Cambridge Assessment International Education

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BIOLOGY **0610/32**

Paper 3 Theory (Core) **October/November 2024**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- 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.

INFORMATION

- 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 **16** pages.

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1 **(a)** Fig. 1.1 is a photomicrograph showing a cross-section of an artery.

View solution

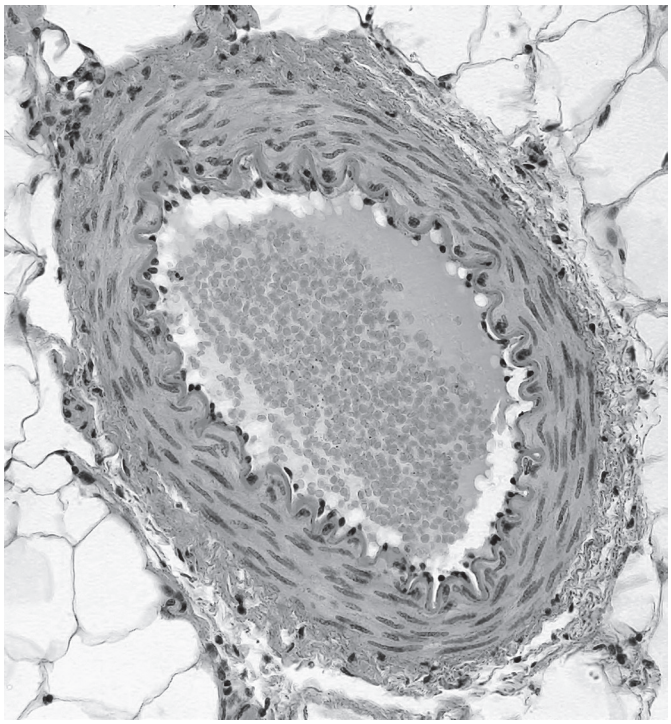

Fig. 1.1

On Fig. 1.1, identify and label the:

- artery wall
- lumen.

[2]

(b) Complete the table by circling the correct words to show the differences between arteries and veins.

View solution

type of blood vessel	relative thickness of the wall	relative diameter of the lumen
artery	**thick / thin**	**wide / narrow**
vein	**thick / thin**	**wide / narrow**

[2]

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

..... [1]

View solution

(d) Fig. 1.2 is a simplified diagram of the circulatory system in humans.

View solution

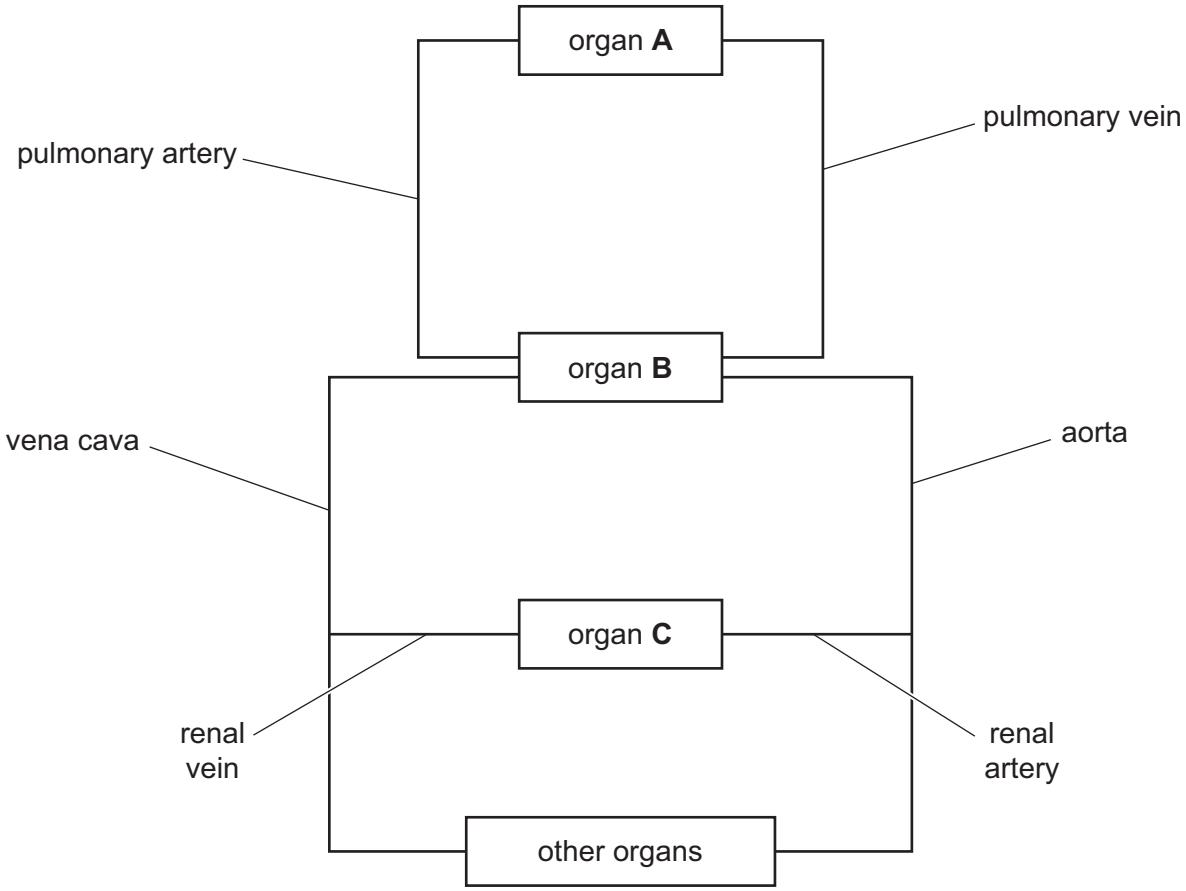

Fig. 1.2

(i) State the names of the organs represented by the letters **A**, **B** and **C** in Fig. 1.2.

A .....

B .....

C .....

[3]

(ii) Draw **two** arrows **on Fig. 1.2** to show the direction of blood flow in the pulmonary vein and the pulmonary artery. [1]

(e) State the name of the blood vessels that transfer substances to and from cells.

View solution

..... [1]

(f) (Circle) the names of **two waste** substances that are transferred from cells to blood.

View solution

amino acids **carbon dioxide** **fatty acids**

glucose **oxygen** **urea**

[2]

[Total: 12]

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2 **(a)** Tick **(✓) all** the boxes that describe enzymes.

View solution

they are permanently changed by the reaction	
they are involved in all metabolic reactions	
they are proteins	
they are solvents	
they slow down all chemical reactions	

[2]

(b) Fig. 2.1 shows the effect of pH on the activity of three different digestive enzymes, **X**, **Y** and **Z**.

View solution

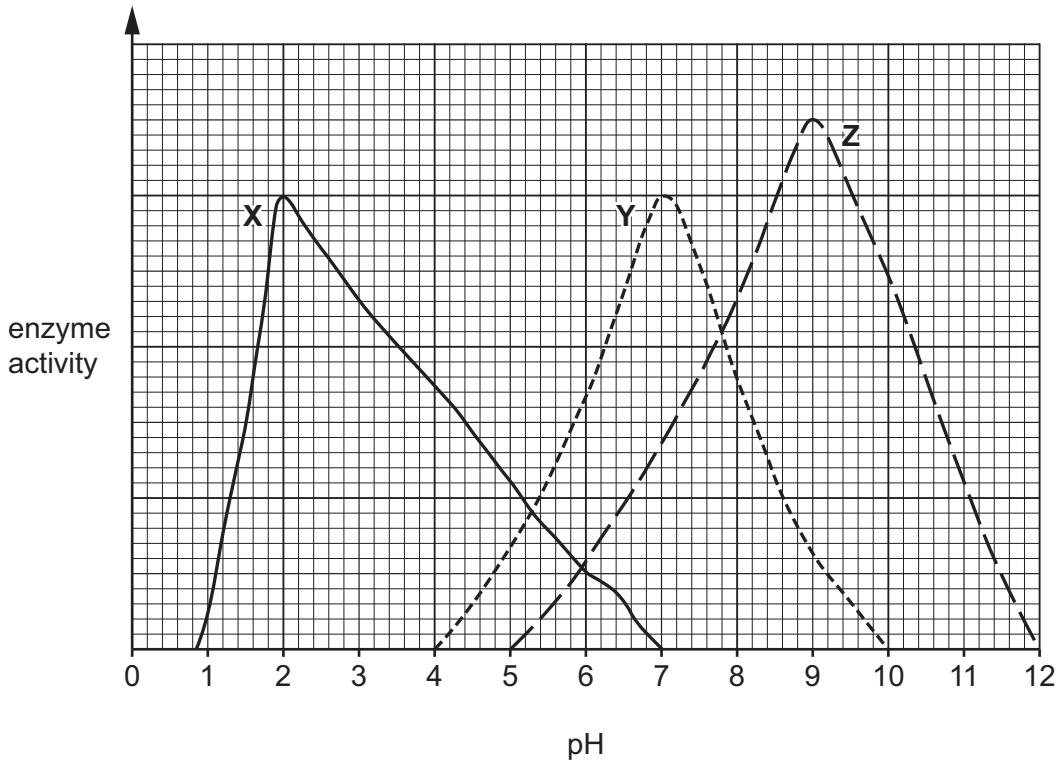

Fig. 2.1

Using the information in Fig. 2.1:

(i) State the optimum pH of enzyme **Z**.

..... [1]

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(ii) State a pH value at which both enzymes **X** and **Y** are active.

..... [1]

(iii) State a pH value at which enzyme **Y** is completely denatured.

..... [1]

(iv) Enzyme **X** is a protease.

Describe its location and action in the digestive system.

location .....

action .....

[2]

(v) Enzyme **Y** is produced by the salivary glands.

State the substrate and product of enzyme **Y**.

substrate .....

product .....

[2]

(c) State the type of digestion that uses enzymes.

View solution

..... [1]

(d) State **one** factor, other than pH, that affects enzyme activity.

..... [1]

[Total: 11]

View solution

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3 **(a)** Fig. 3.1 is a diagram of part of the carbon cycle.

View solution

Three processes that occur in the carbon cycle are labelled **Q**, **R** and **S**.

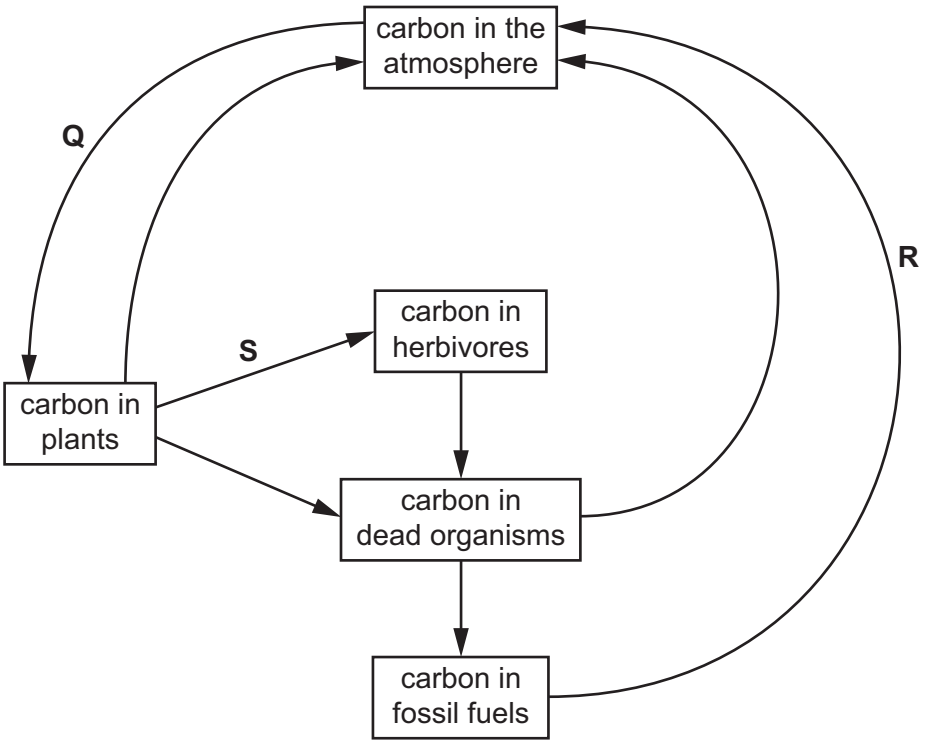

Fig. 3.1

(i) Complete the table by stating the names of processes **Q**, **R** and **S** in Fig. 3.1.

letter in Fig. 3.1	name of the process
Q	
R	
S	

[3]

(ii) Draw **one** arrow **on Fig. 3.1** to represent the transfer of carbon by respiration in herbivores. [1]

View solution

(b) Carbon dioxide is one gas that causes climate change.

State the name of **one other** gas that causes climate change.

View solution

..... [1]

(c) Suggest **one** way that humans can increase the rate of removal of carbon dioxide from the atmosphere.

.....

.....

..... [1]

(d) Proteins contain carbon.

View solution

State **two other** chemical elements all proteins contain.

1 .....

2 .....

[2]

(e) Describe what is meant by the term carnivore.

View solution

.....

.....

..... [1]

[Total: 9]

4 A population of a species of fish was accidentally introduced into a lake.

(a) State **two** features that can be used to classify this introduced species as a fish.

View solution

1 .....

2 .....

[2]

(b) Describe what is meant by the term population.

View solution

.....

.....

.....

.....

..... [2]

(c) Fig. 4.1 shows the changes in the population size of the introduced fish species in the lake between 2004 and 2010.

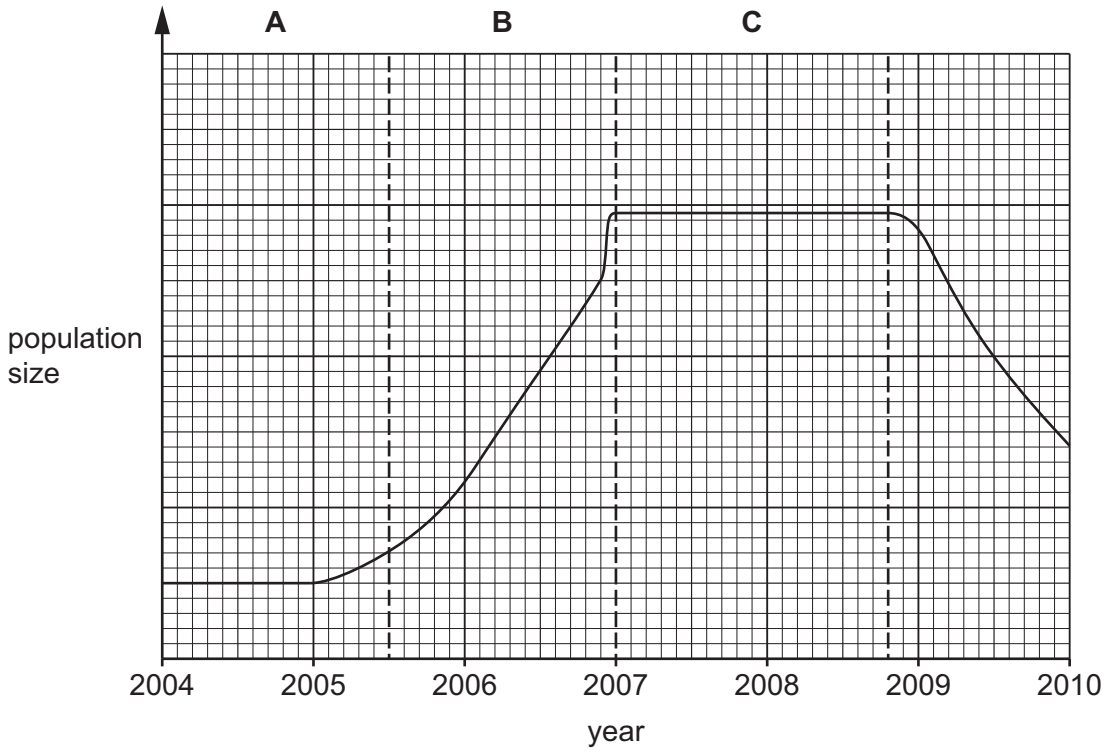

Fig. 4.1

(i) The boxes on the left show the letters identifying the sections of the graph in Fig. 4.1.

View solution

The boxes on the right show the phases of population growth.

Draw lines to link each letter with the correct phase.

Draw **three** lines.

letter from Fig. 4.1	**phase**
A	death
B	exponential (log)
C	lag
	stationary

[3]

(ii) Describe possible reasons for the change in population size between 2009 and 2010 in Fig. 4.1.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

View solution

5 **(a)** A student investigated the effect of windspeed on the rate of transpiration.

The student placed a fan at different distances from a plant shoot and measured the distance the air bubble moved in three minutes.

The distance the air bubble moved can be used to calculate the rate of water uptake, which is equivalent to the rate of transpiration.

Fig. 5.1 shows the apparatus the student used.

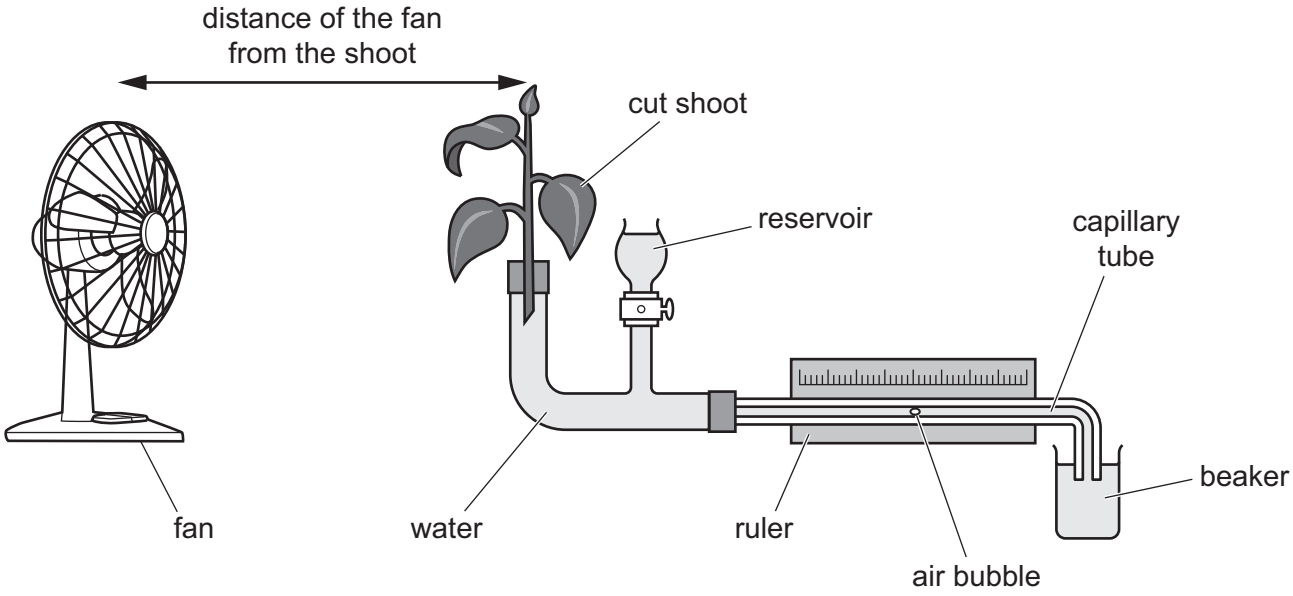

Fig. 5.1

Table 5.1 shows their results.

Table 5.1

distance of the fan from the shoot / m	distance travelled by the air bubble in three minutes / mm	rate of water uptake / mm per second
0.3	26	0.14
0.4	25	0.14
0.5	23	0.13
0.6	20	
0.7	19	0.11
0.8	16	0.09

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(i) Calculate the rate of water uptake when the fan is 0.6 m from the plant shoot.

View solution

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

Space for working.

..... mm per second [2]

(ii) Using the information in Fig. 5.1 and Table 5.1, complete the sentences by writing a word or phrase in the spaces to describe the results.

As the fan is moved further away from the shoot, the windspeed .....

and the ..... moved by the air bubble decreased.

View solution

During transpiration water evaporates from the surfaces of the

..... cells into the air spaces inside the leaf. The water vapour

diffuses out of the leaf through the ..... . This causes

water to move through the capillary tube causing the air bubble to

move towards ..... .

[5]

(iii) State **one other** factor that affects the rate of transpiration.

View solution

..... [1]

(b) State **two** uses of water in a plant.

View solution

1 .....

2 .....

[2]

(c) Explain why the leaf can be described as an organ.

View solution

.....

.....

.....

.....

..... [2]

[Total: 12]

6 Fig. 6.1 is a photograph of intensive egg production on a chicken farm.



Fig. 6.1

(a) In 1905, each chicken produced a mean of 120 eggs per year. In 2021, each chicken produced a mean of 300 eggs per year.

View solution

Calculate the percentage increase in mean egg production per year.

Space for working.

.....% [2]

(b) Egg production has increased due to selective breeding and intensive farming.

View solution

Describe the **disadvantages** of intensive livestock farming.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Complete the flowchart to describe how egg production in chickens is increased by selective breeding.

View solution

identify the chickens that .....

↓

use these chickens to .....

↓

observe the offspring for improvement in egg production

↓

repeat this process over many .....

[3]

(d) Selective breeding is also used to increase crop plant production.

View solution

State **two other** ways to increase crop plant production.

1 .....

2 .....

[2]

[Total: 10]

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7 **(a)** A scientist investigated the effect of the enzyme pectinase on the volume of fruit juice produced by the same mass of two different fruits.

View solution

Fig. 7.1 shows the results.

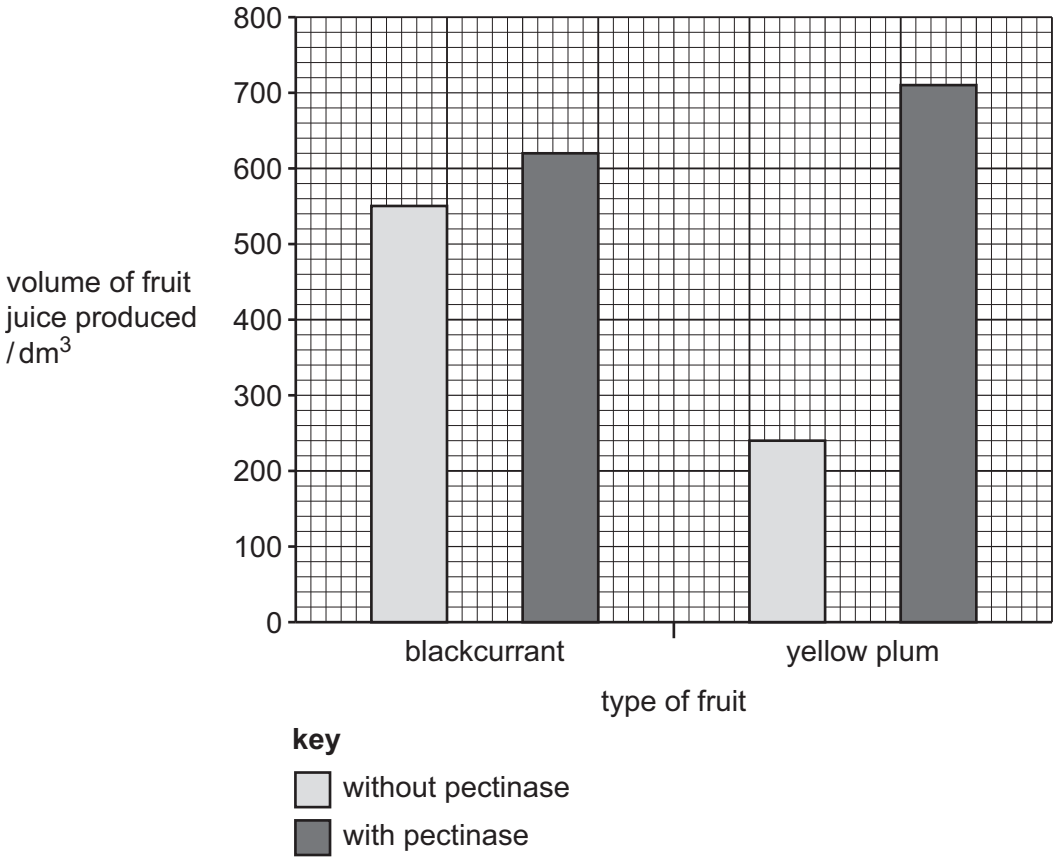

Fig. 7.1

Describe the results shown in Fig. 7.1.

.....

.....

.....

.....

.....

.....

..... [3]

(b) State **two** components of a balanced diet that are provided by fruits such as blackcurrants and plums.

1 .....

2 .....

[2]

(c) State **two** reasons why bacteria are useful in biotechnology and genetic modification.

1 .....

2 .....

[2]

(d) The box on the left contains the beginning of a sentence.

The boxes on the right show some sentence endings.

Draw **two** lines to make two correct sentences.

	can only be done in plants.
	changes the genetic material of an organism.
Genetic modification	inserts, changes or removes genes.
	involves sexual reproduction.
	is used in active transport.

[2]

[Total: 9]

View solution

8 **(a)** Alveoli are the gas exchange surfaces in humans.

View solution

(i) State **two** features of gas exchange surfaces in humans.

1 .....

2 .....

[2]

(ii) State the name of the organ system alveoli belong to.

View solution

..... [1]

(b) State the word equation for aerobic respiration.

View solution

..... [2]

(c) Explain why muscle cells have a high rate of respiration.

View solution

.....

.....

.....

.....

..... [2]

[Total: 7]

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