هيكل العلوم انسباير الصف السادس المتقدم

تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف السادس ⇦ علوم ⇦ الفصل الثالث ⇦ ملفات متنوعة ⇦ الملف

تاريخ إضافة الملف على موقع المناهج: 03-06-2026 01:58:12

المزيد من مادة علوم:	ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس

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المزيد من الملفات بحسب الصف السادس والمادة علوم في الفصل الثالث

1	ملزمة هيكل العلوم انسباير الصف السادس المتقدم
2	مراجعة وفق هيكل 2026
3	تدريبات الاستعداد للاختبار
4	مذكرة هيكل امتحان العلوم
5	الهيكل الوزاري 2026

وزارة التربية والتعليم
MINISTRY OF EDUCATION

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الفصل الثالث 2025-2026

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Q1: Students will describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. (page: 8)

الأسئلة الموضوعية - MCQ

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LESSON

Water in the Atmosphere

PAGE KEELEY SCIENCE PROBES

What happened to the puddle?

Four friends noticed a large puddle on the sidewalk when they walked to school in the morning. When they walked home, the puddle was gone. They wondered what happened to the water that was in the puddle.

Desi: I think the water soaked into the bricks.

Trudi: I think the water went up into the clouds.

Max: I think the water is in the air around us.

Carli: I think the Sun changed it into something else.

Which friend do you most agree with? Explain why you agree. You will revisit your response to the Science Probe at the end of the lesson.

Question 1

What is the main title of the lesson featured at the top of the page¡

- A) Water in the Clouds
- B) The Disappearing Puddle
- C) Water in the Atmosphere
- D) Page Keeley Science Probes

D	C	B	A

Question 2

When did the four friends first notice the large puddle on the sidewalk

- A) When they walked to school in the morning
- B) When they walked home from school
- C) During their lunch break
- D) The previous evening

D	C	B	A

Question 3

Which friend hypothesized that the water from the puddle soaked into the bricks

- A) Trudi
- B) Max
- C) Carli
- D) Desi

D	C	B	A

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What was Trudi's theory regarding what happened to the water in the puddle

- A) The Sun changed it into something else.
- B) The water went up into the clouds.
- C) The water is in the air around us.
- D) The water soaked into the sidewalk bricks.

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D	C	B	A

What are students explicitly asked to do after choosing the friend they most agree with

- A) Draw a diagram of the water cycle.
- B) Explain why they agree and revisit their response at the end of the lesson.
- C) Conduct an experiment with a bowl of water.
- D) Write a short story about the four friends.

D	C	B	A

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Q2: Students will identify physical and chemical properties of substances. (page: 150)

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COLLECT EVIDENCE

How can density be used to determine if you had gold?

Answer:

Density is an intensive physical property, meaning it remains constant for a pure substance regardless of the sample size. Pure gold has a specific, known density of approximately **19.3 g/cm^3**.

To determine if an unknown sample is pure gold, you can calculate its density by measuring its mass (using a scale) and its volume (using water displacement). If the calculated density matches **19.3 g/cm^3**, the substance is likely gold. If the density is significantly different, the sample is a different substance or a counterfeit (such as pyrite or brass).

Question:

How can density be used to determine if an unknown metal sample is pure gold?

- **A)** By measuring the sample's weight and comparing it to the weight of a standard gold bar, regardless of its size.
- **B)** By calculating the sample's density (mass divided by volume) and seeing if it matches the known density of pure gold, which is approximately 19.3 g/cm^3.
- **C)** By observing if the sample changes color when its density increases under high water pressure.
- **D)** By melting the sample to see if its volume doubles when it reaches its maximum density point.

D	C	B	A

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Q3: Students will identify physical and chemical properties of substances. (page: 157)

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COLLECT EVIDENCE

How can knowing a substance's chemical properties be used to determine if you had a piece of gold?

Answer: Chemical properties describe how a substance interacts or reacts with other matter to change its fundamental identity. Gold is a highly noble metal, meaning it is chemically **inert** and extremely resistant to corrosion, oxidation, and most acids.

Question:
How can knowing a substance's chemical properties help determine if an unknown sample is genuine gold?

- **A)** By measuring how quickly the sample melts when exposed to low temperatures.
- **B)** By testing its lack of reactivity with strong acids like nitric acid, because pure gold is chemically inert and does not easily corrode or oxidize.
- **C)** By observing if the sample magnetic forces increase when it comes into contact with other precious metals.
- **D)** By checking if the sample can be scratched easily by a copper coin or a steel blade to verify its chemical hardness.

D	C	B	A

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Q4: Students will explore the impact of human activities on climate. (page: 192)

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What are greenhouse gases?

Answer: Greenhouse gases (GHGs) are gases in Earth's atmosphere that trap heat. They allow sunlight to pass through the atmosphere freely, but they absorb the infrared radiation (heat) that reflects back up from the Earth's surface, preventing it from escaping directly into space. This process is known as the **greenhouse effect**, and it keeps the planet warm enough to sustain life.

Question:
What are greenhouse gases, and how do they impact Earth's atmosphere?

- **A)** They are atmospheric gases that block incoming solar radiation, completely cooling the Earth's surface and preventing sunlight from reaching oceans.
- **B)** They are gases in the atmosphere—such as carbon dioxide and methane—that trap infrared radiation (heat) radiating from the Earth's surface, warming the planet.
- **C)** They are highly toxic industrial chemicals that actively destroy the ozone layer without interacting with thermal or infrared radiation.
- **D)** They are rare gases produced exclusively by volcanic eruptions that convert oxygen directly into nitrogen gas.

D	C	B	A

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Q5: Students will recognize various water reservoirs and will develop and use models about their concepts. (page: 27)

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Where is water stored?

Answer: Water on Earth is stored in several natural reservoirs across the planet, moving between them through the water cycle. These storage areas can be broadly categorized into four main reservoirs:

- **Oceans:** The largest reservoir, holding about **97.2%** of all Earth's water (saltwater).
- **Glaciers and Ice Caps:** The largest reservoir of *freshwater*, containing roughly **2.1%** of global water, locked up mostly in Antarctica and Greenland.
- **Groundwater:** Water stored beneath the Earth's surface in soil pores and rock formations (aquifers), accounting for about **0.6%** of Earth's total water.
- **Surface Water and Atmosphere:** The remaining tiny fraction (**less than 0.1%**) is stored in freshwater lakes, rivers, soils, and as water vapor in the atmosphere.

Question:
Where is the vast majority of Earth's water stored, and which reservoir holds the largest amount of Earth's *freshwater*?

- **A)** Most of Earth's water is stored in the atmosphere as clouds, while the largest freshwater reservoir is found in surface rivers.
- **B)** Most of Earth's water is stored in the oceans, while the largest freshwater reservoir is locked up in glaciers and ice caps.
- **C)** Most of Earth's water is stored in underground aquifers, while the largest freshwater reservoir is found in deep saltwater lakes.
- **D)** Most of Earth's water is stored in biosphere vegetation, while the largest freshwater reservoir is located in shallow soil moisture.

D	C	B	A

Q6: Students will explore atmospheric and oceanic circulation. (page: 79)

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As you learned previously, air masses bring with them the characteristics of their source region as they move. As wind carries an air mass away from the area where it formed, the air mass will eventually collide with another air mass. A **front** is a boundary between two air masses. Recall that air masses can be warm or cool depending on the source region in which they form. Let's investigate what happens when different types of air masses meet.

what is a weather "front"?

A) The central core of a single, isolated air mass where the temperature and wind speed remain completely stable.

B) The boundary that forms between two different air masses when they collide as wind moves them away from their source regions.

C) The high-altitude atmospheric layer where solar radiation turns warm air into cool moisture.

D) A high-pressure system that prevents wind from carrying air masses across different geographical regions.

D	C	B	A

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Q7: Students will explore the impact of human activities on land, develop and design solutions to enhance their understanding. (page: 135)

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THREE-DIMENSIONAL THINKING

Complete the chart by filling in the **effects** of each positive action.

Positive Action	Effects
Governments preserve land.	
Logging company reforests an area.	
City creates urban park.	
Girl recycles paper.	
Farmer composts food scraps.	

Positive Action	Effects
Governments preserve land.	Protects natural ecosystems, prevents habitat destruction for endangered species, and keeps natural resources from being overexploited.
Logging company reforests an area.	Restores depleted forests, reduces soil erosion, helps absorb carbon dioxide from the atmosphere, and rebuilds wildlife habitats.
City creates urban park.	Lowers urban heat, provides green spaces for community recreation, increases local biodiversity, and improves urban air quality.
Girl recycles paper.	Conserves natural resources by reducing the number of trees cut down, saves energy, and decreases the amount of waste sent to landfills.
Farmer composts food scraps.	enriches the soil with vital nutrients, improves soil moisture retention, and reduces reliance on chemical fertilizers while cutting down on methane emissions from landfills.

Question:
Which of the following pairs correctly matches an environmental "Positive Action" with its corresponding ecological "Effect"?

- **A) Action:** Girl recycles paper. → **Effect:** Increases industrial logging activities to meet urban energy consumption demands.
- **B) Action:** Logging company reforests an area. → **Effect:** Accelerates structural soil erosion and permanently eliminates native wildlife habitats.
- **C) Action:** Farmer composts food scraps. → **Effect:** Enriches the soil naturally with vital nutrients and reduces the need for synthetic chemical fertilizers.
- **D) Action:** City creates urban park. → **Effect:** Raises local temperatures by replacing natural vegetation with heavy concrete structures.

D	C	B	A

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Q8: Students will explore the impact of human activities on land how human cause changes to Earth's land environments. (page: 81)

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COLLECT EVIDENCE

How do the collisions of air masses cause weather? Record your evidence (D) in your Science Notebook.

Answer: The collisions of air masses cause weather because different air masses have distinct **temperatures, densities, and moisture levels.** When they meet, they do not mix easily, creating a boundary called a **front.** The interactions at these fronts force air to rise, leading to weather changes:

- **Lighter Air Rises:** Warm air is less dense than cold air. When a warm air mass and a cold air mass collide, the warmer, moisture-filled air is forced upward over the heavier, denser cold air.
- **Cooling and Condensation:** As the warm air rises into the upper atmosphere, it cools down. Cooler air cannot hold as much water vapor as warm air, causing the moisture to condense into water droplets, forming **clouds.**
- **Precipitation and Storms:** If the condensation continues, it leads to **precipitation** (rain, snow, or sleet).
  - A **cold front** (cold air pushing into warm air) forces warm air up rapidly, often causing sudden, severe weather like thunderstorms.
  - A **warm front** (warm air sliding over cold air) moves more gradually, typically producing steady, lighter rain or overcast skies over a larger area.

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Question:
How do the collisions of differing air masses cause changes in the weather?

- **A)** The air masses blend together instantly, neutralizing atmospheric pressure and clearing all cloud cover over the region.
- **B)** The cooler, denser air mass is forced upward into the stratosphere, where it absorbs solar radiation and prevents clouds from forming.
- **C)** The warmer, less dense air mass is forced upward over the colder air mass, causing the moisture within it to cool, condense, and form clouds and precipitation.
- **D)** The collision creates a vacuum that pulls moisture directly out of nearby oceans and scatters it as sudden wind without temperature shifts.

D	C	B	A

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Q9: Students will explore the impact of human activities on the atmosphere. (page: 128)

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THREE-DIMENSIONAL THINKING

Summarize your understanding of the cause-and-effect relationships between human activities and the environmental impacts on land in the table below.

Type	Causes	Effects
Deforestation		

Type	Causes	Effects
Deforestation	* Clearing forested land for large-scale agricultural farming and livestock grazing. * Commercial logging and timber extraction. * Urban expansion, infrastructure construction, and building roads.	* Severe soil erosion and loss of fertile topsoil. * Destruction of natural wildlife habitats, leading to biodiversity loss. * Increased greenhouse gases (carbon dioxide) in the atmosphere, accelerating climate change.

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Question:
Which of the following summaries accurately identifies a primary human **cause** and a direct environmental **effect** of deforestation on land?

- **A) Cause:** Extreme shifts in natural solar radiation; **Effect:** Rapid expansion of dense, native rainforest ecosystems.
- **B) Cause:** Clearing heavily forested areas for agricultural production and urban development; **Effect:** Increased soil erosion and severe destruction of natural wildlife habitats.
- **C) Cause:** Widespread composting of natural organic materials by rural farming communities; **Effect:** Immediate cooling of the Earth's upper atmospheric layers.
- **D) Cause:** The commercial recycling of manufactured consumer paper and wood materials; **Effect:** Sudden drop in the levels of atmospheric carbon dioxide.

D	C	B	A

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Q10: Students will look for patterns in the weather and explore how and why weather changes. (page: 79)

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Air Mass Collision Course

1. Predict what happens when a cold air mass moves toward a warm air mass.

2. Predict what happens when a warm air mass moves toward a cold air mass.

3. Create a diagram to show the interaction of air masses at a cold front and a warm front. Describe what happens as the air masses interact and what type of weather is caused by this interaction.

Cold Front

Warm Front

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1. Prediction: Cold air mass moves toward a warm air mass (Cold Front)

When a colder, denser air mass moves toward a warmer, less dense air mass, it acts like a wedge. The cold air pushes underneath the warm air, forcing the warm, moist air to rise rapidly into the atmosphere. As the warm air rises quickly, it cools and condenses, frequently producing **heavy rain, strong winds, and severe thunderstorms**, followed by cooler temperatures and clearing skies.

2. Prediction: Warm air mass moves toward a cold air mass (Warm Front)

When a warmer, lighter air mass moves toward a cooler, denser air mass, it cannot push the heavy cold air out of the way. Instead, the warm air gently overrides and slides up and over the cold air mass along a gradual slope. As the warm air climbs slowly, its moisture condenses into widespread cloud layers, resulting in **steady, light-to-moderate precipitation (rain or snow) and overcast skies** that can last for hours or days.

3. Diagram Descriptions & Weather Interactions

- **Cold Front Diagram Concept:** * *Visual:* A steep, wedge-shaped boundary of cold air moving forward (left to right). Blue arrows show it pushing under the warm air. Tall, vertical cumulonimbus clouds form right along the steep boundary.
  - *Interaction & Weather:* Rapid vertical lifting of warm air. This leads to sudden, intense weather events such as localized downpours, lightning, gusty winds, and a sharp drop in temperature after the front passes.
- **Warm Front Diagram Concept:**
  - *Visual:* A long, gentle, sloping boundary where warm air moves up and over a retreating wedge of cold air. Broad, flat layers of clouds (cirrus high up, transitioning down to stratus and nimbostratus) span ahead of the front line.
  - *Interaction & Weather:* Gradual, extended lifting of warm air. This leads to extended periods of steady drizzle, gray skies, and foggy conditions, followed by warmer, more humid weather once the front passes.

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What occurs when a cold air mass moves rapidly toward a warm air mass, and what type of weather does it typically produce?

- **A)** The warm air mass traps the cold air below it, creating completely stagnant, windless, and dry desert conditions.
- **B)** The cold air mass pushes underneath the less dense warm air, forcing it upward rapidly to form tall clouds and severe thunderstorms.
- **C)** The two air masses blend smoothly at high altitudes without creating a boundary, resulting in immediate clear skies.
- **D)** The warm air mass is compressed into a tight space, causing it to freeze instantly and create heavy blizzards regardless of the season.

D	C	B	A

How do air masses interact during a warm front, and what weather characteristics are associated with this boundary?

- **A)** The warm air mass rapidly forces the cold air down into the ground, causing sudden tornadoes and dry, high-speed winds.
- **B)** The warm air mass sinks beneath the heavier, denser cold air mass, causing all cloud formation to stop completely.
- **C)** The lighter warm air mass gently slides up and over the denser cold air mass along a gradual slope, creating steady, long-lasting precipitation.
- **D)** The cold air mass evaporates instantly upon contact with the warm air, preventing any changes in air temperature or pressure.

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D	C	B	A

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Q11: Students will explore the impact of human activities on the water. (page: 164)

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. **Describe** two ways you can personally help minimize human impact on Earth's water.

Answer: 1. **Conserve Water at Home:** You can significantly reduce the strain on local freshwater reservoirs and wastewater treatment facilities by practicing daily conservation habits. Examples include turning off the tap while brushing your teeth, taking shorter showers, fixing household leaks promptly, and running washing machines or dishwashers only when they are fully loaded.
2. **Prevent Water Pollution:** You can protect water quality by safely managing what goes down the drain. This means never pouring toxic chemicals, household cleaners, medications, or motor oil down sinks or storm drains. Additionally, reducing the use of chemical fertilizers and pesticides in home gardens prevents harmful runoff from washing into local rivers, lakes, and underground aquifers during rainstorms.

Question:
Which of the following describes two effective actions an individual can take to personally minimize human impact on Earth's water resources?

- **A)** Increasing daily hot water usage to flush household drains and spraying liquid chemical fertilizers heavily right before a major rainstorm.
- **B)** Turning off the faucet while brushing teeth to conserve freshwater resources and avoiding pouring hazardous chemicals down household drains to prevent pollution.
- **C)** Replacing natural backyard soil with asphalt to eliminate rainfall absorption and running half-empty dishwashers multiple times a day.
- **D)** Dumping unused synthetic medications into storm drains and utilizing more chemical pesticides to maximize garden plant growth.

D	C	B	A

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Q12: Explain the role of decomposers in the ecosystem. (page: 16)

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COLLECT EVIDENCE

How do clouds form? Record your evidence (C) in your Science Notebook.

Answer: Clouds form through a three-step atmospheric process driven by temperature and moisture changes:

1. **Evaporation:** Sunlight heats water surfaces (oceans, lakes, and rivers), converting liquid water into an invisible gas called **water vapor**, which rises into the atmosphere.
2. **Cooling:** As the warm water vapor ascends, it encounters lower atmospheric pressure and expands, causing its temperature to drop.
3. **Condensation:** Once the air cools to its **dew point** (the temperature at which air becomes saturated), it can no longer hold all of its water vapor. The vapor condenses back into tiny liquid water droplets or ice crystals. For this condensation to happen, the water molecules must cling to microscopic airborne particles called **condensation nuclei** (such as dust, smoke, salt, or pollen). When billions of these tiny water droplets cluster together, they become visible as a **cloud**.

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Question:
Which of the following correctly describes the steps required for cloud formation in Earth's atmosphere?

- **A)** Water vapor sinks into deep underground aquifers, freezes into solid ice sheets, and is forced upward by thermal geological pressures.
- **B)** Liquid surface water evaporates into vapor, rises and cools in the atmosphere, and condenses into tiny liquid droplets around microscopic airborne particles.
- **C)** High-altitude solar radiation melts nitrogen gas molecules, turning them into heavy chemical elements that block out sunlight.
- **D)** Heavy cloud drops form when dry atmospheric wind forces oxygen particles to combine directly with solid carbon crystals.

D	C	B	A

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Q13: Students will explore the impact of human activities on the land and how humans cause changes to Earth's land environments. (page: 122)

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Impacts of Agriculture	
Pesticide Usage To feed the growing world population, some farmers use higher-yielding seeds and chemical fertilizers. These methods help increase the amount of food grown on each km² of land. Herbicides and pesticides also are used to reduce weeds, insects, and other pests that can damage crops. However, runoff containing these fertilizers can seep into groundwater supplies, polluting drinking water. They can also run off into streams and rivers, affecting aquatic organisms.	

what is a major negative environmental consequence of using chemical fertilizers and pesticides in agriculture?

- **A)** They cause immediate desertification by completely preventing seeds from absorbing natural sunlight.
- **B)** They seep into groundwater supplies and run off into streams and rivers, polluting drinking water and harming aquatic organisms.
- **C)** They evaporate rapidly into the upper atmosphere, causing a severe drop in global oxygen levels.
- **D)** They increase the structural density of the soil, making it impossible for heavy farming machinery to harvest crops.

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D	C	B	A

Q14: Students will identify energy changes in chemical reactions. (page: 189)

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Examine the image to the right.

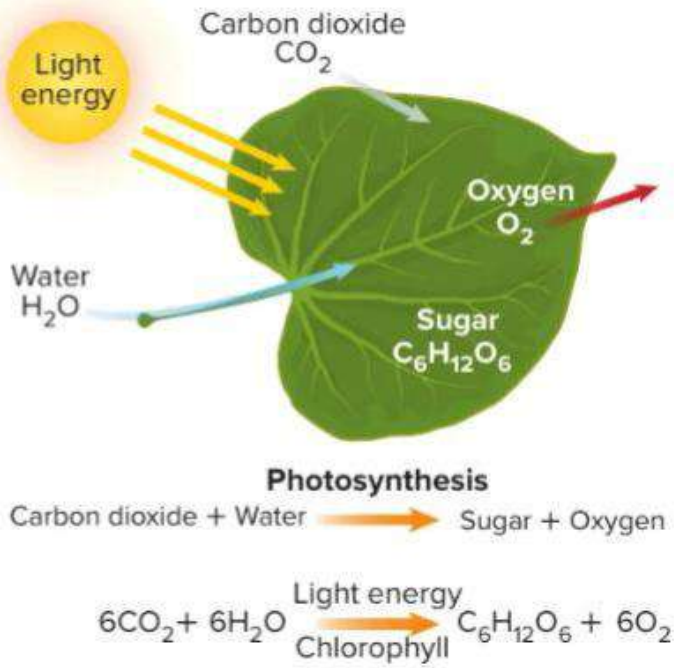
4. What happens to the energy from the Sun in the leaf?

A The light energy is consumed by the leaf and can no longer be used.

B The light energy is used to create energy that the plant uses.

C The light energy is used to break the bonds in the carbon dioxide and water molecules.

D The light energy is used to break the bonds in the sugar and oxygen molecules.



D	C	B	A

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Q15: Students will explore property changes in chemical reactions. (page: 166)

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THREE-DIMENSIONAL THINKING

How can **patterns** in properties of substances provide evidence that a chemical change has taken place? Write your answer in your Science Notebook.

Answer: Patterns in the properties of substances provide evidence of a chemical change when the starting substances (reactants) completely lose their original characteristic properties and a new substance with entirely different properties (products) is formed. Unlike a physical change, where a substance merely changes form, a chemical change alters the atomic structure.

Observable patterns that serve as evidence include:

- **Unexpected Color Change:** A distinct pattern where the final product has a completely different color than the initial reactants (e.g., clear liquids turning bright yellow upon mixing, or iron turning reddish-brown when rusting).
- **Temperature Change (Energy Transfer):** A repeatable pattern of energy being absorbed or released without external heating or cooling. The mixture can become hot to the touch (exothermic reaction) or cold (endothermic reaction).
- **Production of a Gas:** The pattern of bubbling, fizzing, or a new odor appearing when two non-gaseous substances are combined, showing that a new gaseous compound has formed.
- **Formation of a Precipitate:** The pattern where two clear, liquid solutions react to suddenly create an insoluble solid that falls out of the solution.

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How do patterns in the properties of substances provide clear evidence that a chemical change—rather than a physical change—has occurred?

- A) The substances maintain all of their original properties but change their physical state from a solid to a liquid due to simple melting.
- B) The starting materials completely retain their atomic bonds, allowing them to be separated easily by mechanical filtering.
- C) The initial substances show a consistent pattern of changing shape and volume while keeping their original chemical identity intact.
- D) The original substances lose their characteristic properties, yielding new substances with distinct patterns like unexpected color changes, gas production, or temperature shifts.

D	C	B	A

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Q16: Students use a model to describe how the total number of each type of atom is conserved, which explains the conservation of matter. (page: 169)

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How does conservation of mass explain what happened when the two liquids combined to form a solid?

Answer: The law of **conservation of mass** states that matter cannot be created or destroyed in a chemical reaction. Therefore, the total mass of the reactants must exactly equal the total mass of the products.

When two clear liquids are mixed and react to form an insoluble solid (a process called **precipitation**), it might look like new matter has suddenly appeared. However, conservation of mass explains that this solid is simply a rearrangement of the atoms that were already present within the two liquid solutions.

- No new atoms were created, and no atoms were destroyed.
- The atoms dissolved in the liquid liquids broke their original bonds and formed new, tightly bound chemical bonds with each other to create the solid structure.
- If you measure the mass of both liquids separately before mixing them, their combined initial mass will be **exactly equal** to the final mass of the mixture containing the newly formed solid.

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what happens to the total mass and the atoms when two liquid solutions combine to form a solid precipitate?

A) The total mass increases because solid matter is inherently heavier and contains more dense atoms than liquids.

B) The total mass decreases because some of the atoms are permanently destroyed during the chemical transition from liquid to solid.

C) The total mass remains exactly the same because the atoms from the liquids are simply rearranged to form the new solid substance without any atoms being created or destroyed.

D) The total mass changes unpredictably because the law of conservation of mass only applies to physical changes like freezing or boiling.

D	C	B	A

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Q17: Students will develop and use a model to show how the atoms that make up the original substances are regrouped into different molecules. (page: 172)

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How does the arrangement of atoms explain what happened when the two liquids combined to form a solid?

Answer: When two liquids combine to form a solid, a chemical reaction occurs that completely changes how the constituent atoms are organized.

In the initial **liquid state**, the atoms or molecules are loosely bonded, disorganized, and have enough thermal energy to slide, flow, and move past one another freely.

When the two liquids are mixed together:

1. The chemical bonds holding the original liquid molecules together are broken.
2. The freed atoms interact, exchange, or share valence electrons to form entirely new, highly stable chemical bonds with each other.
3. These new bonds fix the atoms into a rigid, highly ordered, and closely packed geometric structure (often a crystalline lattice). Because the rearranged atoms are now locked firmly into fixed positions and can only vibrate in place, the substance transitions from fluid liquids into an insoluble **solid precipitate**.

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Question:
How does the molecular rearrangement of atoms explain the chemical transition that occurs when two liquid solutions mix to form a solid precipitate?

- **A)** The atoms within the liquids absorb surrounding gases, causing them to expand their volume until they freeze mechanically.
- **B)** The original loose bonds of the liquids break, and the atoms rearrange to form new, highly stable, and rigidly fixed chemical bonds that lock the particles into an ordered solid structure.
- **C)** The total number of atoms doubles instantly upon mixing, forcing the extra matter to condense into a solid mass due to a lack of space.
- **D)** The atoms stop vibrating entirely and lose all of their subatomic electrons, which changes their physical state without altering their molecular bonds.

D	C	B	A

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Q18: Students will identify processes that release or store energy. (page: 182)

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THREE-DIMENSIONAL THINKING

WRITING Connection Make an **argument** about the following claim: Exothermic reactions only release thermal **energy**. Write your argument in your Science Notebook.

Argument:

The claim is **incorrect**. While exothermic reactions are most commonly known for releasing thermal energy (heat) into their surroundings, they are not limited to *only* releasing thermal energy. Energy can be released in various other forms depending on the reaction. For example:

- **Light energy:** A combustion reaction (like a burning candle or fire) releases both heat and light. Bioluminescence or chemiluminescence (like in glow sticks) releases light energy with almost no heat.
- **Sound energy:** Explosive exothermic reactions, like fireworks or detonations, rapidly release energy in the form of sound waves and kinetic energy.
- **Electrical energy:** In an electrochemical cell (like a battery), a spontaneous exothermic redox reaction converts chemical energy directly into electrical energy.

Therefore, exothermic reactions release overall net energy to the surroundings, which can manifest as thermal, radiant (light), acoustic (sound), or electrical energy.

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Which of the following statements provides the most accurate argument regarding this claim?

A) The claim is correct because the definition of an exothermic reaction is a chemical reaction that exclusively produces heat.

B) The claim is incorrect because exothermic reactions always absorb thermal energy from the surroundings rather than releasing it.

C) The claim is incorrect because exothermic reactions can release energy in multiple forms, such as light (e.g., glow sticks), sound (e.g., explosions), or electrical energy (e.g., batteries), in addition to thermal energy.

D) The claim is correct because any light or sound produced during a chemical reaction is considered a form of thermal energy.

D	C	B	A

Q19: Students will develop and use models to describe energy changes. (page: 179)

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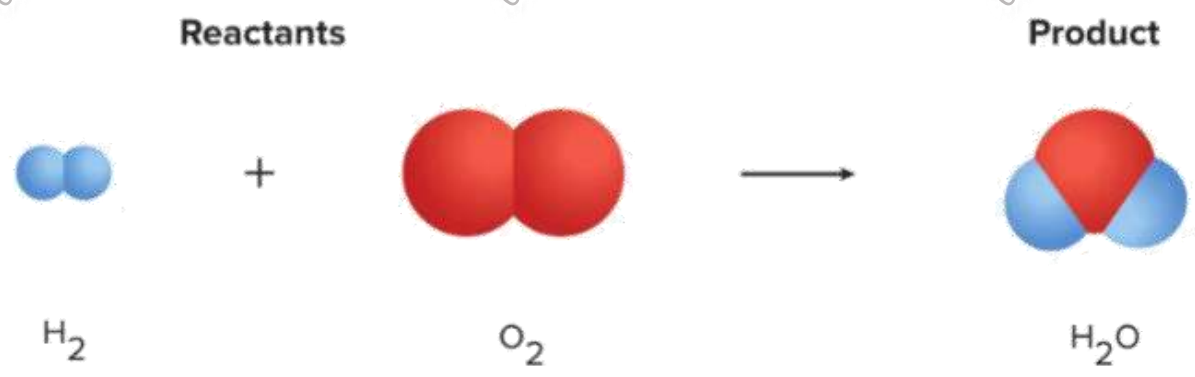
THREE-DIMENSIONAL THINKING

Copy the diagram below into your Science Notebook. Add arrows to the **model** of the formation of water to show where **energy** is absorbed and where energy is released in a chemical reaction.



Where energy is absorbed: Arrows pointing **into** the reactants side (H_2 and O_2). Energy must be absorbed from the surroundings to break the bonds holding the hydrogen atoms together and the oxygen atoms together.

Where energy is released: Arrows pointing **out of** (away from) the product side (H_2O). Energy is released into the surroundings when new chemical bonds are formed to create water molecules.

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Which statement correctly describes where arrows should be added to represent the absorption and release of energy during the formation of water?

A) Arrows should point away from H_2 and O_2 to show energy is absorbed, and arrows should point into H_2O to show energy is released.

B) Arrows should point into the reactants (H_2 and O_2) because breaking bonds absorbs energy, and arrows should point away from the product (H_2O) because forming bonds releases energy.

C) Arrows should only point into H_2O because energy is exclusively absorbed when a new compound is completely formed.

D) Arrows should point away from both the reactants and products because chemical reactions only release energy and never absorb it.

D	C	B	A

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Q20: Students will explain how gravity drives the movement of water through Earth's systems, including groundwater flow (page:28)

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COLLECT EVIDENCE

How does water become groundwater and where else is water stored? Record your evidence (C) in your Science Notebook.

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Answer:
A leaf is highly specialized structurally to maximize the efficiency of photosynthesis by capturing light energy. Its main structural features related to this function include:

- **Broad, Flat Lamina (Blade):** Gives the leaf a large surface area, maximizing the amount of sunlight it can intercept.
- **Thin Profile:** Ensures that sunlight can easily penetrate through all cell layers to reach the photosynthetic tissues deep within the leaf.
- **Palisade Mesophyll Layer:** This upper layer consists of closely packed, vertically elongated cells positioned directly beneath the upper epidermis. These cells contain the highest concentration of **chloroplasts** (which house the light-absorbing pigment, **chlorophyll**), placing them in the optimal position to absorb maximum sunlight.
- **Clear Epidermis and Waxy Cuticle:** The topmost layer is transparent, acting like a window that allows light to pass directly through to the chloroplasts underneath without obstruction, while the waxy cuticle prevents water loss without blocking light.

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which of the following best explains how a leaf's structure is adapted to its function of capturing light energy?

A) The leaf has a thick, opaque epidermis that reflects excess solar radiation to protect deep-lying tissues.

B) The leaf has a broad, flat shape to maximize surface area for sunlight interception, and a palisade mesophyll layer packed with chloroplasts near the top surface to absorb light.

C) The leaf is spherical and compact to minimize surface area, focusing solar energy directly onto a single central chloroplast.

D) The leaf structure relies entirely on spongy mesophyll cells located at the very bottom of the leaf to intercept light after it passes through the stem.

D	C	B	A

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Q21: Students will explore atmospheric, oceanic circulation, and what causes global patterns of winds and ocean currents. (page: 63)

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Surface Currents Ocean currents flow at different ocean. You've learned that density currents move water downward. They carry water from the surface to deeper parts of the ocean. So what causes surface waters to flow?

PHYSICAL SCIENCE Connection As you just discovered, a **surface current** is a wind-driven current that carries ocean water horizontally across the ocean's surface. As wind blows over ocean water, it transfers energy to the water. The moving air particles drag on the surface of the water and cause the top portion of the ocean to move.

which of the following best describes how a leaf's internal anatomy is adapted to optimize the function of gas exchange?

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- **A)** The leaf has a dense, tightly packed upper cuticle layer that traps carbon dioxide gas permanently inside the stem.
- **B)** Microscopic pores called stomata regulate the entry and exit of gases, while the large air spaces in the spongy mesophyll allow those gases to circulate and diffuse easily.
- **C)** Gas exchange is handled entirely by a thick layer of fluid-filled structural cells that pump oxygen out through the roots.
- **D)** The leaf utilizes a system of rigid, completely closed cell walls that prevent any atmospheric gases from penetrating the leaf interior.

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D	C	B	A

Q22: Explain the dynamic within Earth's systems. (page: 94)

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How does the distribution of solar energy affect climate?

Answer:

While leaves must open up to capture light and exchange gases, they face the constant risk of dehydration. A leaf features several critical structural adaptations designed specifically to minimize and limit water loss (transpiration):

- **Waxy Cuticle:** The outermost surface of both the upper and lower epidermis is covered by a non-cellular, waterproof layer made of cutin. This waxy barrier significantly reduces evaporation directly from the leaf surface cells.
- **Stomatal Distribution:** In most land plants, the microscopic pores (stomata) are primarily located on the **lower epidermis** (the underside of the leaf). Being shaded from direct sunlight keeps them cooler, which greatly lowers the rate of water evaporation.
- **Guard Cells:** Each stoma is flanked by two guard cells. When the plant experiences water stress, these cells lose turgor pressure and shrink, causing the stomatal pore to close tightly. This actively halts the escape of water vapor.
- **Specialized Epidermal Features (in dry environments):** Some leaves possess sunken stomata (set into pits) or trichomes (surface hairs) that trap a layer of humid air next to the leaf, reducing the moisture gradient and slowing down water loss.

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which of the following combinations of structural features best explains how a leaf limits excessive water loss?

A) A broad, thin lamina surface combined with highly ventilated, wide-open upper mesophyll cells.

B) A transparent, non-waxy upper epidermis layer that maximizes heat absorption to dry out the inner leaf.

C) A waterproof waxy cuticle covering the surface, alongside guard cells that close the stomata on the cooler, shaded underside of the leaf during water stress.

D) A continuous network of open xylem channels that pump water directly out into the surrounding air to maintain high humidity.

D	C	B	A

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Q23: Students will develop and use a model to explain how upwelling affects the availability of nutrients and organisms in the ocean. (page: 64)

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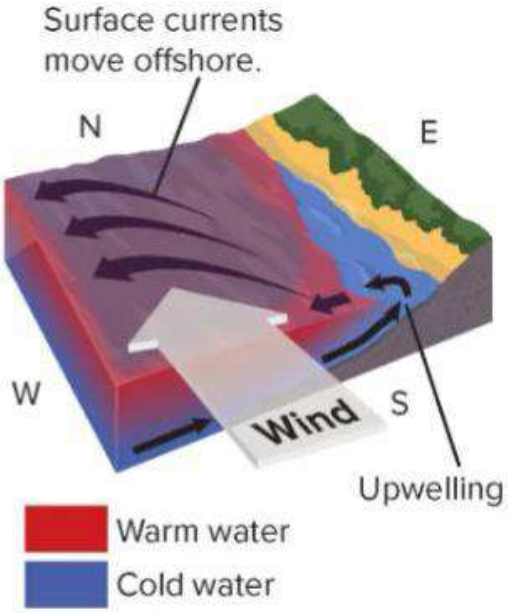
Upwelling As surface currents move toward the poles, they cool and sink. Cold, dense water is brought back up to the surface through upwelling. **Upwelling** is the vertical movement of water toward the ocean's surface. Upwelling occurs when wind blows across the ocean's surface and pushes water away from an area. Deeper, colder water is then forced to the surface. This deeper, colder water is nutrient-rich and supports large populations of algae, fish, and other ocean organisms.



which of the following statements correctly evaluates how vascular tissue structures support the transport of water and nutrients within a leaf?

A) Phloem tissues are hollow dead tubes that suction water from the roots, while xylem tissues use living cells to store unrefined sugars within the upper epidermis.

B) Vascular bundles branch into a dense network of veins, where xylem vessels transport water and minerals to the leaf cells, and phloem sieve tubes carry manufactured sugars away from the leaf.

C) Leaves lack a dedicated internal transport network, instead relying on surface stomata to absorb nutrients directly from rainwater and morning dew.

D) The vascular system consists entirely of open air spaces in the spongy mesophyll that allow fluid nutrients to wash freely across the leaf exterior.

D	C	B	A

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Q24: Students will explore how different surfaces absorb solar energy at varying rates. (page: 41)

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THREE-DIMENSIONAL THINKING

Models can be used to represent **systems** and their interactions. How did this demonstration **model** energy transfer between the Sun and Earth? Support your reasoning by describing a real-life example in your Science Notebook.

Answer:

A chloroplast is an organelle highly specialized structurally to organize and maximize the chemical reactions of photosynthesis. Its structural features relate directly to its functions through a clear division of labor:

- **Double Membrane:** The outer and inner membranes enclose the organelle, regulating the movement of materials into and out of the chloroplast while keeping the photosynthetic enzymes isolated from the rest of the cell.
- **Thylakoids and Grana:** Inside the chloroplast are flat, disc-like membrane sacs called **thylakoids**, which are stacked together like plates to form structures called **grana** (singular: granum).
  - *Function:* The thylakoid membranes house the light-absorbing pigments (**chlorophyll**) and electron transport chains. This stacked structure dramatically increases the available surface area to capture maximum light energy for the **light-dependent reactions**.
- **Thylakoid Lumen:** The narrow space inside each thylakoid sac allows for the rapid accumulation of hydrogen ions (H^+), creating an electrochemical gradient used to synthesize ATP.
- **Stroma:** The fluid-filled space surrounding the grana.
  - *Function:* The stroma contains the necessary enzymes, dissolved carbon dioxide, DNA, and ribosomes required for the **light-independent reactions (Calvin Cycle)**, where sugars are assembled using the chemical energy generated in the thylakoids.

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which of the following correctly pairs a chloroplast's structural feature with its specific function during photosynthesis?

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A) The outer double membrane contains chlorophyll pigments that actively synthesize glucose from water vapor.

B) The fluid-filled stroma stores heavy mineral deposits to reflect excess solar radiation away from the plant stem.

C) The thylakoid membranes are stacked into grana to maximize surface area for light absorption, while the fluid stroma contains enzymes for building sugars.

D) The thylakoid lumen acts as an open channel that completely drains all enzymes out of the chloroplast to stop chemical reactions.

D	C	B	A

Q25: Students will apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (page: 161)

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للتواصل اضغط الرقم: 0566410429

COLLECT EVIDENCE

What are ways in which we can monitor or minimize human impact on Earth's water?

Answer:
We can monitor and minimize human impact on Earth's water through several effective methods:

- **Monitoring:** Regularly testing water quality (checking pH levels, dissolved oxygen, and contaminant levels) and using satellite imaging to track algal blooms or oil spills.
- **Minimizing:** Reducing chemical runoff by limiting agricultural fertilizers, improving wastewater treatment plants to filter out pollutants, enforcing strict regulations on industrial waste disposal, and practicing water conservation at home.

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Question: Which of the following is an effective combination of ways to monitor and minimize human impact on Earth's water?

- **A)** Increasing the use of chemical fertilizers and ignoring industrial runoff.
- **B)** Testing water quality parameters and improving wastewater treatment processes.
- **C)** Relying solely on rainfall to dilute pollutants without active testing.
- **D)** Expanding urban concrete surfaces to prevent water from absorbing into the ground.

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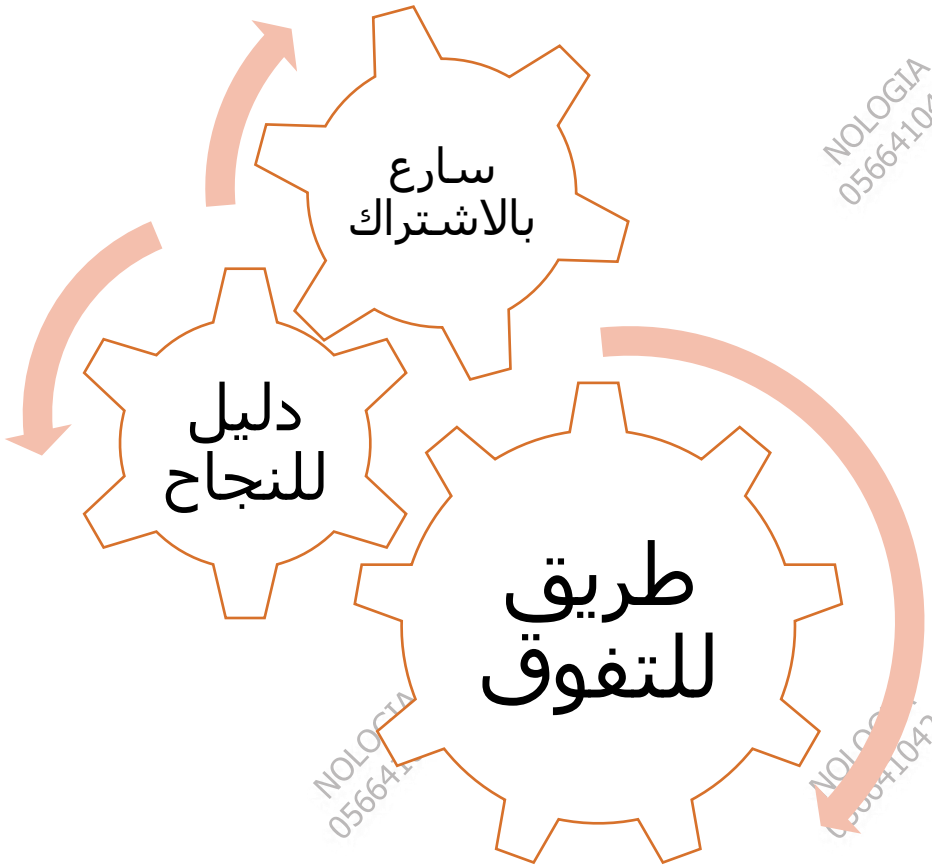
D	C	B	A



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مع أطيب التمنيات بالنجاح والتوفيق ...

النهاية ...