Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2416014860

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2023**

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 **24** pages. Any blank pages are indicated.

[Turn over

1 (a) Complete the sentences about movement into and out of cells.

Diffusion is the net movement of particles down a concentration gradient.

The energy for diffusion comes from the kinetic energy of random movement of molecules and ions.

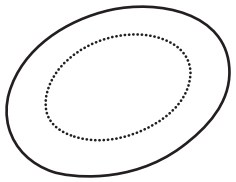
Factors that influence diffusion include concentration gradient, surface area, and temperature.

Osmosis is the movement of water by diffusion through a semi / partially permeable membrane.

The movement of particles through a cell membrane against a concentration gradient using energy from respiration. is called Active transport.

[6]

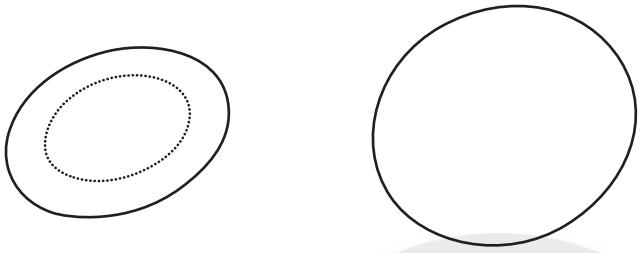
(b) Fig. 1.1 is a diagram of a normal red blood cell.



(normal shape).

Fig. 1.1

Fig. 1.2 shows three red blood cells that have been placed in different concentrations of a salt solution.



A **B** **C**

Fig. 1.2

more solute
less solvent.

Identify the cell that has been placed in a very concentrated salt solution.

Give reasons for your answer.

cell (C)

reasons cell has shrunk,

→ water molecules moved out of the cell.

→ high concentration of water molecules in normal RBC when compared to concentrated salt solution, Therefore, there will be a movement of water molecules from a region of high concentration to a region of low concentration.

[3]

(c) Water is needed by all organisms.

State **two** processes in organisms that use water as a solvent.

1 Digestion

2 Excretion.

[2]

[Total: 11]

2 Fig. 2.1 is a diagram of part of the human digestive system.

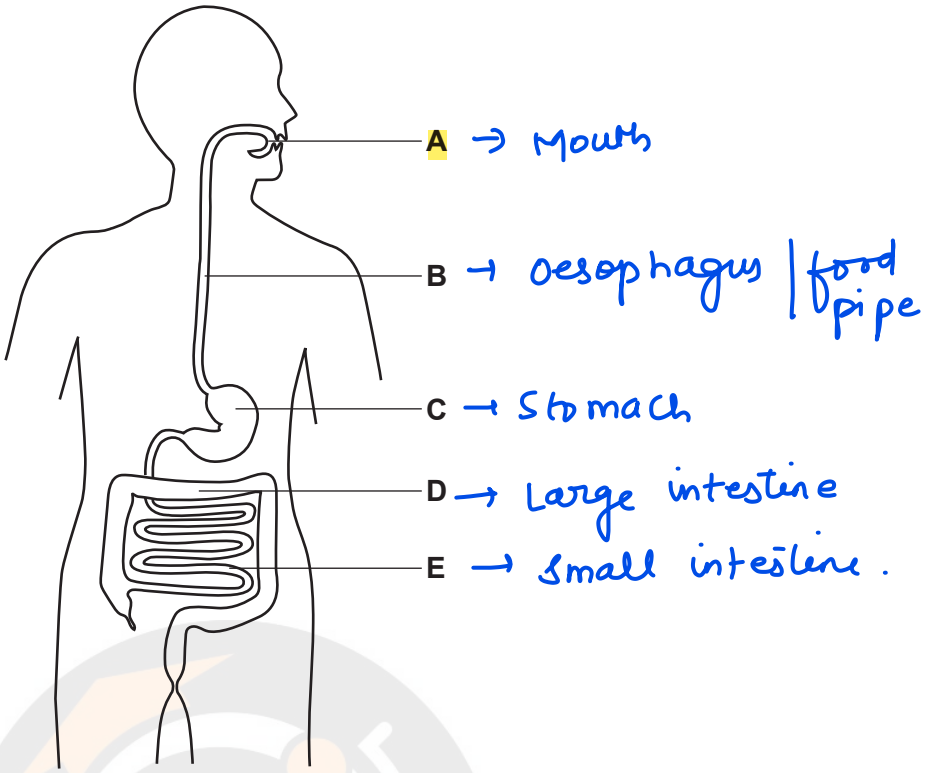


Fig. 2.1

(a) Using the information in Fig. 2.1, state the letters where:

chemical digestion of proteins begins (C) Stomach.

hydrochloric acid is produced (C) Stomach

physical digestion of food occurs. (A) Mouth and (C) Stomach

[4]

(b) State the names of **three** parts of the large intestine. Caecum → Colon → Rectum → Anus.

1 Caecum

2 Colon

3 Rectum.

[3]

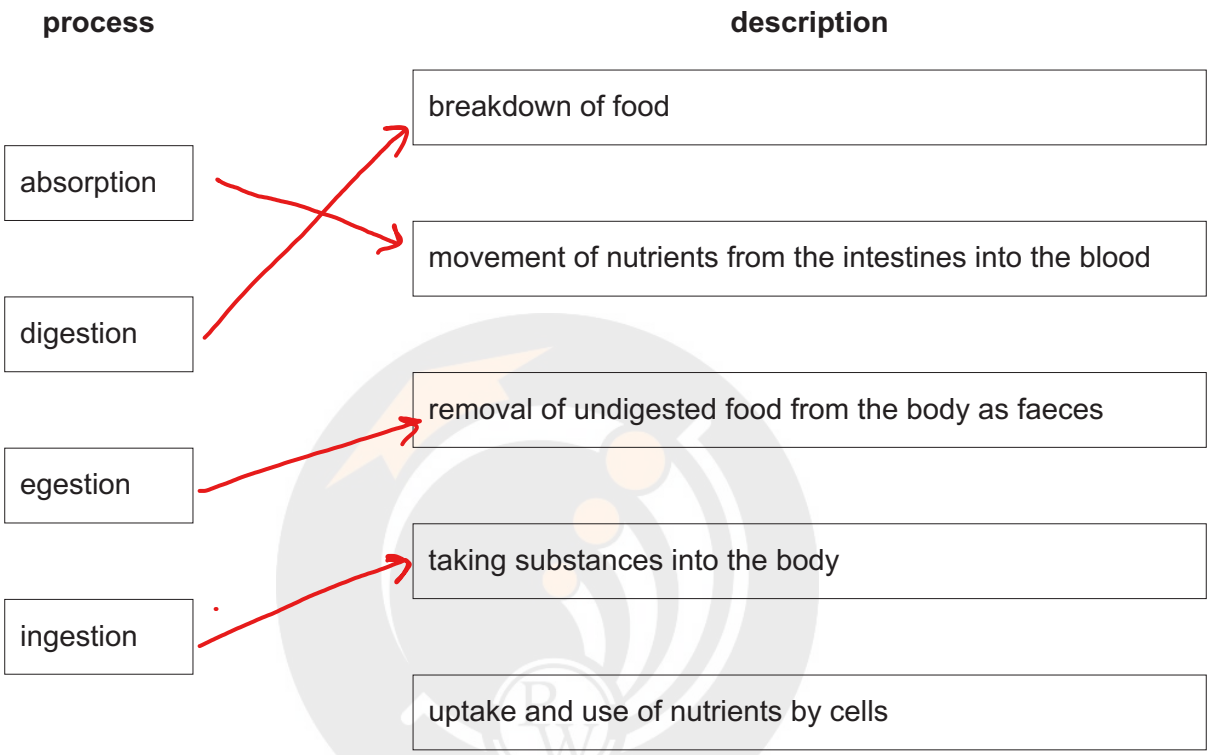
(c) Many processes occur in the digestive system.

The boxes on the left show some of the processes.

The boxes on the right show descriptions of some processes.

Draw **one** line to link each process to its description.

Draw **four** lines.



[4]

[Total: 11]

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3 **(a)** Complete the sentences about transpiration using words from the list.

Each word may be used **once** or not at all.

decomposition **evaporation** **mesophyll**

phloem **root hair cells** **stomata**

Transpiration is the loss of water vapour from leaves.

Water moves from the surface of .....Mesophyll..... cells into the air spaces by .....evaporation..... .

Then the water vapour diffuses out of the leaf through the .....stomata..... .

[3]

(b) A student investigated transpiration.

Fig. 3.1 is a diagram of the apparatus used in the investigation.

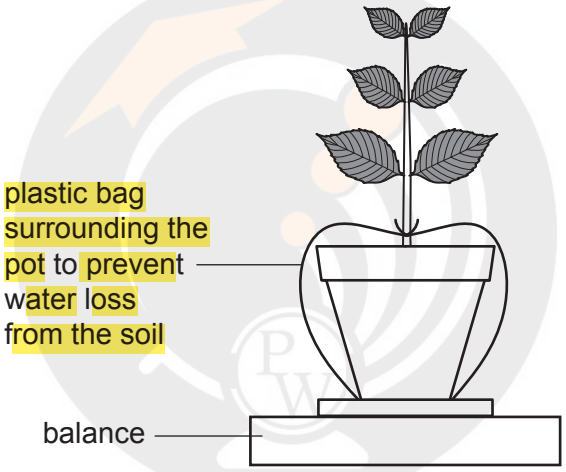

Fig. 3.1

- The student watered the plant before the investigation started.
- She measured the mass of water lost every five minutes. 5 minutes.
- The mass of water lost represents the rate of transpiration.
- She took measurements in still air and with a fan moving air past the plant.
- She plotted her results on a graph as lines labelled **A** and **B**.

Fig. 3.2 shows the results.

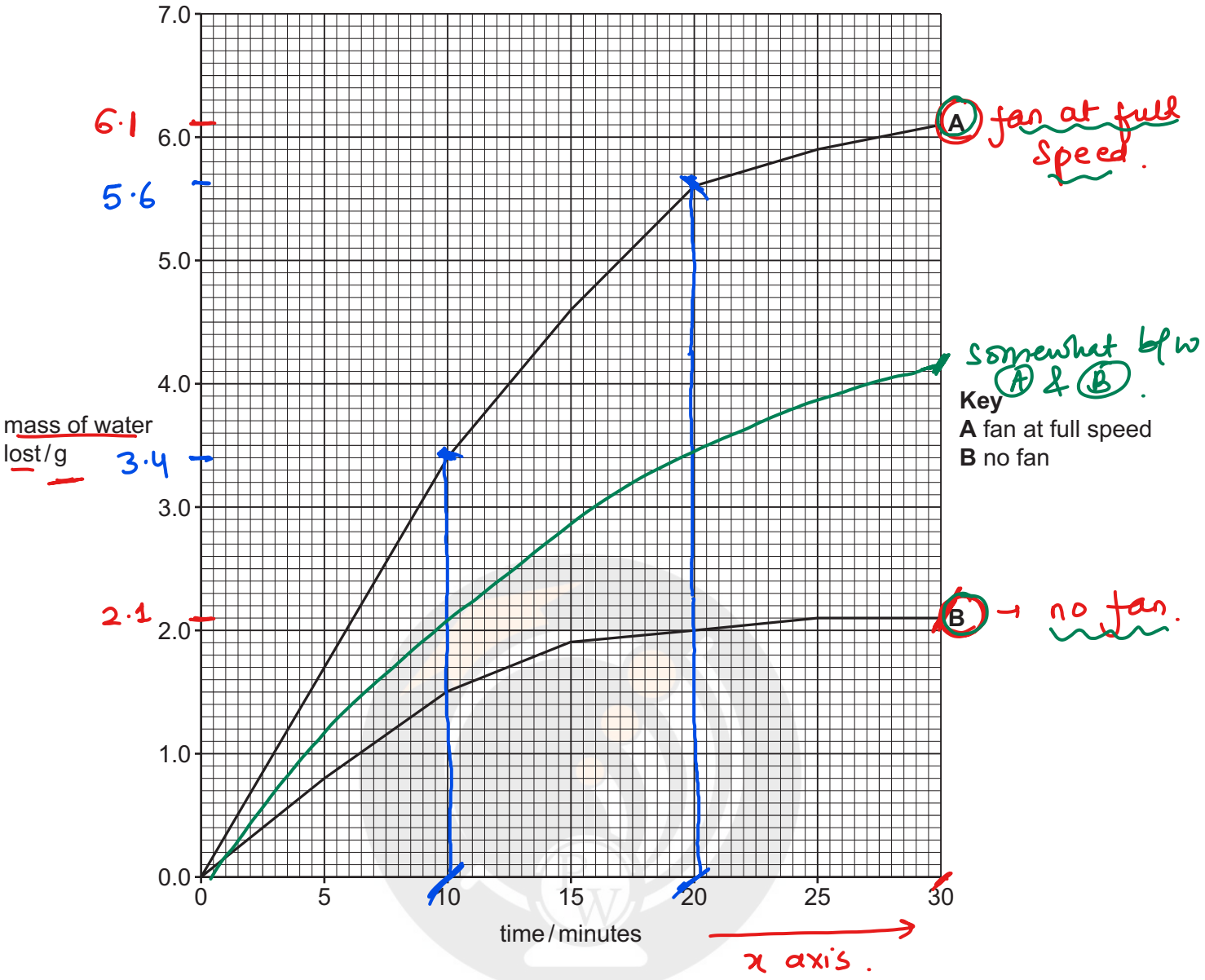

Fig. 3.2

(i) Calculate the difference in the mass of water lost between the results for **A** and the results for **B** at **30** minutes.

A = 6·1 g, B = 2·1 g

difference ⇒ 6·1 − 2·1 ⇒ 4g.

.....g [1]

(ii) Calculate the percentage increase in water loss shown for **A** between **10 minutes** and **20 minutes**.

Give your answer to the nearest whole number.

20 minutes ⇒ 5.6.

10 minutes ⇒ 3.4.

Space for working.

$$\% \text{ change} = \frac{V_f - V_i}{V_i} \times 100$$

$$\Rightarrow \frac{5.6 - 3.4}{3.4} \times 100 = \frac{2.2}{3.4} \times 100$$

.....% [3]

⇒ 64.7%

≈ 65%.

(iii) The student repeated the investigation using the fan at **half-speed**.

Draw a line **on Fig. 3.2** to show the result you would expect when the fan is at half-speed.
[2]

(c) State **one** factor, other than wind speed, that affects the rate of transpiration.

→ temperature. ..... [1]

[Total: 10]

4 Fig. 4.1 is a photograph of part of a kitchen.

Fig. 4.1

(a) Describe methods of maintaining hygiene in the home that reduce the spread of disease.

→ washing hands before making food in kitchen.

→ Good personal hygiene

→ Cleaning and disinfecting surfaces.

→ Washing fruits & vegetables before eating or cooking.

[4]

(b) State **two** ways that pathogens can be transmitted indirectly.

1 Contaminated surfaces (tables, toys), introduction of pathogen can take place into the body..

2 Airborne transmission.

[2]

(c) State **three** body defences against infection.

1 Skin

2 stomach Acid.

3 Tears.

[3]

[Total: 9]

5 **(a)** Fig. 5.1 is a diagram of an insect-pollinated flower.

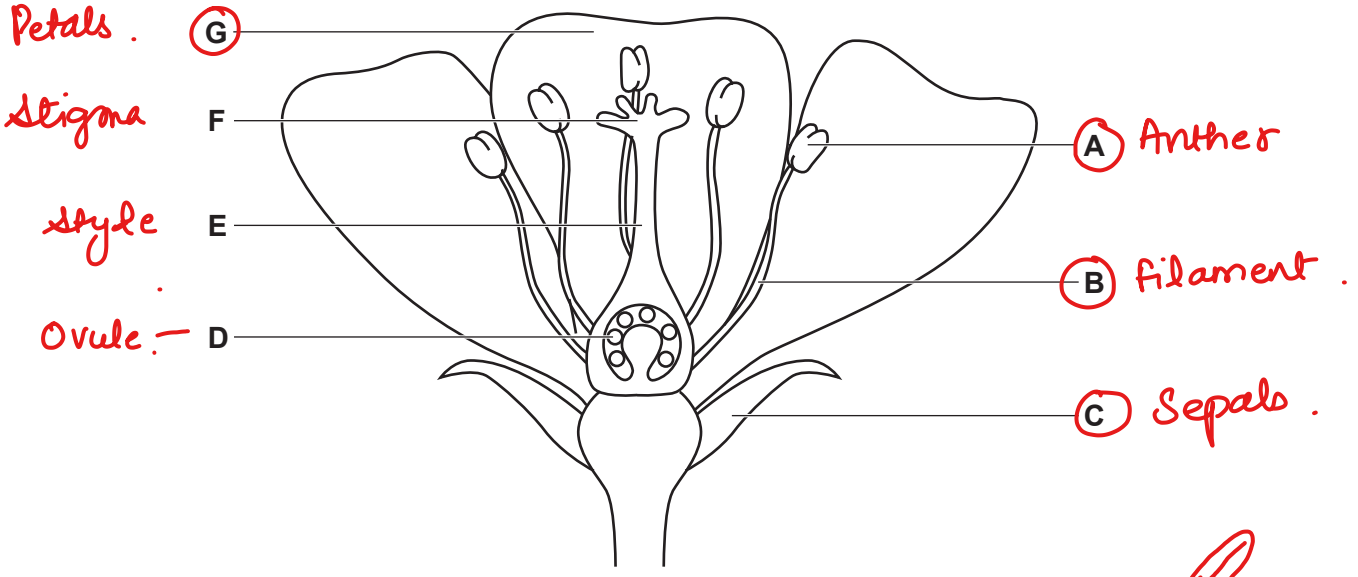

Fig. 5.1

(i) State the letters of the structures in Fig. 5.1 that make up the stamen.

A Anther ..... and ..... B filament.

[2]

(ii) State the letter of the structure in Fig. 5.1 where fertilisation takes place. (inside carpel).

Ovule.

[1]

(iii) Explain how the part labelled **G** in Fig. 5.1 is adapted for its function. (Petals).

→ Bright in colours to attract pollinators.

→ Large to serve a good landing platform for pollinators in some flowers.

→ Produce fragrant substances to attract pollinators.

[2]

(b) (i) Complete the sentence about pollination.

Pollination is the transfer of pollen grains from the ..... Anther. ..... to the ..... stigma (landing platform for pollen grain). .....

[2]

(ii) State **three** ways that pollen grains from insect-pollinated flowers differ from pollen grains from wind-pollinated flowers.

Insect pollinated P.G.

1 large (attachment of P.G) .....

2 fewer production .....

3 Heavier .....

Wind pollinated P.G grains.

① Smaller, lighter.

② Large scale production to minimize the loss (to increase the chances of fertilisation.

③ lighter.

[3]

[Total: 10]

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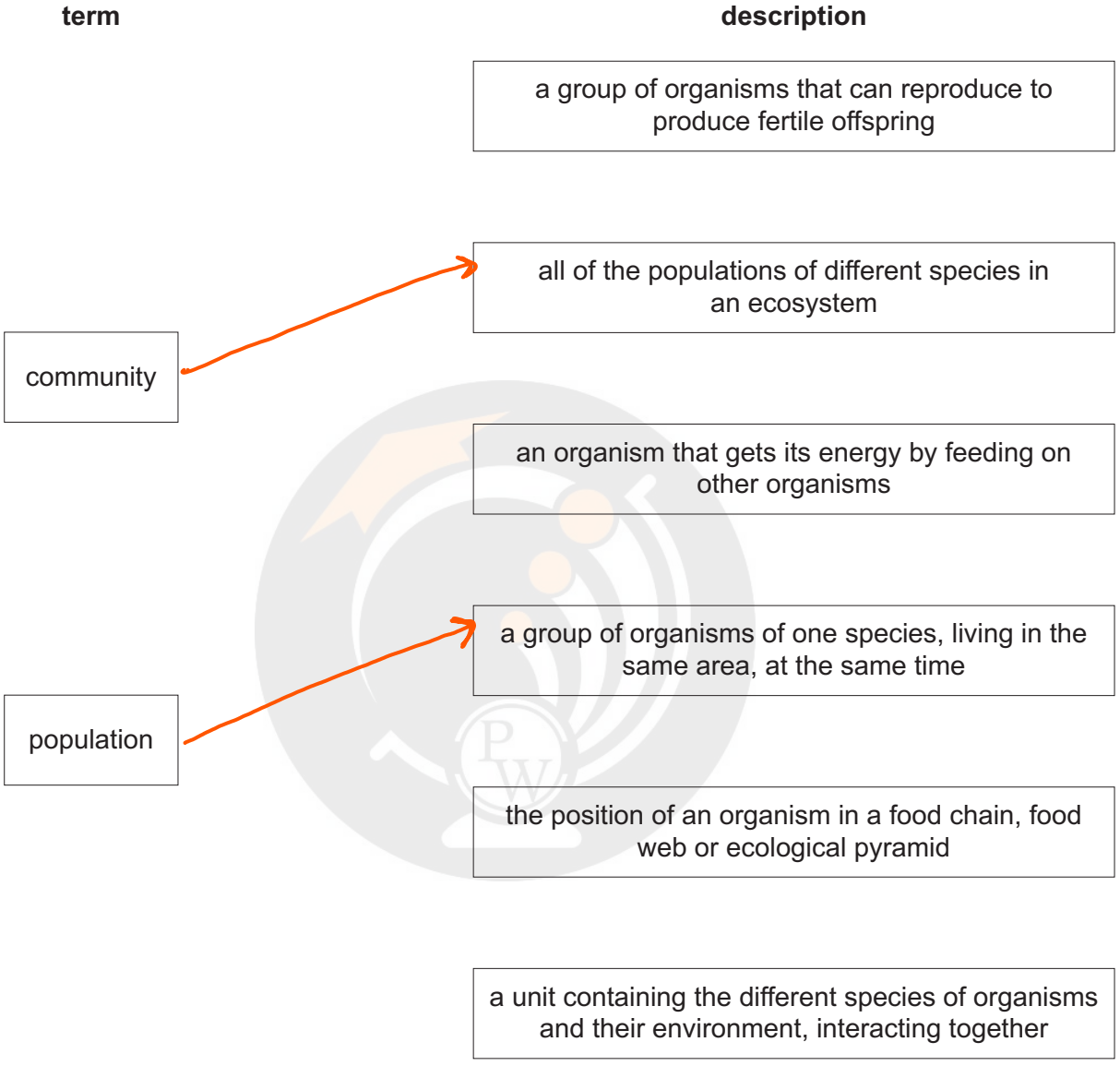
6 **(a)** The boxes on the left show two terms.

The boxes on the right show the descriptions of some terms.

Draw **one** line to link each term to its description.

Draw **two** lines.



[2]

(b) The growth of bacteria in a flask containing nutrients was monitored for six hours.

The number of **live** bacteria per cm^3 was estimated every 30 minutes.

Fig. 6.1 shows the results.

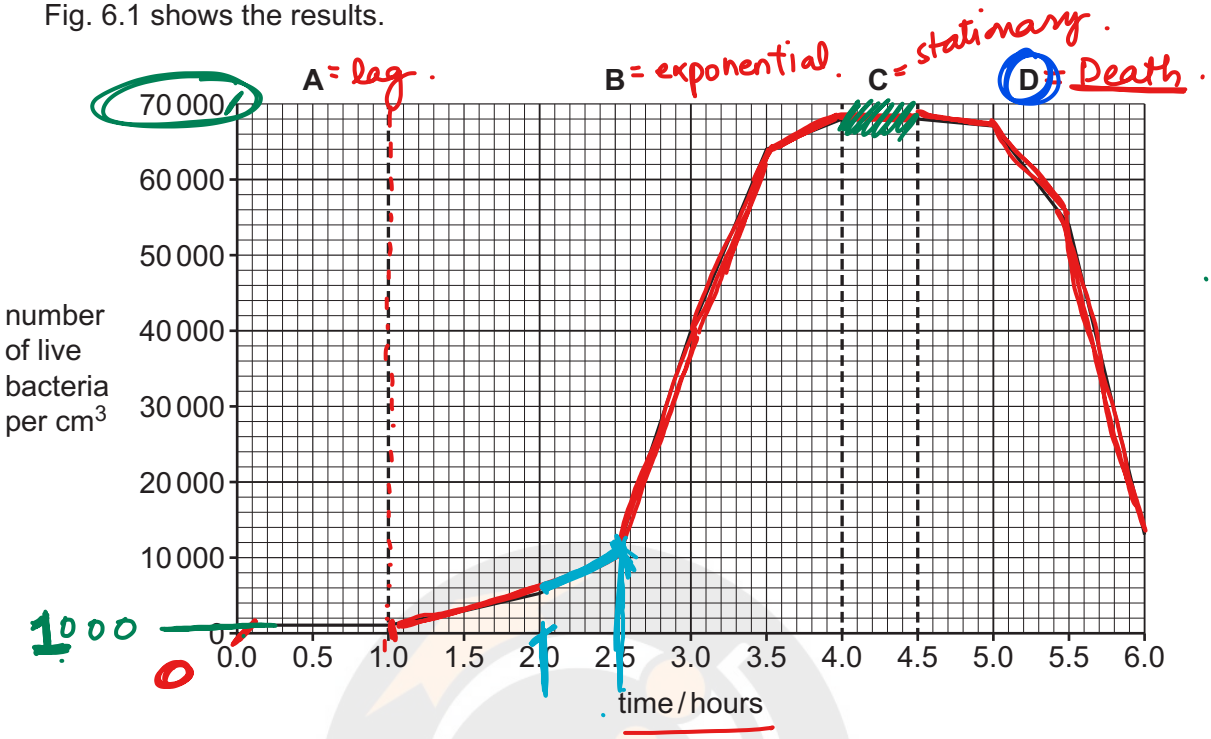


Fig. 6.1

(i) The data in the graph has been divided into four phases: **A**, **B**, **C** and **D**.

The list shows the names of the four phases.

death **exponential** **lag** **stationary**

Use the words from the list to identify phases **A**, **B**, **C** and **D** shown in Fig. 6.1.

A → lag .....

B → exponential .....

C → stationary .....

D → Death. .....

[2]

(ii) Complete the sentences using the data shown in Fig. 6.1 and your knowledge.

The number of live bacteria in phase **A** remained at ..... 1000 .....

per cm^3.

In phase **B** the number of live bacteria doubled between 2.0 hours and

..... 2.5 ..... hours.

The maximum number of live bacteria occurred in phase ..... (C) → Stationary. .

In phase ..... (D) - Death phase. ..... the number of live bacteria decreased because

the bacteria did not have enough ..... Nutrients, oxygen. .

[5]

[Total: 9]

7 **(a)** HIV infection can lead to AIDS. (Acquired immuna deficiency syndrome).

(i) State the words that the letters HIV represent.

Human immuno deficiency virus. [1]

(ii) Describe ways of reducing the risk of a person becoming infected with HIV.

→ Barrier Methods of contraception like condom.

→ Blood screening before transfusion.

→ Steilised medical equipments.

[3]

(b) Chlamydia, gonorrhoea and syphilis are sexually transmitted infections (STIs).

Table 7.1 shows the numbers of people infected with these STIs in one country from 2014 to 2018.

Table 7.1

year	number of people infected		
	chlamydia	gonorrhoea	syphilis
2014	1 400 000	350 000	19 000
2016	1 600 000	468 000	27 000
2018	1 800 000	583 000	35 000

(i) The list shows some conclusions.

Place ticks (✓) in the boxes to identify **two** correct conclusions for the data shown in Table 7.1.

In 2014, there were 1 050 000 more people infected with chlamydia than were infected with gonorrhoea in 2014.	✓
In 2016, the number of people infected with chlamydia was three times greater than the number of people infected with gonorrhoea.	✗
In 2018, more people were infected with syphilis than with gonorrhoea.	✗
The number of people with STIs has increased each year.	✓
Between 2016 and 2018, the number of people infected with syphilis increased by 16 000.	✗

[2]

(ii) Syphilis can be treated with antibiotics.

Suggest the type of organism that causes syphilis.

Bacteria.

..... [1]

[Total: 7]

8 **(a)** Humans have developed modern farming methods to increase food production.

Explain how the use of herbicides and chemical fertilisers has increased food production.

Herbicides :- kill weeds (unwanted plants).
→ Reduces competition with weed.
Hence increases yield of the desired crop.

Chemical fertilizers :-
→ Nutrient supply - provide essential nutrients.
like Nitrogen (N), Phosphorus (P), Potassium (K).
→ Increased growth of plants.

[4]

(b) Fig. 8.1 shows intensive farming of chickens.

Fig. 8.1

State **three** disadvantages of intensive livestock production.

1 Increased risk of diseases from animals to humans due to close contact between animals & surroundings to them.

2 Greenhouse gas emissions as ruminants produces CH4 during digestion that is responsible for green house effect.

3 Pollution is caused while intensive livestock production as it includes large amount of animal waste polluting waterways, soil, land, etc. [3]

The protein pectinase is used in food industries to make fruit juice clear.

(c) Pectinase is an example of a type of protein.

State the name of this type of protein.

Enzymes. ..... [1]

(d) Fig. 8.2 shows the process used to produce clear fruit juice.

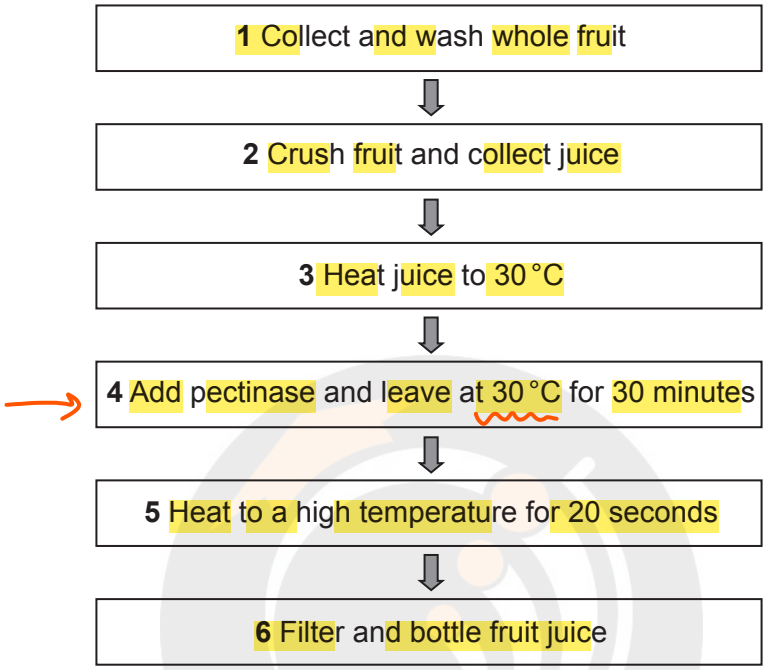


Fig. 8.2

(i) Explain why a temperature of 30 °C is used in step **4**.

optimal temperature for enzymatic activity. .....

..... [1]

(ii) During step **4** amylase may be added to the fruit juice.

Suggest the purpose of adding amylase.

To breakdown starch content & thereby increasing sugar content in the juice. .....

..... [1]

(iii) Explain why the juice is heated to a high temperature in step **5**.

→ Killing the microbes .....

..... [1]

(e) Yeast is used in biotechnology.

Circle **two** uses of the products of anaerobic respiration in yeast.

ethanol, CO_2.

biofuels **bread-making** **herbicide production**

insulin production **lactic acid production** **washing powders**

[2]

[Total: 13]

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