Cambridge Assessment International Education

# Cambridge IGCSE™

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*3702568318*

**BIOLOGY** **0610/33**

Paper 3 Theory (Core) **October/November 2022**

**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 **20** pages.


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**1** Fig. 1.1 shows leaves from five different species of tree.

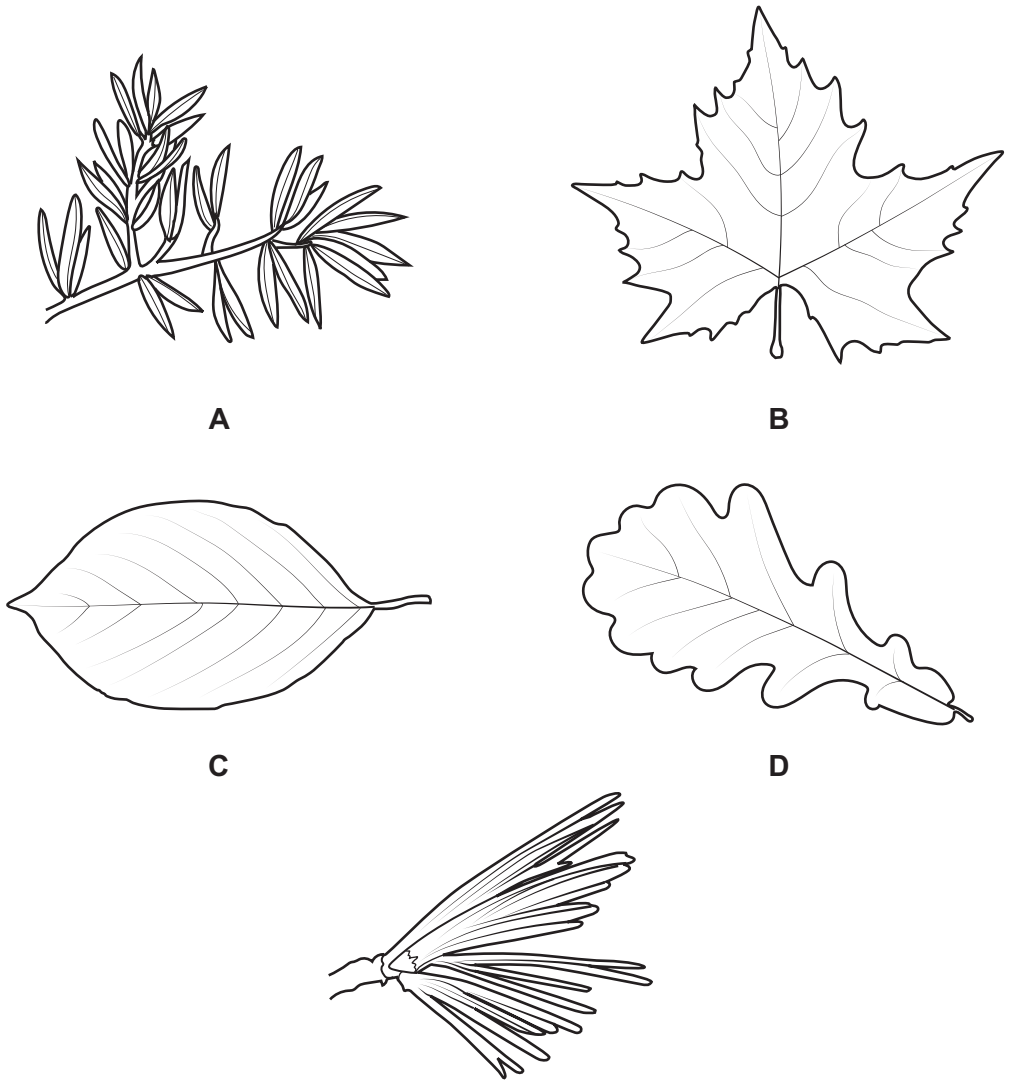



**Fig. 1.1**

**(a) (i)** Use the key to identify each tree species in Fig. 1.1.

Write the letter of each tree species (**A**, **B**, **C**, **D**, **E**) in the correct box beside the key.

| | | | |
|---|---|---|---|
| 1 (a) | multiple narrow, needle-like leaves | go to 2 | |
| (b) | single leaf which is **not** needle-like | go to 3 | |
| 2 (a) | leaves are evenly spread along the branch | *Juniperus communis* | |
| (b) | leaves start from a single point | *Cedrus deodara* | |
| 3 (a) | leaf has an unlobed smooth edge | *Frangula alnus* | |
| (b) | leaf has a lobed edge | go to 4 | |
| 4 (a) | lobes have a smooth, rounded edge | *Quercus robur* | |
| (b) | lobes have a jagged, irregular edge | *Acer pseudoplatanus* | |

[4]

**(ii)** State the genus of *Quercus robur*.

..... [1]

**(b) (i)** Define the term species.

.....

.....

..... [2]

**(ii)** Organisms are classified into kingdoms based on their features.

State **two** features of plant cells that are **not** found in animal cells.

1 .....

2 .....

[2]

[Total: 9]

**2** **(a)** Fig. 2.1 shows a diagram of an animal cell.

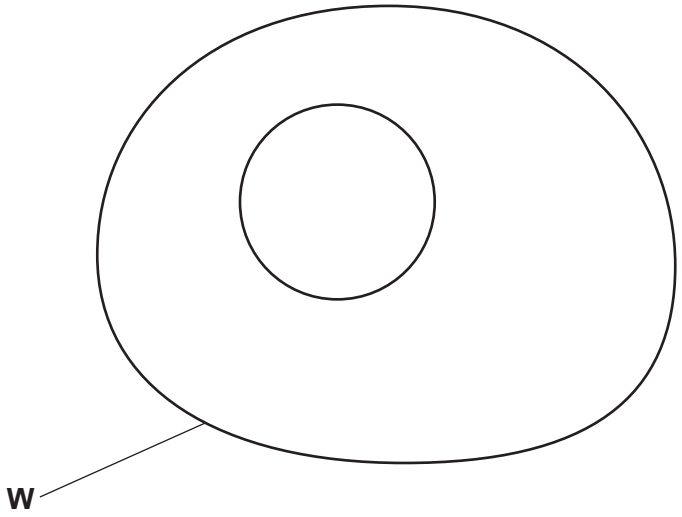



**Fig. 2.1**

**(i)** State the name of structure **W** on Fig. 2.1.

..... [1]

**(ii)** Write the letter **X** on Fig. 2.1 to show where chromosomes are found.

[1]

**(iii)** State what chromosomes are made from.

..... [1]

**(b)** **(i)** State the sex chromosomes that are found in the body cells of a human male.

..... [1]

**(ii)** A man and a woman have a child.

Complete the genetic diagram to show the inheritance of sex.

State the probability of the child being female.

| | | father | |
|---|---|---|---|
| | | | |
| mother | | | |
| | | | |

probability of the child being female .....

[3]

[Total: 7]

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**3** Eggs can be part of a balanced diet.

**(a)** Egg yolks are a source of iron and vitamin D.

State the dietary importance of iron and vitamin D.

iron .....

.....

.....

vitamin D .....

.....

.....

[2]

**(b)** Chickens lay eggs. Fig. 3.1 is a photograph of a chicken.



**Fig. 3.1**

A farmer wanted to increase the size of his chickens.

Describe how the farmer could use **selective breeding** to produce larger chickens.

.....

.....

.....

.....

.....

.....

..... [3]

**(c)** New alleles are formed by mutation.

**(i)** Define the term mutation.

..... [1]

**(ii)** State **two** factors that increase the risk of mutation.

1 .....

2 .....
[2]

[Total: 8]

**4** **(a)** Fig. 4.1 shows a small pond.



**Fig. 4.1**

A student investigated a pond ecosystem and found that:

- Frogs eat pond snails.
- The pond contains aquatic plants.
- Pond snails eat aquatic plants.

Construct a food chain for these organisms. Do **not** draw the organisms.

.....

[2]

**(b)** The student then investigated a seashore ecosystem.

The food web for this seashore is shown in Fig. 4.2.

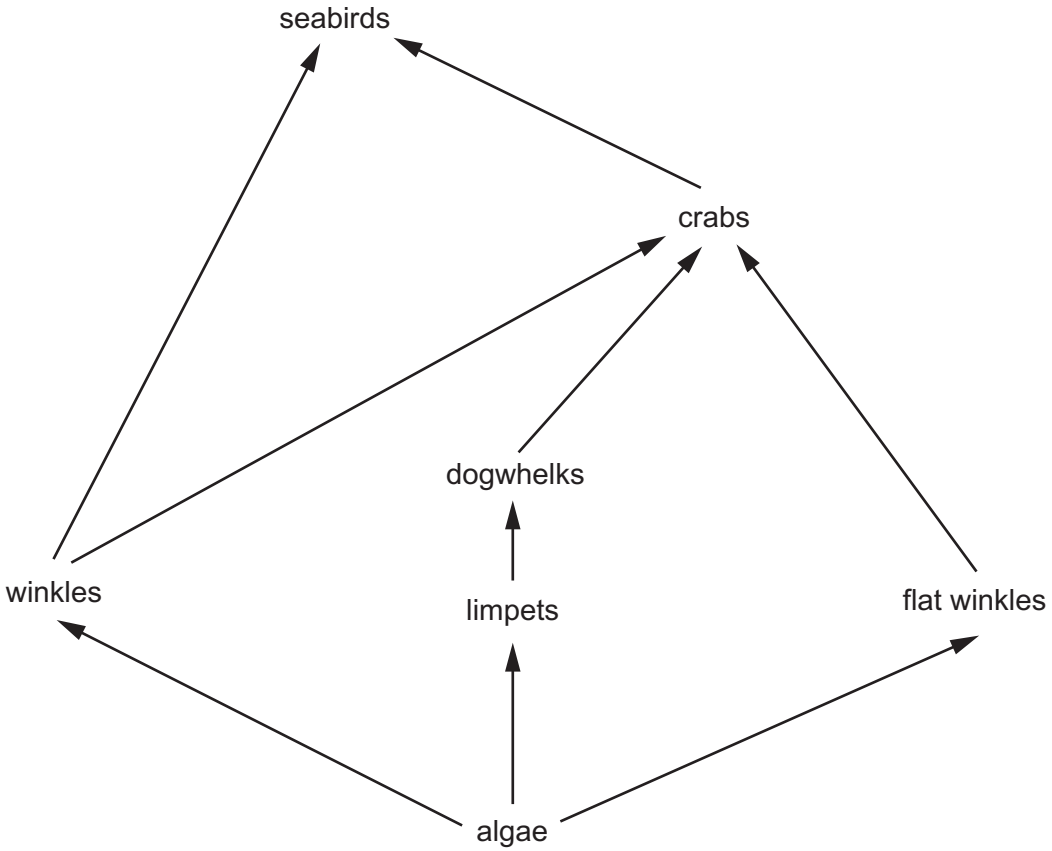



**Fig. 4.2**

**(i)** Complete Table 4.1 by counting the number of each type of organism in the food web.

**Table 4.1**

| description | number of each type of organism in the food web |
|---|---|
| carnivore | |
| consumer | |
| herbivore | |
| producer | |

[4]

**(ii)** A new species of starfish was introduced to the seashore food web in Fig. 4.2.

The starfish species eats limpets.

Predict what would happen to the number of dogwhelks and algae in this area after the starfish were introduced.

dogwhelks .....

.....

algae .....

.....

[2]

**(c)** Some bacteria that live on the seashore feed on dead material.

State the term used to describe organisms that get energy from dead or waste organic material.

..... [1]

[Total: 9]

**5** Fig. 5.1 is a diagram of a cross-section of a leaf.

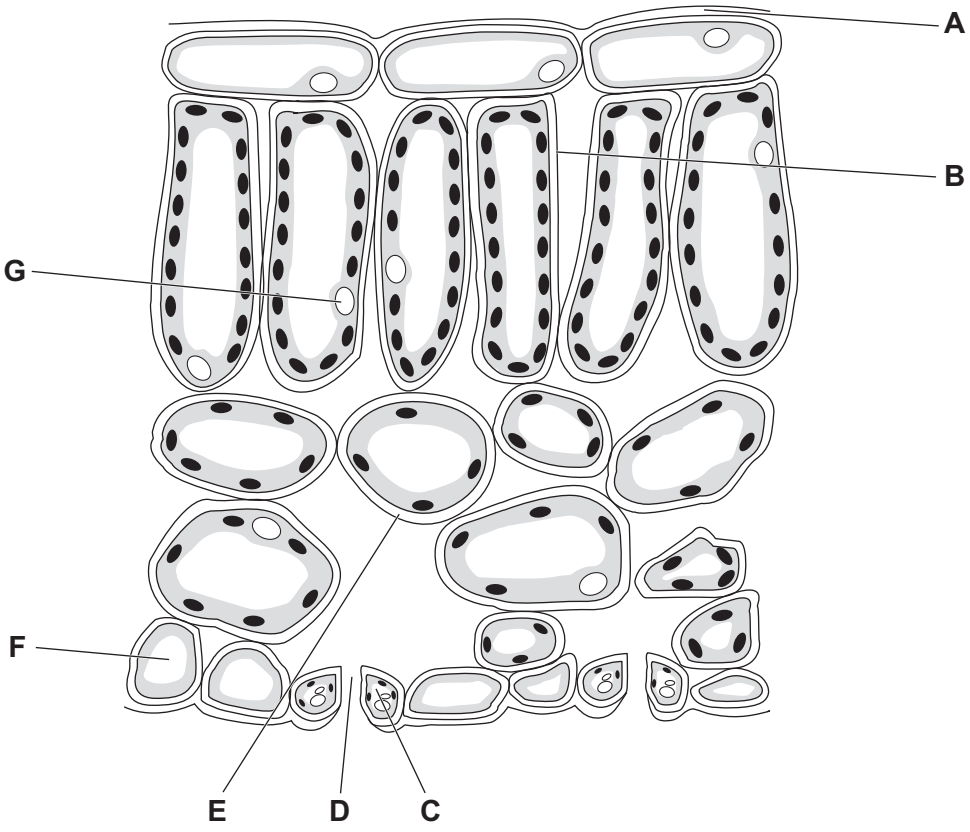



**Fig. 5.1**

**(a) (i)** State the letter in Fig. 5.1 which shows where water evaporates from during transpiration.

..... [1]

**(ii)** State the letter in Fig. 5.1 which shows where water vapour moves out of the leaf during transpiration.

..... [1]

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**(b)** Some students investigated the effect of temperature on the rate of transpiration.

The apparatus they used is shown in Fig. 5.2.

They measured the rate of movement of the air bubble in the capillary tube.

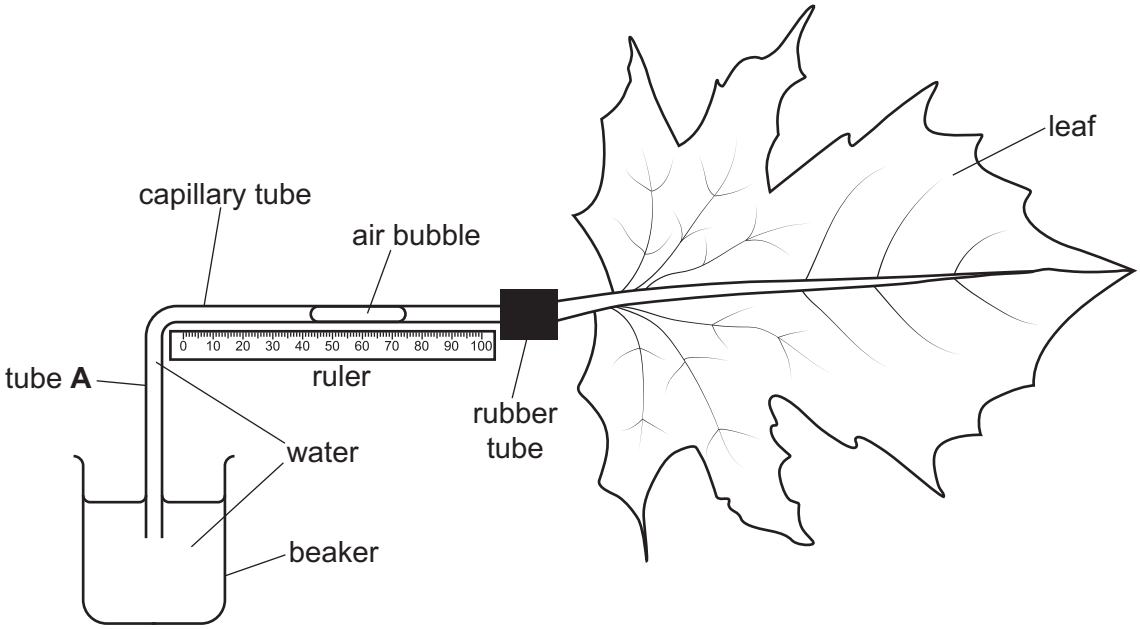



**Fig. 5.2**

**(i)** Water travels to the leaf along tube **A**.

State the name of the vessels in a plant stem that tube **A** represents.

..... [1]

The distance moved by the air bubble in three minutes was measured at different environmental temperatures.

Table 5.1 shows the results.

**Table 5.1**

| environmental temperature / °C | distance moved in three minutes / mm | rate of movement of the air bubble / mm per minute |
|---|---|---|
| 15 | 2 | 0.67 |
| 20 | 8 | 2.67 |
| 25 | 18 | 6.00 |
| 30 | 23 | |

**(ii)** Using the information in Table 5.1, calculate the rate of movement of the air bubble when the environmental temperature is 30 °C.

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

..... mm per minute
[2]

**(iii)** Describe the effect of an increase in environmental temperature on the rate of transpiration shown in Table 5.1.

.....

.....

..... [1]

**(c)** Water is absorbed by plants.

**(i)** State the name of the cells where water enters a plant.

..... [1]

**(ii)** State the name of the process by which water moves into plant cells.

..... [1]

[Total: 8]

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**6** Fig. 6.1 is a diagram of a section through a human heart.

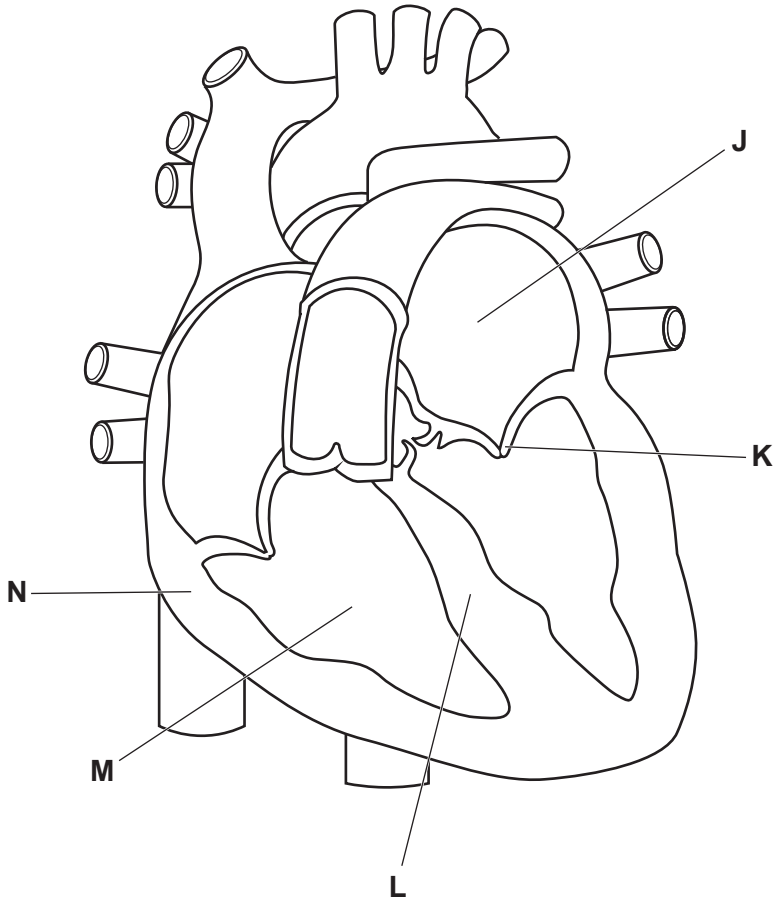



**Fig. 6.1**

**(a) (i)** Complete the table to identify the labelled structures in the heart shown in Fig. 6.1.

| structure | letter in Fig. 6.1 |
|---|---|
| one-way valve | |
| | **L** |
| muscular wall | |
| ventricle | |
| atrium | |

[5]

**(ii)** State the name of the artery that takes blood from the heart to the lungs.

..... [1]

**(b)** Doctors sometimes monitor the activity of the heart.

State **two** methods for monitoring heart activity.

1 .....

2 .....
[2]

[Total: 8]

**7** **(a)** Fig. 7.1 shows some names and functions of structures in the alimentary canal and associated organs.

The boxes on the left show the names of structures.

The boxes on the right show functions.

Draw a straight line from each structure to the correct function.

Draw **three** lines.

| **structure** | **function** |
|---|---|
| | absorption of small food molecules through the wall of the alimentary canal into the blood |
| anus | |
| | break down of food into smaller pieces without chemical change |
| pancreas | |
| | control the egestion of faeces |
| small intestine | |
| | secretion of lipase |

**Fig. 7.1**

[3]

**(b) (i)** Bread is a food that contains carbohydrates. A piece of bread is ingested.

Describe what happens to a piece of bread from the moment it enters the mouth until it reaches the stomach.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

**(ii)** State the name of a structure in the alimentary canal or an associated organ, that secretes protease.

..... [1]

**(c) (i)** Water is absorbed into the blood from the alimentary canal.

State where most of the water is absorbed in the alimentary canal.

..... [1]

**(ii)** Diarrhoea occurs when less water is absorbed from the alimentary canal.

State a treatment for diarrhoea.

.....

.....

..... [1]

[Total: 10]

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**8** **(a)** Large molecules are made from smaller molecules.

State the name of the **two** small molecules that make fats and oils.

1 .....

2 .....
[2]

**(b)** Palm oil is used in many food products. Oil palm plants can be grown as a large-scale monoculture.

Table 8.1 shows the total area used for growing oil palm plants from 1970 to 2010, in one country.

**Table 8.1**

| year | total area of land used for growing oil palm plants / million hectares |
|---|---|
| 1970 | 0.13 |
| 1980 | 0.25 |
| 1990 | 1.13 |
| 2000 | 4.16 |
| 2005 | 5.50 |
| 2010 | 7.82 |

**(i)** Using the information in Table 8.1, calculate the percentage increase in the total area of land used for growing oil palm plants between 1980 and 2005.

..... %
[2]

**(ii)** Describe the negative impacts to an ecosystem of growing plants such as oil palm as a large-scale monoculture.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 7]

**9** **(a)** Complete the description of the endocrine system, using words from the list.

Each word or phrase may be used once, more than once or not at all.

| | | | | |
|---|---|---|---|---|
| **adrenal glands** | **blood** | **chemical** | **decreases** | **electrical** |
| | **increases** | **narrows** | **nerves** | |
| **oestrogen** | **ovaries** | **testes** | **testosterone** | **widens** |

Hormones are ..... substances that are produced by glands and carried by the ..... . A hormone alters the activity of a target organ.

An example of a hormone is adrenaline, which is produced in the ..... . Adrenaline ..... the breathing rate, ..... the pulse rate and ..... the pupils.

[6]

**(b)** Fig. 9.1 is a diagram of some human organs.

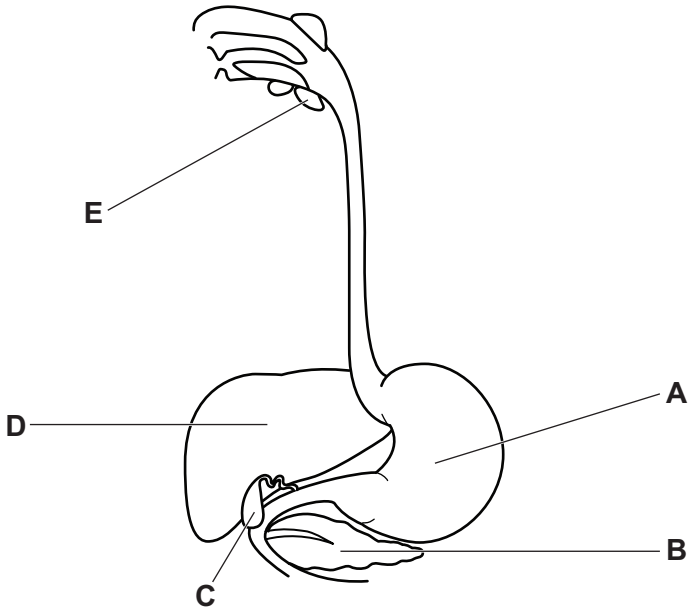



**Fig. 9.1**

**(i)** State the letter in Fig. 9.1 that identifies the organ that produces insulin.

..... [1]

**(ii)** State the function of insulin.

.....

.....

..... [1]

**(iii)** State the letter in Fig. 9.1 that identifies the organ that produces urea.

..... [1]

[Total: 9]

**10** Proteins have many functions in the body.

**(a)** Circle the elements in the list that are present in **all** proteins.

**calcium** **carbon** **hydrogen** **iron**

**magnesium** **nitrogen** **oxygen**

[2]

**(b)** Enzymes are proteins that catalyse reactions in the body.

A scientist investigated the effect of pH on digestive enzymes **K**, **L** and **M**.

Their results are shown in Fig. 10.1.

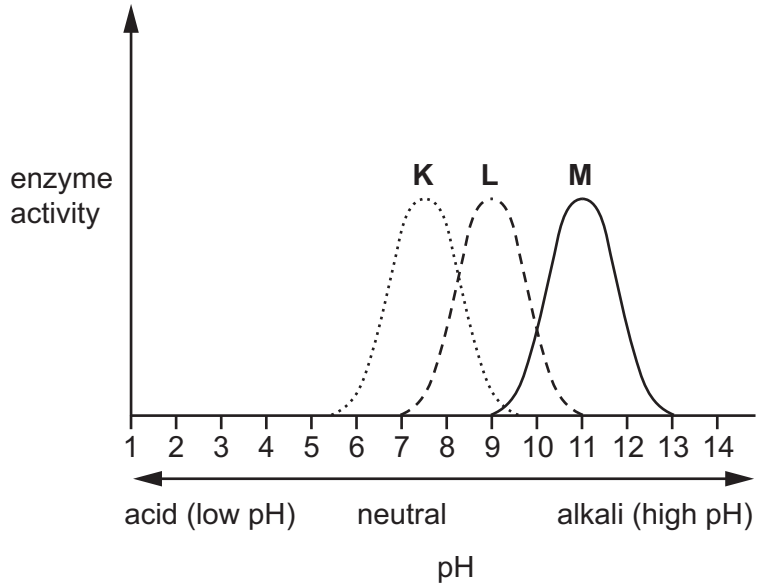



**Fig. 10.1**

**(i)** The pH inside the ileum is 7.4.

Use the information in Fig. 10.1 to identify which enzyme is most active in the ileum.

.....

[1]

**(ii)** On Fig. 10.1, draw the expected activity of an enzyme from the stomach.

[2]

[Total: 5]

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