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Reproduction in Humans and Plants

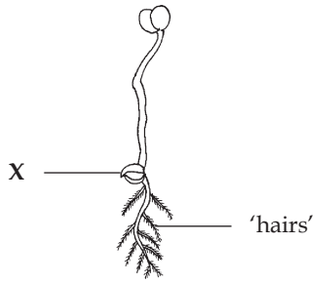
1. Mary filled two pots with fertile garden soil and planted five balsam seeds in each pot. She placed the pots in a well-lit garden and watered them regularly. After ten days, shoots grew in pot A but not in pot B.

   (a) Give a possible reason for this occurrence. [2m]

   _____

   _____

   (b) Mary observed a shoot in Pot A which looked like the picture shown below.



   (i) What is the function of the tiny 'hairs' found on the root? [2m]

   _____

   _____

   (ii) Name part X and state its function. [2m]

   _____

   _____

   (iii) What would happen to part X after a few days? [1m]

   _____

   _____

   (iv) Why do you think this happened? [1m]

   _____

   _____

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(c) Peter wants to grow some balsam shoots to the stage shown in the picture in (b). He fills a pot with fertile garden soil and plants five balsam seeds. He then places the pot in a warm, dark airy place. He waters the seeds regularly.

Will seedlings grow in Peter's pot? Explain your answer. [2m]

Answers: 1. (a) The seeds in pot B were boiled seeds. 1. (b) (i) The tiny 'hairs' found on the root help to increase the surface area of the root so that more water can be absorbed by the root. (ii) X is the seed leaf. It provides the developing seedling with nutrients before its real leaves appear. (iii) It would shrivel and drop off. (iv) Once the real leaves of the young plant grew, the young plant was able to photosynthesize and make food for itself. It no longer needed the seed leaves to provide it with nutrients. 1. (c) Yes, they will. Peter's balsam seeds receive sufficient air, water and warmth for them to germinate. Since the seedlings do not have real leaves, they do not undergo photosynthesis and hence sunlight is not needed for their growth. (However, if Peter wants his seedlings to develop further into young plants with leaves, he needs to give them sunlight from then on.)

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Reproduction in Humans and Plants

1. Study the table below.

	Male and female parts needed for reproduction	
	In plants	**In humans**
1		
2		
3		
4		
5		
6		
7		

Mrs Jones asked Alan and Betty to complete the above table. When they came to 'ovary', the two students could not agree on where to place it. Alan said that it should be placed in the 'In plants' column while Betty insisted that it should be placed in the 'In humans' column.

(a) Who is right? [1m]

_____

(b) What is an ovary and what are its functions? (Consider all meanings of 'ovary' when answering this question.) [2m]

_____

_____

_____

_____

Reproduction in Humans and Plants

(c) Complete the table by filling in the parts needed for reproduction in plants and in humans. [4m]

(d) What type of reproduction do the plants and humans which have the parts specified in the table undergo? [1m]

_____

(e) There are plants and animals which do not undergo the method of reproduction mentioned in (d).

Name one plant and one animal that do not undergo this type of reproduction and state how each of them reproduces. [2m]

- Name of plant: _____

  How it reproduces: _____

  _____

- Name of animal: _____

  How it reproduces: _____

  _____

Answers: 1. (a) Both are right. The ovary is a part of the reproductive system of a plant and an animal. 1. (b) In plants, the ovary is the female part of the flower which contains the ovules. Fertilization occurs in the ovary. In humans, the ovary is the female reproductive organ containing the eggs or ova (the female sex cells). Every month, a ripened ovum is released from the ovary into the fallopian tube. 1. (c) 1 anther; testis 2 pollen grains; penis 3 filament; oviduct 4 stigma; ovary 5 style; uterus 6 ovary; vagina 7 ovule; ovum (ova) 1. (d) They undergo sexual reproduction. 1. (e) (i) Name of plant : pineapple plant How it reproduces : from suckers (ii) Name of animal : amoeba How it reproduces : by cell division (binary fission) (*Accept any other reasonable answers.*)

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Water And Changes Of State

The Three States Of Water

There are three states of water – solid, liquid and gas.

Water can change from one state to another by gaining or losing heat.

Freezing

When water is placed in a freezer, it changes to ice. This goes to show that its state has change from a liquid to a solid.

When water is placed in a freezer, it gradually loses heat. Its temperature drops slowly down to 0°C. This change in state is called **freezing**. It is at 0°C that water freezes. Hence, the **freezing point of water** is **0°C**.

However, if you add salt to water, its freezing point becomes much lower. If, instead of pure water, we use seawater (which contains salt particles in it), its freezing point is approximately at –2.2°C!

Melting

When ice is taken out from the freezer and left on the table at room temperature, it slowly melts as it starts to gain heat from its surroundings.

Melting is the process where a solid changes to a liquid state. The temperature at which ice melts to change to water is called the **melting point** of ice.

During melting, the temperature remains constant at **0°C** as heat energy is taken in by the ice as it slowly becomes water.

Adding salt to ice can lower the melting point of ice. Thus, the ice will melt faster.

The freezing and melting point of water are the same. It is 0°C.

Condensation

When you pour yourself a cup of iced water, water droplets appear on the external surface of the cup after a while. This is because the warm water vapour in the surrounding air comes into contact with the cold surface of the cup and loses its heat. The warm water vapour condenses on the cold surface of the cup which you see as water droplets. This is known as condensation when water changes from a gas to a liquid.

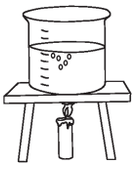
In the kitchen, condensation is also evident when you boil a pot of soup on the stove. The steam leaves the surface of the boiling soup. It loses heat and cools down. A visible white 'cloud' appears to hover above the pot. This white 'cloud' is actually the water droplets floating in the air.

Water And Changes Of State

Just before covering the pot with a dry and clean metal lid, you will notice that some water droplets have condensed on it. The steam from the pot of hot soup has condensed on the cool surface of the metal lid. The steam has lost heat to its surroundings and has changed from a gaseous state to a liquid state.

Boiling And Evaporation

Both boiling and evaporation refer to a change from the liquid state to the gaseous state. However, there are some differences between boiling and evaporation.

Boiling	Evaporation
• Takes place only at the boiling point of the liquid (for water, the **boiling point** is **100°C**) • During boiling, the temperature of the substance will remain at the boiling point until all the substance has changed into the gaseous state.	• Takes place at any temperature above melting point
• Bubbles can be seen in the liquid during boiling.	• Bubbles cannot be seen in the liquid during boiling
• Boiling takes place throughout the whole liquid. • Bubbles form at the bottom of the beaker and rise to the surface during boiling. 	• The liquid which is exposed at the surface evaporates first. 

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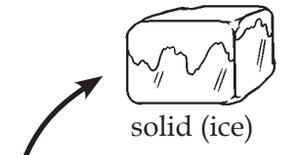
Water And Changes Of State

Freezing

liquid → solid

When liquid water loses heat, it freezes to become solid ice.



solid (ice)

Melting

solid → liquid

When solid ice at 0°C is heated, it gains heat and melts to form liquid water.

liquid (water)

Boiling (at 100°C)

liquid → gas

When liquid water is heated until it reaches a temperature of 100°C, it boils to form gaseous steam.

Condensation

gas → liquid

When steam or water vapour loses heat, it condenses to form liquid water.

Evaporation (below 100°C)

liquid → gas

When liquid water gains heat, it evaporates to form gaseous vapour.

Evaporation can take place at any temperature above melting point, but the higher the temperature, the faster the rate of evaporation.

gas
(water vapour)

Water and changes of state

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Water And Changes Of State

Change of state	Heat gain / Heat loss	Examples
Freezing (liquid → solid)	Heat loss	Water placed in the freezer changes into ice. Water droplets high up in the sky freeze and fall as snowflakes in cold countries during winter. Lakes and rivers become frozen during winter in cold countries.
Melting (solid → liquid)	Heat gain	An ice cube left outside in the open melts into a liquid. Frozen rivers and lakes melt in spring.
Evaporation (liquid → gas)	Heat gain	Wet clothes hung on poles outside become dry after some time. Puddles of water formed on the road after a rain dry up after a while.
Condensation (gas → liquid)	Heat loss	Droplets of dew can be found on the surfaces of leaves or on vehicles parked overnight in the open early in the morning. A layer of mist forms on our spectacle lenses when we come out of an air-conditioned place. This is because in an air-conditioned room, the lower temperature causes the surfaces of the lenses to become cold. When we step outside to a hotter place, the water vapour in the surrounding air condenses into water droplets when it comes into contact with the colder surface of our lenses, forming a layer of mist which blurs our vision. When we open the lid of a pot of boiling hot soup, we notice that the underside of the lid is wet. This is because the lid is at a higher temperature than the surrounding air. When the pot is opened, the hot underside of the lid is exposed to the cooler air in the surroundings. The water vapour in the air comes into contact with the surface of the lid and condenses into water droplets. Water droplets can be seen on the outside surface of a glass of drink with ice cubes inside it. This is because the ice cools the drink and the glass. When the water vapour in the air outside (which is at a higher temperature) comes into contact with the cooler outer surface of the glass, it condenses into water droplets. The same explanation applies to water droplets seen on the surface of fruit soon after they are taken out of the refrigerator.
Boiling (liquid → gas)	Heat gain	When water reaches 100°C, it starts to boil and change into steam. This is called the boiling point of water.