حل تجميعة صفحات الكتاب وفق الهيكل الوزاري منهج انسباير

موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف السادس ⇦ علوم ⇦ الفصل الأول ⇦ حلول ⇦ الملف

تاريخ إضافة الملف على موقع المناهج: 2024-11-17 12:40:52

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

التواصل الاجتماعي بحسب الصف السادس

صفحة المناهج الإماراتية على فيسبوك					
المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات	

المزيد من الملفات بحسب الصف السادس والمادة علوم في الفصل الأول

1	حل تجميعة مراجعة وفق الهيكل الوزاري
2	حل أسئلة الامتحان النهائي القسم الورقي منهج انسباير
3	أسئلة الامتحان النهائي القسم الورقي منهج انسباير
4	تجميعة أسئلة مراجعة وفق الهيكل الوزاري مع أسئلة امتحانات سابقة
5	حل تجميعة صفحات الكتاب وفق الهيكل الوزاري منهج انسباير

هيكل علوم انسباير

الصف السادس

2025-2024

الفصل الأول

Q1 page 17 &18

Energy and volume

Thermal expansion : التمدد الحراري increase in volume of material when particles motion increase .(move faster)

Thermal contraction : الانكماش الحراري when substance to take up less space (particles move slower)

Materials expand or contract when subjected to changes in temperature. Most materials expand when they are heated, and contract when they are cooled.

Thermal contraction

No.	Example
1	ENGINEERING Connection Investigate how thermometers use thermal contraction and thermal expansion to measure temperature.

When measuring hot objects, the mercury in the bulb expands and rises in the tube. When measuring cold objects, the mercury contracts and falls

Kinetic energy and Temperature :

Temperature is measures the average kinetic energy of the particles in a material .

The lower the kinetic energy ⟶ the lower of temperature ⟶ substance will contracts

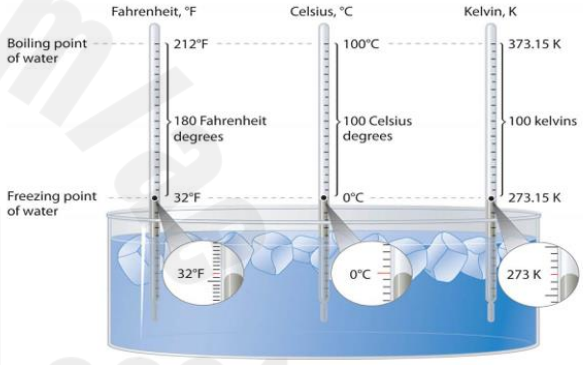
The higher the kinetic energy ⟶ the higher of temperature ⟶ substance will expand

إذا قلت الطاقة الحركية للجزيئات قلت سرعتها وحرارتها ويؤدي ذلك إلى إنكماشها حرارياً

إذا زادت الطاقة الحركية للجزيئات زادت سرعتها وحرارتها ويؤدي ذلك إلى تمددها حرارياً

Absolute zero, or 0 K, corresponds to the point at which molecular energy is at a minimum. The Kelvin scale is preferred in scientific work . Temperatures measured on the Kelvin as K, not °K.

الصفر المطلق هو الصفر في مقياس كلفن وهي تمثل أقل طاقة حركية يمكن أن تكتسبها الجزيئات ، ومقياس كلفن يستخدم أكثر في المجالات العلمية . وتقاس بالكلفن فقط بدون أن نقول درجة .



Temperature scales

Three different scales are commonly used to measure temperature:

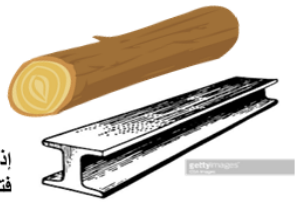
Fahrenheit (°F), Celsius (°C), and Kelvin (K). : مقاييس درجة الحرارة ثلاثة هي

The Celsius scale (°C) is used for common temperature measurements in most of the world. its zero point 0 °C being defined as the freezing point of water, and 100 °C as the boiling point of water .

المقياس الأكثر استعمالاً هو سيليزية حيث يبدأ من الدرجة صفر وهي درجة تجمد الماء وينتهي عند 100 درجة وهي درجة غليان الماء .

2	COLLECT EVIDENCE How could models of the particles in the wood and metal blocks show why one felt colder than the other?

Why do some materials feel colder than others ?



When particles are closer together , kinetic energy and speed of particles will decrease , then temperature decrease . إذا زاد تماسك الجزيئات قلت طاقتها الحركية وقلت حرارتها فتشعر أنها باردة

Q2 page 21 & 27

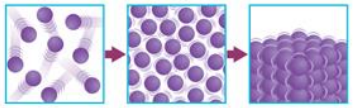
What evidence is there that particles in a solid move ?

Solid particles : the particles in solid do not have the same freedom to move around like liquid and gas particles . in solid the particles vibrate back and forth in place . they have low amounts of kinetic energy . expansion and contraction in solids does occur . it is less noticeable because the particles are holding each other in place .

جزيئات المادة الصلبة لا تتمتع بنفس الحرية مثل جزيئات المواد السائلة والغازية. فهي تهتز فقط ذهابًا وإيابًا في مكانها. و بالتالي فهي تمتلك طاقة حركية لكن يحدث لها التمدد والانكماش . إنه أقل وضوحًا .

3

Examine the model below. The particles are undergoing a change in energy.



4. Which statement best describes what is taking place in the images?

A The kinetic energy of the particles on the right is the greatest of the three images of particles.

B The particles in the middle have more kinetic energy than the particles on the right.

C The particles in the middle have less space between them than the particles on the left, which means they have more kinetic energy.

D Energy was added to the particles on the left to give them more energy than the particles in the middle.

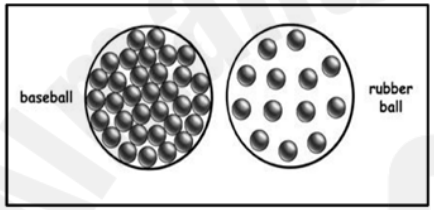
Energy and Mass :

Two substances have the same average kinetic energy be being at the same temperature . when one substance has more particles (more mass) ,so this substance has more energy .

<u>When Baseball and rubber ball have same temperature:</u>

Rubber ball has less mass so it has less energy .

Baseball has more mass (more particles) so it has more of energy .



Q3 page 74 & 83

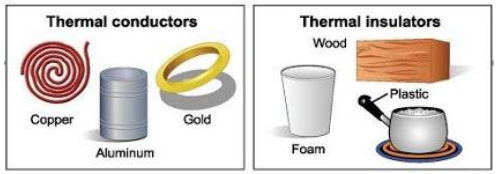
EXPLAIN
THE PHENOMENON

Kitchenware is made of many different types of materials. Have you ever thought about how those different materials transfer thermal energy? Use your ideas about kitchenware to make a claim about what affects how a material transfers thermal energy.

Some kitchenware made of wood so we can touch and catch without feeling heat > and some kitchenware made of metal it can transfer heat so we can cook

Conductors and Insulators : المواد الموصلة والمواد العازلة

- Materials that are good <u>conductors</u> of thermal energy(flow easily) are called thermal conductors. Metals are very good thermal conductors.
- Materials that are poor conductors of thermal energy (does not flow easily) are called thermal insulators. Gases such as air and materials such as plastic and wood are thermal insulators.



THREE-DIMENSIONAL THINKING

You can bake food in either a metal pan or oven safe glass. Which would require more energy to heat up? Which would cool down the fastest? Explain your reasoning.

A glass dish would require more energy to heat up because it has a higher specific heat. The metal pan would cool down the fastest because it has a low specific heat.

1. Mass

Mass means how many particles make up the substance/object.

Large mass = needs more thermal energy

Smaller mass = needs less thermal energy

Mass and thermal energy are **directly proportional**

Direct proportion

mass and temperature change are inversely proportional

Inverse proportion

2. Properties of Matter

1. Reflectivity

- Black objects absorb thermal energy
- White objects reflect thermal energy

2. Thin or Thick

- Thin objects heat up fast
- Thick objects heat up slower

3. Surface Area

- If an object has a lot of space to cover it with need more thermal energy.

3. Type of Material

All materials can transfer thermal energy.

But the rates will depend of the Specific Heat.

Specific Heat:

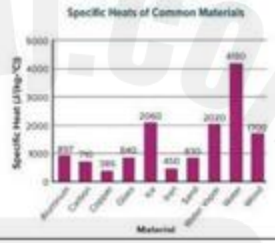
How long it takes an object to heat up and to cool down.

Scientific definition:

The quantity of heat required to raise the temperature of one gram of a substance by one Celsius degree

High S.H: needs lots of energy to heat up

Low S.H: needs less energy to heat up.



Conductors: allow lots of thermal energy to transfer

Insulators: allow little thermal energy to transfer

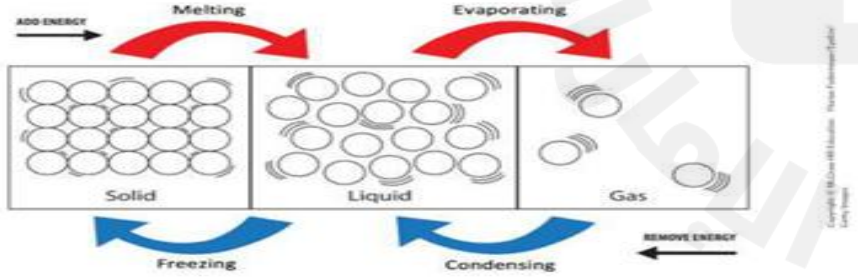
Q4 page 26 & 29

Summarize It!

1. **Relate** kinetic energy to the speed of particles.

No speed	no	kinetic energy
Greater mass	greater	kinetic energy
Greater speed	greater	kinetic energy

Model each statement above. Model the first statement as solid particles, the second statement as liquid particles, and the last statement as gas particles.



LESSON 2 LAUNCH

SCIENCE PROBES

What's the Difference?

Five friends were talking about the differences among solids, liquids, gases. They each agreed that the differences have to do with the pa in each type of matter. However, they disagreed about which differe determine whether the matter is a solid, liquid, or gas. This is what th

Gwyneth: I think it has to do with the number of particles.
George: I think it has to do with the shape of the particles.
Hoda: I think it has to do with the size of the particles.
Natalie: I think it has to do with the movement of the particles.
William: I think it has to do with how hard or soft the particles are.

تختلف حالات المادة من خلال حركة الجزيئات

الصلبة لا تتحرك لانها قريبه جدا فقط تهتز و لديها طاقة حركية قليلة جدا

Q5 and Q 9 page 65

Radiation is the transfer of energy through electromagnetic waves

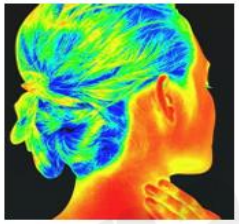
Electromagnetic waves include things like sun , fire and any warm object emit more of radiation .

الإشعاع : انتقال الحرارة عن طريق الموجات الكهرومغناطيسية مثل انتقال أشعة الشمس والنار وأي جسم ساخن .

Thermogram shows the temperature of an object by using colors .

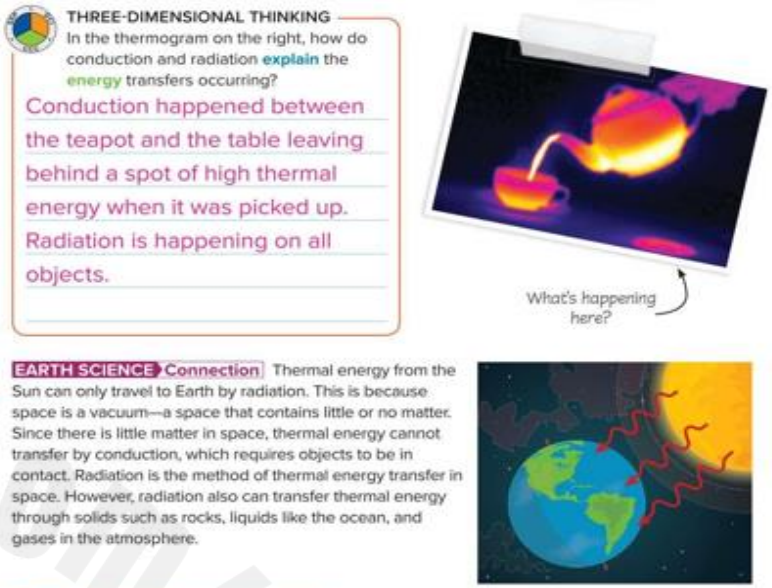
Hot object shown in white , red and yellows

Cooler objects are shown with blues , purples and black



الثيرموجرام تقنية تعرض حرارة الجسم بالإشعاع واستخدام الألوان.

اللون الأبيض والأحمر والأصفر تدل على الأجسام الساخنة واللون الأزرق والبنفسجي والأسود يدل على الأجسام الباردة



THREE-DIMENSIONAL THINKING

In the thermogram on the right, how do conduction and radiation **explain** the energy transfers occurring?

Conduction happened between the teapot and the table leaving behind a spot of high thermal energy when it was picked up. Radiation is happening on all objects.

What's happening here?

EARTH SCIENCE Connection Thermal energy from the Sun can only travel to Earth by radiation. This is because space is a vacuum—a space that contains little or no matter. Since there is little matter in space, thermal energy cannot transfer by conduction, which requires objects to be in contact. Radiation is the method of thermal energy transfer in space. However, radiation also can transfer thermal energy through solids such as rocks, liquids like the ocean, and gases in the atmosphere.

COLLECT EVIDENCE

How does radiation help explain the direction of thermal energy transfer between the toast and the environment? Record your evidence (B) in the chart at the beginning of the lesson.

Heat transfers from the toast to the environment.

Q6 page 51 & 52

Thermal Energy :The total energy of a substance

depends on:

- The kinetic energy or the speed of the particles (measured by temperature)
- The potential energy or the arrangement of the particles (determined by state of matter)
- The total number of particles in the substance (measured by the mass of the substance)
- the type of matter that makes up the substance

تعتمد الطاقة الحرارية على الطاقة الحركية من خلال درجة الحرارة
الطاقة المخزنة من خلال حالة المادة
مجموع عدد الجزيئات من خلال الكتلة
و تعتمد على نوع المادة التي صنعت منها المادة
و لا تعتمد على الحجم ابدا

3. A scientist was working with substance Y. Which of the following does not represent an increase in thermal energy?

A The temperature of the substance rose by 10°C.
B The volume of the substance increased by 10 mL.
C The mass of the substance increased by 10 g.
D The substance changed from a liquid into a solid.

Real-World Connection

4. **Explain** Think of a time that you noticed a change of state. Explain what happened using the terms *temperature*, *particle motion*, and *energy*.

Student answers will vary. Sample answer: ice melts when it is taken out of the freezer because the temperature rises, which gives the particles more and more energy. Eventually the energy is enough to break the attractive forces between particles.

5. **Compare** the amount of thermal energy required to melt a solid with the amount of thermal energy released when the same liquid becomes a solid.

The amount of energy released would be the same amount required to melt the substance. This is why the melting point and the freezing point are at the same temperature.

Q7 page 27

Three-Dimensional Thinking

Some students want to demonstrate thermal expansion. They devise the following method: A large black balloon is taken to a shady area and filled with cool air. The balloon is then taken to a bright, sunny location. After a short time, the balloon begins to expand.

3. What explanation does this investigation verify?

A A balloon filled with cool air will rise into the atmosphere.

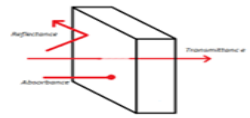
B As particles gain energy, the material takes up more space.

C The air inside the balloon lost energy.

D The sunlight caused the air in the balloon to contract.

Q8 page 83

How factors affect how thermal energy is transferred between substances :

Reflectivity absorbency 	Reflection is when energy bounce off a surface . قدرة المادة على عكس الموجات الضوئية Absorbency : قدرة المادة على امتصاص الموجات الضوئية White substance reflects all radiated المواد البيضاء تعكس كل الأشعة الساقطة عليها . Black object absorbs all radiated light energy المواد السوداء تمتص الضوء الساقط عليها
Thickness 	When Larger thickness increase take more time to heat object or to cooling كلما زاد سُمك المادة كلما زاد وقت تسخينها وكذلك وقت تبريدها Thickness relates to the mass of substance سمك المادة مرتبط بكتلة المادة أي كلما زادت كتلة المادة زاد الوقت المستغرق لتسخينها أو تبريدها
Surface area 	When surface area increase rate of heat increase كلما زادت مساحة السطح كلما كان التسخين أسرع

Q10 page 12 & 14

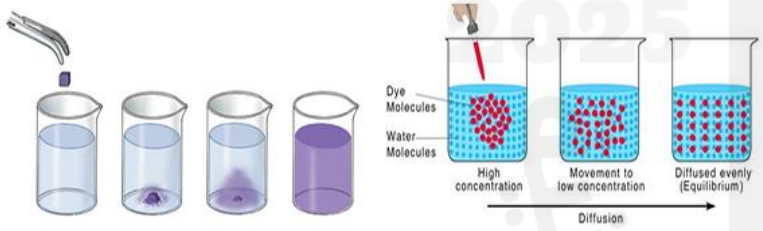
In liquids, particles are quite close together and move with random motion throughout the container. Particles move rapidly in all direction.

جزيئات المادة السائلة تتحرك في كل الاتجاهات بشكل عشوائي

Diffusion الانتشار: is the net movement of particles from a region of higher concentration to a region of lower concentration.

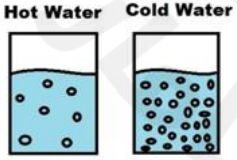
until its concentration becomes equal (same) throughout a space.

حركة الجزيئات من المنطقة الأعلى تركيزاً إلى المنطقة الأعلى تركيزاً حتى يتساوى تركيز المواد في الوعاء

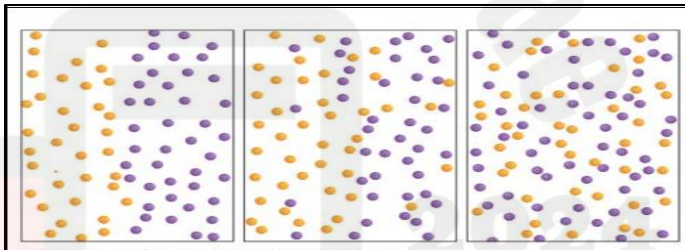


Energy is the ability to cause change

Higher temperatures increase the energy and therefore the movement of the particles, increasing the rate of diffusion(fasting) . Lower temperatures decrease the energy of the particles, thus decreasing (slowing) the rate of diffusion.
كلما زادت الحرارة زادت سرعة الانتشار والعكس صحيح

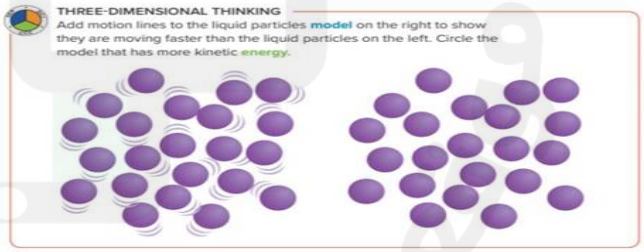


Kinetic energy is the energy an object has because of its motion. الطاقة الحركية التي يكتسبها الجسم بسبب حركته



What **process** does the image above represent?

diffusion



We can use diffusion to understand how fast the particles move.

The faster the substance diffuses, the faster the particles are moving.

When we add heat energy, the particles move faster.

This means the particles have more kinetic energy (movement energy).

ظاهرة الانتشار نستطيع من خلالها التعرف على سرعة حركة الجزيئات

ينتشر ملون الطعام بسرعة في الماء الساخن لان طاقة حركية اكثر فتتحرك الجزيئات بشكل اسرع و بمسافات متباعدة

اما في الماء البارد يكون الانتشار بطيئا جدا لان طاقة حركية قليله و سرعة الجزيئات بطيئة و المسافة بينهم تكون قليلة

Q11 page 103,111

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.
[redacted] I think the water is in the air around us.
Carli: I think the Sun changed it into something else.

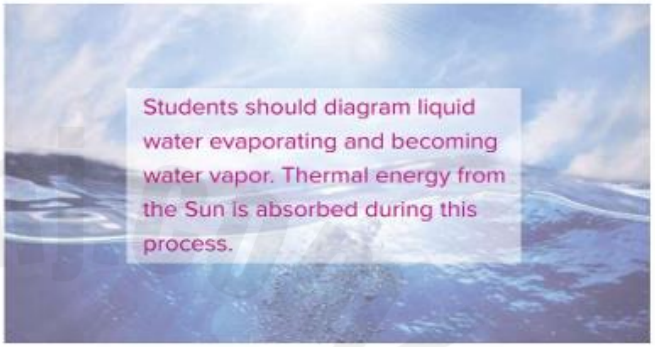
Circle the student you most agree with. Explain why you agree with that student.

الماء يتبخر و يصعد الو الجو بسبب حرارة الشمس

Water will evaporate and rise into atmosphere because the heat that come from sun

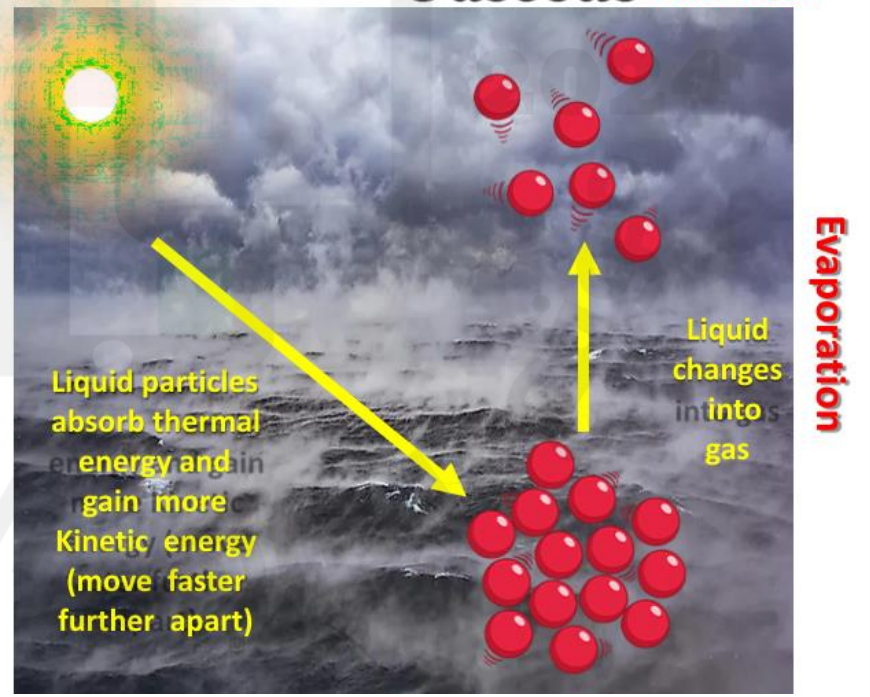
PHYSICAL SCIENCE Connection Water does not actually disappear from a puddle or a cloud. It evaporates. **Evaporation** is the process by which a liquid, such as water, changes into a gas. When the Sun shines on a body of water, water near the surface absorbs thermal energy and becomes warmer. As a molecule of water absorbs energy, it begins to vibrate faster. When it has enough energy, it breaks away from other water molecules. It rises into the atmosphere as a particle of gas called water vapor. Like other gases in the atmosphere, water vapor is invisible.

THREE-DIMENSIONAL THINKING
On the figure below, **model** the process that changes liquid water to water vapor. Label the transfer of **energy** that takes place during this process.



How does **energy** from the Sun drive the cycling of **matter**?

Thermal energy from the Sun causes liquid water on or near Earth's surface to evaporate and become water vapor.



Q12 page 163

Albedo and Temperature

The measure of the reflectivity of a surface is termed albedo.

يسمى قياس انعكاسية السطح بـ البيدو.

Light colored, reflective surfaces like ice or thick cloud have high albedo.

الأسطح العاكسة ذات الألوان الفاتحة مثل الجليد أو السحابة السميكة لها البيدو عال.

Dark surfaces such as soil have low albedo levels because they do not reflect much sunlight.

الأسطح المظلمة مثل التربة لديها مستويات منخفضة من البيد و لأنها لا تعكس الكثير من أشعة الشمس.

The temperature of the atmosphere is greatly affected by the albedo of the hydrosphere, geosphere, and biosphere.

تتأثر درجة حرارة الغلاف الجوي بشكل كبير بالبيد و الغلاف المائي والغلاف الأرضي والمحيطالحيوي.

The more reflective a surface is, the less it absorbs solar energy.

كلما كان السطح أكثر انعكاسا ، كلما قل امتصاصه للطاقة الشمسية.

Low Albedo	High albedo
-low Reflect -High absorbs -High temperature	-High Reflect -low absorbs -low temperature

Some solar energy is absorbed by living things such as plants.

يتم امتصاص بعض الطاقة الشمسية من قبل الكائنات الحية مثل النباتات

convert sunlight into usable chemical energy in the form of sugars.

تقوم النباتات بتحويل ضوء الشمس إلى طاقة كيميائية قابلة للاستخدام في شكل سكريات

How does the reflectivity of a surface (albedo) affect its temperature?

B) Surfaces with low albedo tend to be warmer because they absorb more heat.

Q13 page 176

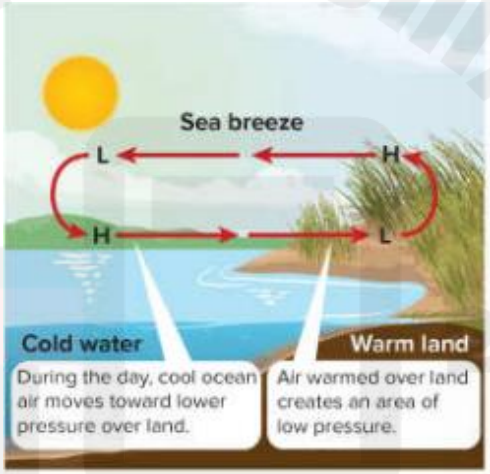
Differences in air pressure cause air to flow.

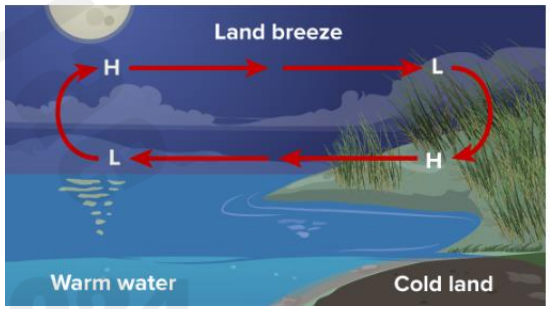
Wind is the movement of air from areas of high pressure to areas of low pressure.

The following activity explores two types of local winds – sea breezes and land breezes.

2. Predict whether a sea breeze could occur at night. Explain.

Answer: A sea breeze could only occur at night if the land stayed warmer than the water.





At night, the water is warm and the land is cool.

At night, the land cools more quickly than the water. Therefore, the air above the land cools more quickly than the air over the water. As a result, an area of lower pressure forms over the warmer water.

The Sun's energy warms Earth unevenly.

Warm air rises and puts less pressure on Earth than cooler air.

الهواء الدافئ دائما يرتفع ويصعد إلى أعلى. لان ضغط قليل وكثافة قليلة

Cold air sinks and puts more pressure on Earth. الهواء البارد دائما ينزل على الأسفل لان كثافته عالية وضغط مرتفع

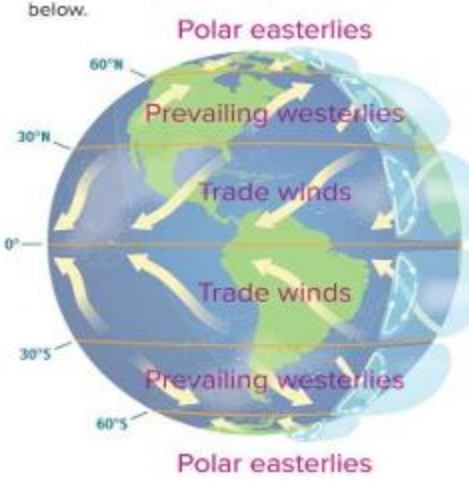
These temperature differences creates differences in air pressure.

This creates local and global winds. اختلاف في درجات الحرارة يؤدي الى اختلاف في الضغط بالتالي ينتج رياح محلية و عالمية

Q14 page 178, 179

Global convection cells help generate the three basic wind systems at Earth's surface in each hemisphere: **trade winds, westerlies and polar easterlies.**

1. Label the image with the global wind systems based on the descriptions below.

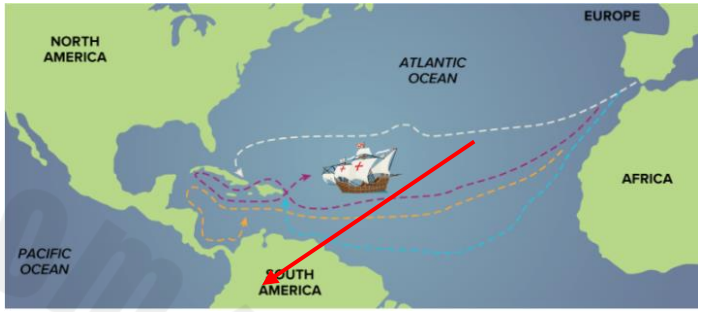


- The **polar easterlies** are cold winds that blow from east to west near the North Pole and the South Pole. Polar easterlies begin as dense polar air that sinks.
- The **prevailing westerlies** are steady winds that flow from west to east between latitudes 30°N and 60°N, and 30°S and 60°S.
- The **trade winds** are steady winds that flow from east to west between 30°N latitude and 30°S latitude.

2. In which direction do you think weather generally moves across the United States? Why?

Most of the continental United States falls in the westerlies wind belt. The westerlies flow from west to east causing weather patterns to typically move west to east.

3. HISTORY Connection The trade winds were named by sailors, who took advantage of these winds to sail their ships across the oceans. It is the northeast trade winds that carried ships from Europe to the New World. Label the direction of the trade winds on the map below.



Q15 page 175, 186

Imagine you are entering a large, air-conditioned building on a hot summer day. As you open the door, you feel cool air rushing past you out of the building. **Model** why you think this happens in the space below.

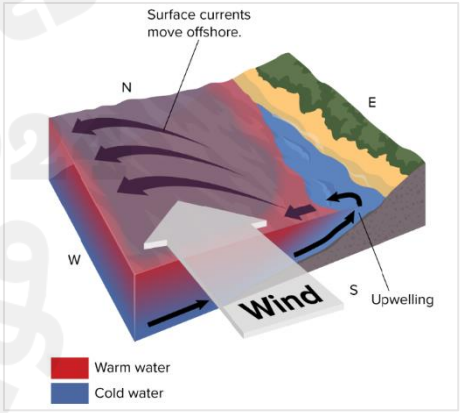
تخيل أنك تدخل مبنى كبيرًا ومكيفًا في يوم صيفي حار. عندما تفتح الباب، تشعر بالهواء البارد يندفع نحوك خارج المبنى. قم بتوضيح سبب حدوث ذلك

Answer: Cool air in the building moves outside because the air pressure is higher inside the building than outside.

• الهواء البارد الموجود في المبنى يتحرك إلى الخارج لأن ضغط الهواء البارد داخل المبنى أعلى منه خارجه

- ✓ 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 water to move.

- ✓ As surface current move towards poles, they cool and sink.
- ✓ Cold, dense water is brought back up by upwelling.
- ✓ Upwelling is the vertical movement of water toward the ocean's surface.



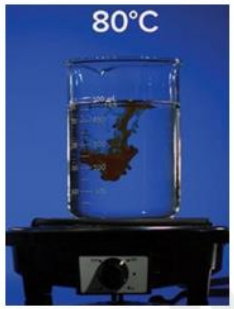
- ✓ Upwelling occurs when wind blows across the ocean's surface and pushes water away from an area.
- ✓ **Deeper, colder water is forced to the surface.**
- ✓ This deeper, colder water is nutrient rich and supports large populations of fish, algae and other organisms.

How does wind influence the movement of water?

B) By creating ocean currents and surface waves

الأسئلة الكتابية

page 14, 26, 27, 43

		
Kinetic energy		
Speed of particles		
Diffusion rate		

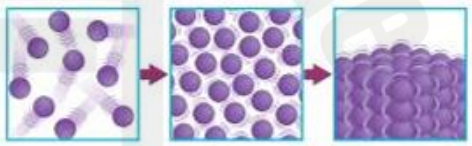
Complete

More mass ⟶ ..... kinetic energy

less speed ⟶ ..... kinetic energy

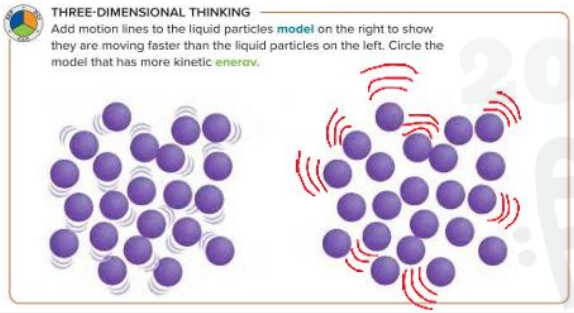
Zero speed ⟶ ..... kinetic energy

No speed ⟶	no	kinetic energy
Greater mass ⟶	greater	kinetic energy
Greater speed ⟶	greater	kinetic energy



4. Which statement best describes what is taking place in the images?

The particles in the middle have more kinetic energy than the particles on the right.



كلما زادت الخطوط حول الجزيئات زادت سرعته

Kinetic energy and Temperature :

Temperature is measures the average kinetic energy of the particles in a material .

The lower the kinetic energy ⟶ the lower of temperature ⟶ substance will contracts

The higher the kinetic energy ⟶ the higher of temperature ⟶ substance will expand

إذا قلت الطاقة الحركية للجزيئات قلت سرعتها وحرارتها ويؤدي ذلك إلى إنكماشها حرارياً

إذا زادت الطاقة الحركية للجزيئات زادت سرعتها وحرارتها ويؤدي ذلك إلى تمددها حرارياً

Kinetic energy in gases is greater than in liquids and solids because the distance between molecules is large. Kinetic energy in solids is very small because there is no distance between molecules.

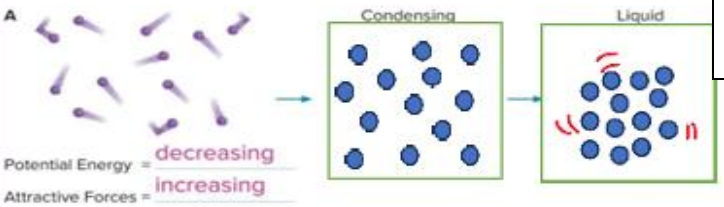
الطاقة الحركية في الغازات أكبر من السائلة و الصلبة لان المسافة بين الجزيئات كبيرة / الطاقة الحركية في المادة الصلبة قليلة جدا لان لا يوجد مسافة بين الجزيئات.

THREE-DIMENSIONAL THINKING

For each example:

1. Complete the **model** of the particles.
2. Indicate how potential **energy** is changing (increasing or decreasing).
3. Indicate how the attractive forces are changing (increasing or decreasing).

A

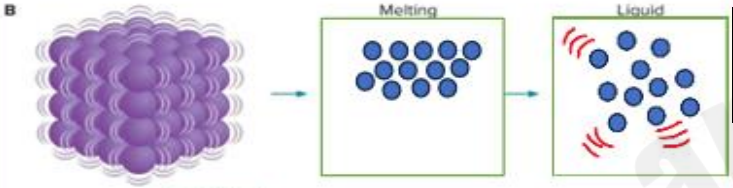


Potential Energy = decreasing

Attractive Forces = increasing

تغيرت حالة المادة من الغازية الى السائلة فقلت المسافة ف قلت الطاقة المخزنة و زادت قوة التجاذب بين الجزيئات

B

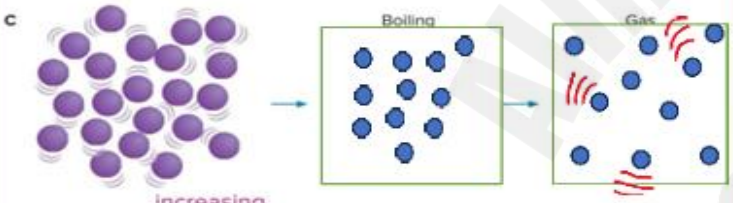


Potential Energy = increasing

Attractive Forces = decreasing

تغيرت حالة المادة من الصلبة الى السائلة فزادت المسافة ف زادت الطاقة المخزنة و قلت قوة التجاذب بين الجزيئات

C



Potential Energy = increasing

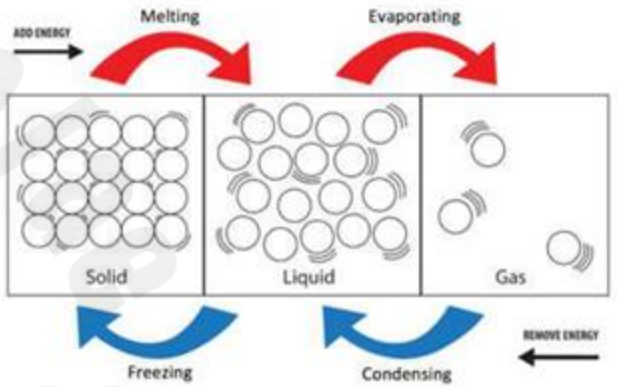
Attractive Forces = decreasing

تغيرت حالة المادة من السائلة الى الغازية فزادت المسافة ف زادت الطاقة المخزنة و قلت قوة التجاذب بين الجزيئات

Potential energy depend on 1- distance between particles()and2- when the state matter change

تعتمد الطاقة الكامنه او المخزنة على المسافة بين الجزيئات كلما زادت المسافه بينهم زادت الطاقة الكامنه و تزيد اذا تغيرت حالة الماده من الصلبة الى السائلة و من السائلة الى الغازية لان سوف تزداد المسافة بين الجزيئات

كلما زادت قوة التجاذب بين الجزيئات قلت الطاقة الكامنه



page 53, 60, 65, 71, 73, 83,89

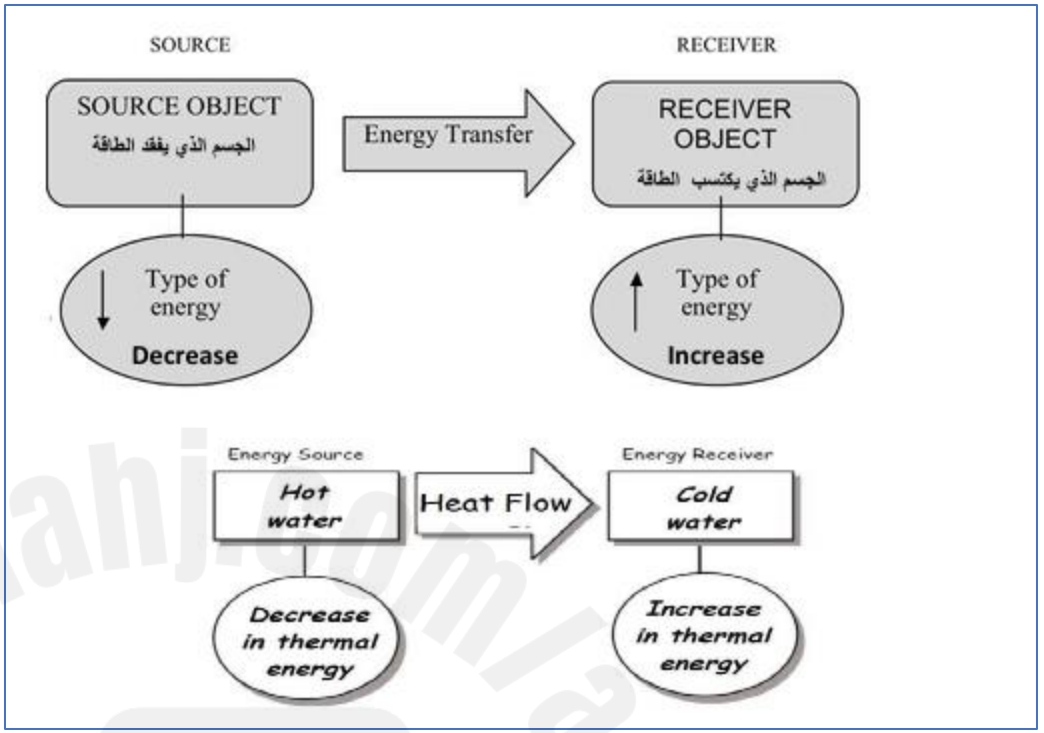
Janey had a bowl of hot soup for lunch. The soup was so hot she decided to put it in the refrigerator for a few minutes to cool it. What happened to cool the soup so Janey could eat it?

A. The heat moved from the soup to the cold air in the refrigerator.
B. The cold in the refrigerator moved into the hot soup.
C. No heat or cold moved out of or into the soup. It just cooled off.

Circle the answer that
Describe what happe

دائما تنتقل الحرارة من الجسم الدافئ الى الجسم البارد

تنتقل الحرارة من الشوربة الحارة او الدافئة الى الهواء البارد في الثلاجه



Heat transfer from ..... to .....

Temperature of soap ..... And temperature of surrounding air .....

THREE-DIMENSIONAL THINKING
In the figure above, the water in the ice cube tray is 10°C. It is placed in the freezer at 0°C. Add arrows to the figure to model the direction of energy transfer.

transfers from the **warmer water in the tray** to the **colder environment in the freezer**.

يبرد الماء من خلال نقل الحرارة من الماء الدافئ الى الهواء البارد في الفريزر

الحرارة تنتقل من اعلى حرارة الى اقل حرارة / من الدافئ الى البارد

تنتقل الحرارة من الدافئ الى البارد / من اعلى حرارة الى اقل حرارة

Heat is the thermal energy that is transferred between regions with different temperatures (flowing from the high-temperature region to the low-temperature region).

الحرارة انتقال الطاقة الحرارية من المنطقة الأعلى في درجة الحرارة إلى المنطقة الأقل في درجة الحرارة

substance can only be cooled by allowing some of its energy to be transferred to another substance . for example , liquid water transfers energy to the surrounding air in a freezer .

التبريد يتم عن طريق السماح للطاقة الحرارية بالانتقال من الجسم (سحب الطاقة الحرارية من الجسم)

COLLECT EVIDENCE

How does the type of material in the kitchenware affect how it transfers thermal energy? Record your evidence (B) in the chart at the beginning of the lesson.

Some materials, such as metals, conduct thermal energy easily. Other materials, such as wood or plastic, do not. The amount of energy needed to change the temperature of a material by a given amount depends on several factors.

are shown with blues, purples, and black.

THREE-DIMENSIONAL THINKING

In the thermogram on the right, how do conduction and radiation **explain** the **energy** transfers occurring?

Conduction happened between the teapot and the table leaving behind a spot of high thermal energy when it was picked up. Radiation is happening on all objects.

وضح توصيل الحرارة بالتوصيل و بالاشعاع

What's happening here?

ENCOUNTER THE PHENOMENON | Why is this kitchenware made out of so many different materials?

لان بعض الأدوات يجب ان تكون موصله للحرارة لكي ينضج الطعام مثل القدر

و بعض المواد يجب ان تكون عازلة لكي نستطيع مسكها او نحرك الأكل بها

THREE-DIMENSIONAL THINKING

You can bake food in either a metal pan or oven safe glass. Which would require more **energy** to heat up? Which would cool down the fastest? Explain your reasoning.

A glass dish would require more energy to heat up because it has a higher specific heat. The metal pan would cool down the fastest because it has a low specific heat.

يمكنك خبز الطعام إما في مقلاة معدنية أو زجاج آمن للاستخدام في الفرن. ما الذي يتطلب المزيد من الطاقة للتسخين؟ أيهما من شأنه أن يبرد بشكل أسرع؟

سيتطلب الطبق الزجاجي المزيد من الطاقة للتسخين لأنه يحتوي على حرارة نوعية أعلى/ و سوف يبرد بشكل ابطا.

سوف يبرد الوعاء المعدني بشكل أسرع لأنه يحتوي على حرارة نوعية منخفضة.

الكوب من المعدن يسخن اسرع

لذا يجب استخدام كوب عازل للحرارة مثل سيراميك

Adita and his friends were learning about insulators and conductors in school. They all agree that metal, a conductor, will heat up more quickly than ceramic, an insulator. They have different ideas about how the materials will cool. This is what each friend said:

Adita: I think the ceramic will cool quicker than the metal.

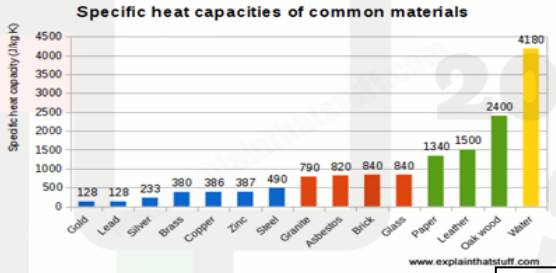
Niabi: I think the metal will cool quicker than the ceramic.

Irene: I think they will both cool at the same rate.

Rafi: I think conductors and insulators have nothing to do with how a material cools, just how a material heats up.

specific heat is the amount of the thermal energy required to increase the temperature of 1 kg of a material by 1 °C

الحرارة النوعية هي كمية الطاقة الحرارية المطلوبة لزيادة درجة حرارة واحد كيلوجرام من المادة بمقدار واحد درجة سيليزية .



High S.H: needs lots of energy to heat up

Low S.H: needs less energy to heat up.

المادة التي لها حرارة نوعية عالية تسخن و تبرد و ببطئ مثل الماء

المادة التي لها حرارة نوعية منخفضة تسخن و تبرد بسرعه مثل المعادن و الرمل

4. The specific heat of air is 1.0 J/g•K and the specific heat of copper is 0.4 J/g•K. Which statement describes how each material would affect the amount of thermal energy transferred?

B Copper transfers thermal energy the quickest.

	Air	copper
Specific heat	.....	Low
conductivity	insulator	.....
Time to get cool		

page 103, 111, 112, 113,116

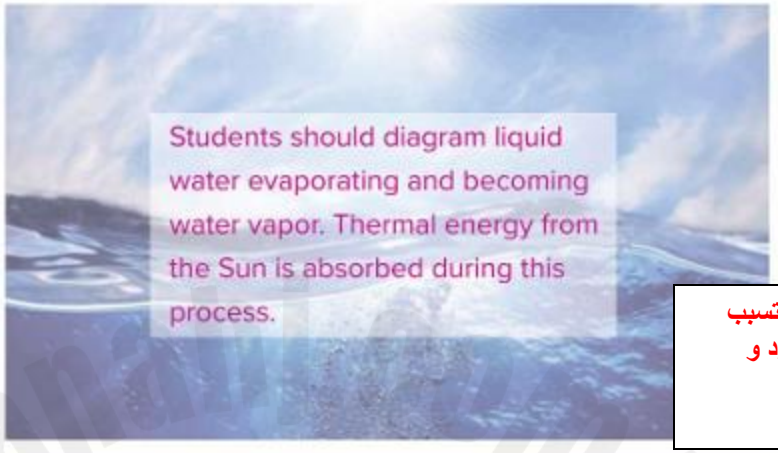
Four friends noticed a large puddle on the sidewalk when they walked to school in the morning. When they walked home, the puddle was gone. They wondered what happened to the water that was in the puddle.

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.

Circle the student you most agree with. Explain why you agree with that student.

THREE DIMENSIONAL THINKING

On the figure below, **model** the process that changes liquid water to water vapor. Label the transfer of **energy** that takes place during this process.



How does **energy** from the Sun drive the cycling of **matter**?

Thermal energy from the Sun causes liquid water on or near Earth's surface to evaporate and become water vapor.

الشمس مهمة في دورة الماء , لانها تسخن الماء و تسبب في تبخرها و بالتالي يصعد البخار الى اعلى و ثم يبرد و يكون السحب و ثم ينزل المطر

The molecules move and vibrate so quickly that they escape into the atmosphere as molecules of water vapor.

التبخير تحول المادة السائلة إلى الحالة الغازية عند امتصاص طاقة حرارية تجعل جزئيات المادة السائلة تتحرك أسرع حتى تتحول إلى غاز

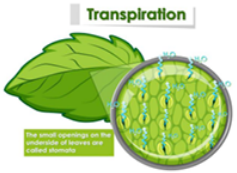
Heat from the sun, or thermal energy causes the evaporation process.

About 90 percent of water in the atmosphere is produced by evaporation from water bodies, while the other 10 percent comes from:

90 % من المياة في دورة الماء مصدرها المسطحات المائية ولكن 10% تأتي من :

- transpiration from plants عملية النتح
- cellular respiration of organism عملية التنفس
- water stored in organism . الماء المخزن في أجسام الكائنات الحية

During the process of **transpiration**, water molecules in the plant tissues are removed from the aerial parts of the plants.

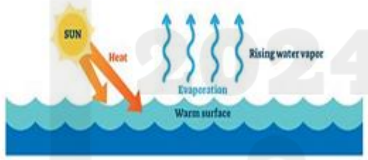


النتح : خروج الماء الزائد من أنسجة النبات الهوائية عن طريق الثغور

Evaporation : عملية التبخير

Evaporation happens when a liquid substance becomes a gas

When water is heated (absorbs thermal energy) , it evaporates.



Organism also release water vapor to the atmosphere when they breathe out. This is called **cellular respiration**. organisms combine oxygen with foodstuff molecules then as waste products, carbon dioxide and water.

الكائنات الحية تطلق بخار الماء أثناء عملية التنفس ويتم ذلك عن طريق تكسير الطعام واتحاده مع الأكسجين ليخرخ ثاني أكسيد الكربون والماء على شكل فضلات للغلاف الجوي .

water stored in the tissues of organisms released back to environment when organism die and decompose

الماء المخزن في أجسام الكائنات الحية يخرج بعد موتها وتحللها .

COLLECT EVIDENCE

Why do clouds and other bodies of water "disappear?"

Some water evaporates before precipitation.

COLLECT EVIDENCE

How else does water enter the atmosphere?

About 90 percent of water in the atmosphere is produced by evaporation from water bodies, while the other 10 percent comes from transpiration from plants. There is always water in the atmosphere

How water evaporate (reappear) ?

Dew, water beads on outside of cup filled with cold water.

تظهر البخار ليلا من خلال ظاهرة الندى او على الزجاجة الباردة تظهر قطرات ماء عليها

Condensation is the opposite of evaporation. It is the process where water vapor in the atmosphere is changed back into liquid water. As water vapor moves to the upper atmosphere, it begins to cool off. Clouds

form when the rising air and water vapor cool off and clump together. It takes millions of water vapor molecules to form a droplet of water that weighs enough to fall to the ground.

التكثيف عملية تحول المادة الغازية إلى الحالة السائلة بالتبريد

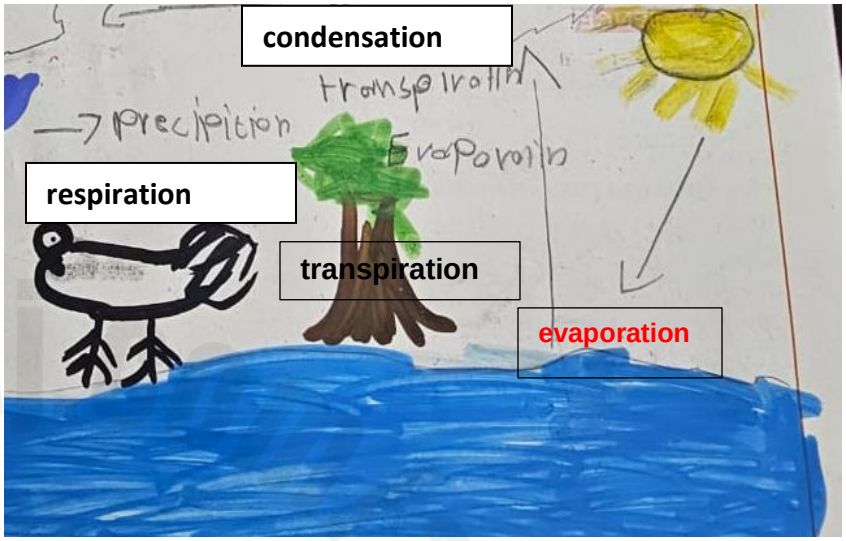
بخار الماء في الأعلى يبرد فتتكون السحب وعندما تثقل السحب ينزل الماء على شكل قطرات من المطر .

Crystallization is the process by which a substance becomes a crystalline solid, sort of like freezing.

التبلور (تكوين بلورات البَرَد) هي عملية تحول المادة السائلة إلى الحالة الصلبة بزيادة التبريد

THREE-DIMENSIONAL THINKING

Model the three ways water enters the atmosphere. Use arrows and labels to show the transfer of **energy** that drives the cycling of water from Earth's surface to Earth's atmosphere.



THREE-DIMENSIONAL THINKING

On the figure below, **model** the process that changes water vapor to liquid water. Label the transfer of **energy** that takes place during this process.

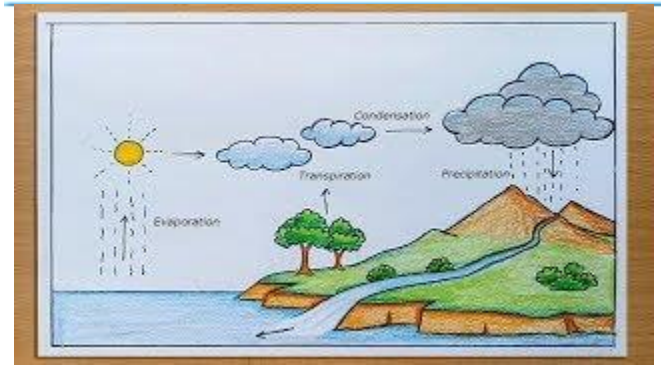
COLLECT EVIDENCE

How do clouds form?

C. Answers may vary. Sample answer: When water vapor in the atmosphere cools, it loses thermal energy and condenses into liquid water in a process called condensation.

تتكون السحب من خلال صعود بخار الماء الى اعلى ثم تبرد و تفقد طاقتها الحرارية بواسطة عملية تكثف و يتكون سحب

Sketch Create a concept sketch that models how water cycles into and through the atmosphere. To construct a concept sketch, begin by listing the processes and relationships you want to describe. Then, draw your sketch and write complete sentences describing the sketch. Include labels for the energy that drives water cycling, the state that water is in at each step (solid, liquid, or gas), and the transfer of thermal energy. Be creative!



Three-Dimensional Thinking

Jorge wanted to model two processes that cycle water in the atmosphere for a class project. He began by filling a self-sealing plastic bag half-full of water. After sealing the bag, he taped it to a sunny window. After a few hours, water beaded along the inside of the bag.

2. Which processes are represented by Jorge's model?

A transpiration and respiration

B condensation and crystallization

C respiration and evaporation

evaporation and condensation

Examine the photo below.

3. Which statement best describes the transfer of energy in the photo above?

A When water changes state from a liquid to a solid, thermal energy is absorbed.

B When water changes state from a solid to a liquid, thermal energy is absorbed.

C When water changes state from a liquid to a solid, thermal energy is released.

When water changes state from a solid to a liquid, thermal energy is released.

Jane was drinking a glass of water. She asked her father where the water came from. Her father said it was groundwater that was pumped up by their well. Jane wondered what the water looked like underground. This is what her family said:

Mom: I think it looks like a huge ocean underground.

Dad: I think it looks like a small lake underground.

I think it seeps into little holes or spaces between the soil and the rocks.

Annie: I think it looks like a long, underground tube filled with water.

Philip: I think it looks like an underground volcano with water spurting out of the top.

Which person do you agree with the most? Explain your ideas about groundwater.

ENCOUNTER THE PHENOMENON

How might a single drop of water travel from a cloud to a stream to an aquifer?

Water falls to Earth's surface as precipitation in the form of rain, snow, sleet, or hail. The water can enter the ocean or other bodies of water, or seep into the ground to become groundwater.

COLLECT EVIDENCE

Why does water on Earth's surface flow and where does it go?

...t gravity pulls water downhill on Earth's surface in streams and also down into the ground as groundwater. Water flows into and out of streams via precipitation and groundwater flow. Eventually it enters the ocean.

1. **Organize** Create a graphic organizer that illustrates the role of gravity in keeping water moving on Earth. Include at least four places where water is stored and the state that water is in at each reservoir.

Gravity
(force pulling things down to earth)

Precipitation:
Rain, hail, sleet or snow (different states of water liquid or solid) is pulled down by gravity.

Runoff:
Gravity allows water to move down towards the reservoirs for storage in the oceans, rivers, glaciers or underground

On Earth's surface, **gravity moves water from higher to lower areas.**

The water can enter rivers and streams, and eventually reaches lakes or oceans.
Water is constantly moving through the water cycle.

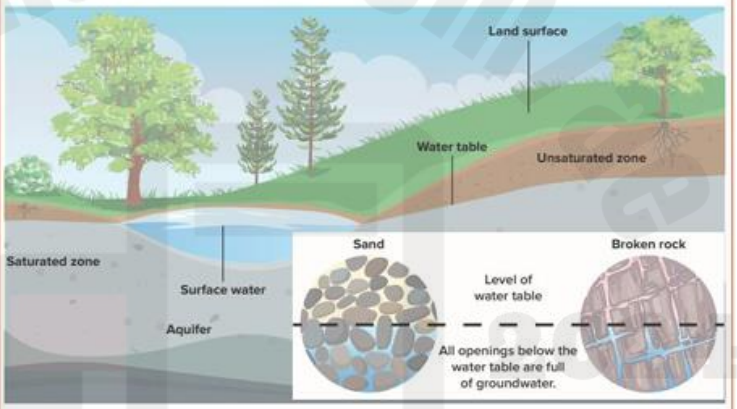
But most water remains in certain storage areas for relatively long periods of time.
A storage area is called a **reservoir.**

Reservoirs can be oceans, lakes, glaciers and ice caps, and groundwater.

2. Which person do you agree with the most?
   - A Marco: Wind drags water particles along in the stream.
   - B Selma: Gravity causes water in the stream to move downhill.
   - C Brock: The Sun warms the stream causing it to flow.
   - D Chen: The stream moves because of its velocity.

THREE-DIMENSIONAL THINKING

1. Draw arrows on the figure below to **model** how you think groundwater might flow.



2. Read the first paragraph on the following page and revise your arrows as needed.
3. What force **causes** groundwater to flow?

Precipitation

- Energy from the sun causes water on Earth's surface to evaporate into the atmosphere.
- The temperature in the atmosphere is lower so it causes the water vapor to condense.
- Once the water vapor condenses or cystalizes it will form a cloud.
- The liquid that falls is called precipitation.

The 4 types of precipitation are: rain, hail, sleet and snow

Page 145, 147, 15, 59, 164, 16

ENCOUNTER THE PHENOMENON | What effect does the Sun have on water?

the Sun's energy warms different parts of Earth.

Four friends are at the beach on a sunny day. They notice that the sand is much warmer than the ocean water. They wondered why the temperatures of these surfaces differed even though they are exposed to the same amount of sunlight.

I think that land warms faster than the ocean because water requires more energy to be heated.

is more attracted to solid surfaces than liquid surfaces.

Max: I think the land warms faster than the ocean because water is clear and sunlight can pass through it more easily than the land.

Talia: I think the land warms faster than the ocean because water depth increases away from the shore.

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 with a real-life example.

Energy from the sun is transferred to Earth.
DIfferent areas of Earth receive different amounts of this energy.
Some areas receive more and others less.

The sun is able to transfer enough energy to melt snow and ice on Earth's surface.

The big idea is that land and water absorb and release energy from the Sun at different rates. Water absorbs and releases thermal energy more slowly than land because water has a higher specific heat. That means ocean water requires more thermal energy to raise its temperature than land

الماء يحتاج الى طاقة اكبر لكي يسخن لان لديه طاقة نوعية عالية / فيسخن ببطئ .

عكس الأرض و الرمال فهي تملك طاقة نوعية منخفضة تحتاج حرارة اقل لكي تسخن فتسخن بسرعة ، لذا ني الجو الحار نشعر ان الرمل اسخن بكثير من ماء البحر

THREE-DIMENSIONAL THINKING

You just investigated how thermal energy from land and water influence the atmosphere. Now, use these cause-and-effect relationships to predict how land, water, and air will absorb and release thermal energy in the following scenarios.

1. Suppose you go to the beach in the morning of a sunny summer day. **Explain** the rate at which thermal energy is absorbed by the water, sand, and air during the day.

Sample answer: The sand will absorb thermal energy at a faster rate than the water. The air above the land will absorb thermal energy at a faster rate than the air above the water.

2. **Explain** why the flow of energy between air and sand is different than that between air and water as thermal energy is absorbed from day to night.

Sample answer: Water has a higher specific heat than land. Air has a lower specific heat compared to land and water. Therefore, energy is absorbed at a faster rate between land and air than between water and air. Land and water highly influence the temperature of air.

الماء يحتاج الى طاقة اكبر لكي يسخن لان لديه طاقة نوعية عالية / فيسخن ببطئ .

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3. As the Sun begins to set, predict the effect on the rate at which the air, water, and sand will cool.

Sample answer: The sand will release thermal energy at a faster rate than the water. The air above the land will release thermal energy at a faster rate than the air above the water.

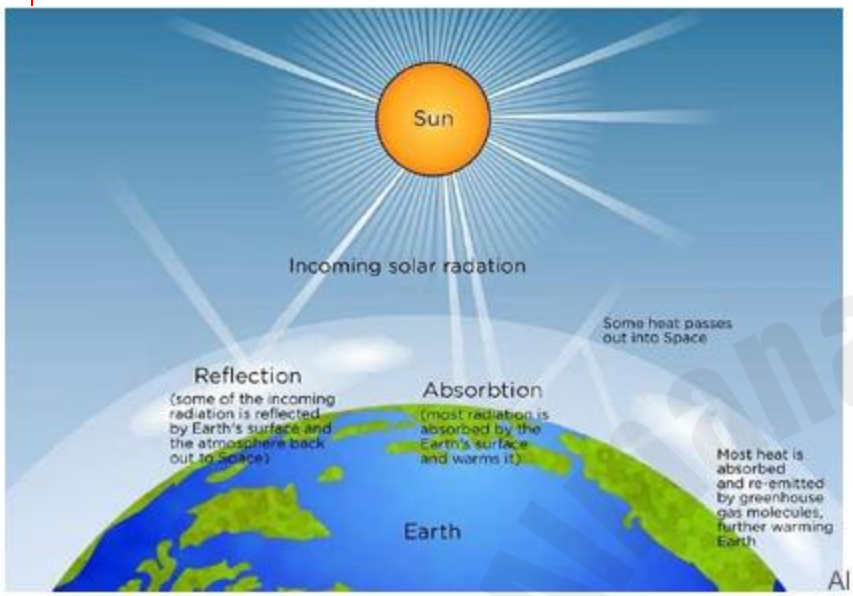
THREE-DIMENSIONAL THINKING

For Earth to radiate thermal energy, it must first absorb thermal energy. However, some natural surfaces on Earth and in the atmosphere are more reflective than absorbent. Examine the photo below.

Use the photo to describe areas of high and low albedo. **Explain** your reasoning.

Sample answer: The snow peaked mountain tops have a high albedo compared to the darker mountain rocks. This is because lighter colored objects are more reflective than darker colored objects.

Diagram Create a visual to show how energy is transferred from the Sun to Earth and the atmosphere. Include how features on Earth's surface affect this transfer of energy.



Al M

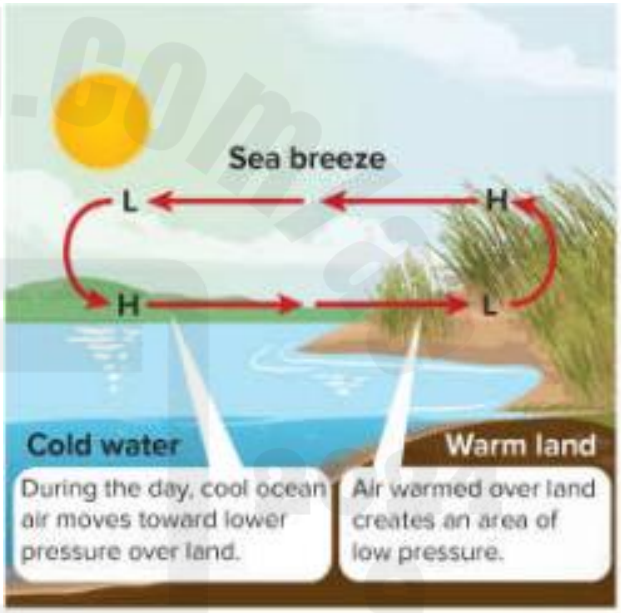
Sea breeze and Land Breeze

- ✓ During day, air over the land warms by conduction and rises, creating an area of low pressure.
- ✓ The air over the water sinks. This creates an area of high pressure because it is cooler.
- ✓ The differences in pressure over the warm land and the cooler water results in a sea breeze--a cool wind that blows from the sea onto the land.

- ✓ At night, the opposite occurs.
- ✓ The land cools more quickly than the water.
- ✓ As a result, an area of lower pressure forms over the warmer water.
- ✓ In a land breeze, cool air over the land moves toward lower pressure over the water.

At night, the water is warm and the land is cool.

At night, the land cools more quickly than the water. Therefore, the air above the land cools more quickly than the air over the water. As a result, an area of lower pressure forms over the warmer water.



2. Predict whether a sea breeze could occur at night. Explain.

Answer: A sea breeze could only occur at night if the land stayed warmer than the water.

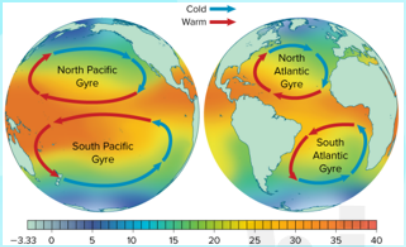
احدث فقط في النهار / و لكن ممكن ان تحدث في الليل اذا اليابسة ظلت دافئة

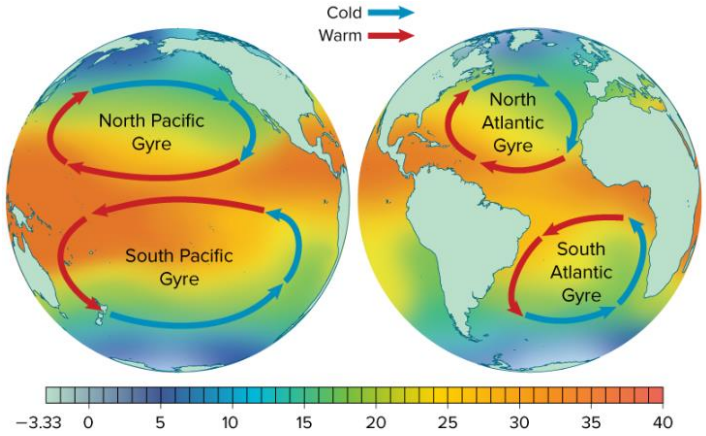
Why do ocean currents flow in certain directions?

Influencing Factors

- ✓ Landmasses deflect the flow of ocean currents.
- ✓ They help create large circular systems of ocean currents called **gyres**.
- ✓ The currents within each gyre move in the same direction.
- ✓ However, the direction of current movement in a gyre is different in each hemisphere.

Do the gyres in different hemispheres move in the same direction?





1. In what direction do gyres flow in the Northern Hemisphere? What about in the Southern Hemisphere? Why do you think this **pattern** occurs?

Answer: Gyres in the Northern Hemisphere circle clockwise and gyres in the Southern Hemisphere circle counterclockwise. This pattern results in the Coriolis effect.

2. Why are the major warm-water currents on the western boundaries of oceans and the major cold-water currents on the eastern boundaries of oceans? What explains this **pattern?**

Answer: Because of the Coriolis effect, water flowing from the equator toward the poles are on the western boundaries of oceans, and water flowing from polar regions toward the equator are on the eastern boundaries of oceans.

3. What **energy** ultimately drives convection in the oceans?

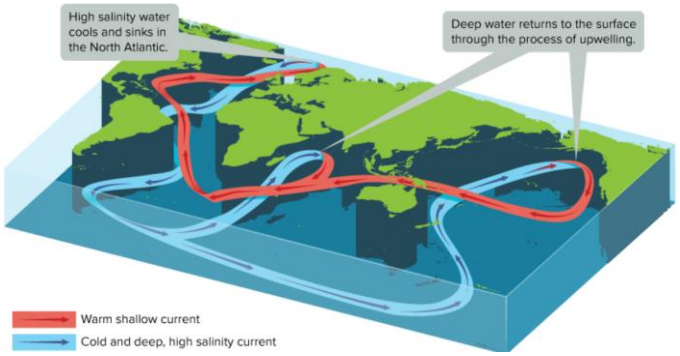
Answer: Solar energy drives convection in the oceans.

What is the Great Ocean Conveyor Belt and what does it affect?

It is a model that explains how ocean currents circulate thermal energy around Earth affecting weather and climate.

Global Conveyor Belt

- Surface currents, upwelling, and density currents combine to form the **Great Ocean Conveyer Belt.**
- Variations in temperature and salinity drive this global pattern of interconnected ocean currents.



- Earth's rotation causes moving air and water to appear to curve to the right in the Northern Hemisphere and to the left in Southern Hemisphere a phenomenon is known as the **Coriolis effect**.
- It is the Coriolis effect that produces the curving patterns of circulating wind.

- Air is being carried around Earth by rotation.
- The surface has a greater velocity near the equator than at the poles because it has to travel a greater distance in 24 hours.

1. The Coriolis effect is not only the factor that influences the motion of wind.
2. Landmasses also affect the speed and direction of wind systems.
3. For example, the westerlies in the Southern Hemisphere are locally very strong.
4. Because this systems is mostly over the oceans and has few continents to disrupt the wind.

✓ Types of ocean currents include
density currents and surface currents.

Density Currents

✓ High Salinity and cold temperature causes water to become more dense.
✓ Water that is denser will sink.
✓ This helps create currents of water deep in the ocean as water flows from areas of high density to low density.
✓ **A density current** is the vertical movement of water caused by differences in density.

Surface Currents

✓ Ocean currents flow at different depths in the ocean.
✓ Density currents carry water from the surface to deeper parts of the ocean.

Upwelling

✓ As surface current move towards poles, they cool and sink.
✓ Cold, dense water is brought back up by upwelling.
✓ Upwelling is the vertical movement of water toward the ocean's surface.