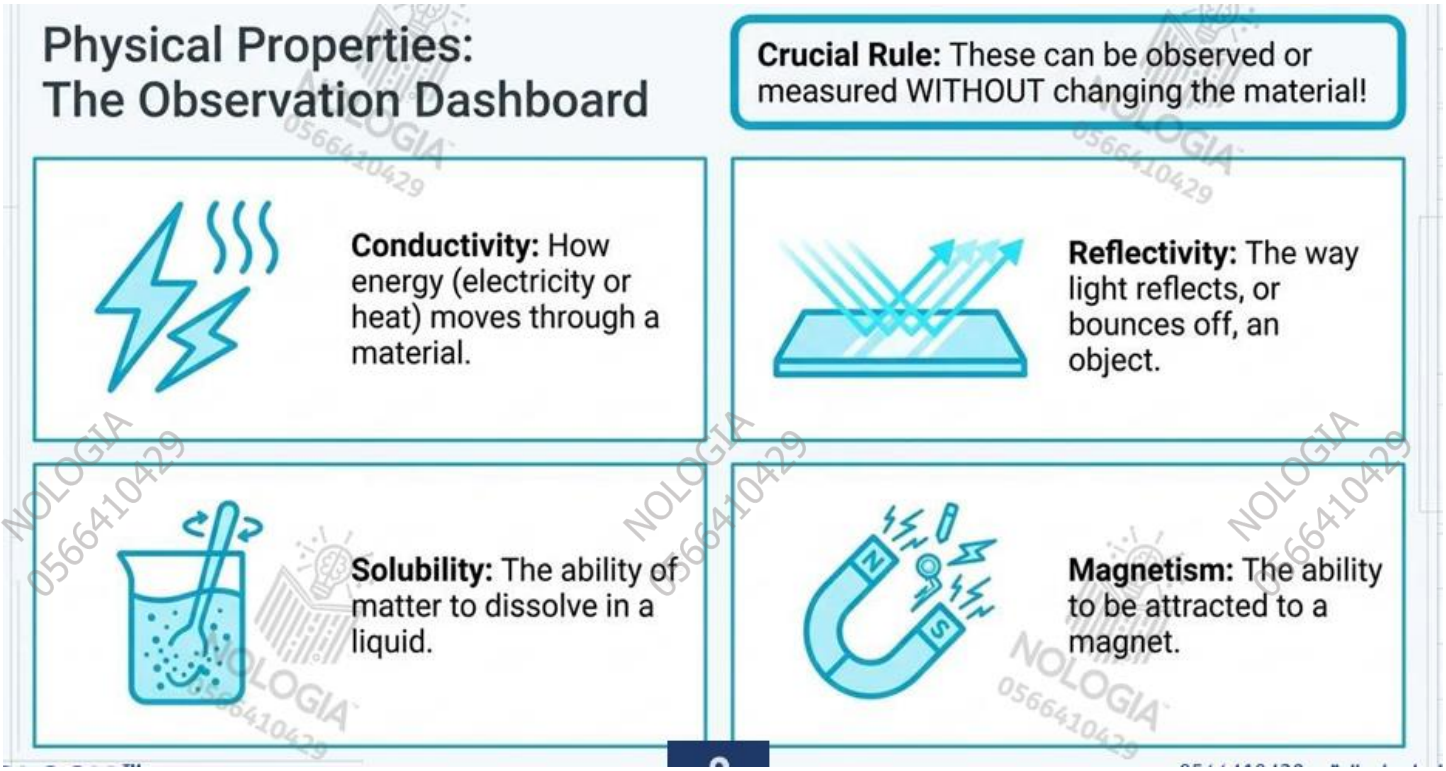
- Observing or measuring a physical property does not change the substance into new matter.
- Color, hardness, conductivity, magnetism, reflectivity, and solubility are physical properties.
- Scientists combine multiple physical properties to identify unknown materials.

Property	Scientific Definition	Example
Physical Property	A characteristic observed or measured without changing the material.	Color, mass, volume, hardness
Conductivity	Ability of heat or electricity to move through a material.	Copper, iron, and silver
Magnetism	Ability of a material to be attracted to a magnet.	Iron, nickel, and steel
Reflectivity	How light bounces off the surface of an object.	Mirrors and shiny metal pans
Solubility	Ability of matter to dissolve evenly in a liquid.	Sugar or salt in water

Remember:

✓ A physical property is observed or measured without changing the identity of the material.

✓ Physical properties help us identify and classify materials.



Questions :

Question 1: How can we use the physical properties of matter to identify materials?

(A) By reacting the material so it forms a new substance	(B) By observing and measuring properties without changing the material
(C) By destroying the mass and volume of the material	(D) By changing the material into a different element

Question 2: What is a physical property of matter?

(A) A characteristic observed or measured without changing the material	(B) A change that produces a brand-new substance
(C) The ability of a substance to burn into ash	(D) A force that pulls objects toward Earth

Question 3: What happens to a material when you measure its physical properties?

(A) It turns into a new chemical substance	(B) It loses all of its mass
(C) It remains the same substance	(D) It always turns into a gas

Question 4: Which term describes a characteristic of matter observed without changing the material?

(A) Chemical reaction	(B) Physical property
(C) Chemical change	(D) Gravitational pull

Question 5: A student measures the mass and observes the color of a coin. What did the student observe?

(A) Physical properties	(B) Chemical changes
(C) Signs of rusting	(D) New substances forming

Question 6: Why is dissolving sugar in tea considered observing a physical property?

(A) The sugar turns into carbon dioxide gas	(B) The sugar burns and releases smoke
(C) The water freezes into solid ice	(D) The sugar spreads evenly without changing into a new substance

Question 7: Which of the following is NOT a physical property of matter?

(A) Conductivity	(B) Reflectivity
(C) Ability to rust	(D) Solubility

Question 8: When light bounces evenly off a smooth mirror, which physical property is shown?

(A) Reflectivity	(B) Solubility
(C) Magnetism	(D) Conductivity

Question 9: Which physical property allows heat to move easily through a metal pot?

(A) Solubility	(B) Conductivity
(C) Magnetism	(D) Reflectivity

Question 10: Testing whether an iron clip is pulled by a magnet tests which physical property?

(A) Solubility	(B) Reflectivity
(C) Volume	(D) Magnetism

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Q2 : Unit 1 - Module: Matter

Lesson 1: Identify Properties of Materials

Identify conductivity, magnetism, reflectivity, and solubility as physical properties of matter.

(Page 17)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Three Dimensional Thinking (Practice Q2) · Page 17):

Conductivity, magnetism, reflectivity, and solubility are four key physical properties of matter. Conductivity describes how heat or electricity moves through a material. Magnetism is the ability to be attracted to a magnet. Reflectivity is how light bounces off a surface. Solubility is the ability to dissolve in a liquid. Volume measures the space taken up by an object, and mass measures the amount of matter.

Key Ideas from the Student Book:

- Conductivity, magnetism, reflectivity, and solubility are physical properties of matter.
- Volume measures the space taken up by an object.
- Copper is identified by its reddish-brown shiny reflectivity, high conductivity, and non-magnetic nature.

Physical Property	What It Describes	Examples
Conductivity	How well heat or electricity moves through a material	Metals like copper, silver, and iron
Magnetism	Ability of a material to be attracted to a magnet	Iron nails and steel paper clips
Reflectivity	How light bounces off a surface	Smooth mirrors and shiny pans
Solubility	Ability of a substance to dissolve in a liquid	Sugar and salt dissolving in water
Volume & Mass	Volume = space taken up; Mass = amount of matter	Measured with a container/ruler and a balance

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Remember:

✓ Conductivity, magnetism, reflectivity, and solubility are all physical properties.

✓ Volume measures the space taken up by an object; mass measures the amount of matter.

Physical Properties: The Observation Dashboard

Crucial Rule: These can be observed or measured WITHOUT changing the material!



Conductivity: How energy (electricity or heat) moves through a material.



Reflectivity: The way light reflects, or bounces off, an object.



Solubility: The ability of matter to dissolve in a liquid.



Magnetism: The ability to be attracted to a magnet.

Deep Dive: Conductivity & Magnetism

Conductivity



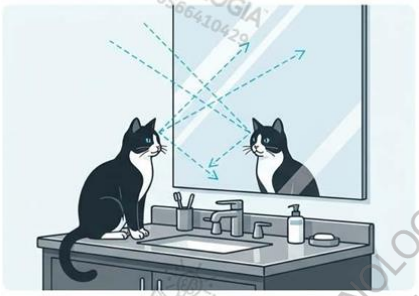
Conductivity in Action: Metals such as iron, silver, and copper are excellent conductors of heat and electricity.

Magnetism

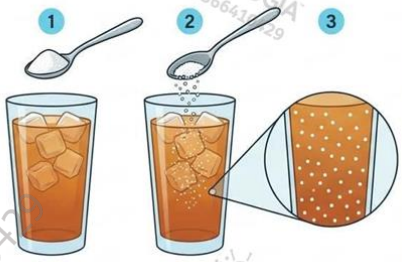


Magnetism in Action: Some metals are highly magnetic. A material only needs to be attracted to a magnet; it does not need to be a magnet itself.

Deep Dive: Reflectivity & Solubility



Reflectivity in Action: Smooth, flat surfaces—like mirrors and shiny pans—reflect light evenly, creating a clear image.



Solubility in Action: Think about sugar in iced tea. The tiny sugar particles disperse evenly throughout the liquid. They don't disappear (the tea still tastes sweet!), they just dissolve.

Questions :

Question 1: Which property measures the space taken up by an object?

(A) hardness	(B) mass
(C) volume	(D) weight

Question 2: How can physical properties of matter be measured or tested?

(A) Using tools like a balance for mass, a ruler for volume, and testing magnetism, conductivity, and solubility	(B) By burning the material until it turns into ash
(C) By guessing without using any scientific instruments	(D) Physical properties cannot be observed or measured

Question 3: Which three physical properties can best help identify copper?

(A) Gas at room temperature, soluble in water, and magnetic	(B) Shiny reddish-brown reflectivity, high conductivity, and non-magnetic
(C) Dull surface, poor conductor, and floats in air	(D) Transparent, soluble in water, and attracted to a magnet

Question 4: Which physical property describes how heat or electricity moves through a material?

(A) Solubility	(B) Conductivity
(C) Magnetism	(D) Reflectivity

Question 5: Which physical property is the ability of a material to be attracted to a magnet?

(A) Reflectivity	(B) Solubility
(C) Magnetism	(D) Hardness

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Question 6: Which physical property describes the way light bounces off an object?

(A) Reflectivity	(B) Conductivity
(C) Solubility	(D) Mass

Question 7: Which physical property is the ability of matter to dissolve in a liquid?

(A) Magnetism	(B) Reflectivity
(C) Conductivity	(D) Solubility

Question 8: Metals such as iron, silver, and copper are good conductors of:

(A) Light and sound only	(B) Heat and electricity
(C) Gravity and mass	(D) Solubility and odor

Question 9: Why do smooth mirrors and shiny metal pans show a clear reflection?

(A) They dissolve in water	(B) They reflect light evenly
(C) They are attracted to magnets	(D) They have zero mass

Question 10: A student stirs salt into warm water until it dissolves. Which property was tested?

(A) Magnetism	(B) Reflectivity
(C) Solubility	(D) Hardness

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Q3 : Unit 1 - Module: Matter

Lesson 2: Mixtures and Solutions

Describe homogeneous mixtures as uniform throughout and heterogeneous mixtures as not uniformly mixed together.

(Page 25)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Types of Mixtures (Practice Q3) · Page 25):

A mixture is a physical combination of two or more substances. Homogeneous mixtures are uniform throughout—every sample looks the same (such as sugar water, tap water, and carbonated beverages). Heterogeneous mixtures have parts that are NOT uniformly mixed together (such as a garden salad, muddy water, and fog).

Key Ideas from the Student Book:

- Homogeneous mixtures are uniform throughout.
- Heterogeneous mixtures have parts that are not uniformly mixed together.
- Solutions are homogeneous mixtures; suspensions and colloids are heterogeneous mixtures.

Type of Mixture	Description	Examples
Homogeneous Mixture	Uniform throughout; parts cannot be seen separately.	Sugar water, salt water, tap water, carbonated drink
Heterogeneous Mixture	Not uniformly mixed together; parts are uneven or visible.	Garden salad, trail mix, muddy water, fog

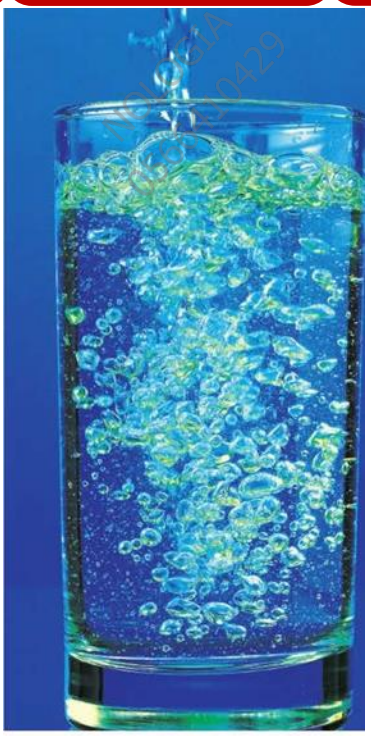
Remember:

✓ Homogeneous mixture = uniform throughout.

✓ Heterogeneous mixture = not uniformly mixed together.

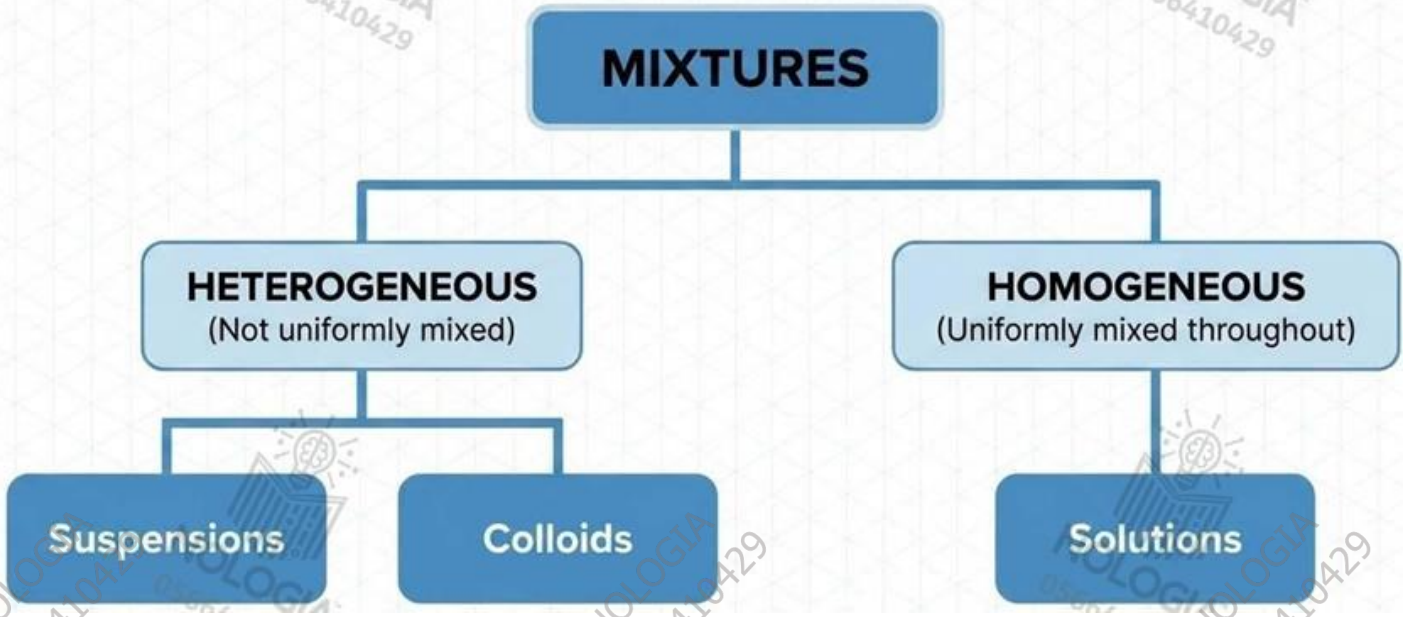
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A carbonated beverage is a solution of carbon dioxide gas in liquid water under pressure. When the pressure is released, the carbon dioxide gas bubbles out of the solution.

The Mixture Family Tree



Questions:

Question 1: Which row correctly identifies an everyday mixture and its type?

(A) Garden salad – Homogeneous mixture (uniform throughout)	(B) Sugar dissolved in water – Homogeneous mixture (uniform throughout)
(C) Tap water – Heterogeneous mixture (not uniformly mixed)	(D) Fruit salad – Homogeneous solution

Question 2: How is a homogeneous mixture described?

(A) Its parts are not uniformly mixed together	(B) It is uniform throughout
(C) Its parts settle to the bottom quickly	(D) It contains only one pure element

Question 3: How is a heterogeneous mixture described?

(A) Its parts are not uniformly mixed together	(B) It is completely uniform throughout
(C) Its substances are chemically bonded	(D) Its particles are completely dissolved

Question 4: Mixtures that have parts that are not uniformly mixed together are called:

(A) Homogeneous mixtures	(B) Solutions
(C) Heterogeneous mixtures	(D) Pure compounds

Question 5: Mixtures that are uniform throughout are called:

(A) Homogeneous mixtures	(B) Heterogeneous mixtures
(C) Suspensions	(D) Colloids

Question 6: Why is a garden salad classified as a heterogeneous mixture?

(A) All the vegetables dissolve in water	(B) Every bite has the exact same uniform composition
(C) Its parts are not uniformly mixed and can be seen separately	(D) A chemical reaction turns the salad into a gas

Question 7: Why is sugar water classified as a homogeneous mixture?

(A) The sugar settles at the bottom immediately	(B) You can pick out the sugar crystals by hand
(C) The sugar and water are not uniformly mixed	(D) The dissolved sugar particles are spread evenly throughout the water

Question 8: Tap water contains dissolved minerals and gases spread evenly throughout. What type of mixture is tap water?

(A) Homogeneous mixture	(B) Heterogeneous suspension
(C) Heterogeneous colloid	(D) Pure element

Question 9: Which of the following is a heterogeneous mixture?

(A) Salt dissolved in warm water	(B) A bowl of mixed nuts and raisins
(C) Sugar dissolved in tea	(D) Filtered tap water

Question 10: Which of the following is a homogeneous mixture?

(A) Garden salad with tomatoes	(B) Sand mixed with gravel
(C) Unopened carbonated beverage	(D) Muddy water in a beaker

Question 11: In which type of mixture can there be more of one ingredient in some parts than others?

(A) Homogeneous mixture	(B) Heterogeneous mixture
(C) Solution	(D) Pure substance

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Q4 : Unit 1 - Module: Matter

Lesson 2: Mixtures and Solutions

Define a solution as a type of homogeneous mixture.

(Page 31)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Three Dimensional Thinking (Practice Q4) · Page 31):

A solution is a type of homogeneous mixture that is uniform throughout because one substance dissolves evenly in another. Examples of solutions include cranberry juice, sugar water, salt water, tap water, and carbonated beverages. Muddy water (suspension), potting soil (solid mixture), and milk (colloid) are heterogeneous mixtures, not solutions.

Key Ideas from the Student Book:

- A solution is a type of homogeneous mixture that is uniform throughout.
- In a solution, dissolved particles spread evenly and do not settle out.
- Mixtures are formed by physically combining substances and separated using physical properties.

Mixture	Classification	Reason
Cranberry juice	Solution (Homogeneous mixture)	Substances are dissolved evenly in water.
Muddy water	Suspension (Heterogeneous mixture)	Clay particles do not dissolve and settle out.
Potting soil	Heterogeneous solid mixture	Contains unevenly mixed pieces of soil and bark.
Milk	Colloid (Heterogeneous mixture)	Tiny fat and protein droplets are suspended, not dissolved.

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Remember:

✓ A solution is a type of homogeneous mixture in which substances dissolve evenly throughout.

✓ Sugar water, tap water, carbonated drinks, and cranberry juice are solutions.



Questions :

Question 1: Which mixture is most likely a solution?

(A) muddy water	(B) cranberry juice
(C) potting soil	(D) milk

Question 2: How are mixtures formed and separated?

(A) Formed by physically combining substances and separated using physical properties	(B) Formed by burning substances and can never be separated
(C) Formed only in space and separated by gravity alone	(D) Formed by chemical reactions that destroy the original matter

Question 3: What is a solution?

(A) A type of homogeneous mixture in which substances dissolve evenly	(B) A heterogeneous mixture whose particles settle quickly
(C) A pure element made of one kind of atom	(D) A chemical reaction that produces smoke

Question 4: A type of homogeneous mixture that is uniform throughout is called a:

(A) Suspension	(B) Solution
(C) Colloid	(D) Precipitate

Question 5: When sugar dissolves completely in a glass of water, what is formed?

(A) A suspension	(B) A colloid
(C) A solution	(D) A chemical compound

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Question 6: Why is muddy water NOT a solution?

(A) The clay particles dissolve completely	(B) The clay particles do not dissolve and settle out over time
(C) Muddy water contains only pure water	(D) Muddy water is uniform throughout

Question 7: Why is an unopened carbonated beverage considered a solution?

(A) It contains sand and gravel at the bottom	(B) Its ingredients are not uniformly mixed
(C) It is a solid at room temperature	(D) Carbon dioxide gas and flavorings are dissolved evenly in water

Question 8: Can a solution contain dissolved gases or solids in a liquid?

(A) Yes, tap water and carbonated drinks have dissolved gases and solids	(B) No, solutions can only be made of two solids
(C) No, gases never dissolve in liquids	(D) Yes, but only during a chemical reaction

Question 9: How can you separate dissolved salt from a saltwater solution?

(A) By using a magnet	(B) By picking out the salt with tweezers
(C) By evaporating the water so the solid salt remains	(D) By pouring it through a gravel sieve

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Q5 : Unit 1 - Module: Matter

Lesson 3: Physical and Chemical Changes

Identify a chemical change as a change that produces new matter with different properties.

(Page 33)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Lesson 3 Launch (Practice Q5) · Page 33):

A chemical change—also called a chemical reaction—is a change that produces new matter with different properties from the original matter. During a chemical change, particles link up in new ways (such as frying an egg, burning wood, a nail rusting, or mixing baking soda and vinegar). A physical change begins and ends with the same kind of matter.

Key Ideas from the Student Book:

- A chemical change produces new matter with different properties from the starting materials.
- A physical change alters shape, size, or state without forming new matter.
- Matter is neither created nor destroyed during a physical or chemical change (conservation of mass).

Type of Change	Definition	Examples
Chemical Change	Produces new matter with different properties.	Frying an egg, burning wood, nail rusting, baking a cake, milk going sour
Physical Change	Begins and ends with the same kind of matter.	Tearing paper, dissolving salt, melting butter, evaporating water, crushing sugar

Remember:

✓ A chemical change produces new matter with different properties.

✓ A physical change begins and ends with the same kind of matter.

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VOCABULARY

Look for these words as you read:

- chemical change
- conservation of mass
- physical change

Changes in Matter

Think about the ways the banana was changing. Matter can be changed in many ways. A **physical change** begins and ends with the same kind of matter. A **chemical change**—also called a chemical reaction—is a change that produces new matter with different properties from the original matter. The law of **conservation of mass** states that matter is neither created nor destroyed during a physical change or chemical reaction. For example, when you mix baking soda with vinegar, particles in the baking soda and vinegar link up in new ways. During the chemical change, bubbles form and a solid is left behind. The new substances formed have different properties than the starting materials.

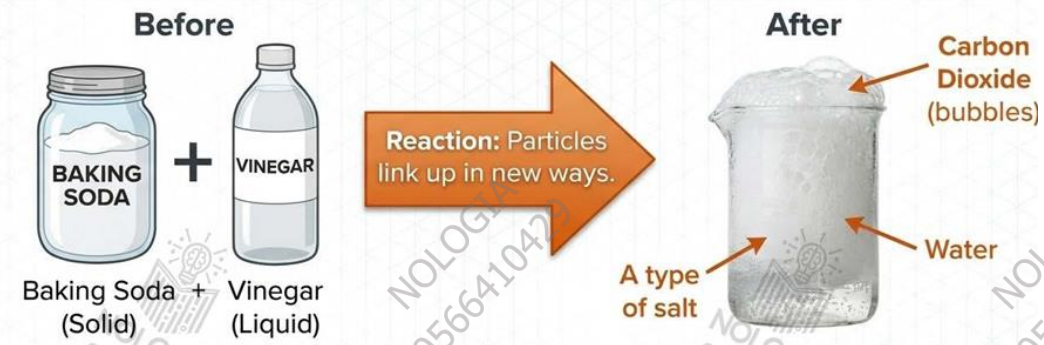
GO ONLINE Watch the video *Identifying Chemical Changes* to learn more about how to recognize a chemical change.



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Chemical Change: Creating New Matter

Also called a **chemical reaction**. A change that produces new matter with different properties from the original matter.



Key Takeaway: The starting materials are gone; entirely new substances have formed.

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Questions:

Question 1: How do you decide if a change is a chemical change, and which group contains ONLY chemical changes?

(A) It produces new matter with different properties; e.g., frying an egg, burning wood, and a nail rusting	(B) It keeps the same kind of matter; e.g., tearing paper, melting butter, and evaporating water
(C) It only changes size; e.g., crushing a sugar cube and dissolving salt	(D) It changes state without reacting; e.g., freezing water and folding paper

Question 2: What is a chemical change?

(A) A change in size or shape without forming new matter	(B) A change of state from solid to liquid
(C) A change that produces new matter with different properties	(D) A physical combination of two substances

Question 3: What is another name for a chemical change?

(A) A chemical reaction	(B) A physical property
(C) A homogeneous mixture	(D) A state of matter

Question 4: What happens to particles during a chemical change?

(A) Particles stay in the exact same molecules	(B) Particles link up in new ways to form new substances
(C) Particles disappear so mass is destroyed	(D) Particles only move slightly closer together

Question 5: Which of the following is an example of a chemical change?

(A) A nail rusting	(B) Tearing up paper
(C) Melting butter	(D) Crushing a sugar cube

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Question 6: Why is burning wood classified as a chemical change?

(A) It only cuts the wood into smaller pieces	(B) Ash can be cooled to become wood again
(C) It only changes the volume of the wood	(D) It produces new substances like ash and smoke with different properties

Question 7: When baking soda and vinegar are mixed, bubbles of carbon dioxide gas and a salt form. What occurred?

(A) A physical change	(B) A chemical change
(C) Freezing	(D) Condensation

Question 8: Why is folding paper into an origami shape NOT a chemical change?

(A) The paper turns into a new gas	(B) Folding paper releases light and heat
(C) No new matter is produced and the paper keeps its properties	(D) The paper changes into ash

Question 9: Which of the following is a physical change rather than a chemical change?

(A) Baking a cake	(B) Evaporating water
(C) A rotting banana	(D) Lighting a match

Question 10: What does the law of conservation of mass state?

(A) Matter is neither created nor destroyed during a physical or chemical change	(B) Matter is always destroyed when wood burns
(C) New mass is created out of nothing when water freezes	(D) Only solids have mass

Q6 : Unit 1 - Module: Matter

Lesson 3: Physical and Chemical Changes

Identify change in color, change in odor, temperature change, formation of a gas, and formation of a solid as possible signs of a chemical change.

(Pages 42 - 43)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Signs of Chemical Change (Practice Q6) · Page 42 - 43):

The five possible signs that a chemical change has occurred are: (1) Change in Color (shiny metal turning to rust or tarnish), (2) Change in Odor (toasting a marshmallow producing a sweet smell), (3) Temperature Change (burning wood releasing heat and light), (4) Formation of a Gas (bubbles/fizzing when an antacid tablet reacts in water), and (5) Formation of a Solid (soap scum forming when dissolved soap reacts with minerals in tap water).

Key Ideas from the Student Book:

- The five signs of a chemical change are: change in color, change in odor, temperature change, formation of a gas, and formation of a solid.
- Soap scum is a chemical change because soap reacts with minerals in tap water to form a new solid.
- Rust on metal is a chemical color change, whereas painting a fence only coats the wood.

Sign of Chemical Change	Scientific Example	Important Note
1. Change in Color	Shiny metal turning to rust or tarnish	Painting a wooden fence is physical, not chemical.
2. Change in Odor	Toasting a marshmallow gives off a pleasant smell	Indicates new gas molecules formed.
3. Temperature Change	Burning wood releases heat and light	Freezing/boiling alone is a physical change.
4. Formation of a Gas	Antacid tablet fizzing in water	Soda bubbles are dissolved gas escaping (physical).
5. Formation of a Solid	Soap reacting with tap water minerals to form soap scum	A new solid precipitate forms from reacting solutions.

Remember:

✓ Five signs of chemical change: change in color, change in odor, temperature change, formation of a gas, and formation of a solid.





Change in Odor Have you ever toasted marshmallows over a campfire? An uncooked marshmallow has little odor. While your marshmallow is toasting, it gives off a pleasant smell. This change in odor is evidence of a chemical change.

5 Signs of a Chemical Change

You can often see, hear, or smell the formation of new substances.

1. Change in Color

Shiny metal turning to rust/tarnish.



2. Change in Odor



Uncooked marshmallow toasting and giving off a pleasant smell.

3. Temperature Change

Matter becoming warm/cold, or giving off light (e.g., burning wood).



4. Formation of a Gas

Bubbles or fizzing (e.g., dropping an antacid tablet into water).



5. Formation of a Solid



Solutions reacting to form a solid (e.g., soap scum from dissolved soap reacting with tap water minerals).

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Questions :

Question 1: Why is the formation of soap scum considered a chemical change?

(A) Tap water freezes when it touches soap	(B) Dissolved soap reacts with minerals in tap water to form a new solid
(C) Soap melts and evaporates into the air	(D) Soap scum is attracted to a magnet

Question 2: Why is rust on a shiny metal considered a chemical change while painting a wooden fence is not?

(A) Rust is a new substance formed by a chemical reaction, while paint only coats the wood	(B) Painting a fence forms a new metal, while rust is dried water
(C) Both rusting and painting are chemical reactions	(D) Rust is a physical change, while painting is a chemical change

Question 3: Which list correctly identifies all five possible signs of a chemical change?

(A) Change in color, change in odor, temperature change, formation of a gas, and formation of a solid	(B) Change in shape, change in size, melting, freezing, and boiling
(C) Magnetism, reflectivity, conductivity, and solubility	(D) Rotation, revolution, gravity, and tides

Question 4: When a marshmallow is toasted, it turns brown and gives off a sweet smell. Which two signs are observed?

(A) Magnetism and solubility	(B) Change in color and change in odor
(C) Freezing and condensation	(D) Sieving and filtration

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Question 5: Dropping an antacid tablet into water causes fizzing bubbles. Which sign of chemical change is this?

(A) Formation of a solid	(B) Change in odor
(C) Formation of a gas	(D) Reflectivity

Question 6: When dissolved soap reacts with minerals in tap water to form soap scum, which sign is shown?

(A) Formation of a solid	(B) Formation of a gas
(C) Freezing of water	(D) Evaporation of a liquid

Question 7: Shiny metal changing to reddish-brown rust or dark tarnish is an example of which sign?

(A) Formation of a gas	(B) Change in volume
(C) Solubility	(D) Change in color

Question 8: Why are the bubbles in an opened bottle of soda NOT a sign of a chemical change?

(A) Soda contains no gas	(B) They are dissolved carbon dioxide gas escaping, not a new substance forming
(C) Soda is a solid mixture	(D) The bubbles are made of solid ice

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Question 9: Does a temperature change ALWAYS mean a chemical change has occurred?

(A) Yes, every temperature change is a chemical reaction	(B) No, chemical changes never involve temperature changes
(C) No, temperature change can also occur during a physical change like water freezing	(D) Yes, freezing water forms a brand-new element

Question 10: When wood burns in a campfire, it becomes hot and gives off light. Which sign is this?

(A) Temperature change	(B) Formation of a liquid
(C) Magnetism	(D) Condensation

Question 11: Spoiled milk develops a sour smell and solid curds. Which signs of chemical change are present?

(A) Magnetism and reflectivity	(B) Change in odor and formation of a solid
(C) Freezing and melting	(D) Conductivity and solubility

Question 12: Two clear liquid solutions are mixed and a white powder settles at the bottom. Which sign occurred?

(A) Change in odor	(B) Evaporation
(C) Melting	(D) Formation of a solid

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Q7 : Unit 1 - Module: Matter

Lesson 4: Solids, Liquids, and Gases

Describe a solid as having a definite shape and a definite volume.

(Page 63)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Three Dimensional Thinking (Practice Q7) · Page 63):

A solid has a definite shape and a definite volume because its particles are tightly packed together in a regular pattern and vibrate in place. A liquid has a definite volume but no definite shape (it takes the shape of its container). A gas has no definite shape and no definite volume.

Key Ideas from the Student Book:

- A solid has both a definite shape and a definite volume.
- A liquid has a definite volume, but no definite shape.
- Matter changes state by adding energy or removing energy.

State of Matter	Shape	Volume	Particles
Solid	Definite shape	Definite volume	Tightly packed; vibrate in place
Liquid	No definite shape	Definite volume	Close together; slide past one another
Gas	No definite shape	No definite volume	Far apart; move rapidly and freely

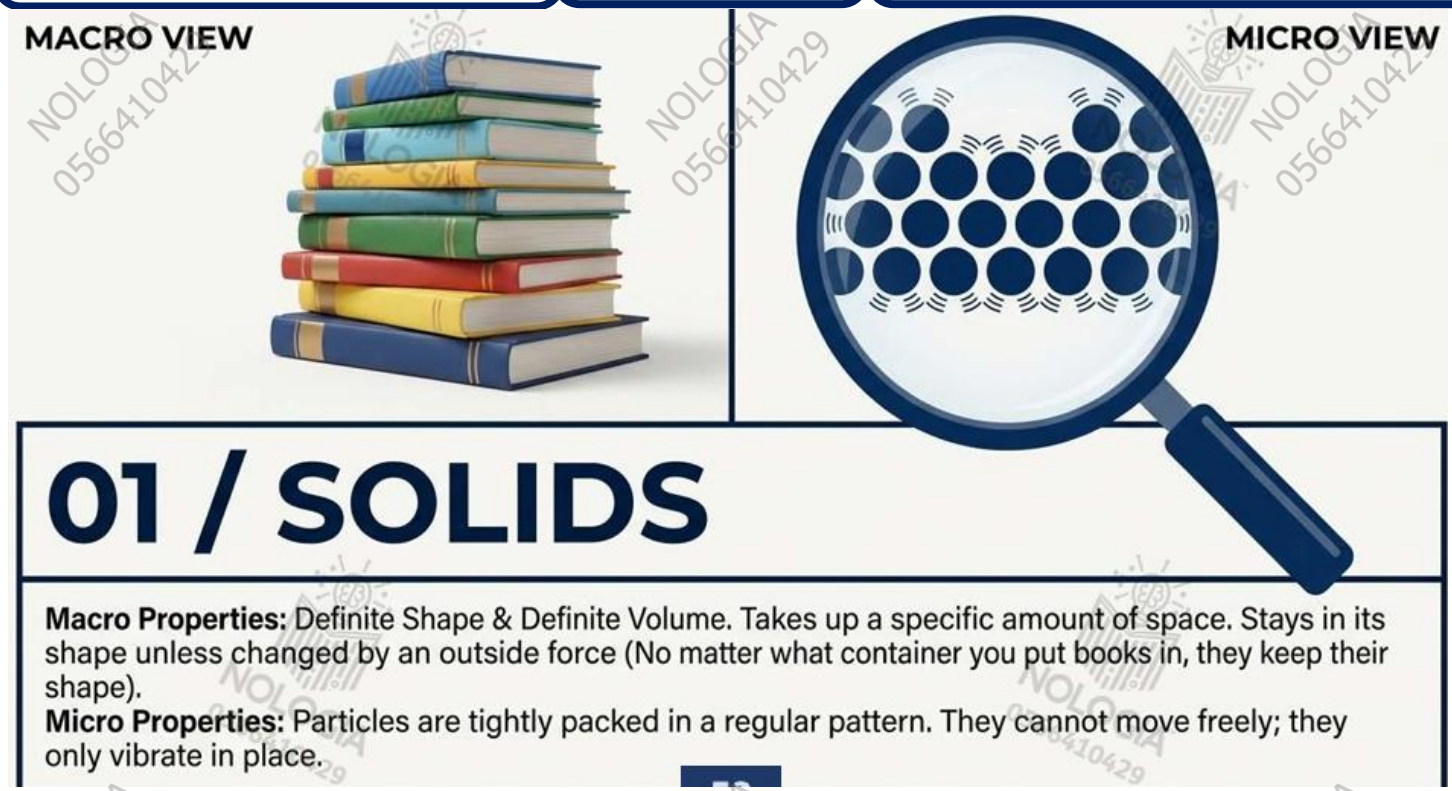
Remember:

✓ A solid has a definite shape and a definite volume.

✓ A liquid has a definite volume but no definite shape; a gas has neither a definite shape nor a definite volume.

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Questions:

Question 1: Which statement accurately describes the shape and volume of a solid?

(A) A solid has a definite shape and a definite volume	(B) A solid has a definite volume but no definite shape
(C) A solid has a definite shape but no definite volume	(D) A solid has no definite shape and no definite volume

Question 2: A liquid has _____.

(A) definite volume and definite shape	(B) definite volume and no definite shape
(C) no definite volume and definite shape	(D) no definite volume and no definite shape

Question 3: How does matter change from one state to another?

(A) By adding energy or removing energy	(B) By adding mass or removing volume
(C) By changing gravity only	(D) Matter can never change state

Question 4: Which state of matter has BOTH a definite shape and a definite volume?

(A) Solid	(B) Liquid
(C) Gas	(D) Vapor

Question 5: What happens to the shape and volume of a book when placed into a box?

(A) It flows to fill the bottom of the box	(B) It expands to fill the entire box
(C) Both its shape and volume stay the same because it is a solid	(D) Its volume doubles

Question 6: Why does a solid keep its definite shape and definite volume?

(A) Its particles are far apart and fly freely	(B) Its particles are tightly packed and vibrate in place
(C) Its particles slide past one another easily	(D) It has no particles

Question 7: How do a solid and a liquid compare in shape and volume?

(A) Both have a definite shape, but only a solid has a definite volume	(B) Both have a definite volume, but only a solid has a definite shape
(C) Neither has a definite shape or volume	(D) A solid has no definite volume, while a liquid has a definite shape

Question 8: Which of the following is an example of a solid with a definite shape and volume?

(A) Air in a balloon	(B) Milk in a glass
(C) Steam in the air	(D) A wooden block

Question 9: A solid stays in its definite shape and definite volume unless:

(A) It is changed by an outside force or heat energy	(B) It is placed in a dark room
(C) Its mass is measured on a balance	(D) Someone looks at its color

Question 10: Which state of matter has NO definite shape and NO definite volume?

(A) Solid	(B) Liquid
(C) Gas	(D) Ice

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Q8 : Unit 4 - Module 1: Earth's Patterns and Movements

Lesson 1: The Role of Gravity

Identify that Earth's gravitational force pulls objects down toward the center of Earth.

(Page 20)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: Summarize It (Practice Q8) · Page 20):

Gravity is a force of attraction, or pull, between any two objects with mass. No matter the location on Earth's surface, Earth's gravitational force pulls objects on all sides down toward the center of Earth.

Key Ideas from the Student Book:

- No matter the location on Earth's surface, gravity pulls objects down toward the center of Earth.
- Dropped objects rush downward toward Earth's center due to gravity.
- Earth's gravity holds people, oceans, and the atmosphere on the planet.

Concept	Scientific Fact
Direction of Earth's Gravity	Always pulls objects on all sides down toward the center of Earth.
Meaning of "Down" on Earth	"Down" means toward the center of Earth; "Up" means away from the center.
Barringer Crater Formation	Earth's gravity pulled a meteor from space down toward Earth's surface.

Remember:

✓ Earth's gravitational force pulls all objects down toward the center of Earth.

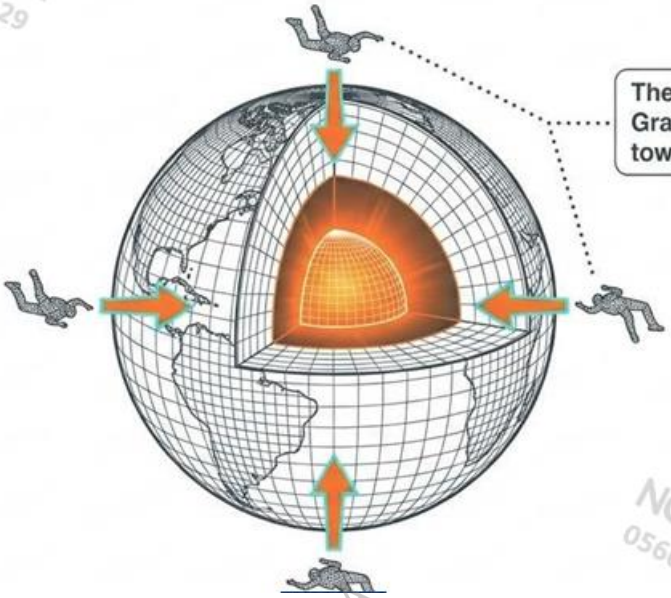
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Earth's Inward Pull

No matter the location on Earth's surface, gravity pulls objects on all sides down toward the center.

Every object with mass experiences a gravitational pull.



Questions :

Question 1: What pulls objects toward Earth's surface and caused the Barringer Crater to form?

(A) Earth's gravitational force pulling objects down toward the center of Earth	(B) Solar wind pushing objects away from the center of Earth
(C) Earth's rotation flinging objects outward into space	(D) Magnetism pulling objects only toward the North Pole

Question 2: In which direction does Earth's gravitational force pull objects?

(A) Upward away from Earth	(B) Down toward the center of Earth
(C) Always toward the North Pole	(D) Always toward the South Pole

Question 3: No matter the location on Earth's surface, gravity pulls objects toward the:

(A) Moon	(B) Sun
(C) Center of Earth	(D) Equator only

Question 4: Why do skydivers fall toward the ground after jumping from a plane?

(A) Earth's gravity pulls their mass down toward the center of Earth	(B) Clouds push them downward
(C) They have zero mass in the air	(D) The Moon pushes them toward Earth

Question 5: Why do penguins near the South Pole not fall off Earth?

(A) Their feet are magnetic	(B) There is no gravity at the South Pole
(C) Gravity pulls them inward toward the center of Earth	(D) Air pressure glues them to the ice

Question 6: What is gravity?

(A) A force that pushes objects apart	(B) A force of attraction, or pull, between any two objects with mass
(C) A chemical reaction in the atmosphere	(D) The reflection of light off a mirror

Question 7: Four students around a globe drop a ball. Which direction do all four balls fall?

(A) Straight toward the South Pole	(B) Outward into space
(C) Toward the North Pole	(D) Inward toward the center of Earth

Question 8: What caused the Barringer Crater to form?

(A) Wind eroded a mountain	(B) Gravity pulled a meteor from space down to Earth's surface
(C) An ocean wave washed away the rock	(D) Sunlight melted the ground

Question 9: What does the word "down" mean from any point on Earth?

(A) Toward the center of Earth	(B) Away from the center of Earth
(C) Toward the Sun	(D) Toward the Moon

Question 10: Why does a ball thrown straight up slow down and fall back to the ground?

(A) Sunlight pushes the ball down	(B) The ball loses its mass at the top
(C) The ball becomes magnetic	(D) Earth's gravity pulls the ball downward toward Earth's center

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Q9 : Unit 4 - Module 1: Earth's Patterns and Movements

Lesson 2: Earth's Motion

Identify Earth's rotation as the cause of the pattern of day and night.

(Page 41)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: Three Dimensional Thinking (Practice Q9) · Page 41):

Rotation is a complete spin of Earth on its axis every 24 hours (one day). Earth's rotation causes the repeating pattern of day and night: the half of Earth facing the Sun is lit (day), while the half facing away from the Sun is in darkness (night).

Key Ideas from the Student Book:

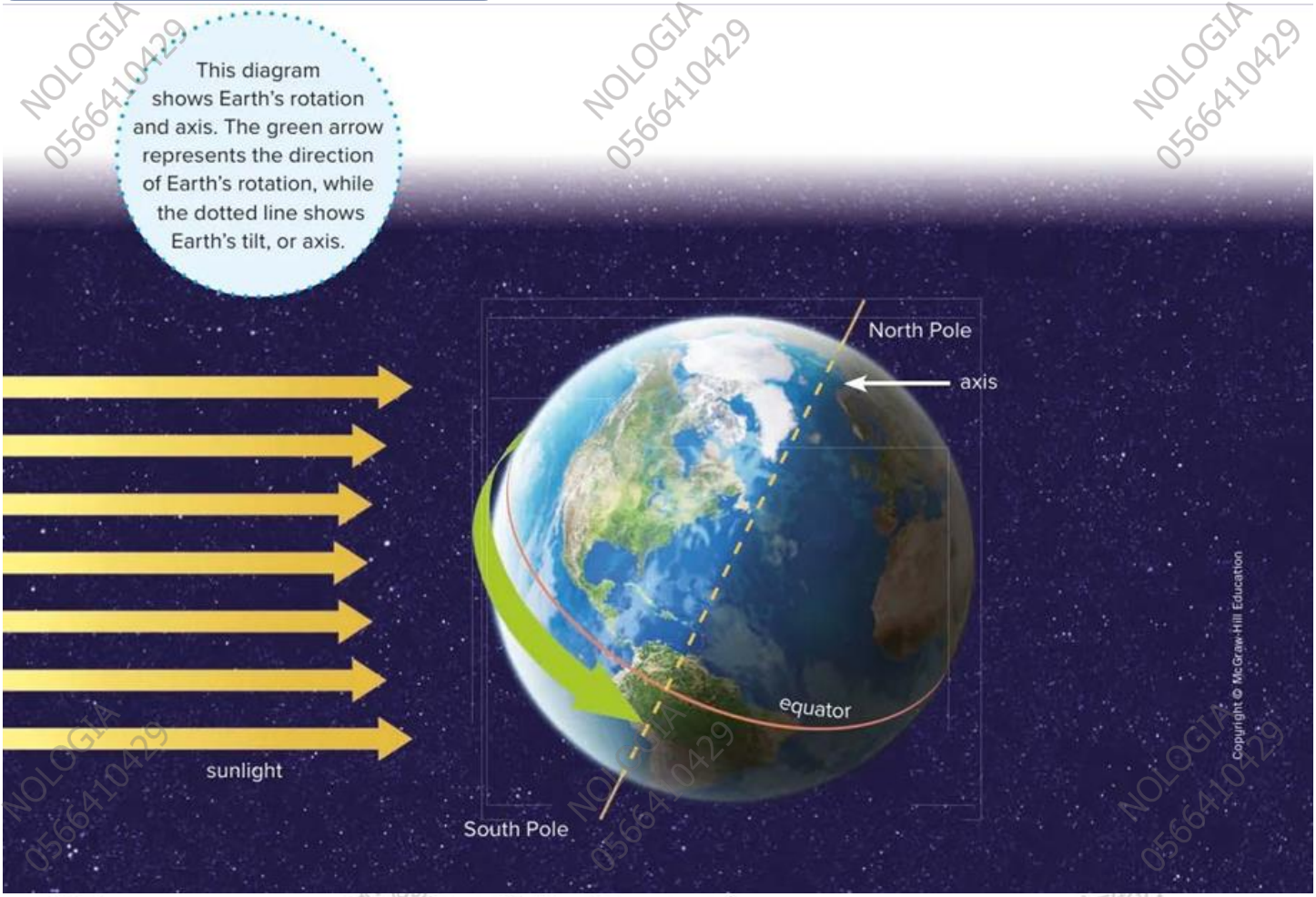
- One rotation is a complete spin of Earth on its axis every 24 hours.
- Earth's rotation causes the pattern of day and night.
- Half of Earth faces the Sun (day) while the other half faces away (night).

Concept	Duration	Effect
Earth's Rotation	24 hours (1 day) per spin on its axis	Causes the daily pattern of day and night.
Side Facing the Sun	Lit by sunlight	Experiences daytime.
Side Facing Away from the Sun	In darkness	Experiences nighttime.

Remember:

✓ Earth's rotation on its axis every 24 hours causes the pattern of day and night.

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Movement 1: Earth's Rotation



Definition: A complete spin on an imaginary line (axis) passing through the center of the Earth.

Speed: ~1,600 kilometers/hour.

Time: 24 hours to complete one rotation.

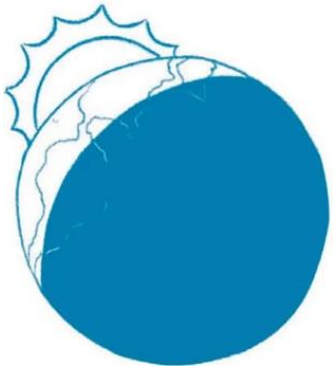
Result: The cycle of Day and Night. Half the surface faces the Sun (daylight), the other faces away (darkness).

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Questions:

Question 1: How does the illustration show how Earth's movement causes day and night?



(A) As Earth rotates on its axis every 24 hours, the half facing the Sun has day and the half facing away has night	(B) As Earth revolves around the Sun, the entire planet is dark for six months
(C) The Moon blocks the Sun every night to cause darkness	(D) The Sun cools down every night and heats up every day

Question 2: The Moon looks completely dark as seen from Earth. What causes a new moon?

(A) The side of the Moon that is lit by the Sun can be seen from Earth	(B) The side of the Moon that is lit by the Sun cannot be seen from Earth
(C) The Sun stops shining during the new moon phase	(D) Earth blocks the Moon every single night

Question 3: What causes the repeating pattern of day and night on Earth?

(A) Earth's revolution around the Sun	(B) Earth's rotation on its axis
(C) The Moon's orbit around Earth	(D) The tilt of the Moon's axis

Question 4: How long does it take Earth to make one complete rotation on its axis?

(A) 1 hour	(B) 29 days
(C) 24 hours (1 day)	(D) 365 1/4 days

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Question 5: What is one complete spin of Earth on its axis called?

(A) Rotation	(B) Revolution
(C) Orbit	(D) Equinox

Question 6: At any point in time, how much of Earth's surface faces the Sun and has daylight?

(A) All of Earth	(B) One half (1/2)
(C) One fourth (1/4)	(D) None of Earth

Question 7: What happens on the half of Earth's surface facing away from the Sun?

(A) It experiences noon	(B) It receives direct sunlight
(C) It experiences summer solstice	(D) It is in darkness and experiences nighttime

Question 8: What is the imaginary line through the center of Earth around which Earth spins?

(A) Earth's axis	(B) Earth's equator
(C) Earth's orbit	(D) Earth's crater

Question 9: Why do living things not feel Earth spinning on its axis?

(A) Earth only spins once every 100 years	(B) Earth stops spinning during the day
(C) There is no gravity on Earth	(D) Living things move smoothly together with Earth

Question 10: Why does the Sun appear to rise in the east and set in the west each day?

(A) Because Earth rotates on its axis every 24 hours	(B) Because the Sun orbits Earth every 24 hours
(C) Because the Moon pushes the Sun	(D) Because gravity pulls the Sun down

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Q10 : Unit 4 - Module 2: Earth and Space

Lesson 1: Earth's Place in Space

Identify the Milky Way as the galaxy that contains our solar system.

(Page 57)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Our Galaxy (Practice Q10) · Page 57):

A galaxy is a huge system of billions of stars, dust, and gas held together by gravity. Our solar system is located in the Milky Way galaxy, a spiral galaxy with more than 200 billion stars grouped into four spiral arms.

Key Ideas from the Student Book:

- A galaxy contains billions of stars, dust, and gas held together by gravity.
- Our solar system is inside the Milky Way galaxy.
- The Milky Way has four spiral arms and more than 200 billion stars.

Feature	Key Scientific Fact
Definition of a Galaxy	Billions of stars, dust, and gas held together by gravity.
Our Galaxy	The Milky Way (contains our solar system, the Sun, and Earth).
Structure	Four spiral arms extending from the center.
Number of Stars	More than 200 billion stars.
Sun's Galactic Orbit	Takes 250 million years to orbit the center of the Milky Way.

Remember:

✓ The Milky Way is the spiral galaxy that contains our solar system.

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Stars in the Milky Way are grouped into four arms that spiral out from the center.

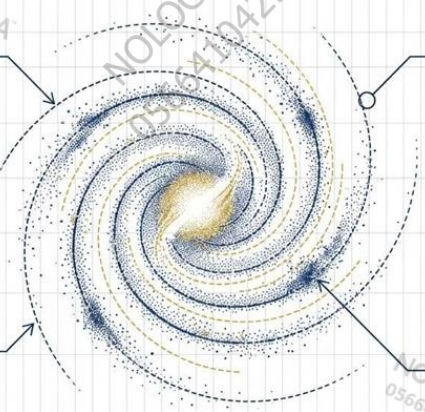
The Milky Way contains more than 200 billion stars. The dust and gas in the galaxy are enough material to make billions of more stars. Astronomers believe the galaxy creates up to seven new stars each year. Even so, the Milky Way is not the largest galaxy.

It is not possible to photograph the entire Milky Way. Astronomers calculate the size and structure of our galaxy using what they know about other galaxies. Just like Earth travels around the Sun, the Sun

Galaxy: A large group containing **billions of stars, dust, and gas** held together by **gravity**.

Structure:
Grouped into **four distinct arms** that spiral out from the center.

Location:
Earth's solar system is located within one of these spiral arms.



Name Origin:
"Milky Way" comes from ancient Greeks ("milky circle") and Romans ("road of milk") who saw streaks of light in the sky.

Future Potential:
Contains enough dust and gas to make **billions** of more stars.

Cosmic Stats & Data

100 Billion
Estimated number of galaxies in the universe.

200 Billion+
Number of stars contained within the Milky Way.

7
Number of new stars created by the Milky Way each year.

250 Million Years
Time it takes for the Sun to complete one orbit around the center of the galaxy.

Questions :

Question 1: Which galaxy contains our solar system?

(A) The Milky Way	(B) Andromeda
(C) Orion	(D) Halley

Question 2: What is a galaxy?

(A) A single planet orbiting a moon	(B) Billions of stars, dust, and gas held together by gravity
(C) A small rock burning in the atmosphere	(D) A cloud of water droplets

Question 3: What force holds the stars, dust, and gas together in a galaxy?

(A) Magnetism	(B) Friction
(C) Gravity	(D) Electricity

Question 4: How are the stars in the Milky Way galaxy arranged?

(A) Grouped into four arms that spiral out from the center	(B) Arranged in a single straight line
(C) Located inside Earth's atmosphere	(D) Frozen in a block of ice

Question 5: Approximately how many stars are in the Milky Way galaxy?

(A) Only 1 star	(B) 8 stars
(C) 1,000 stars	(D) More than 200 billion stars

Question 6: About how many galaxies do astronomers estimate exist in the universe?

(A) Only 1 galaxy	(B) 8 galaxies
(C) About 100 billion galaxies	(D) 100 galaxies

Question 7: Why can we NOT photograph the entire Milky Way from outside?

(A) Because the Milky Way emits no light	(B) Because our solar system is located inside the Milky Way
(C) Because the Milky Way is smaller than Earth	(D) Because the Milky Way only appears in daytime

Question 8: How long does it take the Sun to make one complete trip around the center of the Milky Way?

(A) 24 hours	(B) 365 days
(C) 29 days	(D) 250 million years

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Q11 : Unit 4 - Module 2: Earth and Space

Lesson 1: Earth's Place in Space

Identify the eight planets of the solar system and their order from nearest to farthest from the Sun.

(Page 60)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: The Solar System (Practice Q11) · Page 60):

Our solar system consists of the Sun and all of the objects that orbit around it. A planet is a large, round object in space that orbits a star. From nearest to farthest from the Sun, the eight planets are: Mercury, Venus, Earth, Mars (the four inner planets), followed by the asteroid belt, and then Jupiter, Saturn, Uranus, and Neptune (the four outer planets).

Key Ideas from the Student Book:

- Order from nearest to farthest from the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.
- Inner planets: Mercury, Venus, Earth, Mars. Outer planets: Jupiter, Saturn, Uranus, Neptune.
- The asteroid belt lies between Mars and Jupiter.

Order from Sun	Planet	Group
1st (Nearest)	Mercury	Inner Planet
2nd	Venus	Inner Planet
3rd	Earth	Inner Planet
4th	Mars	Inner Planet
5th	Jupiter	Outer Planet
6th	Saturn	Outer Planet
7th	Uranus	Outer Planet
8th (Farthest)	Neptune	Outer Planet

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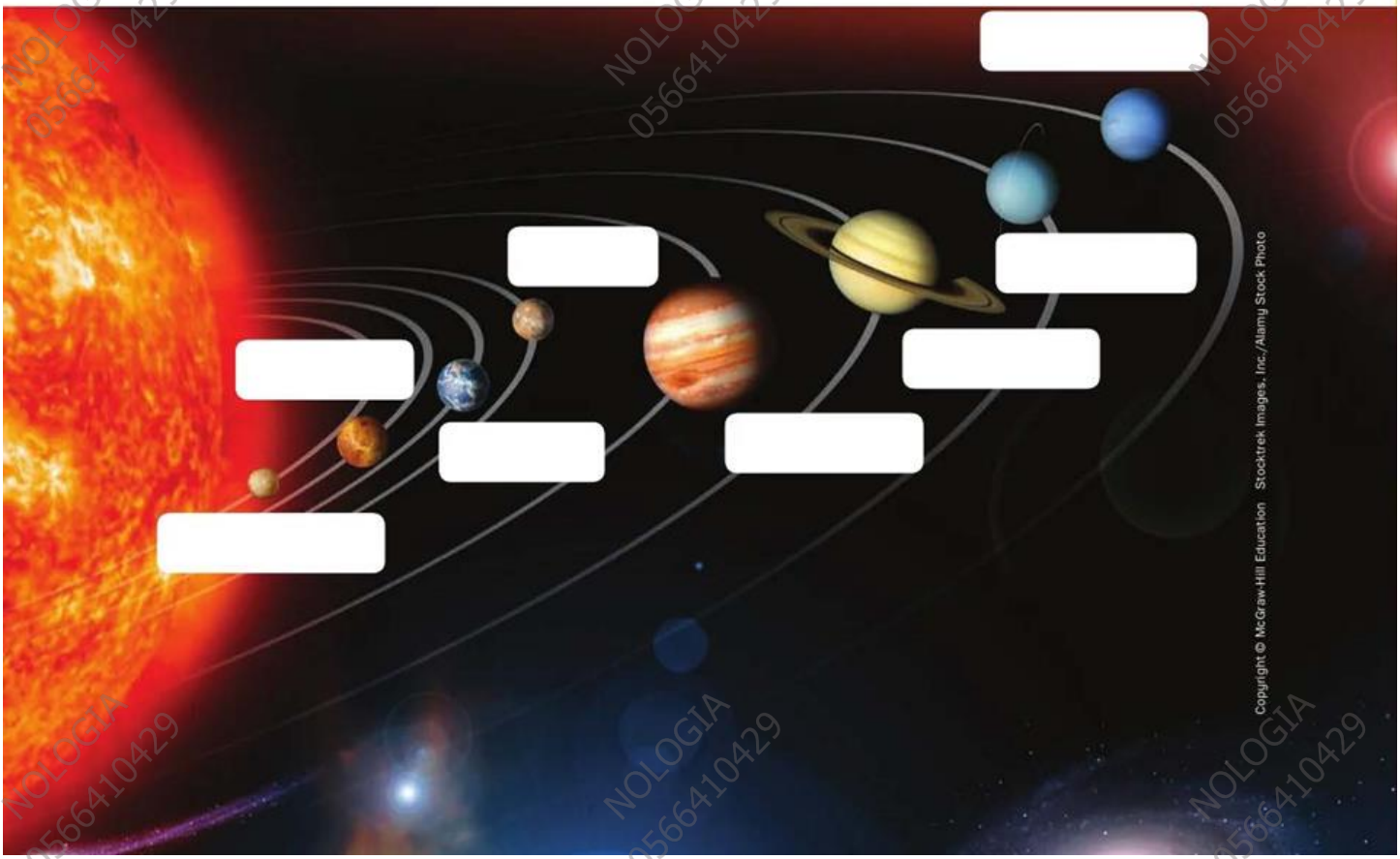
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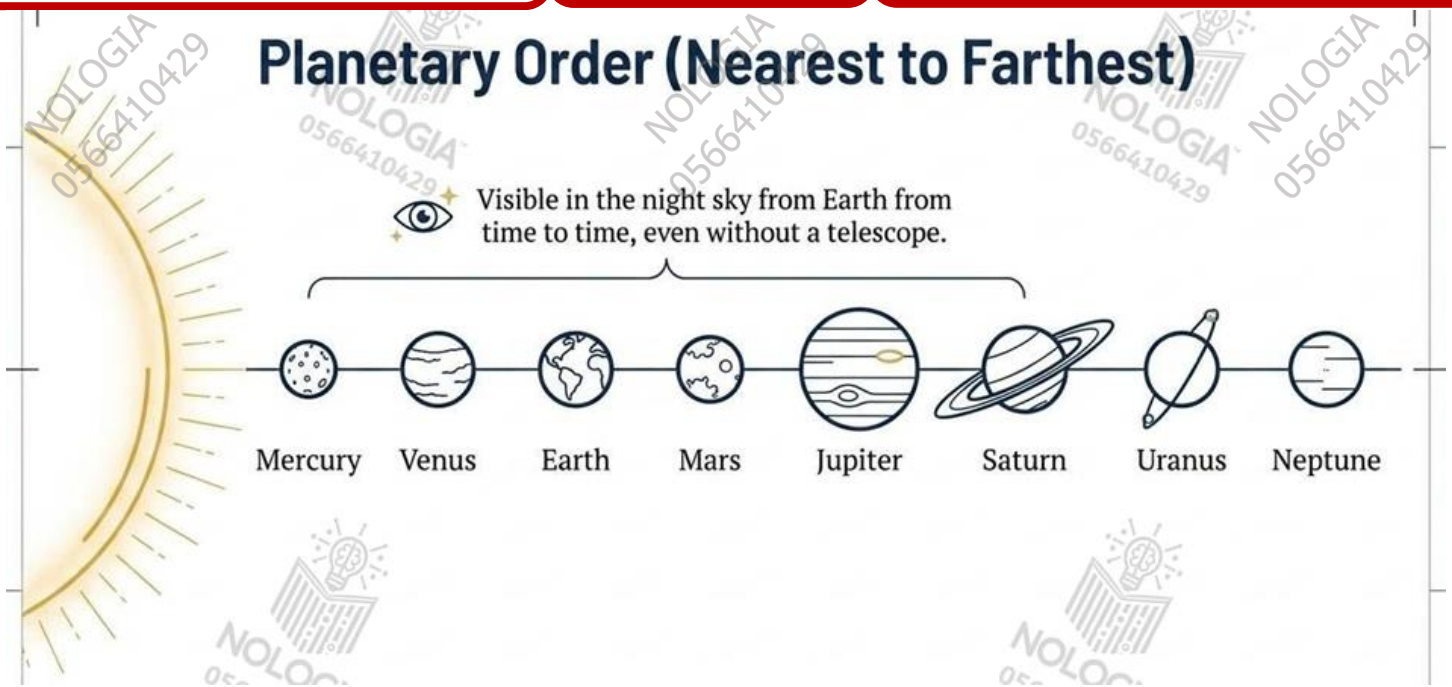
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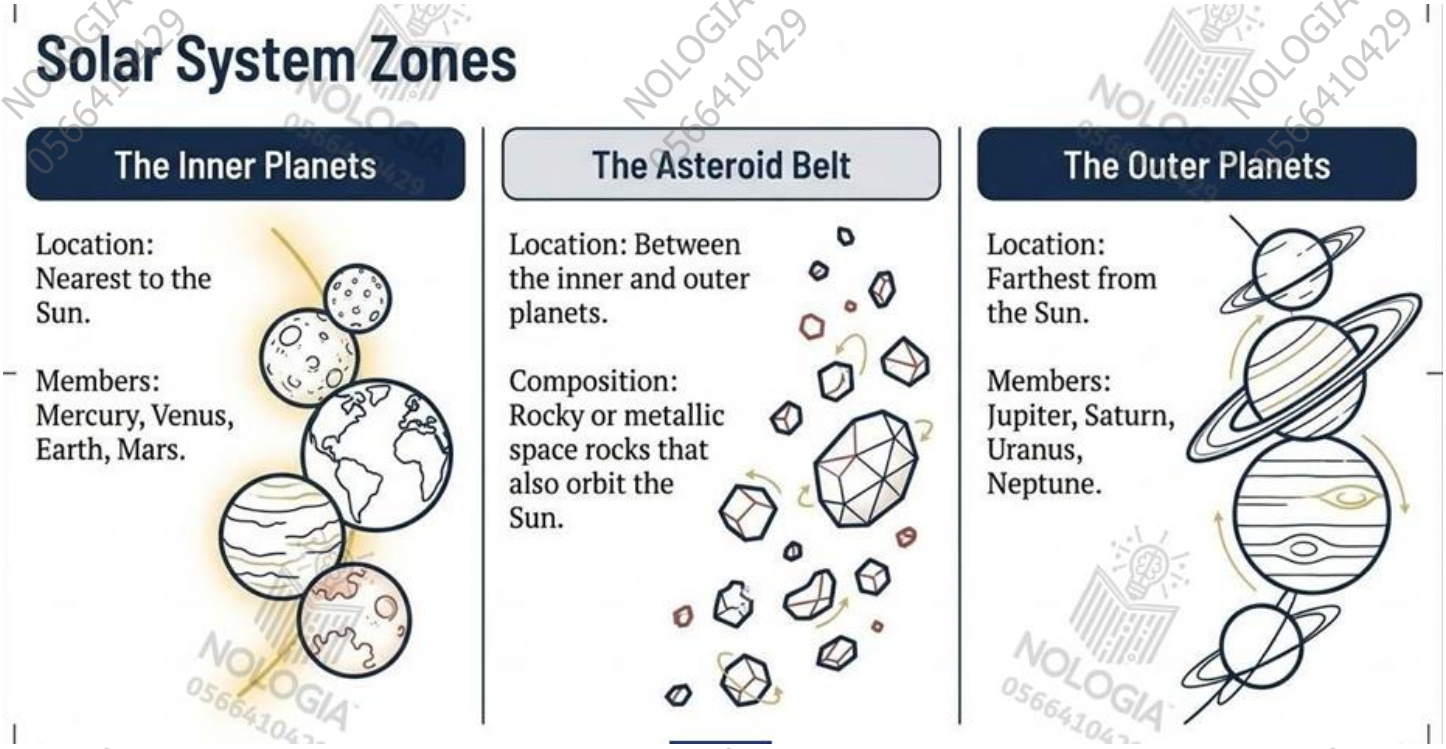
✓ Planets from nearest to farthest from the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

Planets of the Solar System From nearest to farthest from the Sun, the planets in our solar system are Mercury, Venus, Earth, and Mars, or the inner planets. Next are Jupiter, Saturn, Uranus, and Neptune, or the outer planets. The planets revolve in elliptical, or nearly circular, orbits around the Sun. Several planets are visible in the night sky from Earth from time to time, even without a telescope. Visible planets include Mercury, Venus, Mars, Jupiter, and Saturn. Planets do not make their own light, but reflect the light from the Sun.

Between the inner and outer planets is a belt of space rocks called asteroids. These are rocky or metallic objects that also orbit the Sun within the solar system.




Planetary Order (Nearest to Farthest)
Visible in the night sky from Earth from time to time, even without a telescope.
Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune


Solar System Zones
The Inner Planets
Location: Nearest to the Sun.
Members: Mercury, Venus, Earth, Mars.
The Asteroid Belt
Location: Between the inner and outer planets.
Composition: Rocky or metallic space rocks that also orbit the Sun.
The Outer Planets
Location: Farthest from the Sun.
Members: Jupiter, Saturn, Uranus, Neptune.

Questions :

Question 1: Which list correctly identifies all eight planets in order from nearest to farthest from the Sun?

(A) Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune	(B) Earth, Venus, Mercury, Mars, Jupiter, Saturn, Uranus, Neptune
(C) Mercury, Venus, Mars, Earth, Saturn, Jupiter, Uranus, Neptune	(D) Mercury, Venus, Earth, Mars, Jupiter, Uranus, Saturn, Neptune

Question 2: Which planet is nearest to the Sun?

(A) Mercury	(B) Venus
(C) Earth	(D) Mars

Question 3: Which planet is farthest from the Sun?

(A) Jupiter	(B) Saturn
(C) Uranus	(D) Neptune

Question 4: What is Earth's position from the Sun?

(A) First planet	(B) Second planet, between Mercury and Earth
(C) Third planet, between Venus and Mars	(D) Fourth planet, between Mars and Jupiter

Question 5: Which four planets are the inner planets?

(A) Jupiter, Saturn, Uranus, and Neptune	(B) Mercury, Venus, Earth, and Mars
(C) Earth, Mars, Jupiter, and Saturn	(D) Mercury, Venus, Jupiter, and Neptune

Question 6: Which four planets are the outer planets?

(A) Jupiter, Saturn, Uranus, and Neptune	(B) Mercury, Venus, Earth, and Mars
(C) Venus, Earth, Mars, and Jupiter	(D) Mars, Jupiter, Saturn, and Earth

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Question 7: Which planet is second from the Sun, between Mercury and Earth?

(A) Mars	(B) Venus
(C) Jupiter	(D) Saturn

Question 8: Which planet is sixth from the Sun, between Jupiter and Uranus?

(A) Mars	(B) Venus
(C) Saturn	(D) Neptune

Question 9: What is located between the inner planets (Mars) and the outer planets (Jupiter)?

(A) The Sun	(B) Earth's Moon
(C) The asteroid belt	(D) The center of the Milky Way

Question 10: Why can we see planets in the night sky if they do not make their own light?

(A) Planets reflect light from the Sun	(B) Planets burn like stars
(C) Planets reflect light from Earth	(D) Lightning on planets lights them up

Question 11: Which planet is fifth from the Sun and the first outer planet?

(A) Mars	(B) Jupiter
(C) Saturn	(D) Uranus

Question 12: Which planet is seventh from the Sun, between Saturn and Neptune?

(A) Mars	(B) Jupiter
(C) Venus	(D) Uranus

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Q12 : Unit 1 - Module: Matter

Lesson 3: Physical and Chemical Changes

Distinguish between a physical property and a chemical property based on whether the material changes into a different type of matter.

(Page 39)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Make Your Claim (Practice Q12) · Page 39):

We distinguish between a physical property and a chemical property based on whether the material changes into a different type of matter. A physical property is observed or measured without changing the material into new matter. A chemical property is observed only when a material reacts and changes into a different type of matter with new properties.

Key Ideas from the Student Book:

- Physical properties and changes do not produce a different type of matter.
- Chemical properties and changes produce a new type of matter with different properties.

Feature	Physical Property / Change	Chemical Property / Change
Changes into a different type of matter?	No – stays the same kind of matter.	Yes – forms a new type of matter with different properties.
Examples	Slicing a banana, folding paper, conductivity, magnetism.	A banana ripening/rotting, iron rusting, wood burning.

Remember:

✓ Physical property: observed without changing the material into a different type of matter.

✓ Chemical property: observed when the material changes into a different type of matter.

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The Difference at a Glance

	Physical	Chemical
Does it create new matter?	✗ No (Begins and ends with same matter).	✓ Yes (Produces new matter).
Are properties different?	✗ No.	✓ Yes.
Examples	Folding paper, water freezing.	Baking soda + vinegar, rotting banana.

Questions :

Question 1: Complete the claim: "Chemical changes _____, while physical changes _____."

(A) produce new matter with different properties; begin and end with the same kind of matter	(B) keep the same kind of matter; produce new matter with different properties
(C) only change the shape of an object; never form new substances	(D) can be reversed with a magnet; cannot be observed

Question 2: How do you distinguish between a physical property and a chemical property?

(A) Based on whether the object is on Earth or the Moon	(B) Based on whether the material changes into a different type of matter
(C) Based on the size of the container	(D) There is no difference between them

Question 3: Why is a banana rotting a chemical change, while slicing a banana is a physical change?

(A) Slicing forms a new gas, while rotting keeps the same matter	(B) Both slicing and rotting are physical changes
(C) Rotting forms new matter with different properties, while slicing only changes size and shape	(D) A rotten banana can be cooled to become fresh again

Question 4: Which change begins and ends with the SAME kind of matter?

(A) Physical change	(B) Chemical change
(C) Chemical reaction	(D) Rusting

Question 5: Which property can ONLY be observed when a material changes into a different type of matter?

(A) Physical property	(B) Volume
(C) Mass	(D) Chemical property

Question 6: Which statement describes a CHEMICAL property of iron?

(A) Iron is attracted to a magnet	(B) Iron conducts heat and electricity
(C) Iron is silvery-gray and hard	(D) Iron reacts with oxygen and moisture to form rust

Question 7: Which statement describes a PHYSICAL property of paper?

(A) Paper can be folded without changing into a new substance	(B) Paper burns in fire to form ash and smoke
(C) Paper reacts with acid to form gas	(D) Paper rots in soil

Question 8: A student measures the length of a stick and then burns it. Which property is physical and which is chemical?

(A) Both are chemical properties	(B) Length is a physical property; burning (flammability) is a chemical property
(C) Length is chemical; burning is physical	(D) Both are physical properties

Question 9: When salt dissolves in water, no new substance forms. What type of property is solubility?

(A) Physical property	(B) Chemical property
(C) Chemical reaction	(D) Flammability

Question 10: An antacid tablet reacts with water to form gas bubbles of a new substance. What type of property is this?

(A) Physical property	(B) Reflectivity
(C) Chemical property	(D) Volume

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Q13 : Unit 1 - Module: Matter

Lesson 2: Mixtures and Solutions

Distinguish between a suspension and a colloid based on whether particles settle out over time.

(Pages 24 - 25)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Types of Mixtures (Practice Q13) · Pages 24 - 25):

Both suspensions and colloids are heterogeneous mixtures, but they differ in whether their particles settle out over time. A suspension (such as muddy water, silt in water, or oil and vinegar salad dressing) has larger particles that settle out or separate into layers if left standing undisturbed. A colloid (such as milk, fog, or gelatin) has smaller particles suspended evenly throughout another substance that do NOT settle out over time.

Key Ideas from the Student Book:

- A suspension is a heterogeneous mixture whose particles settle out over time when left standing.
- A colloid is a heterogeneous mixture whose particles stay spread out and do not settle over time.
- Both suspensions and colloids are heterogeneous mixtures, unlike solutions which are homogeneous.

Mixture Type	Classification	Do Particles Settle Over Time?	Examples
Suspension	Heterogeneous Mixture	Yes – particles settle to the bottom or separate into layers if left undisturbed.	Muddy water, sand/silt in water, oil and vinegar
Colloid	Heterogeneous Mixture	No – particles remain suspended and do NOT settle out over time.	Milk, fog, clouds, mayonnaise, gelatin

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Remember:

✓ Suspension: particles settle out over time (example: muddy water).

✓ Colloid: particles do NOT settle out over time (example: milk or fog).



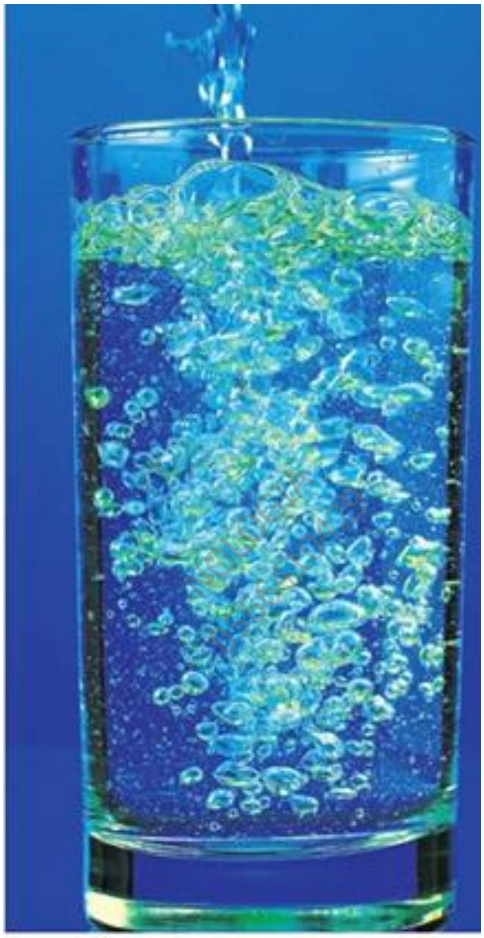
A salad is a heterogeneous mixture.

The appearance of muddy water under a microscope shows that it is a heterogeneous mixture as a suspension. The clay will settle out of the muddy water over time.





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A carbonated beverage is a solution of carbon dioxide gas in liquid water under pressure. When the pressure is released, the carbon dioxide gas bubbles out of the solution.

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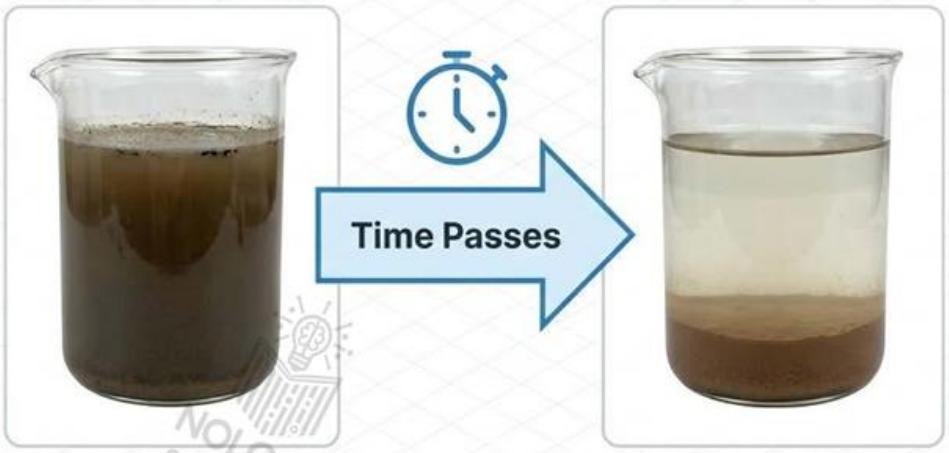
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The NOLOGIA Lab Notebook

Heterogeneous Mixtures: Suspensions

Part I: Combinations of Matter

Before & After



After

- Looks the same throughout at first glance.
- Parts are not uniformly mixed.

The Defining Trait:
Suspensions will settle out over time, revealing their individual parts (e.g., clay settling out of muddy water).

The NOLOGIA Lab Notebook

Heterogeneous Mixtures: Colloids

Part I: Combinations of Matter

A heterogeneous mixture where parts are so small they do not settle out.

Liquid/Solid in Gas
Aerosol



(Example: Airborne dust)

Liquid/Solid in Gas
Cloud/Fog



(Example: Cloud/Fog)

Gas in Liquid/Solid
Foam



(Example: Whipped cream)

How is it different from a suspension? The particles are too small to fall to the bottom.

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Questions :

Question 1: How can you distinguish between a suspension and a colloid?

(A) In a suspension, particles settle out over time; in a colloid, particles do not settle out	(B) In a colloid, particles sink to the bottom; in a suspension, particles dissolve completely
(C) A suspension is homogeneous, while a colloid is a pure substance	(D) Both have particles that settle to the bottom immediately

Question 2: What is a heterogeneous mixture in which parts settle out if left standing undisturbed?

(A) Solution	(B) Suspension
(C) Colloid	(D) Alloy

Question 3: What is a heterogeneous mixture with particles that do NOT settle out over time?

(A) Suspension	(B) Solution
(C) Colloid	(D) Precipitate

Question 4: Muddy water is shaken in a jar and left on a table. After an hour, mud settles to the bottom. Muddy water is a:

(A) Suspension	(B) Colloid
(C) Solution	(D) Pure substance

Question 5: Milk contains fat and protein particles spread in water that do NOT settle out. Milk is an example of a:

(A) Suspension	(B) Colloid
(C) Gas solution	(D) Chemical change

Question 6: Fog is made of tiny liquid water droplets suspended in air that do not settle quickly. Fog is a:

(A) Suspension	(B) Solid alloy
(C) Colloid	(D) Pure element

Question 7: Why must a bottle of oil-and-vinegar salad dressing be shaken before pouring?

(A) Because it is a suspension whose parts separate into layers over time	(B) Because it is a solution that stays uniformly mixed forever
(C) Because shaking causes a chemical reaction	(D) Because it is a solid alloy

Question 8: How are suspensions and colloids similar?

(A) Both have particles that settle to the bottom	(B) Both are homogeneous solutions
(C) Both form brand-new chemical substances	(D) Both are heterogeneous mixtures

Question 9: What is the main property used to tell a suspension apart from a colloid?

(A) Whether the container is made of glass or plastic	(B) Whether the particles settle out over time
(C) Whether the mixture is magnetic	(D) Whether the mixture is on Earth or the Moon

Question 10: A student stirs fine sand into water. After 10 minutes, the sand forms a layer at the bottom. What kind of mixture is this?

(A) Suspension	(B) Colloid
(C) Homogeneous solution	(D) Alloy

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Q14 : Unit 1 - Module: Matter

Lesson 3: Physical and Chemical Changes

Classify common changes such as physical or chemical using evidence about what happened to the matter.

(Page 33)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: Lesson 3 Launch - Chemical Change (Practice Q14) · Page 33):

To classify a change as physical or chemical, examine the evidence of what happened to the matter. If the matter only changed in size, shape, state (solid, liquid, gas), or dissolved without forming a new substance, it is a physical change (e.g., an ice cube melting, tearing paper, sugar dissolving in tea, water boiling into steam). If the matter reacted to form a new substance—shown by signs like rusting, burning, gas bubbles from a reaction, odor change, or color change—it is a chemical change (e.g., a nail rusting, lighting a match, baking a cake, an antacid tablet fizzing).

Key Ideas from the Student Book:

- Melting, freezing, boiling, condensing, cutting, and dissolving are physical changes.
- Rusting, burning, cooking/baking, rotting, and fizzing reactions are chemical changes.
- Evidence of a new substance (gas bubbles, new color, new odor, heat/light) proves a chemical change occurred.

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Event / Change	Classification	Scientific Evidence
An ice cube melting in a glass	Physical Change	Change of state from solid water to liquid water; no new substance forms.
Sugar dissolving in tea / Salt in water	Physical Change	Forms a solution; sugar and water keep their chemical identities.
A wet iron nail rusting	Chemical Change	Iron reacts with oxygen and water to form reddish-brown rust (new substance).
Lighting a match / Burning wood	Chemical Change	Produces ash, smoke, heat, and light (new substances).
Baking a cake / Frying an egg	Chemical Change	Heat causes ingredients to react and form new matter with different properties.
Antacid tablet fizzing in water	Chemical Change	Forms bubbles of a new gas (carbon dioxide).

Remember:

✓ Physical changes: melting, freezing, boiling, cutting, folding, and dissolving (same substance).

✓ Chemical changes: rusting, burning, baking, spoiling, and fizzing reactions (new substance formed).

The Difference at a Glance

	Physical	Chemical
Does it create new matter?	✗ No (Begins and ends with same matter).	✓ Yes (Produces new matter).
Are properties different?	✗ No.	✓ Yes.
Examples	Folding paper, water freezing.	Baking soda + vinegar, rotting banana.

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Questions :

Question 1: Which group of changes includes ONLY chemical changes where new substances are formed?

(A) A wet nail rusting, lighting a match, baking a cake, and an antacid tablet fizzing in water	(B) An ice cube melting, sugar dissolving in tea, and boiling water
(C) Cutting paper, bending copper wire, and freezing water	(D) Dissolving salt in water, crushing ice, and mixing marbles

Question 2: How should "an ice cube melting in a glass" be classified, and why?

(A) Physical change, because solid water changes to liquid water without forming a new substance	(B) Chemical change, because ice turns into a new element
(C) Chemical change, because smoke is produced	(D) Physical change, because a precipitate forms

Question 3: How should "sugar dissolving in warm tea" be classified, and why?

(A) Chemical change, because sugar disappears forever	(B) Physical change, because sugar spreads evenly in the tea without forming a new substance
(C) Chemical change, because fire is produced	(D) Nuclear change, because atoms split

Question 4: How should "a wet iron nail rusting" be classified, and what is the evidence?

(A) Physical change, because the nail only got wet	(B) Physical change, because rust is just frozen water
(C) Chemical change, because reddish-brown rust is a new substance with different properties	(D) Mixture, because iron dissolved in air

Question 5: What evidence shows that lighting a wooden match is a chemical change?

(A) The matchstick only changes length	(B) The wood melts into liquid wood
(C) No energy is released	(D) It releases heat and light and forms ash and smoke

Question 6: What evidence shows that dropping an antacid tablet into water is a chemical change?

(A) Bubbles of a new gas form and fizz in the water	(B) The water freezes into ice
(C) The tablet becomes magnetic	(D) The glass changes shape

Question 7: A student tears a sheet of paper into tiny pieces. What kind of change is this?

(A) Chemical change, because the paper is smaller	(B) Physical change, because every piece is still paper
(C) Chemical change, because gas is released	(D) Phase change from solid to gas

Question 8: When liquid water boils on a stove and turns into steam, what kind of change occurs?

(A) Physical change, because steam is still water in the gas state	(B) Chemical change, because bubbles are formed
(C) Chemical change, because water is destroyed	(D) Rusting change

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Q15 : Unit 1 - Module: Matter

Lesson 4: Solids, Liquids, and Gases

Compare the arrangement and movement of particles in solids, liquids, and gases.

(Page 56)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 1: States of Matter (Practice Q15) · Page 56):

All matter is made of tiny particles that are constantly moving. The state of matter (solid, liquid, or gas) depends on the arrangement and movement of its particles: • Solid: Particles are tightly packed in a regular, fixed pattern and vibrate in place. A solid has a definite shape and definite volume. • Liquid: Particles are close together with no regular arrangement and slide past one another. A liquid has a definite volume but takes the shape of its container. • Gas: Particles are far apart and move rapidly and freely in all directions. A gas has no definite shape and no definite volume; it expands to fill its container.

Key Ideas from the Student Book:

- Solid particles are tightly packed and vibrate in place.
- Liquid particles are close together and slide past each other.
- Gas particles are far apart and move rapidly in all directions.

State of Matter	Particle Arrangement	Particle Movement	Shape & Volume
Solid	Tightly packed in a fixed, regular pattern	Vibrate back and forth in place (lowest energy)	Definite shape and definite volume
Liquid	Close together with no regular arrangement	Slide and flow past one another (medium energy)	No definite shape (takes container shape); definite volume
Gas	Far apart with lots of empty space between them	Move very fast and freely in all directions (highest energy)	No definite shape and no definite volume (fills container)

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Remember:

✓ Solid: tightly packed particles that vibrate in place (definite shape, definite volume).

✓ Liquid: close particles that slide past one another (no definite shape, definite volume).

✓ Gas: far-apart particles that move fast in all directions (no definite shape, no definite volume).



	Solid	Liquid	Gas
Shape	Definite	Indefinite (Takes shape of container)	Indefinite (Fills container)
Volume	Definite	Definite	Indefinite
Particle Spacing	Tightly packed	Less tightly packed	Far apart
Particle Movement	Vibrate in place	Slide past each other	Move quickly in all directions

Review this matrix to quickly compare the physical properties of matter.

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Questions :

Question 1: Which statement correctly compares the particles in solids, liquids, and gases?

(A) Solid particles are tightly packed and vibrate in place; liquid particles slide past one another; gas particles are far apart and move rapidly	(B) Gas particles are tightly packed; liquid particles are fixed; solid particles fly apart
(C) Solid and gas particles do not move at all, while only liquid particles move	(D) All three states have particles with the exact same spacing and speed

Question 2: How are particles arranged and how do they move in a SOLID?

(A) Tightly packed in a regular pattern and vibrating in place	(B) Far apart and moving at high speed in all directions
(C) Sliding freely past one another with no fixed shape	(D) Completely still with zero vibration

Question 3: How are particles arranged and how do they move in a LIQUID?

(A) Locked in a rigid crystal pattern	(B) Close together with no regular arrangement, sliding past one another
(C) Spread far apart to fill any closed room	(D) Destroyed when poured into a cup

Question 4: How are particles arranged and how do they move in a GAS?

(A) Tightly packed and vibrating in fixed positions	(B) Touching each other at the bottom of the container
(C) Far apart with lots of empty space, moving rapidly in all directions	(D) Arranged in neat rows that cannot move

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Question 5: Which state of matter has BOTH a definite shape and a definite volume?

(A) Solid	(B) Liquid
(C) Gas	(D) Plasma

Question 6: Which state of matter has a definite volume but takes the shape of its container?

(A) Solid	(B) Liquid
(C) Gas	(D) Rock

Question 7: Which state of matter has NO definite shape and NO definite volume?

(A) Solid	(B) Liquid
(C) Gas	(D) Ice

Question 8: Why can a liquid flow and take the shape of any cup it is poured into?

(A) Its particles are locked in a rigid grid	(B) Its particles are free to slide past one another
(C) Its particles change into new elements when poured	(D) Its particles have no mass

Question 9: Why can a gas be compressed (squeezed) into a smaller tank much more easily than a solid or liquid?

(A) Gas particles are softer than solid particles	(B) Gas particles are tightly touching one another
(C) Gas has no mass	(D) Gas particles have a large amount of empty space between them

Question 10: In which state of matter do particles have the GREATEST kinetic energy (fastest movement)?

(A) Solid	(B) Liquid
(C) Gas	(D) All have the same speed

Question 11: In which state of matter are particles held together by the STRONGEST attraction, keeping them in fixed positions?

(A) Solid	(B) Liquid
(C) Gas	(D) Water vapor

Question 12: If 100 mL of water is poured from a tall narrow cylinder into a wide flat bowl, what happens to its volume and shape?

(A) Both its shape and volume stay the same	(B) Its shape changes to fit the bowl, but its volume stays 100 mL
(C) Its volume increases to 500 mL	(D) It turns into a solid block

Question 13: What happens when a small amount of helium gas is released into a closed, empty room?

(A) The gas stays in a small cube in the corner	(B) The gas particles sink and form a solid layer
(C) The gas particles spread out to fill the entire room	(D) The gas particles stop moving

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Q16 : Unit 1 - Module: Matter

Lesson 4: Solids, Liquids, and Gases

Use a particle model to determine whether matter is a solid, liquid, or gas.

(Page 59)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Model Matter (Practice Q16) · Page 59):

Scientists use particle models (drawings or 3D models using marbles/balls in a tray) to represent how particles are arranged in solids, liquids, and gases: • A model showing spheres tightly packed in neat, regular rows touching each other represents a SOLID. • A model showing spheres close together at the bottom of a container but randomly arranged and able to roll past one another represents a LIQUID. • A model showing only a few spheres spread far apart throughout the entire container with motion arrows in all directions represents a GAS.

Key Ideas from the Student Book:

- Tight, orderly rows of particles in a model = Solid.
- Close, randomly arranged particles at the bottom of a container = Liquid.
- Widely spaced particles bouncing all over the container = Gas.

Visual Particle Model Description	State of Matter Identified	Why?
Particles packed tightly in neat rows, touching, fixed in place	Solid	Fixed arrangement gives a solid its definite shape and volume.
Particles close together in a random cluster at the bottom, sliding around	Liquid	Particles stay close (definite volume) but slide past each other (no definite shape).
Particles widely separated throughout the whole container with long motion lines	Gas	Particles move fast in all directions and fill the entire volume of the container.

Remember:

✓ Particle Model of a Solid: tightly packed in regular rows.

✓ Particle Model of a Liquid: close together but randomly arranged.

✓ Particle Model of a Gas: far apart and filling the whole container.

	Solid	Liquid	Gas
Shape	Definite	Indefinite (Takes shape of container)	Indefinite (Fills container)
Volume	Definite	Definite	Indefinite
Particle Spacing	Tightly packed	Less tightly packed	Far apart
Particle Movement	Vibrate in place	Slide past each other	Move quickly in all directions

Review this matrix to quickly compare the physical properties of matter.

Questions :

Question 1: In the "Model Matter" activity, how should you arrange marbles in a box to model a SOLID?

(A) Pack the marbles tightly together in neat rows so they can only vibrate in place	(B) Place only three marbles far apart and shake the box violently
(C) Spread the marbles loosely so they roll from side to side across the box	(D) Remove all marbles so the box is completely empty

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Question 2: A particle diagram shows circles packed tightly in neat, even rows. Which state of matter is shown?

(A) Solid	(B) Liquid
(C) Gas	(D) Solution

Question 3: A particle diagram shows circles close together near the bottom of a beaker, but not in neat rows. Which state of matter is shown?

(A) Solid	(B) Liquid
(C) Gas	(D) Vacuum

Question 4: A particle diagram shows circles spread far apart throughout a closed flask with arrows pointing in all directions. Which state of matter is shown?

(A) Solid	(B) Liquid
(C) Gas	(D) Crystal

Question 5: Why do scientists use particle models to study solids, liquids, and gases?

(A) Because real particles are larger than planets	(B) Because real particles of matter are too small to be seen directly
(C) Because matter does not really contain particles	(D) Because models change physical properties into chemical properties

Question 6: In a particle model, what do longer arrows (or more motion lines) attached to the particles represent?

(A) Slower particle movement and lower temperature	(B) Larger particle mass
(C) Stronger magnetic attraction	(D) Faster particle movement and higher kinetic energy

Question 7: A student tilts a tray of marbles slightly so the marbles stay close together but flow to the other side. Which state of matter is the student modeling?

(A) Solid	(B) Liquid
(C) Gas	(D) Metal

Question 8: Which object's particles would best be modeled by spheres locked in a rigid, repeating pattern?

(A) An ice cube or a wooden block	(B) Orange juice in a pitcher
(C) Helium inside a balloon	(D) Steam rising from a kettle

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Q17 : Unit 4 - Module: Earth and Space

Lesson 1: Earth's Gravitational Force

Predict how changes in mass or distance affect the gravitational pull between two objects.

(Page 12)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: The Pull of Earth's Gravity (Practice Q17) · Page 12):

Gravity is a non-contact force of attraction between any two objects that have mass. The strength of the gravitational pull between two objects depends on two factors: 1. Mass: As the mass of one or both objects INCREASES, the gravitational pull between them INCREASES (stronger pull). Earth has more mass than the Moon, so Earth has a stronger gravitational pull than the Moon. 2. Distance: As the distance between two objects INCREASES (they move farther apart), the gravitational pull between them DECREASES (weaker pull). As distance DECREASES (closer together), gravity INCREASES.

Key Ideas from the Student Book:

- Greater mass = stronger gravitational pull.
- Greater distance (farther apart) = weaker gravitational pull.
- Closer distance = stronger gravitational pull.

Factor Changed	How It Changes	Effect on Gravitational Pull	Example
Mass of Objects	Mass Increases (larger mass)	Gravitational pull INCREASES (stronger)	Earth has more mass than the Moon, so objects weigh more on Earth.
Mass of Objects	Mass Decreases (smaller mass)	Gravitational pull DECREASES (weaker)	An astronaut weighs 1/6 as much on the less massive Moon.
Distance Between Objects	Distance Increases (farther apart)	Gravitational pull DECREASES (weaker)	A spacecraft far from Earth feels a weaker pull than one near Earth.
Distance Between Objects	Distance Decreases (closer together)	Gravitational pull INCREASES (stronger)	Closer planets feel a stronger gravitational pull from the Sun.

Remember:

✓ More Mass = Stronger Gravity.

✓ Closer Distance = Stronger Gravity; Farther Distance = Weaker Gravity.



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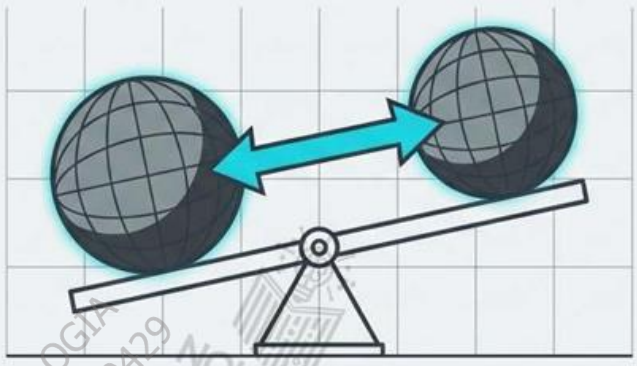


In this photo, Astronaut Buzz Aldrin sets up an experiment on the Moon. Astronauts study the effects of gravity on Earth as well as in space.

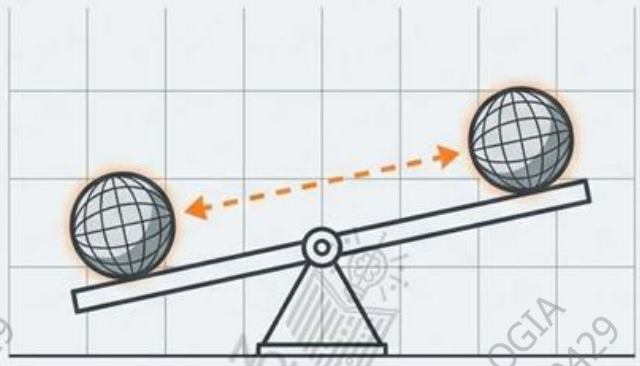
The Universal Pull

Gravity is a force of attraction, or pull, between any two objects.

The strength of gravity is controlled by two things: **Total Mass** and **Distance**.



Greater Mass = Stronger Pull



Greater Distance = Weaker Pull

Questions :

Question 1: What happens to the gravitational pull between two objects if their masses increase or the distance between them changes?

(A) Gravitational pull increases when mass increases, and decreases when distance increases	(B) Gravitational pull decreases when mass increases, and increases when distance increases
(C) Gravitational pull stays constant regardless of mass or distance	(D) Gravitational pull only exists when objects are touching

Question 2: Which two factors determine the strength of the gravitational pull between two objects?

(A) The color and texture of the objects	(B) The mass of the objects and the distance between them
(C) The temperature and odor of the objects	(D) The reflectivity and solubility of the objects

Question 3: What happens to the gravitational pull between two objects if the MASS of one object increases?

(A) The gravitational pull increases (becomes stronger)	(B) The gravitational pull decreases (becomes weaker)
(C) The gravitational pull disappears	(D) The gravitational pull reverses direction

Question 4: What happens to the gravitational pull between two objects as the DISTANCE between them increases (they move farther apart)?

(A) The gravitational pull increases (becomes stronger)	(B) The gravitational pull decreases (becomes weaker)
(C) The gravitational pull stays exactly the same	(D) The objects double in mass

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Question 5: What happens to the gravitational pull between two objects as they move CLOSER together (distance decreases)?

(A) The gravitational pull becomes weaker	(B) The gravitational pull stops working
(C) The gravitational pull increases (becomes stronger)	(D) Their masses become zero

Question 6: Why does Earth have a stronger gravitational pull than the Moon?

(A) Because Earth has much more mass than the Moon	(B) Because the Moon has more mass than Earth
(C) Because Earth spins faster than the Moon	(D) Because the Moon has liquid oceans

Question 7: An astronaut has the same mass on Earth and on the Moon, but weighs less on the Moon. Why?

(A) There is no gravity at all on the Moon	(B) The astronaut lost mass during the rocket trip
(C) The Moon is hotter than Earth	(D) The Moon has less mass than Earth, so its gravitational pull is weaker

Question 8: What is weight?

(A) The amount of space an object takes up	(B) A measure of the gravitational pull on an object's mass
(C) The number of atoms inside an object	(D) How much light bounces off an object

Question 9: Why don't you feel a gravitational pull toward a pencil on your desk, even though you feel pulled toward Earth?

(A) Pencils have zero mass	(B) Only planets have gravity
(C) A pencil's mass is tiny compared to Earth's huge mass	(D) Wood is a gravitational insulator

Q18 : Unit 4 - Module: Earth and Space

Lesson 2: Earth's Movements in Space

Use a diagram of the Sun's apparent path to compare the number of hours of daylight during different seasons.

(Page 32)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: Earth's Revolution - Seasons and the Sun (Practice Q18) · Page 32):

Earth's tilted axis (23.5°) and its revolution around the Sun cause the Sun's apparent path across the sky—and the number of daylight hours—to change with the seasons: • Summer: The Sun takes the HIGHEST and LONGEST path across the sky, resulting in the MOST hours of daylight and warmest temperatures. • Spring and Fall (Autumn): The Sun takes a MEDIUM path across the sky, resulting in about equal hours of daylight and darkness (~12 hours). • Winter: The Sun takes the LOWEST and SHORTEST path across the sky, resulting in the FEWEST hours of daylight and coldest temperatures.

Key Ideas from the Student Book:

- Summer = highest and longest Sun path = most hours of daylight.
- Winter = lowest and shortest Sun path = fewest hours of daylight.
- Spring and Fall = middle Sun path = intermediate hours of daylight.

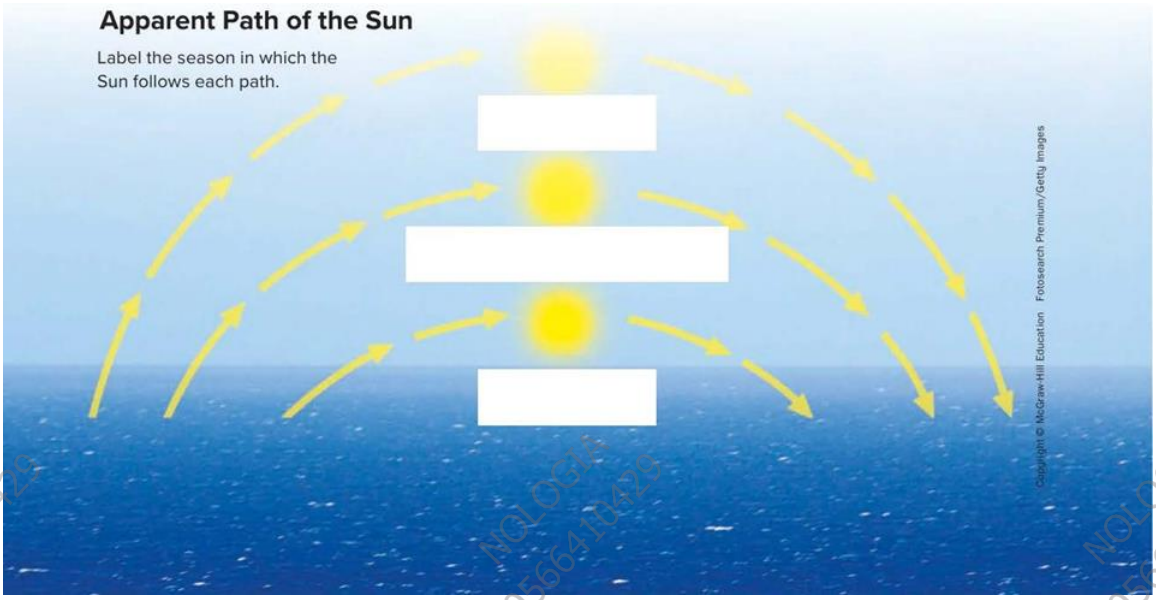
Season	Sun's Apparent Path in the Sky	Noon Sun Height	Number of Daylight Hours
Summer	Longest path across the sky	Highest angle in the sky	Most hours of daylight (longest days, shortest nights)
Spring & Fall (Autumn)	Medium-length path across the sky	Medium angle in the sky	Moderate daylight (~12 hours of day and 12 hours of night)
Winter	Shortest path across the sky	Lowest angle in the sky	Fewest hours of daylight (shortest days, longest nights)

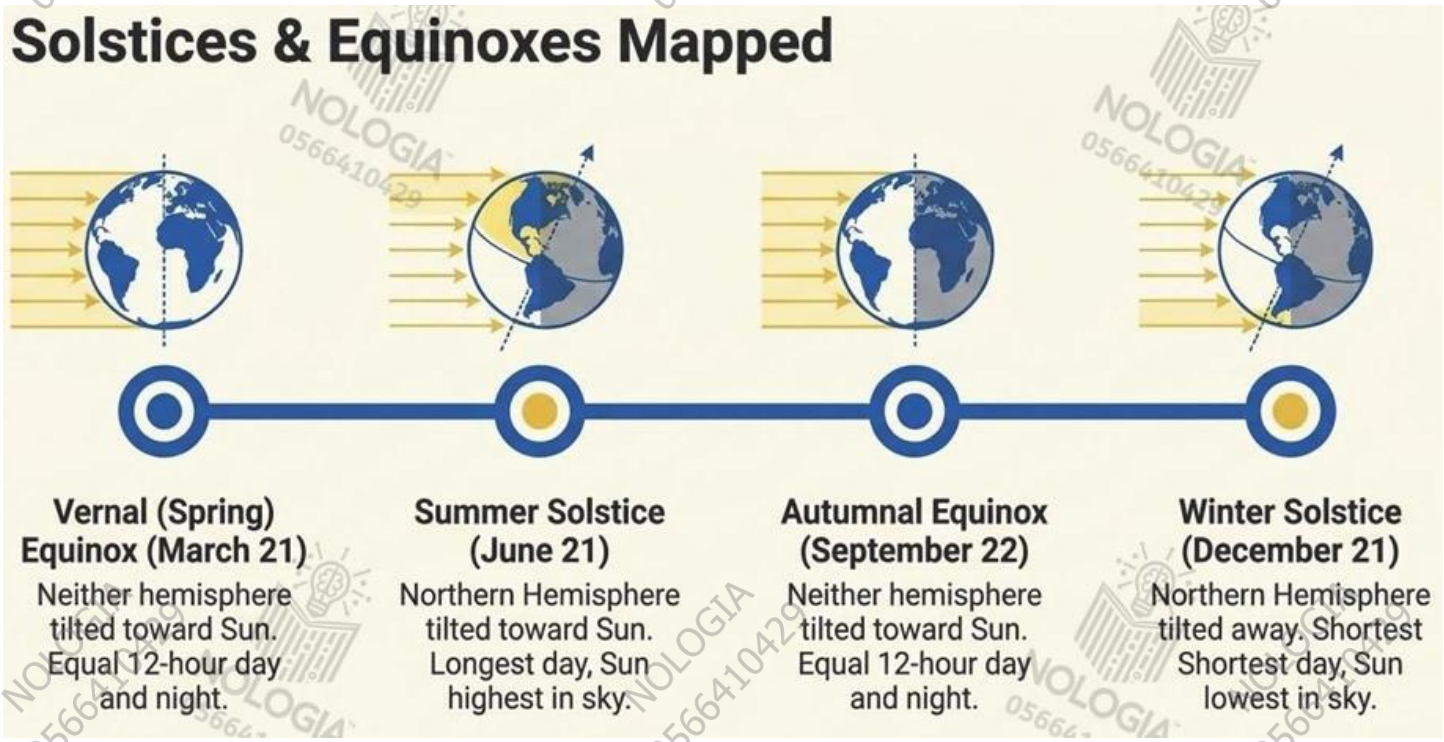
Remember:

✓ Summer: Sun's path is highest and longest -> MOST hours of daylight.

✓ Winter: Sun's path is lowest and shortest -> FEWEST hours of daylight.

✓ Spring & Fall: Sun's path is in between -> about equal day and night.





Questions :

Question 1: Use the diagram of the Sun's apparent path: Which season has the highest Sun path and the greatest number of daylight hours?

(A) Winter	(B) Spring
(C) Summer	(D) Fall (Autumn)

Question 2: During which season is the Sun's apparent path HIGHEST and LONGEST in the sky?

(A) Winter	(B) Fall
(C) Summer	(D) Spring

Question 3: During which season is the Sun's apparent path LOWEST and SHORTEST in the sky?

(A) Winter	(B) Summer
(C) Spring	(D) All seasons are equal

Question 4: During which season does a location experience the MOST hours of daylight?

(A) Winter	(B) Summer
(C) Fall	(D) Spring

Question 5: During which season does a location experience the FEWEST hours of daylight?

(A) Summer	(B) Spring
(C) Fall	(D) Winter

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Question 6: In a diagram showing three curved paths of the Sun (top, middle, bottom), which curve represents Spring and Fall?

(A) The highest top path	(B) The middle path between the summer and winter paths
(C) The lowest bottom path	(D) A straight line underground

Question 7: What two factors combine to cause Earth's changing seasons and different daylight hours?

(A) The tilt of Earth's axis and Earth's revolution around the Sun	(B) The Moon's phases and ocean tides
(C) Volcanoes and earthquakes on Earth	(D) The Sun turning off and on

Question 8: What is one full revolution of Earth around the Sun equal to?

(A) One day (24 hours)	(B) One month (29 days)
(C) One year (about 365 days)	(D) One week (7 days)

Question 9: When the Northern Hemisphere is tilted TOWARD the Sun, what season is it in the Northern Hemisphere?

(A) Winter	(B) Summer (more direct sunlight and longer daylight hours)
(C) Autumn	(D) Midnight

Question 10: When the Northern Hemisphere is tilted AWAY from the Sun, what season is it in the Northern Hemisphere?

(A) Winter (less direct sunlight and fewer daylight hours)	(B) Summer
(C) Spring	(D) Noon

Q19 : Unit 4 - Module: Earth and Space

Lesson 2: Earth's Movements in Space

Use the positions of the Sun, Earth, and Moon to determine the Moon phase visible from Earth.

(Page 23)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: Lesson 2 Launch - Phases of the Moon (Practice Q19) · Page 23 (and Page 35)):

The Moon does not produce its own light; it reflects sunlight. As the Moon revolves around Earth (taking about 29.5 days, or one month), we see different amounts of its sunlit half from Earth, called Moon phases: • New Moon: The Moon is directly BETWEEN the Sun and Earth. The sunlit side faces away from Earth, so the Moon appears dark. • First Quarter & Third Quarter: The Moon is at a 90° right angle to the Sun-Earth line; half of the lit side is visible. • Full Moon: Earth is BETWEEN the Sun and the Moon (Moon is on the opposite side of Earth from the Sun). The entire sunlit side faces Earth, so we see a full bright circle. • Waxing means the lit part is growing (Crescent -> Quarter -> Gibbous); Waning means the lit part is shrinking.

Key Ideas from the Student Book:

• Moon phases are caused by the Moon's revolution around Earth as we view its sunlit half from different angles.

• New Moon = Moon is between Sun and Earth.

• Full Moon = Earth is between Sun and Moon (Moon is opposite the Sun).

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Moon Phase	Position of Moon Relative to Sun & Earth	What We See from Earth
New Moon	Moon is directly BETWEEN the Sun and Earth	Dark (unlit side faces Earth; sunlit side faces the Sun)
First Quarter	One-quarter of the way around Earth's orbit (90°)	Right half of the Moon's disk appears lit
Full Moon	Moon is on the OPPOSITE side of Earth from the Sun (Earth is between Sun and Moon)	Entire circular disk appears fully lit
Third (Last) Quarter	Three-quarters of the way around Earth's orbit	Left half of the Moon's disk appears lit

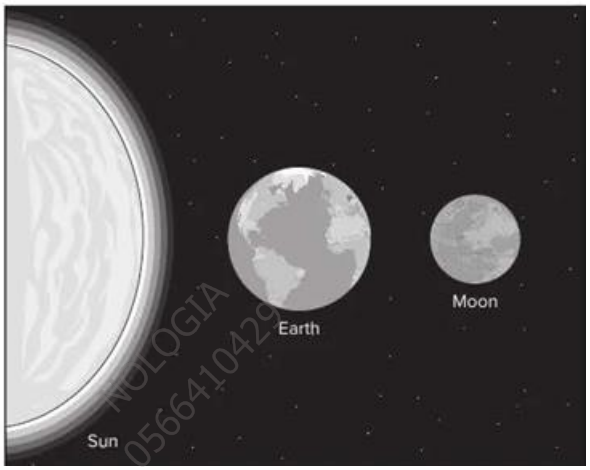
Remember:

✓ The Moon shines by reflecting sunlight; half of the Moon is always lit by the Sun.

✓ New Moon: Moon is between the Sun and Earth (appears dark).

✓ Full Moon: Moon is on the opposite side of Earth from the Sun (appears fully lit).

Phases of the Moon



A.



A full moon

B.



A crescent moon

C.

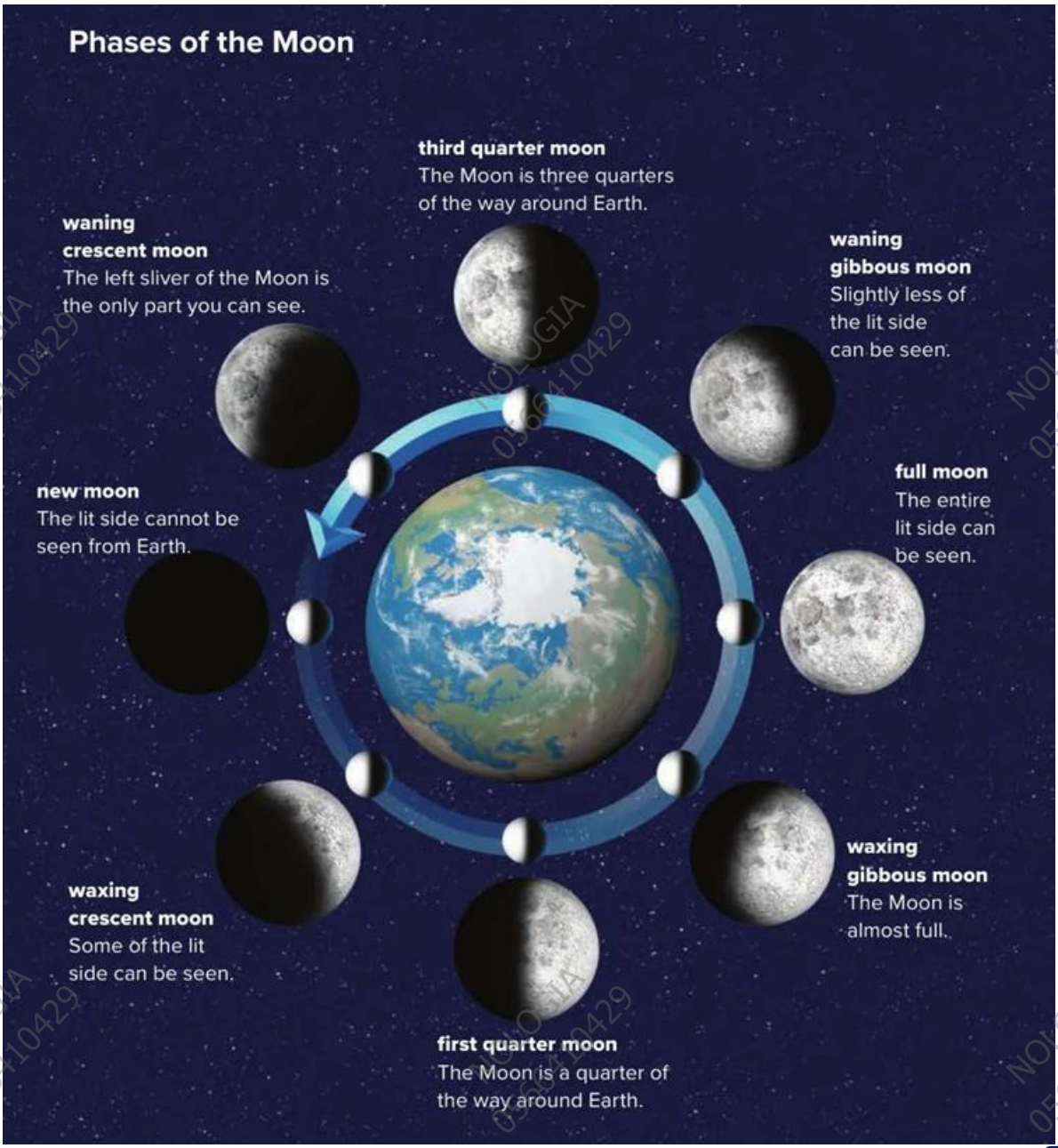


A quarter moon

D.

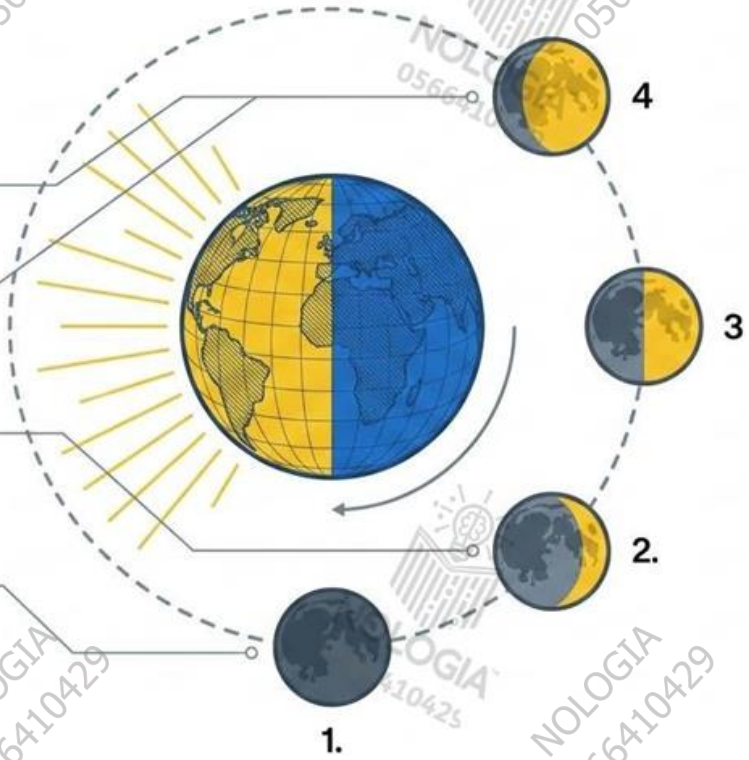


No moon is seen

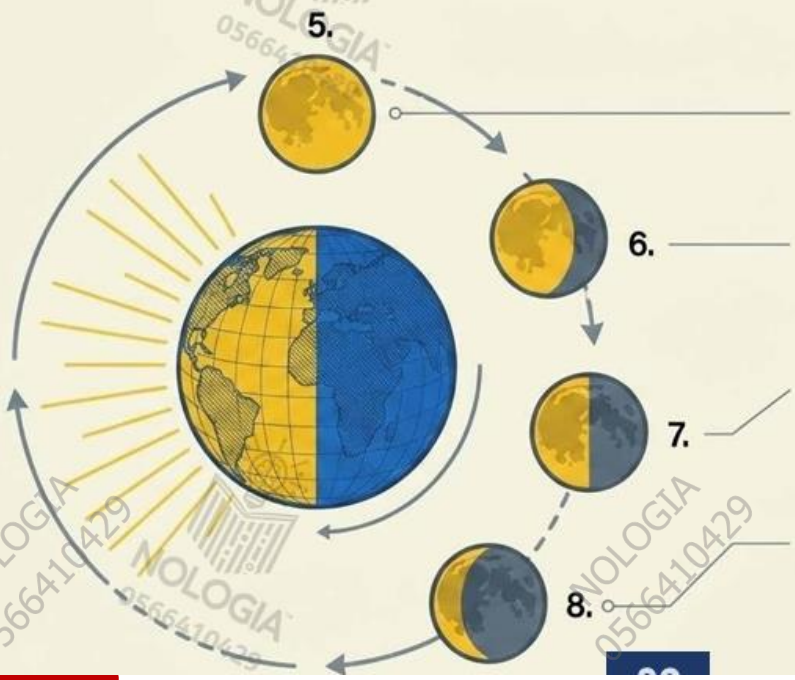


The Lunar Cycle: The Waxing Phases

1. **New Moon:** The lit side faces away from Earth. Cannot be seen at all.
2. **Waxing Crescent:** Some of the lit side becomes visible as a growing sliver.
3. **First Quarter:** The Moon is a quarter of the way around Earth. Looks like a half-moon.
4. **Waxing Gibbous:** The Moon is almost completely full and continues to grow.



The Lunar Cycle: The Waning Phases



5. **Full Moon:** The entire lit side of the Moon faces Earth.
6. **Waning Gibbous:** Slightly less of the lit side can be seen as it begins to shrink.
7. **Third Quarter:** Three quarters of the way around Earth. Looks like a half-moon on the opposite side.
8. **Waning Crescent:** Only the left sliver of the Moon is visible before it disappears again.

Questions :

Question 1: Look at the positions of the Sun, Earth, and Moon: Which phase is visible from Earth when the Moon is on the OPPOSITE side of Earth from the Sun?

(A) New Moon	(B) Waxing Crescent
(C) Full Moon	(D) Third Quarter

Question 2: What causes the repeating cycle of Moon phases seen from Earth?

(A) Earth's shadow falling on the Moon every night	(B) The Moon's revolution around Earth, allowing us to see different amounts of its sunlit side
(C) Clouds covering different parts of the Moon	(D) The Moon changing its actual shape in space

Question 3: Why does the Moon shine in the night sky?

(A) It reflects light from the Sun	(B) It burns like a hot star
(C) It glows from lava on its surface	(D) It reflects light from Jupiter

Question 4: How much of the Moon's globe is illuminated by the Sun at any given time (except during a lunar eclipse)?

(A) None of the Moon	(B) 100% of the Moon
(C) Always half (50%) of the Moon	(D) Only 10% of the Moon

Question 5: Which Moon phase occurs when the Moon is directly BETWEEN the Sun and Earth?

(A) New Moon	(B) Full Moon
(C) First Quarter	(D) Third Quarter

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Question 6: Why can we NOT see the New Moon easily from Earth?

(A) The Moon is hiding behind Mars	(B) The Sun turns off during a New Moon
(C) The Moon shrinks to zero size	(D) The sunlit half of the Moon faces away from Earth, and the dark half faces Earth

Question 7: Which Moon phase occurs when Earth is positioned between the Sun and the Moon?

(A) New Moon	(B) Full Moon
(C) Waning Crescent	(D) First Quarter

Question 8: About how long does it take the Moon to complete one full cycle of phases?

(A) 24 hours (1 day)	(B) 7 days (1 week)
(C) About one month (29.5 days)	(D) 365 days (1 year)

Question 9: What does the word "waxing" mean when describing Moon phases?

(A) The sunlit portion visible from Earth is growing larger each night	(B) The sunlit portion visible from Earth is shrinking smaller each night
(C) The Moon is moving closer to the Sun	(D) The Moon is melting

Question 10: What does the word "waning" mean when describing Moon phases?

(A) The sunlit portion is growing larger	(B) The sunlit portion visible from Earth is decreasing (shrinking) each night
(C) The Moon is spinning faster	(D) The Moon is completely full

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Q20 : Unit 4 - Module: Earth and Space

Lesson 3: Earth's Place in Space

Analyze planetary data to identify the relationship between a planet's distance from the Sun and the length of its year.

(Page 65)

Multiple Choice Questions - MCQ

Structured Concept Explanation (Unit 4: Three Dimensional Thinking (Practice Q20) · Page 65):

A planet's "year" (period of revolution) is the time it takes to complete one full orbit around the Sun. Planetary data shows a clear mathematical pattern: the FARTHER a planet is from the Sun, the LONGER its year (it takes more time to orbit the Sun). This happens because outer planets have a much longer orbital path to travel and experience a weaker gravitational pull from the Sun. Mercury (closest to the Sun) has the shortest year (~88 Earth days), while Neptune (farthest from the Sun) has the longest year (~165 Earth years).

Key Ideas from the Student Book:

- As a planet's distance from the Sun increases, the length of its year increases.
- Mercury is closest to the Sun and has the shortest year.
- Neptune is farthest from the Sun and has the longest year.

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Planet	Order from the Sun	Distance from Sun	Length of Year (Orbit Time)
Mercury	1st (Closest)	Shortest distance (0.39 AU)	Shortest year (~88 Earth days)
Venus	2nd	0.72 AU	~225 Earth days
Earth	3rd	1.00 AU (150 million km)	1 Earth year (365.25 days)
Mars	4th	1.52 AU	~687 Earth days (~1.9 years)
Jupiter	5th	5.20 AU	~12 Earth years
Saturn	6th	9.58 AU	~29.5 Earth years
Uranus	7th	19.2 AU	~84 Earth years
Neptune	8th (Farthest)	Greatest distance (30.1 AU)	Longest year (~165 Earth years)

Remember:

✓ Closer to the Sun = Shorter orbit = Shorter year (Mercury has the shortest year).

✓ Farther from the Sun = Longer orbit = Longer year (Neptune has the longest year).

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Questions :

Planet	Length of Day (hours)	Length of Year (Earth years)	Distance from the Sun (AU)
Mercury	1,408	0.2	0.4
Venus	5,832	0.6	0.7
Earth	24	1.0	1.0
Mars	25	1.9	1.5
Jupiter	10	11.9	5.2
Saturn	10	29.4	9.5
Uranus	17	84.0	19.2
Neptune	16	164.8	30.0

Question 1: Analyze the planetary data: How does a planet's distance from the Sun affect the length of its year (period of revolution)?

(A) As distance from the Sun increases, the length of the planet's year increases	(B) As distance from the Sun increases, the length of the planet's year decreases
(C) Distance from the Sun has no effect on the length of a planet's year	(D) Outer planets have shorter years than inner planets

Question 2: What defines the length of one "year" on any planet?

(A) The time it takes the planet to spin once on its axis	(B) The time it takes the planet to complete one full revolution around the Sun
(C) The time it takes its moon to orbit once	(D) The distance across the planet's equator

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Question 3: What is a planet?

(A) A small rocky object that floats randomly without a path	(B) A burning ball of gas that produces its own light
(C) A large, round space object that orbits the Sun	(D) A cloud of dust and ice outside the solar system

Question 4: Why do stars appear to move across the night sky and change position throughout the year?

(A) Because of Earth's rotation on its axis and revolution around the Sun	(B) Because the Moon pushes the stars from east to west
(C) Because stars orbit around Earth every 24 hours	(D) Because Earth stays completely still in space

Question 5: Mars is farther from the Sun than Earth is. How does the length of a year on Mars compare to a year on Earth?

(A) A year on Mars is shorter than a year on Earth	(B) A year on Mars is longer than a year on Earth
(C) Both planets have a 365-day year	(D) Mars does not orbit the Sun

Question 6: Venus is closer to the Sun than Earth is. How does the length of a year on Venus compare to a year on Earth?

(A) A year on Venus is shorter (225 days) than a year on Earth (365 days)	(B) A year on Venus is longer than a year on Neptune
(C) A year on Venus is 100 Earth years	(D) Venus and Earth have the same year length

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Question 7: Planet X is 2 AU from the Sun and Planet Y is 10 AU from the Sun. Which planet takes more time to orbit the Sun once?

(A) Planet X, because it is closer to the Sun	(B) Planet Y, because it is farther from the Sun
(C) Both take the exact same time	(D) Neither planet orbits the Sun

Question 8: Why do outer planets take longer to complete one revolution around the Sun than inner planets?

(A) They are made of solid rock	(B) They are closer to the Sun
(C) They have a much longer orbital path to travel and weaker solar gravity	(D) They stop moving during winter

Question 9: A newly discovered dwarf planet orbits beyond Neptune. Its period of revolution around the Sun must be:

(A) Less than 88 days	(B) Exactly 365 days
(C) Shorter than Mars's year	(D) Greater than 165 Earth years (longer than Neptune's year)

Question 10: An asteroid orbits in the asteroid belt between Mars (year = 1.9 Earth years) and Jupiter (year = 12 Earth years). Which is the most reasonable length for the asteroid's year?

(A) 50 Earth days	(B) About 4.5 Earth years
(C) 84 Earth years	(D) 200 Earth years

Question 11: How does the length of a year on Saturn (6th planet) compare to a year on Jupiter (5th planet)?

(A) Saturn's year (~29.5 years) is longer than Jupiter's year (~12 years)	(B) Saturn's year is shorter than Jupiter's year
(C) Saturn's year is shorter than Earth's year	(D) Both have a 1-year orbit

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Q21 : Unit 1 - Module: Matter

Lesson 2: Mixtures and Solutions

1 - Define a mixture as a physical combination of two or more substances.

2 - Classify a mixture as homogeneous or heterogeneous using its observable characteristics.

3 -Separating a mixture using differences in the physical properties of its materials.

(Pages 24 & 29)

Free Response Questions - FRQ

Structured Concept Explanation (Unit 1: Types of Mixture & Inquiry Activity (Practice Q21) · Pages 24 & 29):

• Definition of a Mixture: A mixture is a physical combination of two or more substances that keep their own properties and do not chemically combine to form a new substance.

• Classifying Mixtures: A homogeneous mixture (solution) looks uniform throughout and individual parts cannot be seen (e.g., salt water, sugar water, air, brass). A heterogeneous mixture is not uniformly mixed and its different parts or layers can be observed (e.g., salad, trail mix, sand in water, muddy water).

• Separating Mixtures: Because substances in a mixture keep their physical properties, we separate them using differences in properties: Magnetism (magnet attracts iron filings), Particle Size (sieve/strainer separates gravel from sand), State/Solubility (filter paper separates insoluble sand from water), Density (wood floats while rocks sink), and Boiling Point/Evaporation (heating evaporates water and leaves dissolved salt behind).

Key Ideas from the Student Book:

• A mixture is a physical combination of two or more substances.

• Homogeneous mixtures are uniform throughout; heterogeneous mixtures have visibly distinct parts.

• Magnetism, particle size, density, filtration, and evaporation are used to separate mixtures.

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FRQ Sub-Part	Core Concept	Key Scientific Rule / Method
Define a Mixture	Physical combination of 2+ substances	Substances keep their own properties; no new chemical substance is formed.
Homogeneous vs. Heterogeneous	Observable uniformity	Homogeneous = uniform throughout (salt water). Heterogeneous = non-uniform, parts visible (salad, sand + water).
Separating Mixtures	Using physical properties	Magnet (magnetism), Sieve (size), Filter (solid from liquid), Floatation (density), Evaporation (dissolved salt from water).

Remember:

✓ Mixture: a physical combination of two or more substances where each keeps its own properties.

✓ Homogeneous = uniform throughout; Heterogeneous = not uniform (parts can be seen).

✓ Separate iron with a magnet, pebbles with a sieve, sand from water with a filter, and dissolved salt from water by evaporation.

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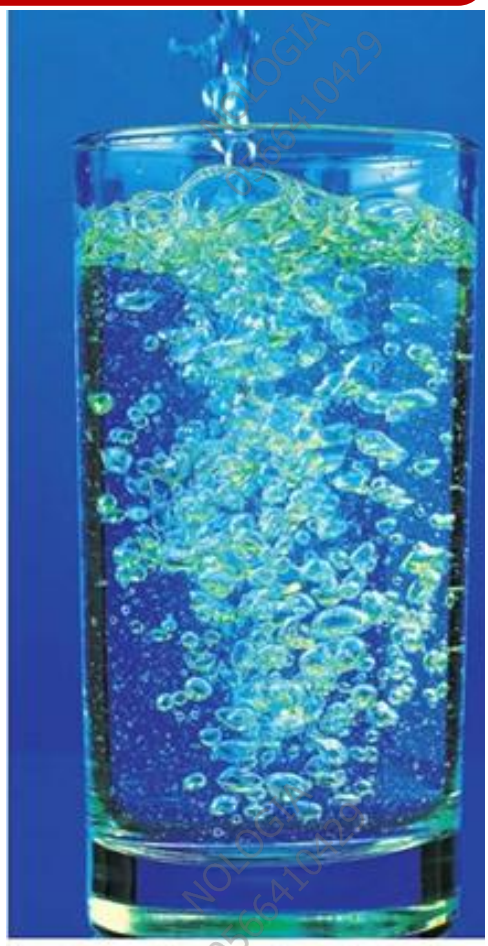
A salad is a heterogeneous mixture.

The appearance of muddy water under a microscope shows that it is a heterogeneous mixture as a suspension. The clay will settle out of the muddy water over time.





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A carbonated beverage is a solution of carbon dioxide gas in liquid water under pressure. When the pressure is released, the carbon dioxide gas bubbles out of the solution.

Materials


safety goggles


1 cup of sand


1 cup of gravel


1/8 cup of small ball bearings


2 bowls


spoon


sieve


magnet

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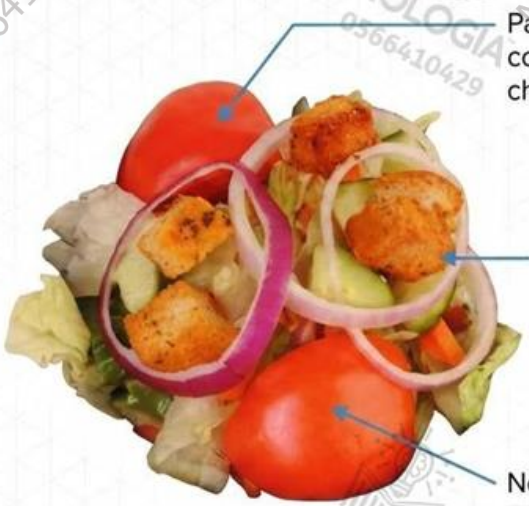
Part I: Combinations of Matter

What is a Mixture?

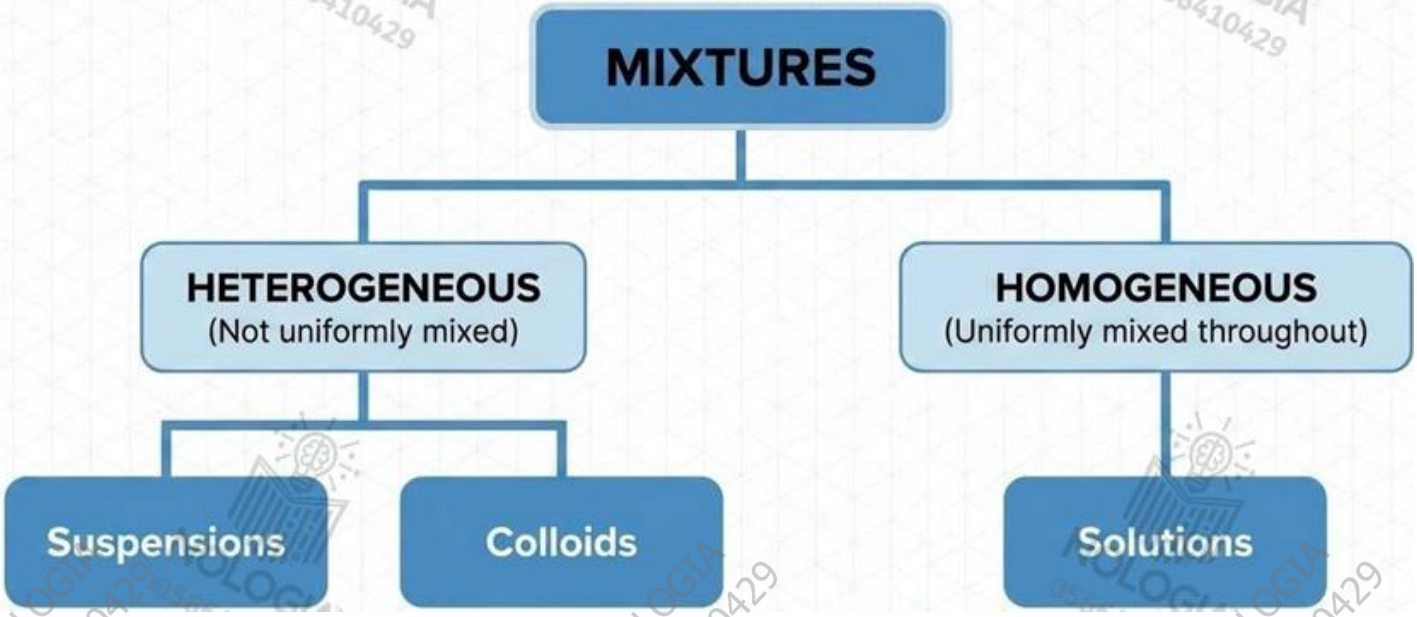


Substance A | Substance B | Physical Combination (Mixture)

A **mixture** forms when two or more substances mix, but **do not** combine chemically.



The Mixture Family Tree



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Questions :

Question 1: Define a mixture and state whether its components form a new substance.

Answer: A mixture is a physical combination of two or more substances. The substances keep their own identities and do not form a new substance.

Question 2: How can you classify a mixture as homogeneous or heterogeneous using its observable characteristics? Give one example of each.

Answer: A homogeneous mixture looks uniform throughout so individual parts cannot be seen (e.g., salt dissolved in water). A heterogeneous mixture is not uniformly mixed and its different parts are visible (e.g., vegetable salad or sand in water).

Question 3: A student has a mixture of iron filings, gravel, sand, and salt. Explain step-by-step how to separate these materials using their physical properties.

Answer: 1. Use a magnet to remove the magnetic iron filings. 2. Use a sieve (strainer) to separate the large gravel from the fine sand and salt. 3. Add water to dissolve the salt, then pour through a filter to trap the insoluble sand. 4. Evaporate the water to leave the solid salt behind.

Question 4: What is a mixture?

Answer: A physical combination of two or more substances that do not form a new chemical substance.

Question 5: What is the difference between a homogeneous mixture and a heterogeneous mixture?

Answer: A homogeneous mixture is uniform throughout (parts cannot be seen separately), while a heterogeneous mixture is not uniform and its parts can be seen.

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Question 6: Classify each mixture as homogeneous or heterogeneous:

(a) trail mix, (b) sugar water, (c) muddy water, (d) clean air.

Answer: Homogeneous: (b) sugar water, (d) clean air. Heterogeneous: (a) trail mix, (c) muddy water.

Question 7: Which physical property and tool are used to separate iron filings from sand?

Answer: Magnetism, using a magnet (iron is magnetic, while sand is not).

Question 8: Which physical property and tool are used to separate pebbles from fine sand?

Answer: Particle size, using a sieve or mesh screen.

Question 9: Which method separates insoluble sand from liquid water?

Answer: Filtration using filter paper and a funnel.

Question 10: Why can filter paper NOT separate dissolved salt from water?

Answer: Because dissolved salt particles are microscopic and pass right through the tiny holes of the filter paper with the water.

Question 11: How can you separate dissolved salt from a salt-water solution?

Answer: By evaporation (heating the solution until the water evaporates into water vapor, leaving solid salt crystals behind).

Question 12: How can density (floating vs. sinking) be used to separate wood chips mixed with small stones?

Answer: Add water to the mixture: the less dense wood chips float to the top and can be skimmed off, while the denser stones sink.

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Q22 : Unit 1 - Module: Matter

Lesson 4: Solids, Liquids, and Gases

1 - Identify melting, evaporation, condensation, and freezing as changes of state.

2 - Explain how adding or removing energy affects particle movement and can cause matter to change state.

3 - Use particle movement and arrangement to explain what happens during melting, evaporation, condensation, or freezing.

(Pages 57 , 58 & 63)

Free Response Questions - FRQ

Structured Concept Explanation (Unit 1: Changing States of Matter, Inquiry Simulation & Three-Dimensional Thinking (Practice Q22) · Pages 57, 58 & 63):

• Changes of State: Matter changes state when thermal energy (heat) is added or removed: - Melting: Solid -> Liquid (adding heat). - Evaporation / Boiling: Liquid -> Gas (adding heat). - Condensation: Gas -> Liquid (removing heat / cooling). - Freezing: Liquid -> Solid (removing heat / cooling).

• Effect of Adding or Removing Energy: Adding thermal energy increases the kinetic energy of particles, making them move faster and spread farther apart. Removing thermal energy (cooling) decreases kinetic energy, making particles move slower and come closer together.

• Particle Behavior During Phase Changes: During melting, solid particles gain energy, vibrate faster, break free from fixed positions, and slide past each other as a liquid. During evaporation, liquid particles gain enough energy to escape into the air as fast, far-apart gas particles. During condensation, gas particles lose energy, slow down, and move closer together to form a liquid. During freezing, liquid particles lose energy, slow down, and lock into fixed vibrating positions as a solid.

Key Ideas from the Student Book:

• Adding heat energy causes melting (solid -> liquid) and evaporation/boiling (liquid -> gas).

• Removing heat energy (cooling) causes condensation (gas -> liquid) and freezing (liquid -> solid).

• Changes of state are physical changes because the substance stays the same.

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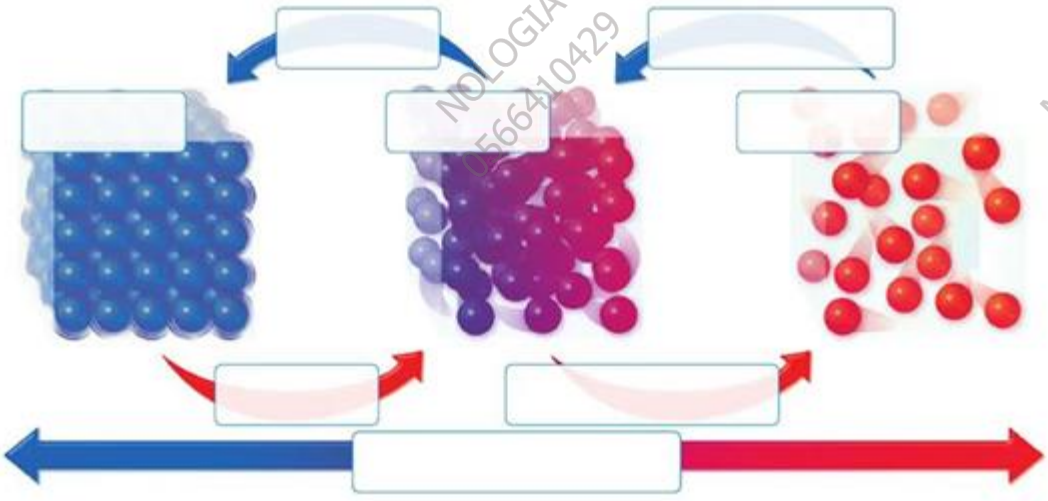
Change of State	State Transition	Thermal Energy (Heat)	What Happens to Particles?
Melting	Solid -> Liquid	Energy ADDED (Heating)	Particles move faster, break out of fixed positions, and slide past each other.
Evaporation / Boiling	Liquid -> Gas	Energy ADDED (Heating)	Particles move much faster, overcome attraction, and spread far apart.
Condensation	Gas -> Liquid	Energy REMOVED (Cooling)	Particles slow down and move closer together to form liquid droplets.
Freezing	Liquid -> Solid	Energy REMOVED (Cooling)	Particles slow down and lock into a fixed, tightly packed pattern.

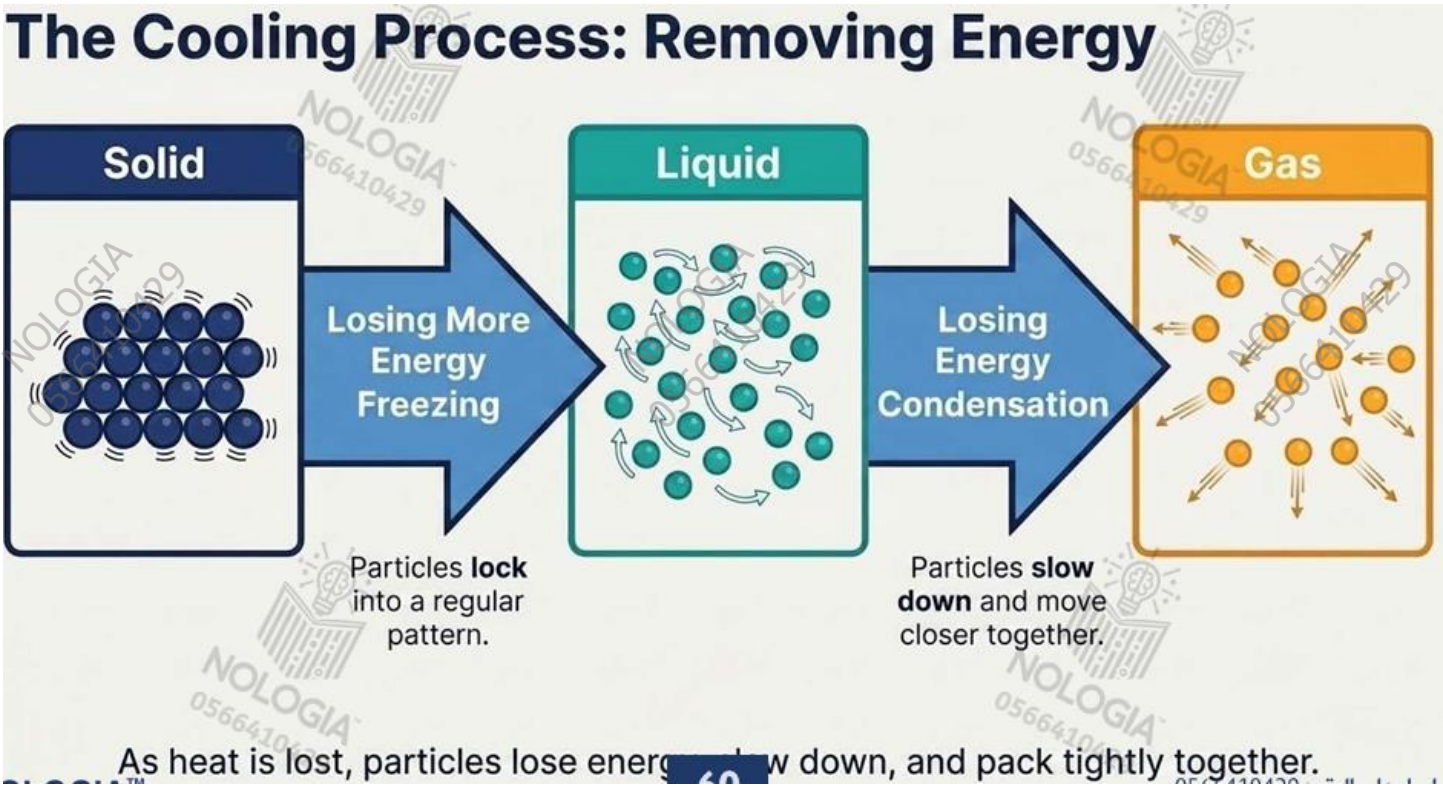
Remember:

✓ Adding Energy (Heating) -> particles move faster and spread apart (Melting & Evaporation).

✓ Removing Energy (Cooling) -> particles move slower and come closer together (Condensation & Freezing).

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The Cooling Process: Removing Energy
Solid
Losing More Energy Freezing
Liquid
Losing Energy Condensation
Gas
Particles lock into a regular pattern.
Particles slow down and move closer together.
As heat is lost, particles lose energy, slow down, and pack tightly together.

Questions :

Simulation

Particles in Matter



GO ONLINE

Explore the simulation *Particles in Matter*. Record data from the simulation in the table below.

Question 1: Identify the state of matter at the beginning and end of each process: (1) Melting, (2) Evaporation, (3) Condensation, and (4) Freezing.

Answer: (1) Melting: Solid to Liquid; (2) Evaporation: Liquid to Gas; (3) Condensation: Gas to Liquid; (4) Freezing: Liquid to Solid.

Question 2: Explain how adding thermal energy (heating) or removing thermal energy (cooling) affects the speed and spacing of particles in matter.

Answer: Adding thermal energy increases kinetic energy, causing particles to move faster and spread farther apart. Removing thermal energy decreases kinetic energy, causing particles to move slower and come closer together.

Question 3: Use particle movement and arrangement to explain what happens when ice melts into liquid water and then evaporates into water vapor.

Answer: When ice melts, tightly packed solid particles gain heat, vibrate faster, and break out of their fixed pattern to slide past one another as a liquid. When liquid water evaporates, particles gain more energy, move very fast, and spread far apart in all directions as a gas.

Question 4: What is melting, and does it require adding or removing heat energy?

Answer: Melting is the change of state from a solid to a liquid; it requires adding heat energy.

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Question 5: What is freezing, and does it require adding or removing heat energy?

Answer: Freezing is the change of state from a liquid to a solid; it requires removing heat energy (cooling).

Question 6: What is evaporation, and does it require adding or removing heat energy?

Answer: Evaporation is the change of state from a liquid to a gas at the liquid's surface; it requires adding heat energy.

Question 7: What is condensation, and does it require adding or removing heat energy?

Answer: Condensation is the change of state from a gas to a liquid; it requires removing heat energy (cooling).

Question 8: What happens to the particles of a liquid when it freezes into a solid?

Answer: The particles lose energy, slow down, and lock into fixed positions where they only vibrate in place.

Question 9: What happens to water vapor gas particles when they touch a cold glass and condense?

Answer: The gas particles lose heat energy to the cold glass, slow down, and move closer together to form liquid water droplets.

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Question 10: How does changing the temperature (adding or removing heat) affect the state and the mass of different types of matter in the simulation?

Answer: Changing the temperature changes the state of matter (because particles speed up and spread apart when heated, or slow down and move closer when cooled), but the mass of the matter stays the same regardless of whether heat is added or removed because the number of particles does not change.

Type of Matter	Temperature	State of Matter	Mass
Iodine	$-10°C$	Solid	50 g (Stays the same)
Iodine	$200°C$	Gas	50 g (Stays the same)
Ethanol	$-10°C$	Liquid	50 g (Stays the same)
Ethanol	$200°C$	Gas	50 g (Stays the same)
Olive Oil	$-10°C$	Solid	50 g (Stays the same)
Olive Oil	$200°C$	Liquid	50 g (Stays the same)

Question 11: In the *Particles in Matter* simulation at $-10°C$ and $200°C$, how do the states of matter of iodine, ethanol, and olive oil change when heated from $-10°C$ to $200°C$, and what happens to their mass? Answer: When heated from $-10°C$ to $200°C$:

Answer:
- **Iodine** changes from a **solid** ($-10°C$) to a **gas** ($200°C$).
- **Ethanol** changes from a **liquid** ($-10°C$) to a **gas** ($200°C$).
- **Olive oil** changes from a **solid** ($-10°C$) to a **liquid** ($200°C$).
- In all three substances, the **mass remains constant (unchanged)** at both temperatures.

Q23 : Unit 1 & 4- Module: Matter & Earth's Gravitational Force

Matter, Mass, Volume & Gravitational Pull

1 - Define matter as anything that has mass and takes up space.

2 - Distinguish between mass and volume using descriptions of objects.

3 - Explain why an object weighs less on the Moon than it does on Earth.

4 - Use evidence about mass and distance to explain differences in gravitational pull between two situations.

(Unit 1 Page 10 & Unit 4 Pages 12 - 13)

Free Response Questions - FRQ

Structured Concept Explanation (Unit 1: Matter & Unit 4: The Pull of Earth's Gravity (Practice Q23) · Unit 1 Page 10 & Unit 4 Pages 12 - 13):

• Definition of Matter: Matter is anything that has mass and takes up space (has volume). Solids, liquids, and gases are all matter; light, heat, and sound are forms of energy, NOT matter.

• Mass vs. Volume: Mass is the amount of matter in an object (measured with a balance in grams or kilograms). Volume is the amount of space an object takes up (measured in mL, L, or cm^3). An inflated balloon has a larger volume than a small metal marble, but the metal marble has a greater mass.

• Weight on the Moon vs. Earth: Weight is the pull of gravity on an object's mass. An object weighs less on the Moon than on Earth because the Moon has much less mass than Earth, so the Moon's gravitational pull is weaker (about 1/6 of Earth's gravity). The object's mass stays the same in both places.

• Evidence About Mass and Distance in Gravity: Gravitational pull is stronger when objects have greater mass and when they are closer together. Gravitational pull is weaker when objects have smaller mass or are farther apart.

Key Ideas from the Student Book:

• Matter = anything that has mass and takes up space.

• Mass = amount of matter (stays constant); Volume = amount of space taken up.

• Objects weigh less on the Moon because the Moon has less mass and weaker gravity than Earth.

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احصل على الشرح كاملاً بـ 99 درهم فقط

Concept	Scientific Definition	How It Changes in Space
Matter	Anything that has mass and takes up space (volume)	All physical objects (solids, liquids, gases) are matter.
Mass	The amount of matter in an object (measured in g or kg)	Stays the SAME everywhere (on Earth, on the Moon, or in space).
Volume	The amount of space an object takes up (measured in mL or cm^3)	Depends on the size of the object, not its weight.
Weight (Gravitational Pull)	The force of gravity pulling on an object's mass	CHANGES with gravity: weighs LESS on the Moon because the Moon has less mass than Earth.

Remember:

✓ Matter is anything that has mass and takes up space.

✓ Mass is the amount of matter; Volume is the amount of space an object takes up.

✓ An object weighs less on the Moon than on Earth because the Moon has less mass and weaker gravity (mass stays the same).

✓ Gravity increases with greater mass and closer distance.

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These rocks all have a different mass and volume.

PRIMARY SOURCE



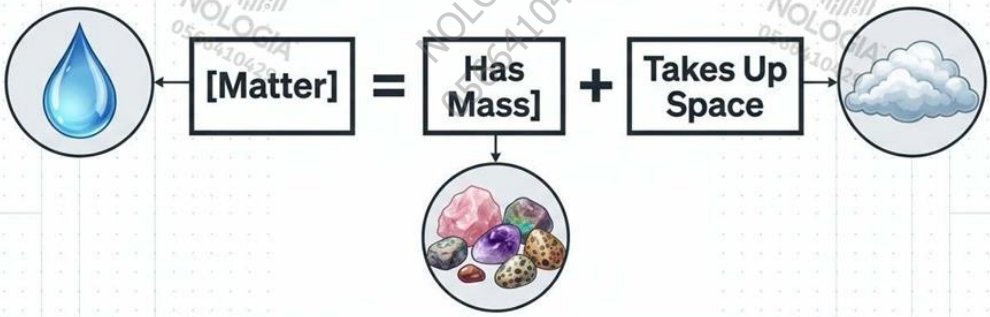
In this photo, Astronaut Buzz Aldrin sets up an experiment on the Moon. Astronauts study the effects of gravity on Earth as well as in space.

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احصل على الشرح كاملاً بـ 99 درهم فقط

The Foundation: What is Matter?



- Everything is matter—from the water you drink to the air you breathe.
- You are made of matter!
- All matter is made of tiny, microscopic particles.

The Pillars of Matter: Mass vs. Volume

MASS



A measure of the **amount of matter** in an object.

- The **Golf Ball Test**: A golf ball has more mass than a table tennis ball because it contains more particles.

Note: Weight is just how strongly gravity pulls on this mass.

VOLUME



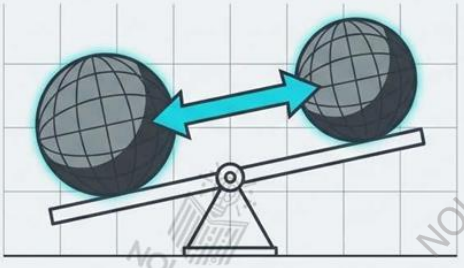
The amount of **space** an object takes up (how large or small it is).

- The **Space Test**: A golf ball and a table tennis ball have roughly the same volume. But an inflated balloon has much more volume than a small bag of marbles!

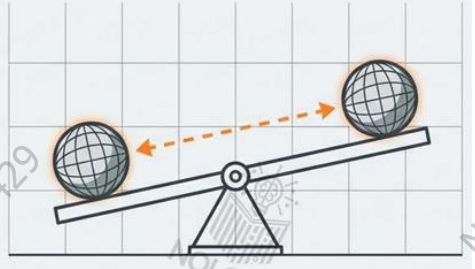
The Universal Pull

Gravity is a force of attraction, or pull, between any two objects.

The strength of gravity is controlled by two things: **Total Mass** and **Distance**.



Greater Mass = Stronger Pull



Greater Distance = Weaker Pull

احصل على الشرح كاملاً بـ 99 درهم فقط

للتواصل اضغط الرقم: 0566410429

Questions :

Question 1: 1. Define matter.

2. Distinguish between mass and volume using the example of a large air-filled beach ball and a small solid iron ball.

Answer: 1. Matter is anything that has mass and takes up space.
2. Mass is the amount of matter in an object, while volume is the amount of space it takes up. The large beach ball has a greater volume (takes up more space), while the small solid iron ball has a greater mass (contains more matter).

Question 2: Explain why a rover or astronaut weighs less on the Moon than on Earth, and state what happens to its mass.

Answer: An object weighs less on the Moon because the Moon has much less mass than Earth, so the Moon pulls on objects with a weaker gravitational force. The object's mass stays the same because the amount of matter in it does not change.

Question 3: Use evidence about mass and distance to explain:

(1) Why Planet A (larger mass) pulls harder on a probe than Planet B (smaller mass) at the same distance, and

(2) Why a satellite feels a weaker pull as it moves farther away from Earth.

Answer: (1) Gravitational pull increases as mass increases, so the more massive Planet A exerts a stronger pull.
(2) Gravitational pull decreases as distance increases, so moving farther from Earth weakens the gravitational pull.

Question 4: What is the scientific definition of matter?

Answer: Matter is anything that has mass and takes up space (has volume).

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Question 5: What is the difference between mass and volume?

Answer: Mass is the amount of matter in an object, whereas volume is the amount of space the object takes up.

Question 6: Why is air considered matter, while sunlight is NOT matter?

Answer: Air has mass and takes up space (like inside a balloon), whereas sunlight is energy and has no mass or volume.

Question 7: Which tool and metric unit are used to measure mass?

Answer: A pan balance (or scale), measured in grams (g) or kilograms (kg).

Question 8: Which tool and metric unit are used to measure the volume of a liquid?

Answer: A graduated cylinder, measured in milliliters (mL) or liters (L).

Question 9: A pillow is much larger than a brick, but the brick is heavier. Compare their mass and volume.

Answer: The pillow has a greater volume (takes up more space), while the brick has a greater mass (contains more matter).

Question 10: Why does an object weigh about six times less on the Moon than on Earth?

Answer: Because the Moon has much less mass than Earth, so its gravitational pull is only about one-sixth as strong as Earth's.

Question 11: An astronaut has a mass of 60 kg on Earth. What is the astronaut's mass on the Moon?

Answer: 60 kg (mass never changes with location because the amount of matter stays the same).

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Q24 : Unit 4 - Module: Earth and Space

Lesson 3: Earth's Place in Space

1 - Define the solar system as the Sun and all of the objects that orbit around it.

2 - Use a solar-system diagram or model to identify Earth's position relative to the Sun and other planets.

3 - Use evidence from models, diagrams, and text to explain Earth's location within the solar system and the Milky Way galaxy.

(Pages 60 - 63)

Free Response Questions - FRQ

Structured Concept Explanation (Unit 4: The Solar System & Milky Way Galaxy (Practice Q24) · Pages 60 - 63):

• Definition of the Solar System: The solar system consists of our star, the Sun, and all of the objects that orbit around it due to the Sun's gravity (including the 8 planets, their moons, dwarf planets, asteroids, and comets).

• Earth's Position in the Solar System: In order from nearest to farthest from the Sun, the eight planets are: 1. Mercury, 2. Venus, 3. Earth, 4. Mars, 5. Jupiter, 6. Saturn, 7. Uranus, 8. Neptune. Earth is the THIRD (3rd) planet from the Sun, located between Venus (2nd) and Mars (4th) among the four inner rocky planets.

• Earth's Location in the Solar System and Milky Way Galaxy: Earth orbits the Sun as the third planet in the solar system. Our solar system is located in one of the outer spiral arms (the Orion Arm) of the Milky Way galaxy—a huge spiral-shaped system of billions of stars, gas, and dust held together by gravity.

Key Ideas from the Student Book:

• The solar system = the Sun + all objects that orbit around it.

• Order of planets from the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

• Earth is the 3rd planet from the Sun (between Venus and Mars), inside the solar system, which is in a spiral arm of the Milky Way galaxy.

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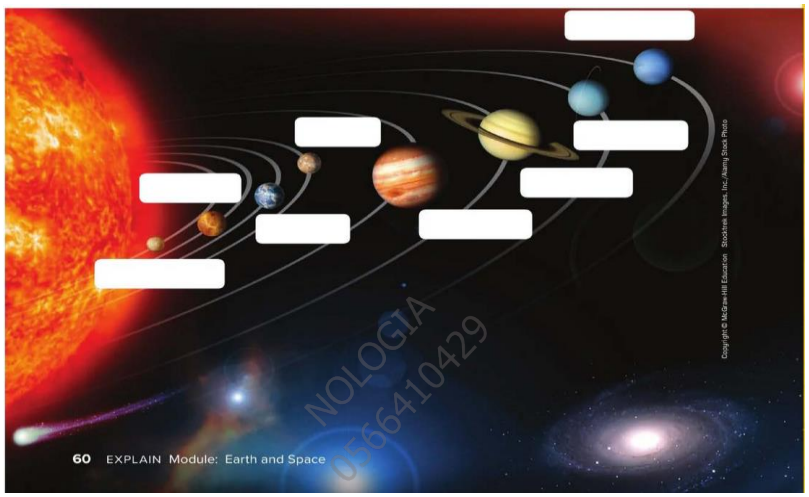
FRQ Sub-Part	Question Focus	Scientific Answer Summary
Define the Solar System	What makes up the solar system?	The Sun and all the objects that orbit around it (8 planets, moons, dwarf planets, asteroids, comets).
Earth's Position Relative to Sun & Planets	Where is Earth in a solar system diagram?	Earth is the 3rd planet from the Sun, positioned between Venus (2nd) and Mars (4th).
Earth's Location in Solar System & Galaxy	How do Earth, the solar system, and the Milky Way fit together?	Earth is the 3rd planet orbiting the Sun in our solar system, and our solar system is located in a spiral arm of the Milky Way galaxy.

Remember:

✓ Solar System: the Sun and all objects that orbit around it.

✓ Earth is the 3rd planet from the Sun, located between Venus and Mars.

✓ Earth is part of the solar system, and the solar system is located in a spiral arm of the Milky Way galaxy.

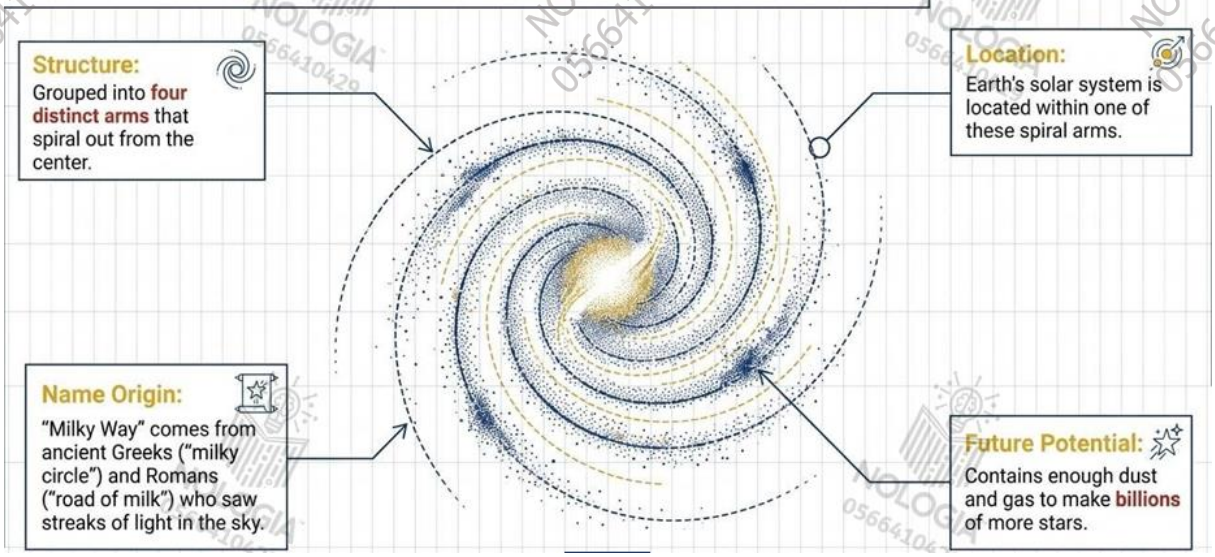


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Galaxy: A large group containing **billions of stars, dust, and gas** held together by **gravity**.



INQUIRY ACTIVITY

Hands On

Model the Solar System

You are going to use a model of the solar system to help you explain more about Earth's location in outer space.

State the Claim Where is Earth located in the solar system?

Materials

- scissors
- construction paper
- 3.5 meters of string
- meterstick

Make a Model

1. Cut circles from construction paper to represent the Sun, the inner planets, and the outer planets.
2. Lay the string out in a straight line on the floor. Place the Sun at one end of the string.
3. The distances of each planet from the Sun have been converted to centimeters in the table below. Place each planet at the correct distance from the Sun on the string.

Space Object	Distance from the Sun (cm)
Mercury	4 cm
Venus	7 cm
Earth	10 cm
Mars	15 cm
Jupiter	52 cm
Saturn	96 cm
Uranus	192 cm
Neptune	300 cm

Talk About It

Does the activity support your claim? Talk about it with a partner.

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Questions :

Question 1: Define the solar system and list three types of objects that orbit the Sun.

Answer: The solar system is the Sun and all of the objects that orbit around it. Objects orbiting the Sun include the eight planets (and their moons), dwarf planets, asteroids, and comets.

Question 2: Explain Earth's location within the solar system and describe where our solar system is located within the Milky Way galaxy.

Answer: Earth is the third inner rocky planet orbiting the Sun in our solar system. Our solar system is located in one of the outer spiral arms of the Milky Way galaxy, which is a spiral galaxy containing billions of stars.

Question 3: What is the solar system?

Answer: The Sun and all of the objects (planets, moons, asteroids, comets, dwarf planets) that orbit around it.

Question 4: What object is at the center of our solar system, and what force keeps the planets in orbit?

Answer: The Sun is at the center, and the Sun's strong gravitational pull keeps the planets in orbit.

Question 5: List the eight planets in order from nearest to farthest from the Sun.

Answer: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

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Question 6: Name the four inner planets and describe their main characteristics.

Answer: Mercury, Venus, Earth, and Mars; they are smaller, rocky, solid planets closest to the Sun with few or no moons and no rings.

Question 7: Name the four outer planets and describe their main characteristics.

Answer: Jupiter, Saturn, Uranus, and Neptune; they are huge gas/ice giants farthest from the Sun with ring systems and many moons.

Question 8: Where is the asteroid belt located in the solar system?

Answer: Between the orbits of Mars (the 4th planet) and Jupiter (the 5th planet), separating the inner and outer planets.

Question 9: What is the name and shape of the galaxy that contains our solar system?

Answer: The Milky Way galaxy; it is a spiral-shaped galaxy.

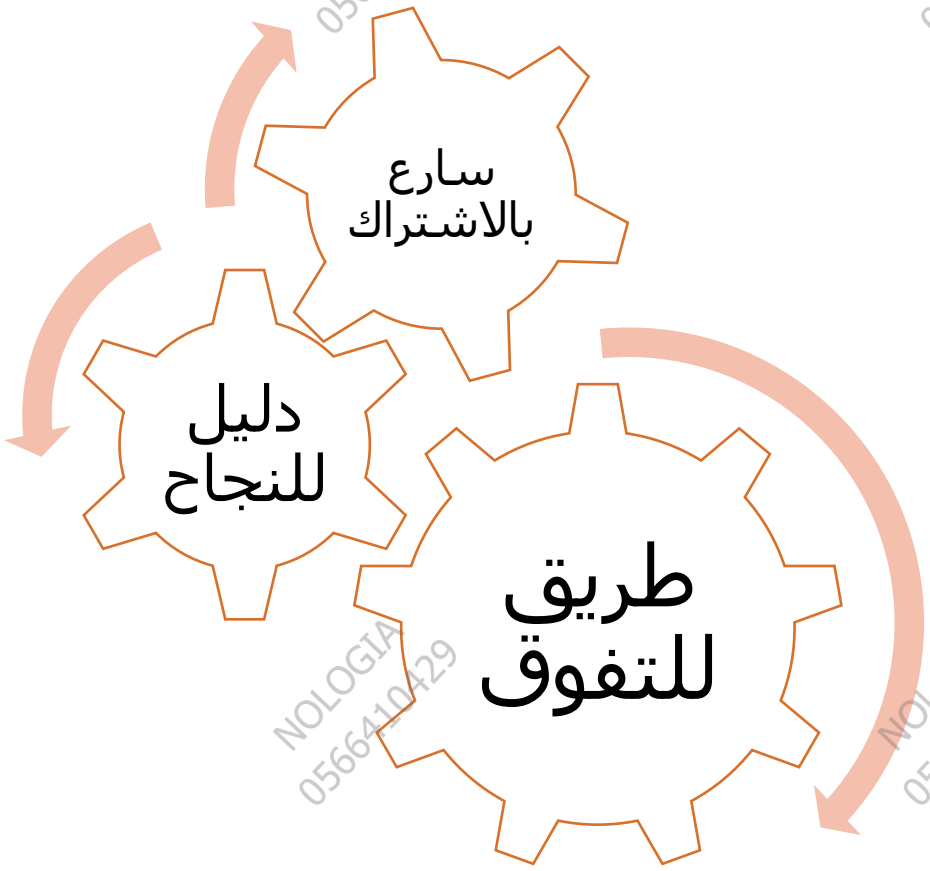
Question 10: Where is our solar system located inside the Milky Way galaxy?

Answer: In one of the outer spiral arms of the Milky Way galaxy (far from the galactic center).

Question 11: Rank the following from SMALLEST to LARGEST: Solar System, Earth, Universe, Milky Way Galaxy.

Answer: Earth -> Solar System -> Milky Way Galaxy -> Universe.

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مع أطيب التمنيات بالنجاح والتوفيق ...

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