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0610/33

October/November 2023

1 hour 15 minutes

No additional materials are needed.

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Any blank pages are indicated.



- 1 (a) Arteries are a type of blood vessel.

State **two** structural features of arteries.



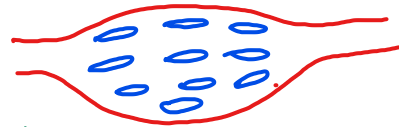
1 Thick wall

2 Have narrow lumen.

[2]

- (b) Capillaries are another type of blood vessel.

State **one** function of capillaries.



→ exchange of material from blood to the body tissues.

[1]

- (c) State the name of the structures in veins that ensure the one-way flow of blood.

Valves.

[1]

- (d) Fig. 1.1 is a diagram of part of the human circulatory system.

The arrows show the direction of blood flow.

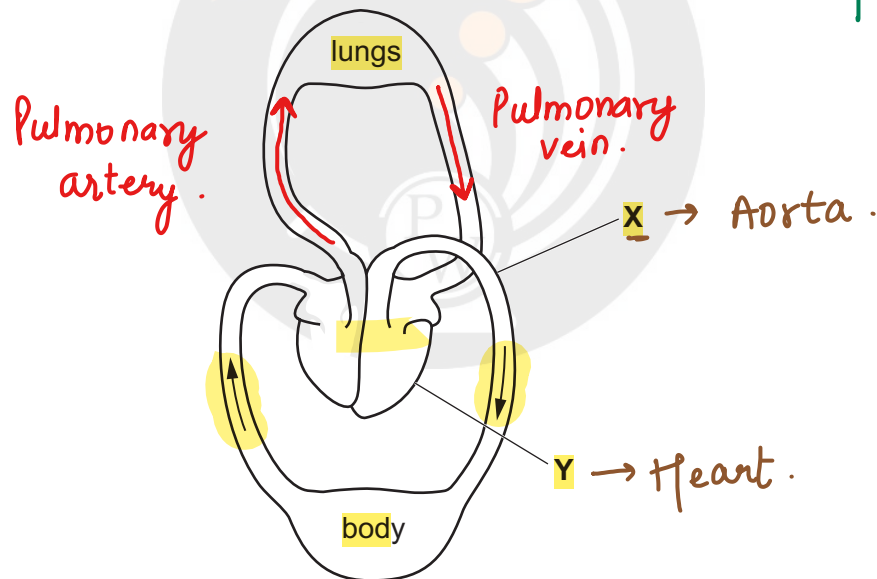
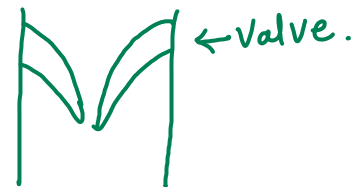


Fig. 1.1

- (i) On Fig. 1.1, draw arrows to show the direction of blood flow to and from the lungs. [1]

- (ii) State the names of blood vessel X and organ Y in Fig. 1.1.

blood vessel X Aorta

organ Y Heart.

[2]



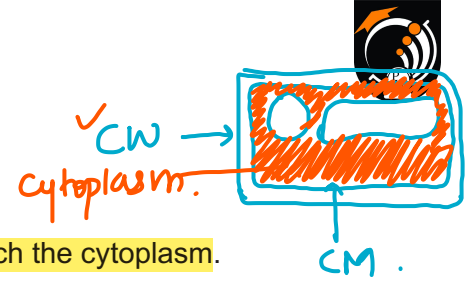
- (e) State the name of the blood vessel that transports oxygenated blood to the kidney.

Renal Artery. [1]

[Total: 8]



2 Water moves into and out of cells by osmosis.



(a) State **two** plant cell structures that water moves through to reach the cytoplasm.

- 1 Cell wall
- 2 Cell membrane

[2]

(b) Potato plant tissue was used to investigate osmosis.

Potato cylinders were placed into different sucrose solutions for 30 minutes.

The masses of the potato cylinders were measured before and after being placed into the solutions.

The difference in mass was calculated for each potato cylinder.

Table 2.1 shows the results of the investigation.

Table 2.1

concentration of sucrose solution / mol per dm ³	starting mass of potato cylinder / g	final mass of potato cylinder / g	difference in mass / g	percentage change in mass
0.0	2.31	2.53	0.22	9.52
0.2	2.35	2.49	0.14	5.96
0.4	2.28	2.34	0.06	2.63
0.6	2.30	2.21	-0.09	-3.91
0.8	2.34	2.19	-0.15	-6.41

(i) Using the information in Table 2.1, calculate the percentage change in mass for the potato cylinder in the 0.6 mol per dm³ sucrose solution.

Give your answer to **two** decimal places.

Space for working.

$$\% \text{ change} = \frac{V_f - V_i}{V_i} \times 100 \Rightarrow \frac{-0.09}{2.30} \times 100 \Rightarrow -0.039 \times 100$$

$$\Rightarrow -3.91\%$$

%
[3]



- (ii) Describe the expected appearance of the potato cylinder that was placed in the 0.8 mol per dm^3 sucrose solution for 30 minutes.

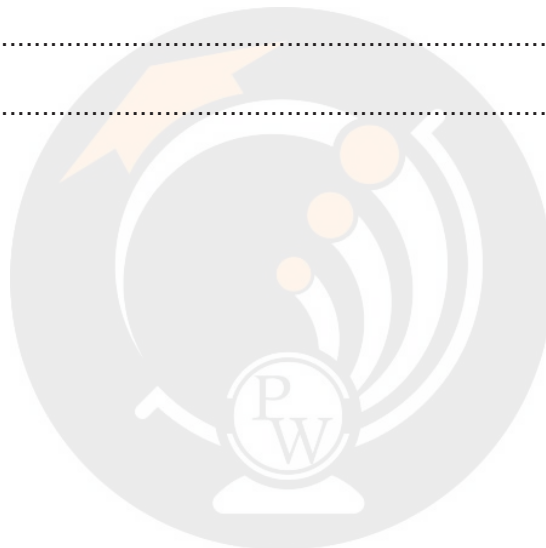
→ Potato cylinders appear to be shrunken [reduced in mass].
→ This happened due to loss of water from potato cylinders to the concentrated sucrose solution [1]

- (iii) Using the results in Table 2.1, describe how the concentration of sucrose solution affects the percentage change in mass of the potato cylinders.

→ As the concentration of sucrose solution increases, the percentage change in mass decreases.
→ In 0.0 to 0.4 mol per dm^3 , the percentage change in mass is positive

[2]

[Total: 8]



- 3 (a) Fig. 3.1 is a drawing of a leaf from an oak tree.

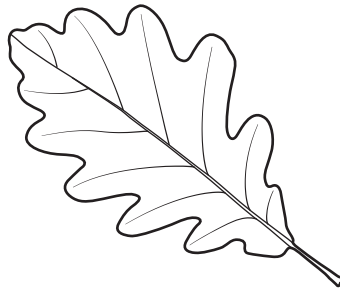


Fig. 3.1

The oak leaf has a large surface area.

Explain why having a large surface area is an adaptation for photosynthesis.

→ To provide more surface area for more incidence of light, hence, more photosynthesis will take place. [1]

- (b) State the word equation for photosynthesis.

Carbondioxide + Water $\xrightarrow{h\nu}$ Carbohydrate + oxygen. [2]



(c) Fig. 3.2 is a diagram of a section of a leaf from a dicotyledonous plant.

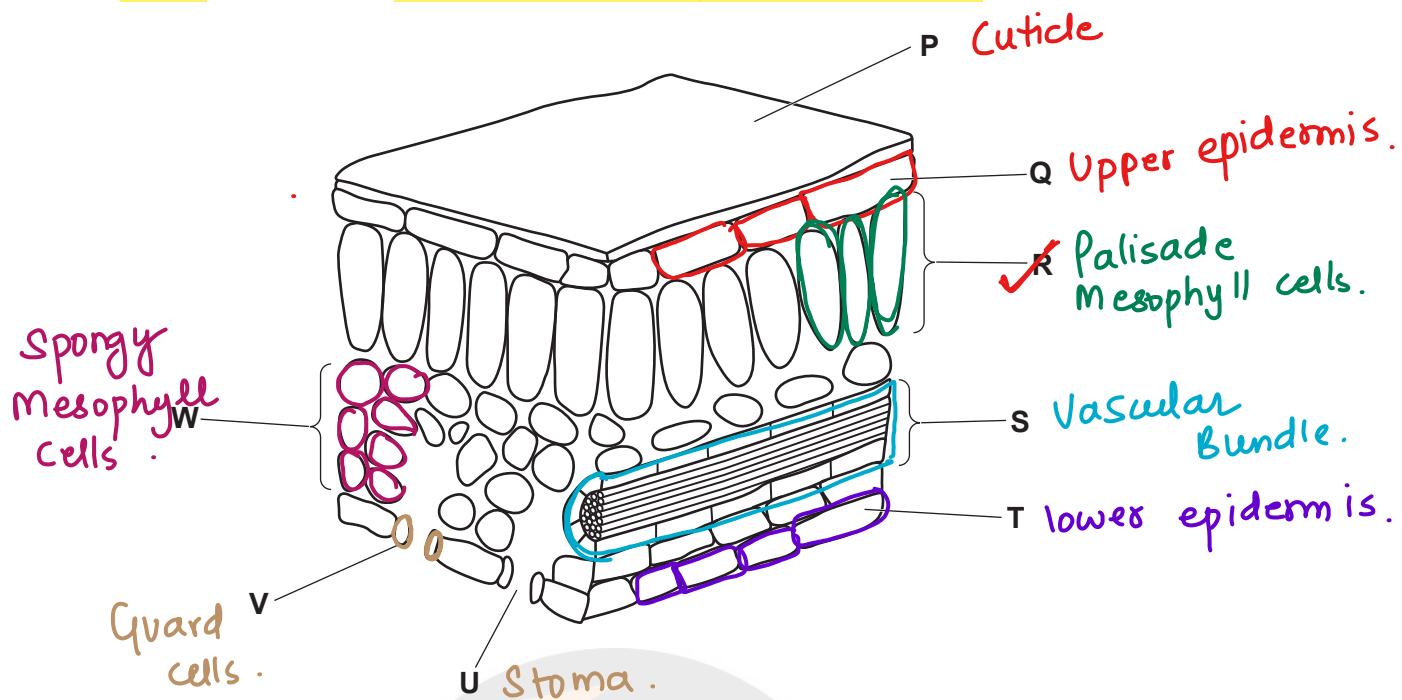


Fig. 3.2

- (i) State the letter in Fig. 3.2 which identifies the tissue that contains the highest density of chloroplasts.

(R) Palisade mesophyll cells.

[1]

- (ii) In Fig. 3.2, the letter S labels a vascular bundle.

State the names of two tissues found in the vascular bundle.

1 Xylem

2 Phloem.

[2]

- (iii) State the letter in Fig. 3.2 which identifies the cells that control gas exchange in the leaf and state their name.

letter V

name Guard cells.

[2]

- (iv) State the name and one function of the layer labelled P in Fig. 3.2.

name Cuticle

function It prevents water loss from surface of leaves.

[2]



- 4 (a) During inspiration air is taken into the lungs.

Table 4.1 shows the structures that air passes through during inspiration.

The structures are **not** in the correct order.

Table 4.1

A	alveoli	⑥
B	bronchi	④
C	bronchioles	⑤
D	larynx	②
E	nose	①
F	trachea	

Identify the order of structures that air travels through during inspiration.

Write the letters from Table 4.1 in the boxes provided to show the correct order.

One has been done for you.

E	D	F	B	C	A
nose	larynx	Trachea.	Bronchi	Bronchioles.	Alveoli

[3]

- (b) The composition of inspired air is different from the composition of expired air.

Describe the differences in composition between inspired and expired air.

Inspired Air Expired Air.

$CO_2 \longrightarrow 0.04\% \longrightarrow 4\%$

$O_2 \longrightarrow 21\% \longrightarrow 16\%$

Water vapour \longrightarrow unsaturated \longrightarrow saturated.

[4]

(c) A student investigated the composition of inspired and expired air.

Fig. 4.1 shows the apparatus that was used.

The student breathed in and out, through the mouthpiece, for 15 seconds.

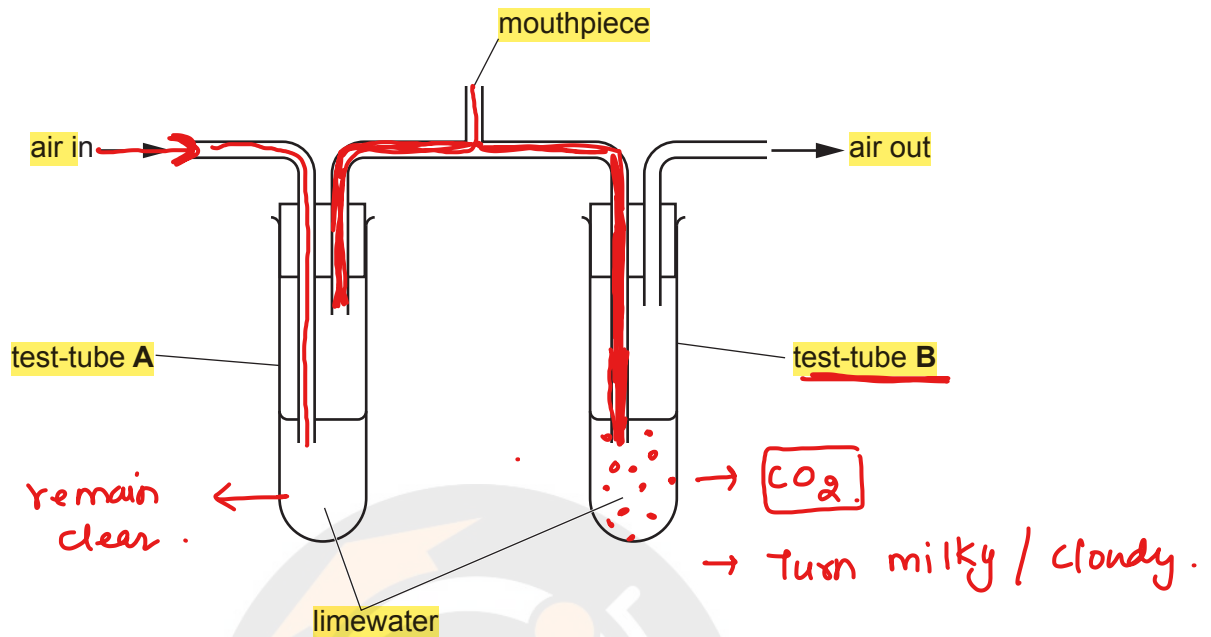


Fig. 4.1

(i) State the name of the gas that can be identified using limewater. → tests the presence of CO_2 .
Carbon dioxide. [1]

(ii) Using the information in Fig. 4.1, predict what happened to the limewater in test-tube A and in test-tube B.

test-tube A No change

test-tube B Turns milky / cloudy. [2]

(d) The student exercised for five minutes.

Describe the effects of vigorous exercise on breathing.

→ Breathing Rate increases :- Since there is increased demand of oxygen by the muscle cells to perform more respiration, to liberate more energy.
 → Depth of breathing increases.
 → To meet the increased oxygen demand. [2]

[Total: 12]



5 Bluebells are plants that can reproduce sexually and asexually.

(a) (i) Define the term asexual reproduction.

→ It is a type of reproduction that involves single parent to produce genetically identical offsprings. [2]

(ii) State one example of a structure that is involved in asexual reproduction in a plant.

Tuber :- swollen, underground stem that stores food & gives rise to new plants as they have buds called eyes, through which new plantlets grow. [1]

(b) Fig. 5.1 is a drawing of a bluebell plant.

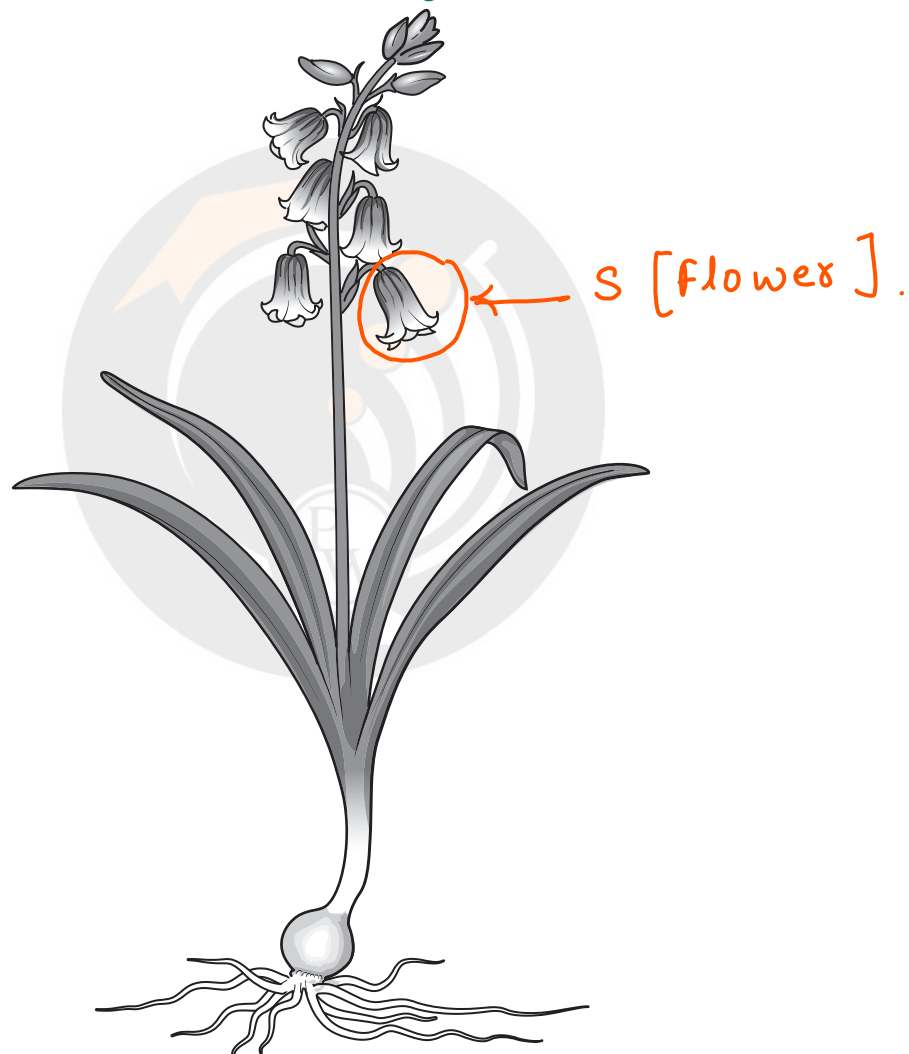


Fig. 5.1

On Fig. 5.1, label the structure that carries out sexual reproduction with a label line and the letter S. [1]

(c) Bluebells grow in ancient woodlands.

Fig. 5.2 is a graph showing the percentage of land that was covered with woodland in one country from the years 1100 to 2000.

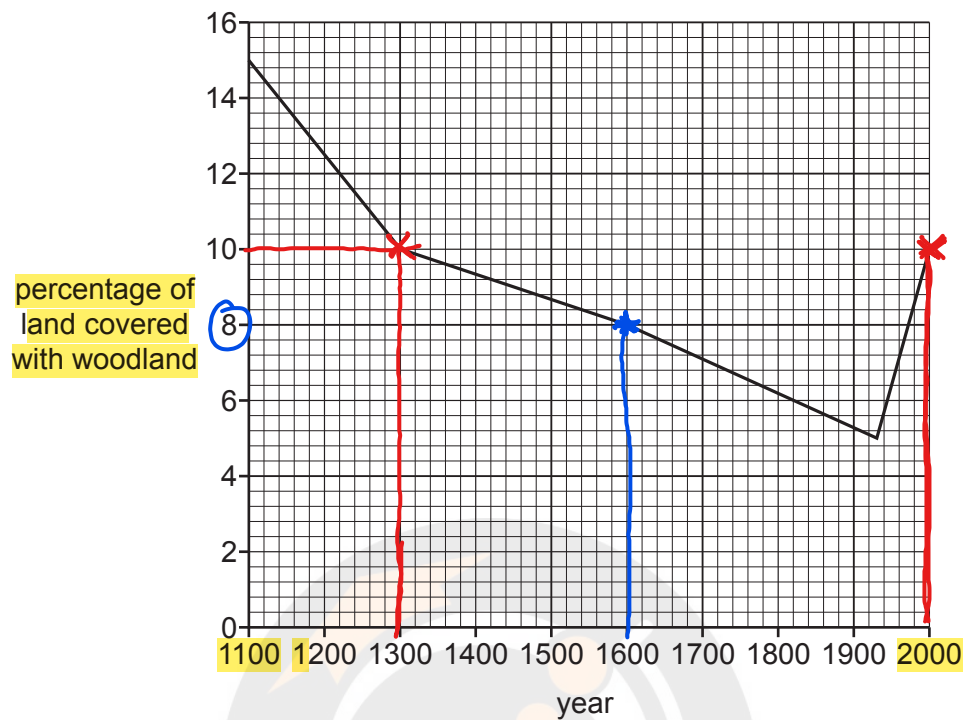


Fig. 5.2

(i) State the years when the percentage of land covered with woodland was 10% in Fig. 5.2.

1300 and 2000 [2]

(ii) State the percentage of land covered with woodland in 1600 in Fig. 5.2.

8% % [1]



- (d) (i) In many countries the percentage of land covered with woodland has decreased because of deforestation.

Suggest **two** reasons why deforestation occurs.

- 1 Urbanization → the construction of tall buildings, roads, dams, industries, etc.
- 2 Agricultural practices :- The cutting of trees for growing crops for commercial purpose [2]

- (ii) Explain the undesirable effects of deforestation.

→ The removal of large number of trees result in habitat destruction on a massive scale.

1) Animals living in the forest lose their homes & sources of food.

2) Soil erosion is more likely to occur.

This soil can end up in rivers, lakes, this will further destroy the habitat there.

3) Flooding becomes more frequent, there is no soil to absorb the rainwater & hold it. [3]

[Total: 12]



- 6 (a) A student investigated variation in flower colour in pea plants.

The student counted the number of pea plants that had purple flowers and the number of pea plants that had white flowers.

Fig. 6.1 shows the results.

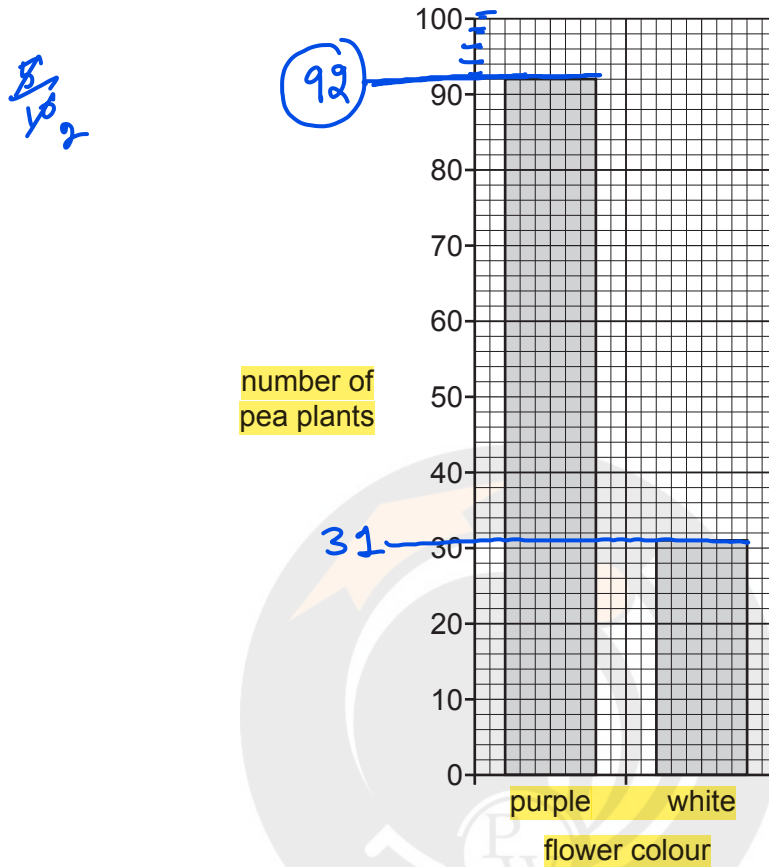


Fig. 6.1



Use the information in Fig. 6.1 and your own knowledge to complete the sentences about variation.

Variation is the differences between individuals of the same species.

Flower colour in pea plants is an example of discontinuous variation. The other type of variation is known as continuous variation.

Discontinuous variation results in a limited number of phenotypes with no intermediates.

Discontinuous variation is usually caused by gene only.

The difference between the number of pea plants that had purple flowers and the number of pea plants that had white flowers is $92 - 31 = 61$.

The ratio of purple to white flowers in Fig. 6.1 is $\frac{92}{31}$ $3:1$.

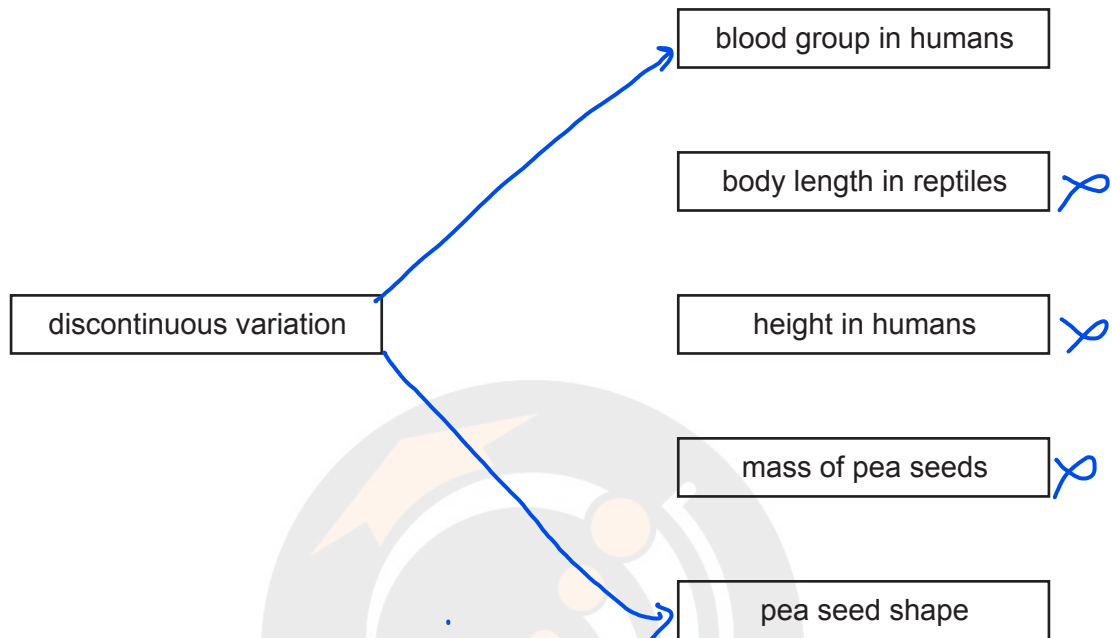
[6]

- (b) Some features of organisms show discontinuous variation.

The term discontinuous variation is in the box on the left.

The boxes on the right show some features of organisms.

Draw **two** lines from 'discontinuous variation' to **two** features that show discontinuous variation.



[2]

- (c) New alleles for flower colour can arise as a result of genetic change.

- (i) State the term used to describe genetic change.

Mutation.

[1]

- (ii) State **one** factor that can increase the rate at which genetic change occurs.

Increasing ionising radiation.

[1]



- (d) Scientists have experimented with genetically modifying pea plants to make them resistant to pea weevils.

Pea weevils are an insect pest.

- (i) Suggest why pea plants might be genetically modified to make them resistant to pests.

→ to increase the overall yield / production.....

[1]

- (ii) State **two** other examples of genetic modification in crop plants.

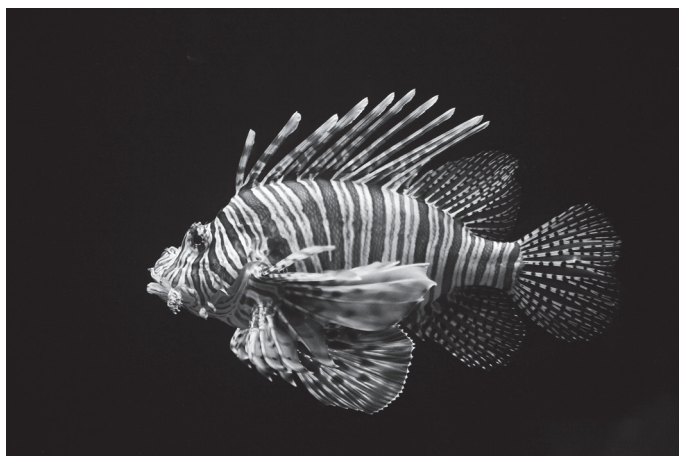
- 1 Herbicide resistant crop.
- 2 Improve the quality of crop in terms of nutrition.

[2]

[Total: 13]



- 7 Fig. 7.1 is a photograph of a lionfish (*Pterois volitans*).



Genus .
species .

Fig. 7.1

- (a) State the genus of the lionfish.

Pterois

[1]

- (b) Lionfish are classified as fish.

Table 7.1 shows features of organisms.

Place ticks (✓) in the boxes to show the correct features of birds, fish and insects.

Table 7.1

features	birds	fish	insects
compound eyes	✗	✗	✓
feathers	✓	✗	✗
internal skeleton	✓	✓	✗

[3]



- (c) Lionfish are an example of a foreign species that has been accidentally introduced to many marine habitats.

Describe the harmful consequences of introducing a foreign species to a habitat.

- Disruption of food chain.
- Competition^{for} food | space.
- Predation on native species.

[3]

- (d) Removing introduced species from habitats is one method of conserving endangered species.

Describe other methods of conserving endangered species.

- Ban hunting | poaching.
- Habitat conservation & restoration of degraded habitats through reforestation & enhanced habitat quality.
- Gene conservation & maintaining a genetic diversity by refraining interbreeding & introducing selective breeding.

[3]

[Total: 10]

8 Fig. 8.1 is a diagram showing part of the carbon cycle.

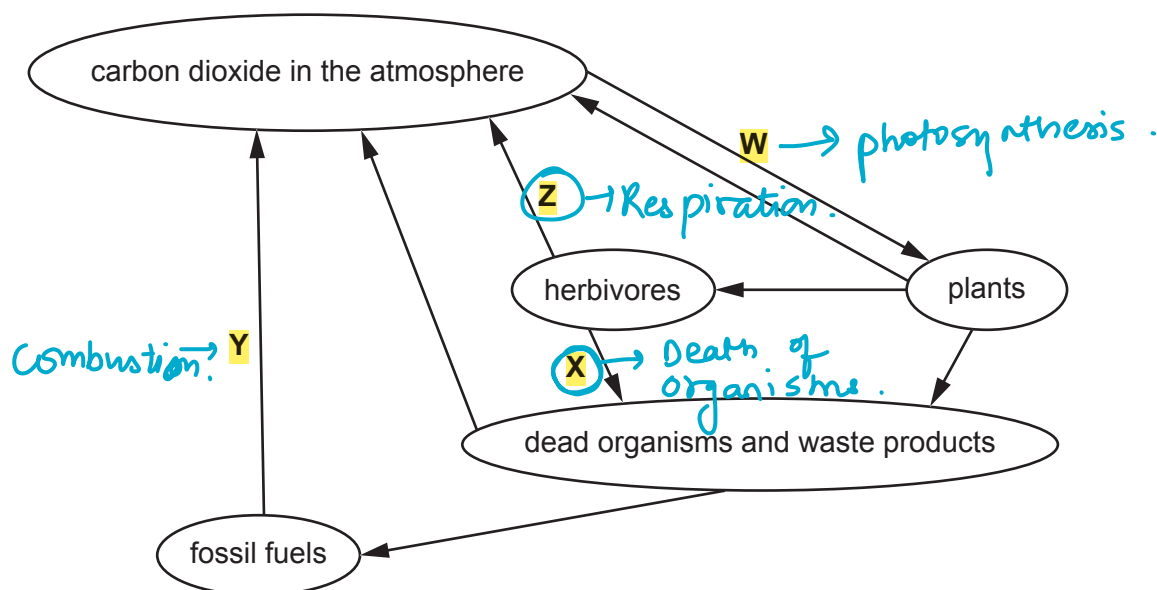


Fig. 8.1

(a) Identify the processes labelled **W**, **X**, **Y** and **Z** in Fig. 8.1.

- W** Photosynthesis
X Death of organisms
Y combustion
Z Respiration [4]

(b) State the names of **two** biological molecules found in plants that contain carbon.

- 1 Proteins
 2 Carbohydrates [2]

(c) An increase in the concentration of carbon dioxide in the atmosphere is causing the enhanced greenhouse effect.

State the name of **one** other greenhouse gas.

- Methane [1]

[Total: 7]

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