U.1 L.1

Essay Questions

What is meant by each of the following?

1. Matter: .....
2. Fluids: .....
3. Flow (fluidity): .....
4. Compressibility: .....
5. Diffusion: .....
6. Brownian motion: .....
   .....
7. Plasma state: .....
   .....

Give reasons for each of the following :

1. Liquids and gases are called fluids.
   .....
2. Honey and water flow at different rates.
   .....
3. Solids have a definite shape and volume.
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   .....
4. Liquids have an indefinite shape and a definite volume.
   .....
   .....
5. Gases have no definite shape or volume.
   .....
   .....
6. Gaseous substances are compressible.
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7. The scent of perfume diffuses throughout the room when a bottle of perfume is left open.
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8. Water gradually turns purple when potassium permanganate crystals are placed in it.
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9. Gases are highly diffusible.
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10. Solids retain their shapes regardless of the shape of their container.

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11. It is easy to divide a quantity of water into smaller portions.

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12. Difficulty of breaking a piece of rock.

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13. Dissolution of table salt in water.

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14. The diffusion of candle smoke in the air.

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15. The scent of flowers is stronger during the day than at night.

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16. The difference between oil and hydrogen gas in compressibility.

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What can be observed when:

1. The piston of a syringe with a closed opening, containing a quantity of air inside is pressed.

.....

2. An empty closed plastic bottle is pressed.

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3. A few crystals of potassium permanganate are added to a beaker containing an amount of water.

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4. A bottle of ammonia placed in a corner of a room is opened.

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5. A spoonful of sugar is stirred in a cup of water.

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6. Gases are heated to very high temperatures in a research laboratory.

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Compare between each of the following:

1. Solid matter, liquid matter and gaseous matter «In terms of: Fluidity - Compressibility – Diffusibility».

	Solid matter	Liquid matter	Gaseous matter
Fluidity	....	....	....
Compressibility	.....	.....	.....
Diffusibility	.....	.....	.....

2. Iron, oil and oxygen «in terms of: Change its shape with changing the container - Change its volume with compression».

P.O.C	Iron	Oil	Oxygen
Change its shape with the changing of the container	.....	.....	.....
Changes its volume with compression	.....	.....	.....

3. Ice, water and water vapour «in terms of: Particles movement – Interparticle spaces - Attraction forces».

	Ice water	Liquid water	Water vapour
Particle motion	....	....	....
Interparticle spaces	.....	.....	.....
Forces of attraction between particles	.....	.....	.....

In the opposite figure, a ping pong ball is pressed without breaking it:

1. What happens to the air inside the ball?

   .....

2. What can be concluded from this figure?

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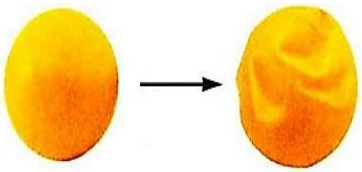
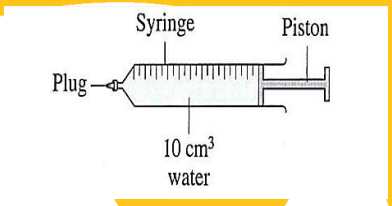


From the opposite figure: The syringe contains 10 cm² of water, and its tip sealed by a plug:



1. What happens to the volume of water when the piston is pushed in?

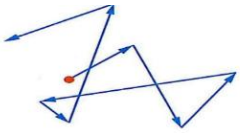
   .....

2. Replace the water with an equal volume of air, what happens to the volume of air when the piston is pushed in? **Explain**.

   .....

   .....

The opposite figure: shows the path taken by one particle of smoke in the air. Explain why the smoke particle moves in this manner?



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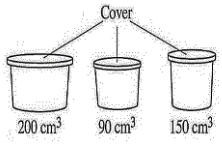
Which of the opposite vessels, can hold 180 cm³ of air? Explain your answer.



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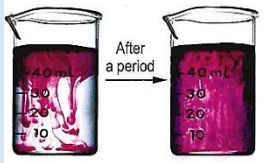
From the opposite figure:

1. Explain the reason for the diffusion of the dye colour in the beaker of water based on the particle theory of matter.

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2. Explain the effect of raising the temperature of the water on the speed of the diffusion of the dye through it.

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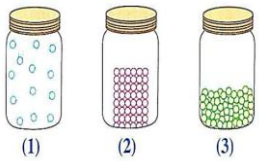
The opposite figure represents particles of matter in its three physical states:



1. What is the physical state of matter when it is in state (3)?

   .....

2. Explain how the movement of the matter particles determines its physical state.

   .....

   .....

   .....

There are materials that have fluidity property and change their shape according to the shape of their container:

1. What is the name given to these materials? .....
2. Give an example of one of these materials that has the following properties:
   1. It has a definite volume and an indefinite shape. .....
   2. It has no definite volume or shape. .....

► **Why do gases fill any container they are placed in, but liquids and solids do not?**

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► **Mention four assumptions about the particle theory of matter.**

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► **Fluids move randomly in a phenomenon known as Brownian motion:**

1. What is Brownian motion?

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2. What causes the Brownian motion with an example?

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► **When gases are heated to very high temperatures, the fourth state of matter is formed:**

1. What is the name given to this fourth state of matter? .....
2. What are the characteristics of this state?

.....

3. Where is this state found?

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► **Give an example of a technological application of the plasma state, <u>Explaining</u> how it works.**

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Variant questions

Choose the correct answer:

1. Both solids and liquids have .....

   a) fixed shapes. b) fixed volumes. c) fluidity. d) fast diffusion.

2. Increasing the volume of a ball by blowing air into it, means that the air .....

   a) does not diffuse. b) occupies space. c) can not be seen. d) has mass.

3. (3) An empty closed container its volume is 250 cm^3, if 40 cm^3 of air is removed from it. What is the volume of air remaining in the container?

   a) 200 cm^3 b) 210 cm^3 c) 250 cm^3 d) 290 cm^3

Matter exists in three main states:

1. Mention two properties that all substances have in common.

   .....

2. Mention a property that liquids have in common with gases, and in which they differ from solids.

   .....

Complete the following statements:

1. Matter particles store ..... energy due to the existence of ..... between them.
2. Gas particles have ..... energy, causes their movement in ..... in all directions.
3. The particles of the gaseous substances ..... very fast, due to their ..... motion.
4. Collisions between fluid molecules and the relatively ..... particles found in it causes a random motion known as .....

Explain the following:

1. Gases are passed through a high electric field in some air conditioners.

   .....

   .....

   .....

Put (T) or (F) for each statement, with correction:

1. Gas molecules vibrate around their fixed position. (.....)
2. The nature of the movement of the matter particles explains their ability to diffuse. (.....)
3. The dissolution of table salt in water indicates that the interparticle spaces in water are small. (.....)
4. Compression of a gas reduces its volume, with keeping the volumes of its molecules. (.....)

From the opposite figure:

1. What is the type of the substance (X)? Clarify the reason and the result of your observation.

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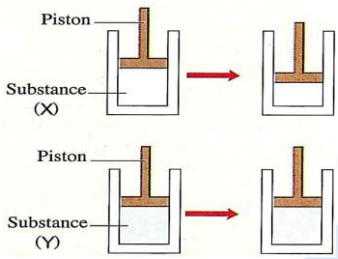

2. Suggest the state of substance (Y), with explaining the nature of the movement of its particles.

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School book questions

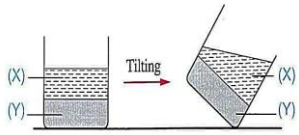
Choose the correct answer for questions:

1. Air and water are similar in that they both .....

   a) have mass. b) can be seen.

   c) have a fixed shape. d) have a fixed volume.

2. When a container containing two substances (X) and (Y) is tilted, their positions become as in the opposite:

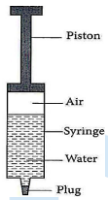


   Which of the following determines the state of substances (X) and (Y)?

   a) (X): Solid, (Y): Liquid. b) (X): Liquid, (Y): Liquid.

   c) (X): Liquid, (Y): Solid. d) (X): Solid, (Y): Gas.

3. In the opposite figure:



   What happens to the volume of each of water and air respectively when the piston of the syringe is pressed?

   a) Decreases, decreases. b) Remains unchanged, increases.

   c) Remains unchanged, decreases. d) Increases, decreases.

The following two figures represent two states of matter:

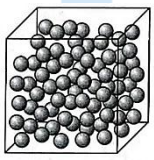


Figure (1)

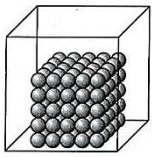


Figure (2)

1. Which of the two figures represents a fluid, and what is its state?

   .....

2. Compare the states of matter shown in the two figures, in terms of:

   - The forces of attraction between particles.
   - The movement of particles.

	Figure (1)	Figure (2)
1- The forces of attraction between particles	.....	.....
2- The movement of particle	....	....

Write the scientific term for each of the following statements:

1. Everything that has mass and occupies space. (.....)
2. Substances that have fluidity property and take the shape of their container. (.....)
3. The ability of fluids to flow easily. (.....)
4. The possibility of reducing the volume of a gas by increasing the pressure exerted on it. (.....)

5. The movement of particles of matter from a region of high concentration to a region of low concentration. (.....)
6. Random motion of relatively large molecules suspended in a fluid in all directions as a result of their continuous collision with the fluid molecules. (.....)
7. The fourth state of matter. (.....)
8. The state in which gas is in the form of a mixture of positively charged ions and negatively charged free electrons. (.....)

Complete the following sentences:

1. ..... matter has fluidity property and is compressible, while ..... matter has fluidity property, but it is incompressible.
2. Diffusion through ..... is very fast, while diffusion through ..... is very slow.
3. The speed of diffusion of substance molecules depends on the ..... of the diffusion medium and the ..... of the molecules.
4. The ..... theory of ..... has succeeded in explaining much of the behavior and ..... of matter.
5. The particles of the same substance are ....., but they are ..... from one substance to another.
6. Particles of matter have ..... energy due to their continuous motion, and they have ..... energy due to the presence of attraction forces between them.
7. The interparticle spaces between iron molecules are ..... while the interparticle spaces between hydrogen molecules are .....
8. The attraction forces between particles are the greatest in ..... matter, while they are almost non-existent in ..... matter.
9. The scientist ..... discovered the random motion of the large particles suspended in fluids, which is known as .....
10. Brownian motion arises from the collisions between ..... and .....
11. When gases pass through a high electric field, their atoms turn into ..... and .....
12. Most of matter in outer space exists in ..... state as the matter found in .....
13. In air conditioners, charged gas ions ..... molecules of harmful air pollutants, making the air .....

Correct the underlined words:

1. The flow of liquids differs according to their density. (.....)
2. During the fluidity, the volume of gas does not change, while the volume of solid changes. (.....)
3. Liquids do not have a definite shape or volume. (.....)
4. Solids have the ability to flow but not to be compressed. (.....)
5. The speed of diffusion through solids is equal to the speed of diffusion through gases. (.....)
6. The interparticle spaces between liquid molecules are equal to the interparticle spaces between gas molecules. (.....)
7. Particles suspended in solids move randomly in a phenomenon known as Brownian motion. (.....)

Choose the correct answer:

1. Which of the following has a definite shape?

   a) Air. b) Oil. c) Ice. d) Water.

2. The common property of solids and liquids is that they both ……

   a) have a definite volume. b) have fluidity property.

   c) have a definite shape. d) can be compressed.

3. Both water and air have ……

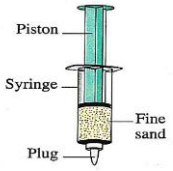
   a) mass. b) a definite shape. c) a definite volume. d) the same particles.

4. Compression of matter means to ……

   a) convert it from one state to another. b) change its mass.

   c) reduce its volume. d) change the volume of its molecules.

5. In the opposite figure:

   The piston does not move when it is pressed, because sand ……

   a) has an indefinite shape. b) does not have fluidity property.

   c) has an indefinite volume d) is incompressible.

6. The rapid movement of matter particles from a region of high concentration to a region of low concentration represents the process of ……

   a) freezing of a liquid. b) melting of a solid.

   c) diffusion of a substance in a liquid. d) diffusion of a substance in a gas.

7. The particles of a matter cannot be seen with the naked eye, because they ……

   a) are very small. b) vibrate. c) move freely. d) move randomly.

8. Why does water overflow out of a cup filled to the brim when ice cubes are added to it? Because ……

   a) ice has a definite volume. b) ice has an indefinite shape.

   c) water does not have a definite volume. d) water exists in different states.

9. What happens to a piece of a substance when the interparticle spaces between its particles increase?

   a) Only its volume changes. b) Only its shape changes.

   c) Both its volume and shape change. d) Neither its volume nor its shape changes.

10. The interparticle spaces are greatest in ……

    a) iron. b) oxygen. c) water. d) oil.

11. The movement of gas particles is ……

    a) circular. b) vibrating. c) random. d) wavey.

12. Which of the following represents the correct order of the mentioned materials, according to the attraction forces between their particles?

    a) Oil < Oxygen < Wood. b) Wood < Oxygen < Oil.

    c) Oxygen < Wood < Oil. d) Oxygen < Oil < Wood.

13. Which of the following is correct?

Choices	Having a definite volume, indefinite shape	The attraction forces between its particles are very strong	The movement of its particles is completely free
a)	Carbon dioxide	Oxygen	Oil
b)	Aluminum	Alcohol	Water vapour
c)	Oil	Iron	Alcohol
d)	Alcohol	Ice	Oxygen

Choose the odd word (or phrase) out, then mention the relation between the rest:

1. Oil/ Alcohol/ Water/ Carbon dioxide.
2. Oxygen/ Hydrogen/ Ammonia/ Wood.
3. Able to flow/ Compressible/ Diffusion through it is slow/ Has indefinite shape.
4. Has a fixed volume/ Able to flow/ Incompressible /Has a fixed shape.
5. Its particles move in a vibrating motion/ The attraction forces between its particles are very strong/ The interparticle spaces are the least/ cannot diffuse.

	The odd word (phrase).	The relation between the rest.
(1)	.....	.....
(2)	.....	.....
(3)	.....	.....
(4)	.....	.....
(5)	.....	.....

U.1 L.2

Essay questions

What is meant by each of the following:

1. Melting point: .....
2. Boiling point: .....

   .....
3. Sublimation: .....

   .....
4. Deposition: .....

   .....
5. Dry Ice: .....
6. Hydrology: .....

Give reasons for each of the following:

1. The conversion of matter from the solid state to the liquid state by heating.

   .....

   .....

   .....
2. The conversion of matter from the liquid state to the gaseous state by heating.

   .....

   .....

   .....
3. During the melting and boiling processes, the temperature remains constant, despite continued heating.

   .....

   .....
4. The purity of substances can be verified by comparing their melting or boiling points with their fixed values in their pure state.

   .....

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   .....
5. The boiling point of pure water is less than 100 ° C on the peaks of mountains.

   .....

   .....
6. Fuel consumption decreases when cooking by using a pressure cooker.

   .....

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7. The boiling point of glucose solution is higher than that of distilled water.

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8. Formation of water droplets on the outer surface of a cup containing ice.

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9. Ice turns into water when it is left in air.

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10. Water freezes in polar regions.

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11. Matter conversions from one state to another are reversible processes.

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12. The evaporation process takes longer time than the boiling process.

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13. Wet clothes dry faster in summer than in winter.

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14. The rate of evaporation increases by increasing temperature.

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15. The rate of evaporation increases by increasing the surface area of a liquid exposed to evaporation.

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16. The rate of evaporation increases by increasing the air currents.

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17. Feeling uncomfortable in hot, humid weather.

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What happens when:

1. The solid substance gains thermal energy.

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2. The liquid substance gains thermal energy.

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3. The ice gains more thermal energy during the melting process.

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4. The atmospheric pressure affecting pure water decreases below normal atmospheric pressure.

.....

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5. The temperature of water vapour in the air decreases below 0° C.

.....

6. A piece of ice is left in the air for a period of time.

.....

.....

7. Leaving dry ice in air.

.....

8. Heating solid iodine.

.....

9. A concentrated spray of regular coffee is exposed to extremely hot dry air.

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Compare between each of the following:

1. Melting point of ice and boiling point of water.

Melting point of ice	Boiling point of water
.....	.....
.....	.....
.....	.....

2. Melting process and freezing process.

Melting process	freezing process.
.....	.....
.....	.....
.....	.....

3. Evaporation process and condensation process.

Evaporation process	condensation process.
.....	.....
.....	.....
.....	.....
.....	.....

4. Sublimation process and deposition process, with examples.

	Sublimation process	deposition process
Defining	.....	.....
	.....	.....
	.....	.....
Examble	.....	.....

5. Evaporation process and boiling process.

Evaporation process	boiling process.
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
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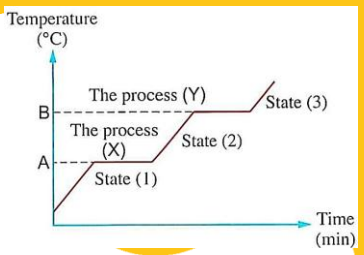
► **Study the following figures, then answer:**

① Name each of the following:



1. States of matter (1), (2) and (3).

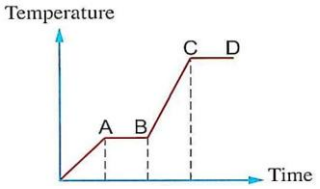
.....

2. Processes (X) and (Y).

.....

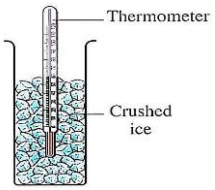
Points (A) and (B). → .....

② The opposite graph shows the process of heating a solid substance:



1. Which part of the graph refers to the existence of the substance:
   - In liquid state only. .....
   - In both liquid and gaseous states. .....
2. Which points indicate the completely free movement of molecules? .....

③ In the opposite figure: What happens to the thermometer reading:



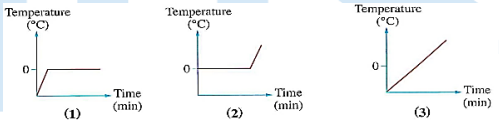
1. During the melting of the ice.

.....

2. When the cup is heated till the ice melts completely.

.....

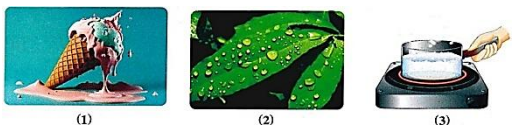
④ The following graphs represent the relation between the temperature of a piece of ice when it is heated over time:



1. **Which** of these previous graphs shows the complete melting of the piece of ice followed by a period of heating? .....
2. **What happens to** the temperature of the ice during its melting?

.....

⑤ From the following figures:



1. **Mention** the conversions of matter represented by each figure.

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.....

.....

2. **Which of the figures** show conversions of matter by losing thermal energy? .....
3. **Complete:** The kinetic energy of the particles of matter is the greatest in figure (.....).

⑥ From the opposite figure:

1. In which of the two containers the rate of evaporation is greater? **Explain**.

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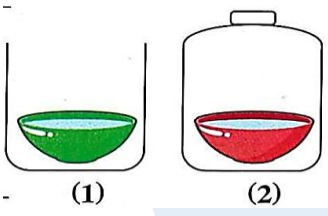
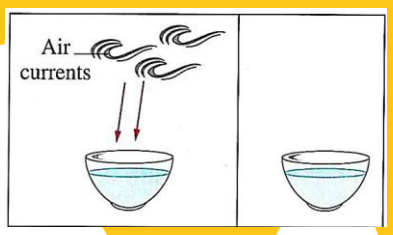


⑦ **From the opposite figure:**



1. Identify the independent variable and the dependent variable.

   .....

   .....

2. What do you conclude?

   .....

   .....

► **Variant questions:**

1. Does each stability of water temperature mean that heat is not being absorbed? **Explain**.

   .....

   .....

   .....

2. «On a hot sunny day, a student tied a balloon filled with air to the garden fence». **What is your explanation** for the increase in the volume of the balloon after several hours?

   .....

   .....

   .....

3. Each pure substance has fixed values for its melting and boiling points at normal atmospheric pressure:

   - **State the values of the melting and boiling points of water at normal atmospheric pressure.**

     .....

     .....

   - Mention some factors that affect the melting and boiling points of substances.

     .....

     .....

4. What is the boiling point of water at the highest peak in the Andes mountains, **which is approximately** at 9600 above sea level?

   .....

   .....

   .....

   .....

5. **Mention a technological application** that depends on the fact that pressure affects the boiling point, **Explaining how it works**.

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   .....

   .....

6. **Mention** one similarity and one difference between evaporation and boiling processes.

.....

.....

.....

7. **Mention the factors** that affect the rate of evaporation of liquids (Three factors are sufficient).

.....

.....

8. **Mention a technological application** based on the fact that the surface area exposed to evaporation affects the rate of evaporation.

.....

9. Mention the steps involved in manufacturing instant coffee.

.....

.....

.....

Variant questions

Complete the following statements:

1. When matter gains thermal energy, so the ..... energy of its particles increases, leads to an increase in its .....
2. When atmospheric pressure increases, the boiling point of liquids ..... and its freezing point .....
3. The temperatures of the ..... and the ..... states of matter are equal at the boiling point.
4. At normal atmospheric pressure, the boiling point of pure water is ..... °C and its melting point is .... °C.

In the chart below, identify the symbols and names of the following:

1. Processes that occur/ 8 by gaining heat.

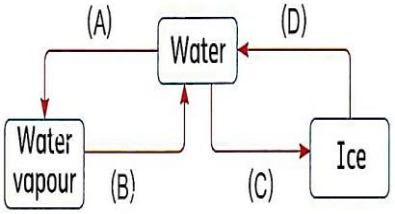
.....

.....

2. Processes that occur by losing heat.

.....

.....

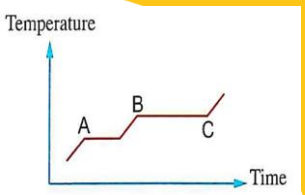


Correct the underlined parts:

1. The boiling point of water decreases by 10°C for every 300 m of altitude. (.....)
2. The boiling point of glucose solution depends on its mass. (.....)
3. The kinetic energy of the molecules of a liquid is very high. (.....)
4. The normal cooking pot helps to save energy during cooking. (.....)

In the opposite heating curve:

1. What does temperature (A) indicate? Explain.



.....

.....

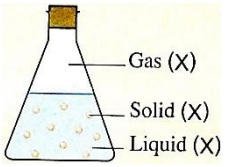
.....

2. Determine the state of matter during the interval BC.

.....

Choose the correct answer:

1. Which of the following expresses the states of the substance (X) in the opposite flask?



a) Energy is released when gas (X) is converted to liquid (X).

b) The molecules of liquid (X) vibrate around their fixed positions.

c) The temperature of the liquid (X) is greater than the temperature of the solid (X).

d) The mass of a molecule of gas (X) is less than the mass of a molecule of liquid (X).

2. The conversion of matter from the solid state to the gaseous state directly is called ..... process.

a) evaporation b) boiling c) deposition d) sublimation

3. All the following affect the rate of evaporation of a liquid, except .....

a) the volume of the liquid. b) the surface area of the liquid.

c) the temperature. d) the wind strength.

4. ..... are reversible processes.

a) Melting and evaporation b) Condensation and evaporation

c) Condensation and freezing d) Evaporation and boiling

Compare between frost and fog (In terms of: The processes forming them).

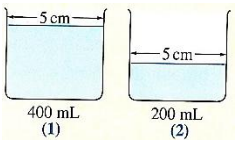
.....

.....

Write the scientific term of each of the following statements:

1. The factor that changes depending on the independent variable. (.....)
2. A type of coffee that dissolves quickly in water. (.....)
3. Science of studying water. (.....)
4. Solid carbon dioxide. (.....)

The opposite figure shows an experiment carried out by one of the students to identify one of the factors affecting the rate of evaporation:



1. Is there a difference between the volume of water in the two containers after 3 hours? **Explain your answer**.

.....

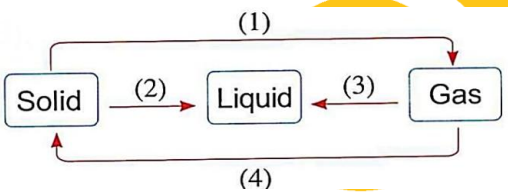
2. What is the suggested modification to investigate the effect of the surface area of the liquid exposed to evaporation on the evaporation rate?

.....

.....

Choose the correct answer for questions (1) – (3).

1. In the opposite chart: Which of the following represents the process of sublimation?



a) (1) b) (2)

c) (3) d) (4)

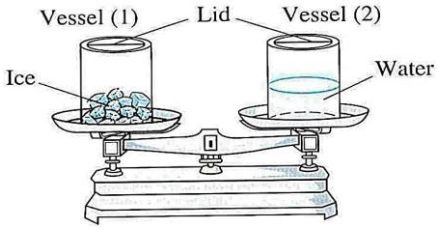
2. The same change in physical state occurs in the processes of .....

a) boiling and condensation b) boiling and evaporation.

c) freezing and condensation. d) freezing and evaporation.

3. The experiment shown in the opposite figure was conducted:

The two pans of the balance were equal at the beginning of the experiment, After several minutes, the pan holding the vessel (1) moved down, because .....



a) the ice cubes in the vessel (1) melted.

b) the water in the vessel (2) evaporated.

c) condensation of water vapour inside the vessel (2).

d) condensation of water vapour outside the vessel (1).

► **Compare between:**

1. The processes of evaporation and boiling (in two points).

processes of evaporation	boiling
.....	.....
.....	.....
.....	.....
.....	.....

► **The opposite table shows the physical state of four substances at different temperatures:**

1. **Which substance(s)** has a boiling point greater than 50°C? Explain your answer.

.....

.....

.....

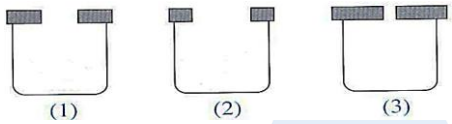
The substance	At 30°C	At 50°C	At 90°C
(W)	Liquid	Gas	Gas
(X)	Solid	Liquid	Gas
(Y)	Solid	Solid	Liquid
(Z)	Liquid	Liquid	Gas

► **The vessels shown in the opposite figure contain equal quantities of water:**

1. Why does the quantity of water in the three vessels decrease after several hours?

.....

.....



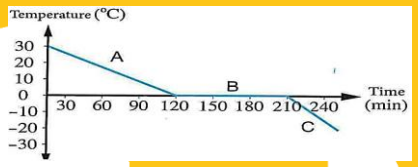
2. Which of these vessels will contain the least amount of water after several hours? **Explain your answer**.

.....

.....

► **The opposite graph shows the change in temperature of a quantity of water over time.**

1. Identify the letter(s) of the parts of the curve at which heat is lost, with explanation.



……

……

Write the scientific term of each of the following statements:

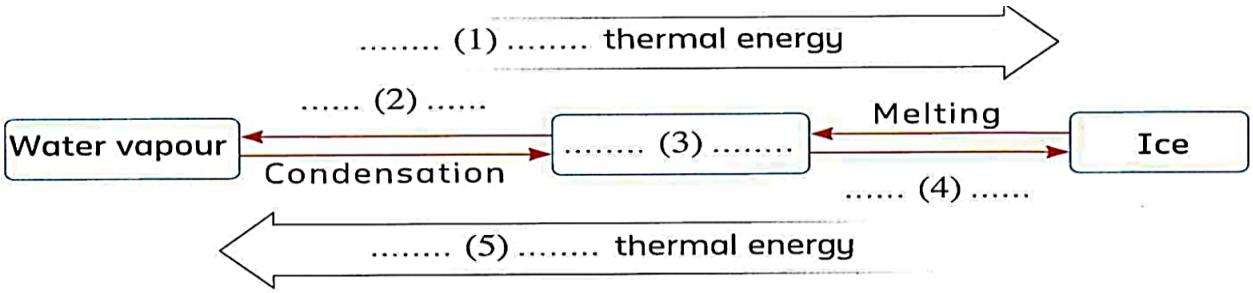
1. The temperature at which a substance changes from the solid state to the liquid state. (……)
2. The point at which the temperature of the substance remains constant during its conversion from the solid state to the liquid state. (……)
3. The temperature at which a substance changes from the liquid state to the gaseous state at a certain point. (……)
4. The temperature at which all the particles of a liquid overcome the forces of attraction between them and change into gas particles. (……)
5. Atmospheric air pressure at sea level. (……)
6. The process of changing matter from the solid state to the gaseous state directly without passing through the liquid state. (……)
7. The process of changing matter from the gaseous state to the solid state directly without passing through the liquid state. (……)
8. Solid carbon dioxide. (……)

Complete the following sentences:

1. At normal atmospheric pressure, the melting point of ice is …… °C while the boiling point of water is …… °C
2. The temperature at which ice starts to convert into water is called …… , while the temperature at which water in all its parts starts to convert into water vapour is called ……
3. At the melting point, the …… between the molecules of the substance become weaker, and the …… between them increases.
4. Factors affecting the melting and boiling points of the substances include …… and ……
5. When the atmospheric pressure decreases, the boiling points of liquids …… and their freezing points ……
6. When 180 g of glucose are dissolved in 1 L of water, the boiling and freezing points of the solution become …… and …… respectively.
7. At melting point, matter exists in both …… and …… states at the same temperature.
8. The …… and …… processes are accompanied by losing thermal energy during matter conversions.
9. The …… and …… processes are accompanied by gaining thermal energy during matter conversions.
10. Evaporation is the reverse process of ……, while sublimation is the reverse process of ……
11. Losing thermal energy by water vapour molecules found in the air results in its condensation in the form of …… or ……

12. The …… process occurs only to the molecules of the surface of a liquid, while the …… process occurs to all parts of the liquid.
13. At the boiling point, the molecules of a substance in its …… state overcome the …… forces between molecules.
14. The evaporation process takes a relatively …… period of time, while the boiling process takes a relatively …… period of time.
15. The rate of evaporation increases by increasing the …… and decreasing the ……
16. Regular coffee …… in water, while instant coffee dissolves …… in water.

Complete the following chart:



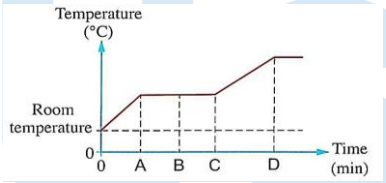
(1) …… (2) …… (3) ……

(4) …… (5) ……

Choose the correct answer:

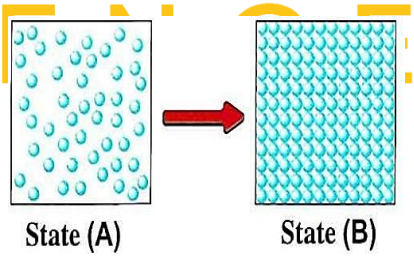
1. The graph represents the heating process of a solid substance.

   How much time does the substance take to completely change into the liquid state?

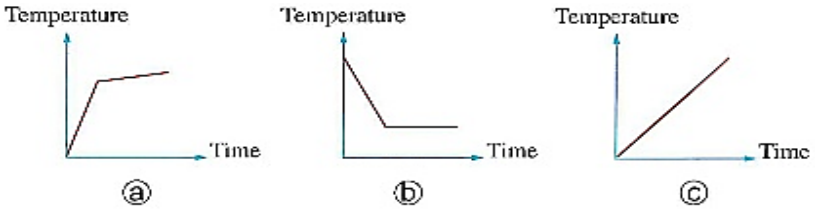


   a) (A). b) (B). c) (C). d) (D).

2. The substance (X) changes from state (A) to state (B) as shown in the opposite figure:



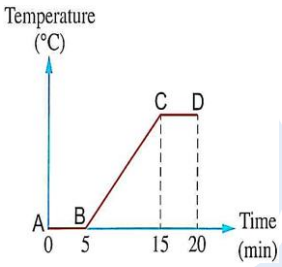
   Which of the following graphs represents the temperature of substance (X) over time?.



3. The following graph shows the changes in temperature of a flask containing ice pieces during a period of 20 minutes.

   Which of the following is correct?

Choices	Intervals during which matter gained heat	Intervals during which the state of matter changes
(a)	AB, BC	AB, BC
(b)	AB, BC	BC, CD
(c)	AB, BC, CD	AB, CD
(d)	AB, BC, CD	AB, BC, CD



4. A solid substance, its melting point is 1500 ° C , changes into its liquid state at .....

(a) 1000° C (b) 1500° C (c) 1550° C (d) 2000° C

5. The boiling point of water at the top of a mountain its height equals 3000° m is .....

(a) 100° C (b) 94° C (c) 90° C (d) 84° C

6. When sodium chloride dissolves in water, __

a) the melting point of the solution increases.

b) the boiling point of the solution increases.

c) the boiling point of the solution decreases.

d) the melting point of the solution does not change.

7. All the following describe the changes in the states of water, except that they are .....

a) reversible processes b) physical processes

c) chemical processes d) accompanied by heat change

8. All the following processes require gaining of heat, except .....

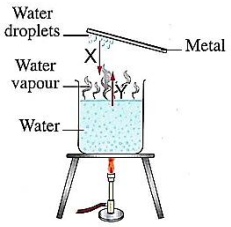
a) boiling b) melting c) evaporation d) freezing

9. 12. The reverse process of melting is the _____ process.

a) deposition b) condensation c) freezing d) sublimation

10. In the activity shown in the opposite figure:

Process (X) requires __ energy, while process (Y) requires __ energy.

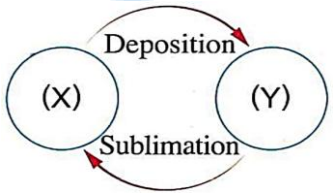


a) gaining / losing b) gaining / gaining

c) losing / gaining d) losing / losing

11. In the opposite figure:

Which of the following represents (X) and (Y)?



a) (X) Solid, (Y) Liquid b) (X) Liquid, (Y) Solid

c) (X) Solid, (Y) Gas d) (X) Gas, (Y) Solid

12. Frost formation is a ..... process.

a) evaporation b) sublimation c) deposition d) condensation

13. All the following represent the evaporation of pure water, except that it .....

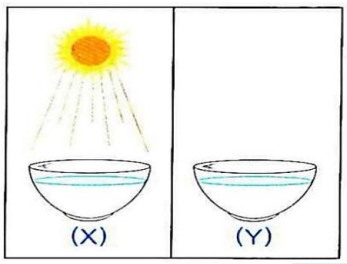
a) can take place at 40°C b) occurs only to surface molecules

c) occurs without heating d) is accompanied by the formation of gas bubbles

14. Wet clothes dry when exposed to the sun as a result of the process of .....

a) melting. b) evaporation. c) boiling. d) condensation.

15. In the opposite figure: The rate of evaporation is .....



a) very fast in both containers (X) and (Y).

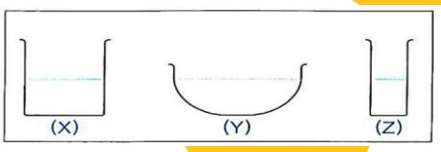
b) very slow in both containers (X) and (Y).

c) greater in container (Y) than in container (X).

d) slower in container (Y) than in container (X).

16. From the opposite figure:

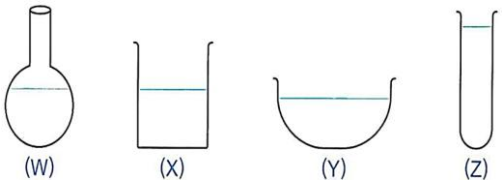
Which of the following expresses the rate of evaporation of water in the three containers when exposed to the same temperature?



a) (X) < (Y) < (Z).
b) (Z) < (Y) < (X).
c) (Z) < (X) < (Y).
d) (Y) < (Z) < (X).

17. The following figures represent four containers containing equal quantities of water that are left in the air for two days:

Which container contains the greatest quantity of water after the two days?



a) (W).
b) (X).
c) (Y).
d) (Z).

18. The rate of evaporation increases by increasing all the following, except .....

a) temperature.
b) surface area of liquid exposed to evaporation.
c) humidity percentage.
d) air currents.

Essay Questions

What is meant by:

1. System: .....
   .....
2. The surroundings: .....
   .....
3. Open system: .....
4. Closed system: .....
5. Isolated system: .....
6. Temperature: .....
7. Internal energy of a system: .....
   .....
8. Specific heat: .....
9. Radiator: .....

Give reasons for the following:

1. A cup of hot tea represents an open system.
   .....
2. A pressure cooker is a closed system, while a thermos flask is an isolated system.
   .....
   .....
   .....
3. A medical thermometer is considered a closed system.
   .....
4. The kinetic energy of solid particles is small, while the kinetic energy of gaseous particles is very high.
   .....
   .....
   .....
5. The temperature of a liquid decreases when it loses an amount of thermal energy.
   .....
   .....
6. The speed of the diffusion of odours in hot air is greater than the speed of their diffusion in cold air.
   .....
   .....
7. The internal energy of any isolated system is constant.

.....

8. The extent of elevation in the temperature of a substance decreases by increasing its mass when it gains an amount of heat.

.....

.....

9. When heating two equal masses of oil and water with the same source of heat, the elevation of the temperature of the oil is greater than that of the water.

.....

10. Specific heat is a characteristic property of substances.

.....

11. Mercury is used in thermometers.

.....

.....

12. Water is an excellent cooling liquid.

.....

.....

13. Water is used in the radiator of the car.

.....

.....

14. The human body contains a large percentage of water.

.....

.....

What happens if:

1. The system gains thermal energy from the surroundings.

.....

.....

2. Heating two different masses of distilled water separately at the same temperature for an equal period of time using a steady flame.

.....

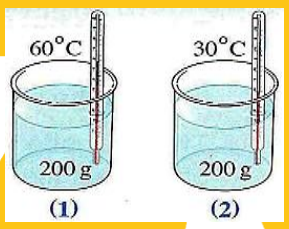
3. Heating two equal masses of water and oil separately at the same temperature for an equal period of time using a steady flame.

.....

4. Heating two equal masses of water and ice separately for an equal period of time using a steady flame.

.....

Study the following figures, then answer the following:



① From the opposite figures, compare between:

1. The kinetic energy of water molecules in the two beakers. **Mention the reason**.

   .....

   .....

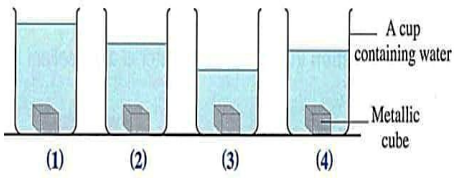
2. The internal energy of water in the two beakers. **Mention the reason**.

   .....

   .....

---

② Four identical metallic cubes of the same substance and temperature of 80°C, were immersed in different volumes of water, with a temperature of 40°C, as shown in the following figure:



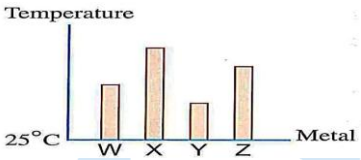
1. What happens to the temperatures of the cubes after they are immersed in water?

   .....

2. Which cube causes the greatest change in water temperature after 10 minutes? **With explanation**.

   .....

3. Four rods of different metals, all have the same mass, were heated with the same source of heat for the same period of time and the temperature increased as it is shown in the opposite figure

   What is the correct descending order of specific heats of these metals? **Explain**.

   .....

   .....

Variant questions:

1. Compare between an open system, a closed system and an isolated system <<In terms of: Definition - An example of each».

①	The open system	The closed system	The isolated system
Definition	....	....	....
Example	....	....	....

2. What do we mean by saying that raising the temperature of 1 kg of substance (X) by 1°C requires an amount of heat equals 700 J?

   .....

3. **What is meant by** that the specific heat of iron is 450 J/kg.°C?

.....

4. What can be concluded from comparing the specific heat values of ice and water:

- Ice: 2090 J/kg.° C **- Water: 4180 J/kg. ° C**

.....

.....

5. Two equal masses of two objects (X), (Y) gained the same amount of heat, so the increase in the temperature of object (X) was less than that of object (Y).

What is the scientific explanation for this observation?

.....

.....

The opposite table:

Metal	Specific heat (J/g.° C)
(X)	0.133
(Y)	0.528
(Z)	0.388

1. Shows the specific heat values of different metals with the same initial temperature and mass of 70 g each. Which of these three metals its temperature increases to a greater extent when they are heated by the same heat source for the same period of time? **With giving reason**.

.....

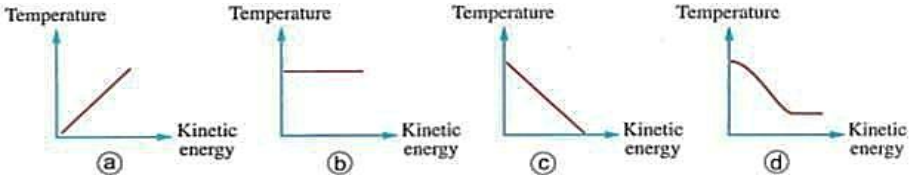
.....

2. **Mention a life application** that proves that water is an excellent liquid for cooling liquid.

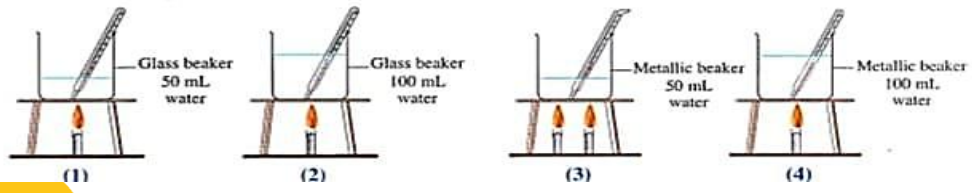
.....

Choose the correct answer:

1. Which of the following graphs represents the relation between the temperature of a substance and the kinetic energy of its molecules?



2. The following figures represent heating of different amounts of water having the same temperature.

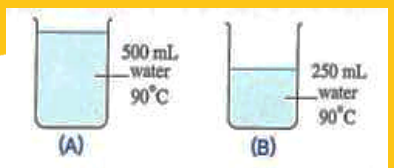


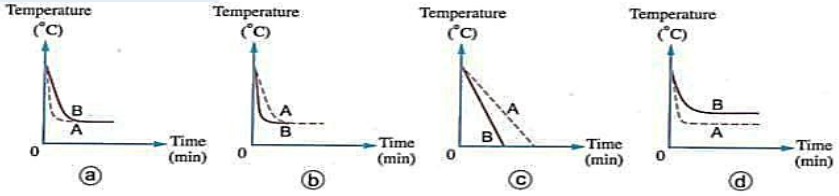
3. In which case is the thermometer reading the highest after 5 min?

a. (1). b. (2). c. (3). d. (4).

4. The containers (A) and (B) shown in the opposite figure were left in an open place.

   Which of the following graphs shows the decrease in the temperature of the two containers over time?





5. After the end of the experiment shown in the opposite figure, it was observed that the elevation in the temperature of the two liquids is equal.

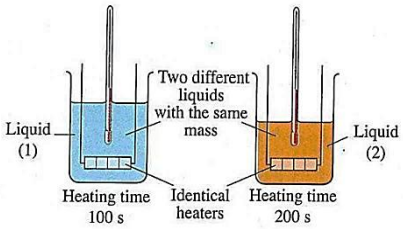
   It can be concluded that .....

   (a) Both liquids absorbed the same amount of energy.

   (b) Liquid (1) received more energy than liquid (2).

   (c) Both liquids have the same specific heat.

   (d) The specific heat of liquid (1) is less than that of liquid (2).

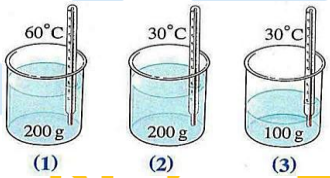


The opposite figure represents a closed system, how can this system be converted into:

1. An open system. .....
2. An isolated system. .....

.....

From the opposite figures:



1. In which two beakers the average speed of water molecules is equal? With explanation

.....

If you know that the specific heat of 1 kg of iron is 450 J/kg. °C

1. **<u>What</u>** is the specific heat of 10 kg of iron? **<u>With explanation</u>**.

.....

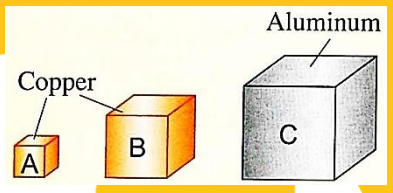
.....

Compare between solid matter and gaseous matter in terms of:

1. Potential energy of the particles and kinetic energy of the particles.

	Solid matter	Gaseous matter
Potential energy	.....	.....
Kinetic energy	.....	.....

From the opposite figure:

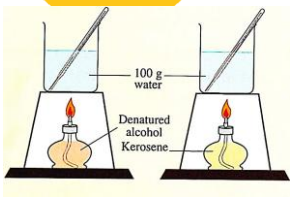


1. Which of these cubes will have the greatest increase in temperature when they are heated with the same flame? **Explain your answer**.

.....

.....

In the experiment shown in the opposite figure: Identify each of the following:



1. The independent variable. .....
2. The controlled variable. .....

School Book Questions

Choose the correct answer:

1. The internal energy of water increases when

   A. the temperature of water changes from 70°C to 60°C

   B. water vapor condenses on a plant leaf.

   C. a quantity of water is heated from 20°C to 30°C

   D. It is placed in a refrigerator.

2. Four equal masses of different metals, (at 25°C), were heated for 10 minutes using the same heat source.

   The temperature of each metal is recorded on the opposite table:

metal	(1)	(2)	(3)	(4)
Temperature after heating	59°C	62°C	55°C	70°C

   Which of these metals is best used in the manufacture of cookware that can withstand high temperatures?

   A. (1) B. (2) C. (3) D. (4)

3. What tools are used to find the specific heat of a substance?

   A. Balance and stopwatch.

   B. Balance and thermometer.

   C. Stopwatch and thermometer.

   D. Balance, stopwatch, and thermometer.

Does the relative stability of seawater temperature mean that it does not absorb heat energy? **Explain**.

.....

.....

Slowly pumping air into a car tire does not raise the temperature. **Does the average kinetic energy** of the air molecules inside the car tire increase or remain unchanged? **Explain**.

.....

.....

Three different quantities of water were heated in three identical containers. The opposite graph shows the time taken by each quantity to reach boiling point:

1. Which of these containers contains the least amount of water? .....
2. What is the independent variable and what is the controlled variable in this experiment?

   .....

   .....

   .....

Write the scientific term for each of the following statements:

1. Any part of the universe that is under study, where changes in energy and matter are observed. (.....)
2. The space surrounding the system which can exchange energy or matter or both with the system. (.....)
3. A system in which energy and matter are exchanged with the surroundings. (.....)
4. A system in which only energy is exchanged with the surroundings while matter is not exchanged. (.....)
5. A system in which neither energy nor matter is exchanged with the surroundings. (.....)
6. A measure of the average kinetic energy of the system's particles. (.....)
7. The summation of the potential and the kinetic energies of the system's particles. (.....)
8. The quantity of heat required to raise the temperature of 1 kg of a substance by 1°C. (.....)
9. A cooling system connected to car engines. (.....)

Complete the following statements:

1. Matter in a system may be ....., liquid, ... or a mixture of them.
2. Systems are classified according to their ability to exchange energy and matter with the surroundings into ..... a closed system or .....
3. Energy exchange occurs in both ..... and ..... systems
4. Matter exchange does not occur in both ..... and ..... systems.
5. The internal energy of a system is the summation of the ..... and ..... energies of the system's particles.
6. The kinetic energy of the particles of ..... matter is greatest because they move .....
7. When a matter gains a quantity of thermal energy, the average kinetic energy of its particles ..... and therefore its temperature .....
8. The potential energy of a ..... matter is at its maximum, while it is almost zero in ..... matter.
9. Gaining thermal energy by an object ..... its temperature while losing thermal energy ..... its temperature
10. The amount of change in the temperature of any object depends on ....., the type of substance and .....
11. The amount of change in the temperature of different masses of the same substance varies when they ..... or ..... the same quantity of thermal energy.
12. When two equal masses of water and oil are heated over a steady flame, the elevation in the temperature of ..... is greater than that of .....

13. When the specific heat of a substance is high, the amount of energy required to raise its temperature is ……., and it takes ……. time to lose the energy it gained.

Choose the correct answer:

1. A system containing substance (A) whose mass is 5 g, and is dissolved in 30 g of water. at the end of the experiment, the temperature of the solution decreased by 3°C and its mass became 35 g. What type of system is this?

   A) Isolated. B) Closed. C) Opened. D) Closed or isolated.

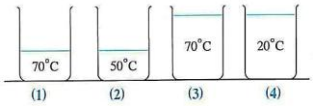
2. All the following are factors that affect the system's temperature, except ……

   A) its mass. B) its shape.

   C) the type of its matter. D) its physical state.

3. From the opposite containers:

   Which two containers would be suitable for conducting an experiment, to show the relation between the time required for the water to reach the boiling point and the mass of water?



   A) (3), (4). B) (1), (4). C) (2), (3). D) (1), (3).

4. The opposite figures represents the process of heating two cubes of the same substance. Which of the following is correct when they reach 60°C?

   (a) Cube (Y) has greater heat energy because its specific heat is higher.

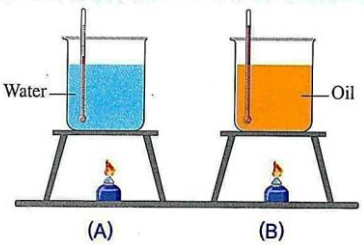
   (b) Cube (Y) has less heat energy than cube (X).

   (c) Cube (X) has less heat energy than cube (Y).

   (d) Cube (X) has greater heat energy, because it has lower specific heat.

5. The opposite figures represent an experiment to measure a factor that affects the amount of change in the temperature of the system. Water

   What is the independent variable in this experiment?



   (a) The volumes of water and oil.

   (b) The amount of heat gained.

   (c) The type of the substance of the oil and water.

   (d) The amount of change in the temperature of oil and water.

6. The specific heat of a metallic ball depends on

   A) type of its substance. B) bits mass.

   C) its volume. D) its radius.

7. Which of the following substances has the highest specific heat?

   A) Water. B) Aluminum. C) Iron. D) Mercury.

U.1 L.4

Essay questions

What is meant by each of the following:

1. Heat: .....
   .....
2. Thermal conduction: .....
   .....
3. Thermal equilibrium: .....
   .....
4. Thermal conductivity: .....
5. Thermal conductors: .....
6. Thermal insulators: .....
7. Thermal convection: .....
8. Sea breeze: .....
9. Radiation: .....
10. Electromagnetic waves: .....
    .....
11. Thermography: .....
    .....

Give reasons for the following:

1. The temperature of a cold solid object increases when it comes into contact with a hot piece of iron.
   .....
   .....
   .....
2. The temperature of a hot piece of iron decreases when placed in a beaker containing cold water.
   .....
   .....
3. Cooking pans are made of aluminum with wooden handles.
   .....
   .....
4. It is preferred to place polystyrene panels between bricks during building walls.
   .....
   .....
   .....

5. It is preferred to use hollow clay bricks during constructing walls.

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6. The presence of cooling systems inside electronic devices which made of materials with good thermal conductivity.

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7. Eagles can fly at great heights without flapping their wings, even though Earth's gravitational force pulls it down.

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8. Heat does not transfer by convection through solid materials.

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9. It is preferred to place the electric space heater on the floor of the room.

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10. The freezer is installed at the top of the refrigerator.

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11. The occurrence of sea breeze.

.....

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12. The sand on the beach is hotter than the sea water at noon.

.....

13. The Sun's heat transfers to us through radiation.

.....

14. The Sun's heat does not transfer to us through conduction or convection.

.....

.....

15. It is preferred to wear dark coloured clothes in winter and light coloured clothes in summer.

.....

.....

16. Solar heater pipes are painted in black.

.....

17. Firefighters wear shiny silver clothes.

.....

18. Thermographic camera is used at airports.

.....

19. Snakes are able to hunt their preys at night.

.....

.....

What happens when:

1. A hot metal block is dipped in a beaker of cold water (according to the temperature of both the metal mass and water).

.....

.....

2. Two objects with the same temperature come into contact.

.....

3. Two non-isolated systems with different temperatures come into contact with each other.

.....

.....

4. A hot drink at 70°C is mixed with another drink at 20°C.

.....

.....

5. A metal spoon is placed in a cup of hot tea.

.....

6. The end of a metal rod with small pins fixed on it with wax is heated.

.....

7. Polystyrene insulating panels are used between building walls during construction.

.....

.....

8. The space heater is placed at the top of the room.

.....

.....

Compare between each of the following:

1. Thermal conductors and thermal insulators "In terms of: Definition - Examples".

.....

.....

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.....

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2. Copper and plastic "In terms of: Thermal conductivity".

.....

.....

3. Hollow clay bricks and solid clay bricks "In terms of: Thermal conductivity".

.....

.....

4. Solid materials and liquid materials "In terms of: The method of heat transfer through them".

.....

.....

5. Heat transfer by conduction, convection and radiation "In terms of the possibility of its transfer in vacum (Space)".

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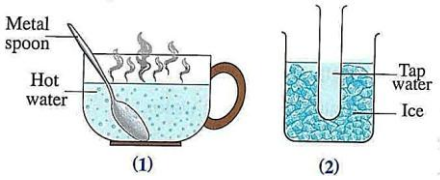
Study the following figures, then answer the questions:

1. From the two opposite figures, Identify the substance that gains heat and the substance that loses heat.



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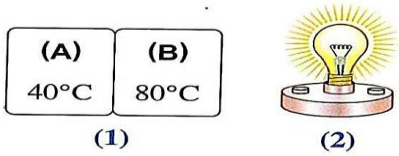
2. From the two opposite figures, **Mention**:



- Possible methods of heat transfer in each of them.

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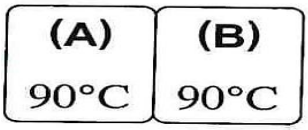
- Direction of heat transfer in Figure (1).

.....

.....

3. In the opposite figure, Does heat transfer from object (A) to object (B)?, **Explain your answer**.



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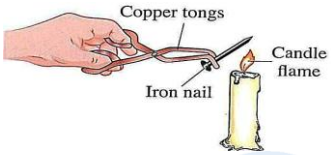
4. From the opposite figure:



- Mention the reason why the hand feels the heat of the flame.

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- What happens when the copper tongs is replaced by a wooden tongs? **Explain your answer**.

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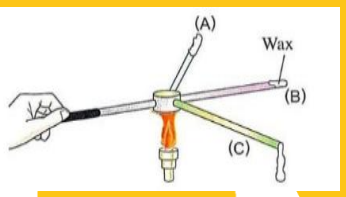
5. In the experiment shown in the opposite figure, Three rods of equal lengths and thicknesses made of different metals were heated:



- What can you conclude from this experiment?

  .....

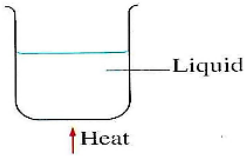
  .....

- Which of these rods is made of the material with the least thermal conductivity?

  .....

  .....

6. From the opposite figure:

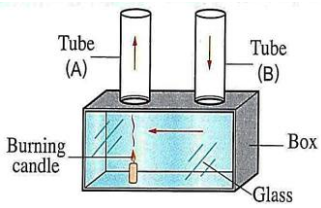


- What happens to the density of liquid particles when heated?

  .....

  .....

  .....



- What is the method by which heat transfers in the liquid?

  .....

  .....

7. In the opposite figure: shows one of the experiments, and the arrow in the figure shows the direction of air movement. **Explain how the air moves**.

   .....

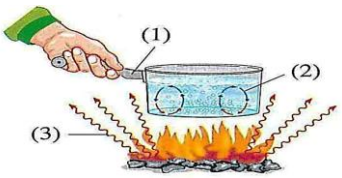
   .....

8. From the opposite figure, which of the two refrigerators is better to use? Explain your answer.

   .....

   .....

9. From the opposite figure: What is the method of heat transfer in each of (1), (2), and (3)?



   .....

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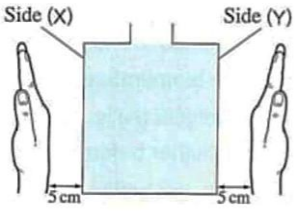
10. The opposite figure: Shows an aluminum tank filled with boiling water, with side (X) is painted with dark black paint, while side (Y) is painted with shiny white paint.

    Which hand feels the heat more? **Explain your answer**.



    .....

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Variant questions:

1. When does heat transfer stop between two objects in contact, one at 100°C and the other at 60° C?

   .....

   .....

2. Mention the methods by which heat transfers.

.....

3. Explain how heat transfers from one end of a copper rod to the other end when it is heated.

.....

.....

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The opposite table:

- Shows the time taken to raise the temperature of four identical rods made of different substances by 1°C Which of these rods is made of the substance with the least specific heat value? **Explain your answer**.

.....

.....

.....

Substance	Time taken
(W)	35 min
(X)	30 min
(Y)	45 min
(Z)	40 min

Mention one life application for the heat transfer by:

1. Conduction. .....
2. Convection. .....
3. Radiation. .....

School Book Questions

Choose the correct answer:

4. When a tray of pies is removed from the oven and placed on a metal surface,

   a) the pie absorbs heat from the tray.

   b) the heat is transferred from the tray to the surrounding air only.

   c) heat is transferred from the pie to the air and the tray.

   d) heat is transferred from the tray to the air and the metal surface.

5. A lemon drink its temperature is 20°C was placed with a cube of ice, and after two minutes, the temperature of the drink became 8°C, the temperature of the remaining part of the ice cube was .....

   a) 0° C b) 2° C c) 4° C d) B° C

6. What happens to the cold air outside a kettle when it comes into contact with its hot outer surface?

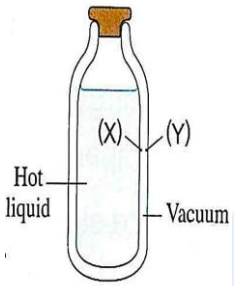
   a) Its density decreases and it sinks downwards.

   b) Its density decreases and rises upwards.

   c) Its density increases and it sinks downwards.

   d) Its density increases and it rises upwards.

7. The opposite figure shows a thermos flask with two walls (X) and (Y), containing a hot liquid. Which of the following is correct?



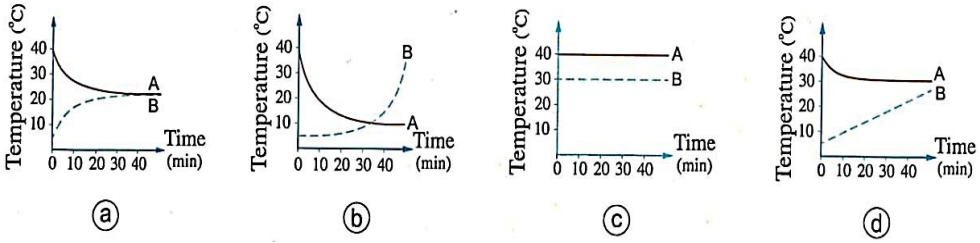
   a) Heat is transferred from (X) to (Y) by conduction and convection.

   b) Heat is transferred from (Y) to (X) by conduction only.

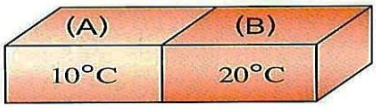
   c) Heat is transferred from (X) to (Y) by radiation only.

   d) Heat is transferred from (Y) to (X) by radiation and convection.

8. (A), (B) are two equal quantities of water, temperature of (A) is 40°C and that of (B) is 5°C. Which of the following graphs shows the change in temperature when they are mixed together?



From the opposite figure:



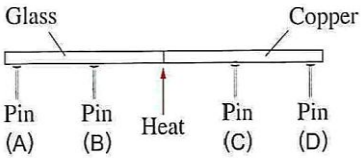
1. When does the thermal equilibrium occur between the two objects (A) and (B), which are made of the same material and have the same mass?

.....

2. What is the expected temperature of the two objects when thermal equilibrium occurs?

.....

The opposite figure shows four pins fixed with wax in two copper and glass rods that are heated by a single heat source. **Which pin will fall first? Explain your answer.**



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Give reasons for the following:

1. The concept of heat is different from the concept of temperature.

.....

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Write the scientific term for each of the following statements:

1. Energy transferred from one system to another due to the difference in their temperatures. (.....)
2. The state reached by two systems with different temperatures after they come into contact and their temperatures become equal. (.....)
3. Thermal energy transfer through solid objects without particles change their position. (.....)
4. A measure of the ability of materials to conduct heat through them. (.....)
5. Thermal energy transfer in fluids with the movement of their particles. (.....)
6. Cool air blowing from the sea towards land during the daytime. (.....)
7. Waves propagate in space in all directions at a speed reaching 300,000 km/s. (.....)
8. Transfer of infrared rays from the surfaces of hot objects without the need for material particles. (.....)
9. A technique that uses a camera to detect thermal radiation emitted from objects and convert it into coloured images. (.....)

Complete the following sentences:

1. Thermal energy is transferred from the ..... temperature system to the ..... temperature system.
2. Heat is transferred in three different methods, which are ..... conduction and .....
3. Heat is transferred from one point to another in ..... objects by .....
4. Thermal conductors include ..... while thermal insulators include .....
5. Cooking pot handles are made of ..... or ..... while the pots themselves are made of .....
6. Silver is preceded by ..... and followed by ..... in thermal conductivity.
7. ..... panels are placed between bricks to prevent ..... changes in temperatures inside the building.
8. Heat is transferred by conduction as a result of ..... among the particles of matter in contact with each other, while it is transferred by convection as a result ..... of the fluid particles.
9. Heat transfers in iron by ..... while it transfers in water by .....
10. The density of hot water is ..... while the density of cold water is .....
11. Sea breeze occurs as a result of the movement of hot air of the ..... which replaced by cold air of the .....
12. The phenomenon of sea breeze is based on heat transfer by ..... while the cooling systems of electronic devices depend on heat transfer by .....
13. Heat transfers in gases by ..... and .....
14. The heat of the Sun reaches us by ..... while the heat from the space heater reaches us by ....., ...
15. ..... camera can detect ..... radiation emitted from objects and convert it into colour images.

Correct the underlined word:

1. Heat is one of the forms of <u>matter</u>. (.....)
2. Heat transfers through solid objects from one end to another by <u>convection</u>. (.....)
3. When two identical copper cubes come into contact, the temperature of the first cube is 60°C and the second is 40°C, their temperatures will be <u>20°C</u> at the thermal equilibrium. (.....)
4. <u>Copper</u> is the first element according to thermal conductivity among natural elements. (.....)
5. When heat transfers <u>by radiation</u>, hot water particles rise up and cold water particles go down. (.....)
6. The effect of sea breeze is more perceptible in <u>spring</u>. (.....)
7. Infrared rays have a <u>chemical</u> effect. (.....)
8. The idea of wearing dark clothes in winter is based on heat transfer by <u>conduction</u>. (.....)
9. When standing in front of a lit bulb, heat transfers to us by <u>conduction</u>. (.....)

Choose from column (B) what suits it in column (A):

① (A)	(B)
Heat transfers through	**By**
(1) Solid objects	(1) Radiation.
(2) Gases	(2) Convection and conduction.
(3) Vacuum (space)	(3) Conduction.
	(4) Convection and radiation.

.....

② (A)	(B)
Heat transfers	**By**
(1) When touching a metal spoon	(1) Conduction and radiation.
(2) From the space heater to the room air	(2) Radiation.
(3) From the Sun to us	(3) Convection.
	(4) Conduction.

.....