

Cambridge IGCSE Biology



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Cambridge IGCSE Biology · Paper 4 · Questions & Answers by Topic

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1 Fig. 1.1 shows the movement of particles through an epithelial cell in the small intestine.

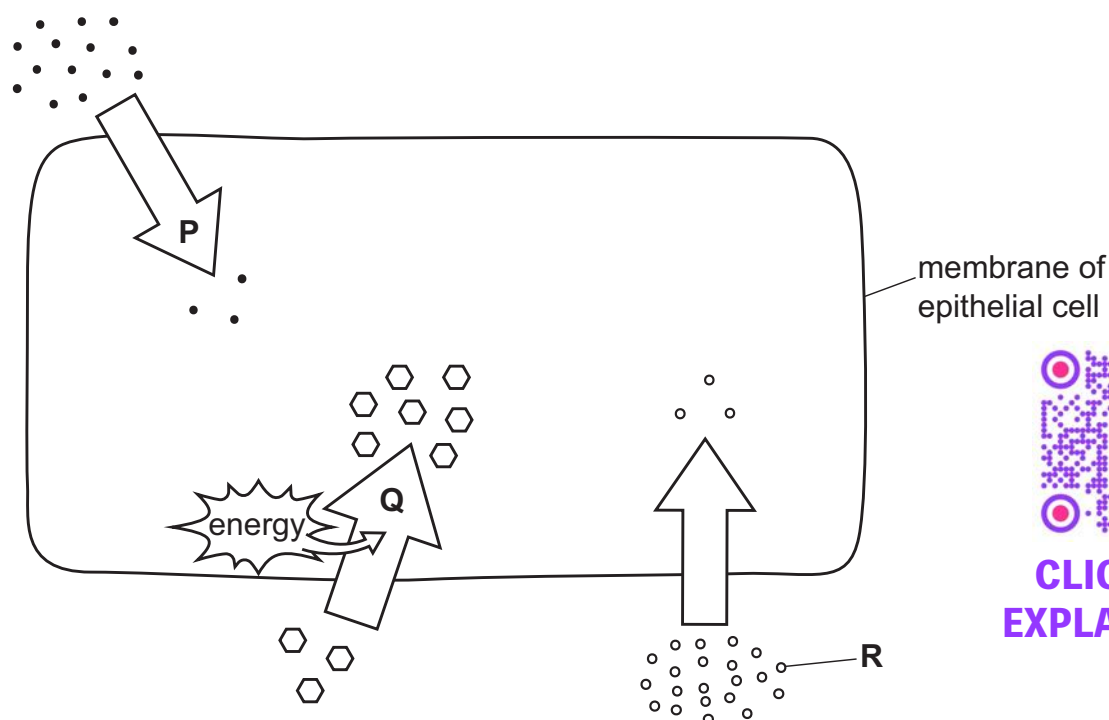


Fig. 1.1

(a) In Fig. 1.1, arrow **P** represents the diffusion of oxygen molecules.

(i) Describe what is meant by the term diffusion.

Diffusion is the of particles. It occurs from a region of to a region of This results from their

[2]

(ii) State the type of energy needed for diffusion.

[1]

(b) Carbon dioxide molecules also move by diffusion.

(i) State the name of the process in human cells that produces carbon dioxide.

[1]

(ii) On Fig. 1.1, draw an arrow to show the direction of diffusion of carbon dioxide molecules.

[1]



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Examiner's insight

A wide range of correct differences was seen, most often the nucleus and the absence of a cell wall or plasmids. Answers were not credited for saying bacteria lack cytoplasm or a cell membrane, or for flagella and vacuoles, which confuse the cell types.

6 (c)

Discuss · [4 marks]

Crop plants such as soya can also be genetically modified. Discuss the advantages and disadvantages of genetic modification of crop plants.

Model answer

✓ Advantage: an increased yield / quantity of crop, and increased nutritional quality / content. ✓ Advantage: resistance to insect pests (or the crop produces its own insecticide), and resistance to herbicides, so less chemical spraying is needed. ✓ Advantage: resistance to disease and to conditions such as drought, cold or salinity, allowing crops to grow where they otherwise could not. ✓ Disadvantage: the modified seeds cost the farmer more and may be sterile, so new seed must be bought for each crop. ✓ Disadvantage: the added genes may spread to nearby wild plants by cross-pollination, there are ethical or religious concerns about altering genomes, and reduced genetic variability leaves the crop less able to adapt to change.

Mark scheme total of four from (max three advantages, max three disadvantages)

MAX 3 ADVANTAGES

- ✓ increased yield / quantity (1)
- ✓ increased nutritional quality / content (1)
- ✓ reduced use of fertiliser (1)
- ✓ decreased damage from pests (1)
- ✓ resistance to insect pests / crops produce insecticide / reduced use of insecticides (1)
- ✓ resistance to herbicides (1)
- ✓ resistance to disease (1)
- ✓ resistance to salinity / cold / drought (1)

MAX 3 DISADVANTAGES

- ✓ (GM) seeds / plants cost more to farmer / consumer (1)
- ✓ (GM) seeds are sterile / need to be bought for each new crop (1)
- ✓ (modified) genes may transfer into other (nearby) plants by cross-pollination (1)
- ✓ ethical / religious concerns about altering natural genomes / of consumers (1)
- ✓ disruption of a food chain by a pest losing its food source (1)
- ✓ reduced genetic variability / crop less able to adapt to a change in the environment (1)

Do not accept: general statements about a 'desirable trait' without qualifying it; disadvantages not discussed in enough detail

Organisms & environment - food webs & energy flow

Cambridge IGCSE Biology 0610 - Solved Past Paper

February/March 2026 · Paper 4 Theory (Extended) - 0610/42 · Question 6

Organisms & environment - food webs & energy flow

● hard ● medium ● easy

● 6 (a)(i)

Identify · [3 marks]

Figure 6.1 shows a lake food web. Use Figure 6.1 to identify: all of the producers; an organism that only feeds as a secondary consumer; an organism that consumes at three different trophic levels.

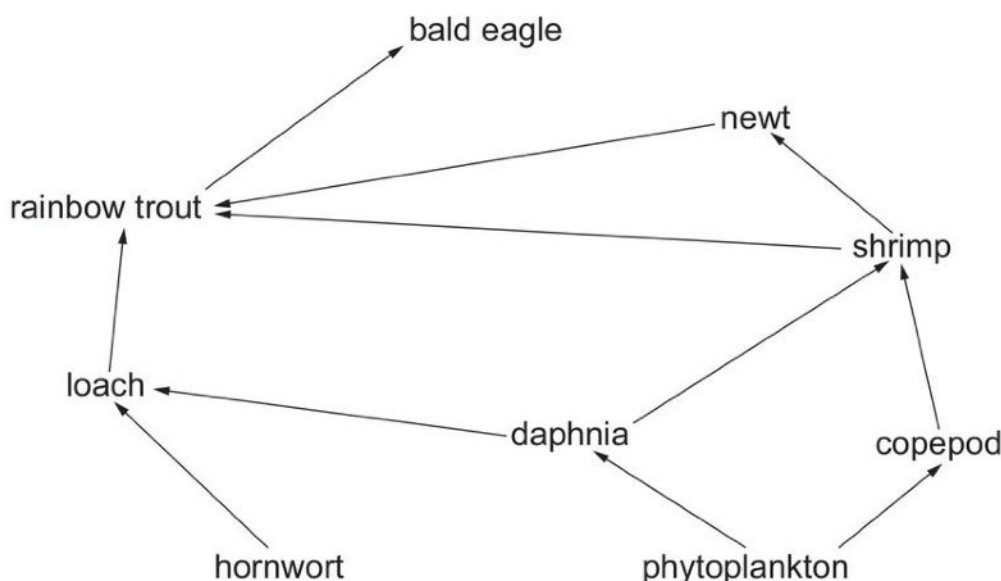


Figure 6.1

Figure 6.1 - a lake food web

Model answer

✓ Producers: hornwort and phytoplankton. ✓ Only feeds as a secondary consumer: the shrimp. ✓ Consumes at three different trophic levels: the (rainbow) trout.

Mark scheme 3 marks

- ✓ producers: hornwort and phytoplankton (1)
- ✓ only a secondary consumer: shrimp (1)
- ✓ consumes at three trophic levels: (rainbow) trout (1)

Examiner's insight

The producers are hornwort and phytoplankton; the shrimp only feeds as a secondary consumer, and the rainbow trout feeds at three different levels - loach, rainbow trout and daphnia were common wrong choices.



(c) In Fig. 1.1, arrow **Q** represents another type of particle movement.

Identify the type of particle movement represented by arrow **Q**.

Explain your answer.

type of movement

explanation

.....

.....

[3]

(d) In Fig. 1.1, particle **R** moves from the lumen of the small intestine into the epithelial cell.

Suggest why particle **R cannot** be starch.

Because starch is

and it's

to move in or out of the cell

For starch to be transported, it must be

[2]



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Examiner's insight

Most wrote about enzymes denaturing at high temperature and the need for an optimum, though some wrongly said enzymes denature at low temperatures too. Few noted that respiration releases the heat, or linked temperature to the yield of penicillin.

6 (c)(iii)

State · [2 marks]

State the role of the paddles in the fermenter.

Model answer

✓ The paddles stir / mix the contents of the fermenter. ✓ This keeps the oxygen, nutrients and organisms evenly (uniformly) distributed, and keeps the temperature even throughout.

Mark scheme any two from

- ✓ reference to mixing / stirring (1)
- ✓ ensure even / uniform distribution of oxygen / air / nutrients / fungi (1)
- ✓ ensure even / uniform temperature / pH throughout the fermenter (1)

Examiner's insight

Many said the paddles stir or mix the organisms, nutrients and air. Fewer expressed the idea of an even distribution of these, and very few mentioned the even distribution of heat.

6 (c)(iv)

State · [2 marks]

Other than penicillin, state the names of two commercial products that can be made using fermenters.

Model answer

✓ Insulin. ✓ Mycoprotein (single-cell protein). Other valid fermenter products are also accepted.

Mark scheme any two from

- ✓ insulin (1)
 - ✓ mycoprotein (1)
 - ✓ AVP e.g. another valid fermenter product (1)
- Do not accept:** bread (a common incorrect answer)

Examiner's insight

The expected answers of insulin and mycoprotein were not seen often, though many other valid products were accepted. Bread was a common wrong answer.

Revise from your notes

- Biotechnology - fermenters & industrial products: 19.2
- Microorganisms & their uses: 19.1

Using Fig. 1.2 and Fig. 1.3, describe **and** explain the difference in appearance of the cells before and after immersion in salt solution.

Before immersion, cells are as the cell membrane pushes against the creating

After immersion, cells become and the cell membrane from the cell wall, resulting in

This causes water to flow by from the with to the salt solution through

[6]

[Total: 16]



**CLICK FOR
EXPLANATION**



- 2 (a) The internal body temperature of a person was recorded.

Fig. 2.1 shows the results.

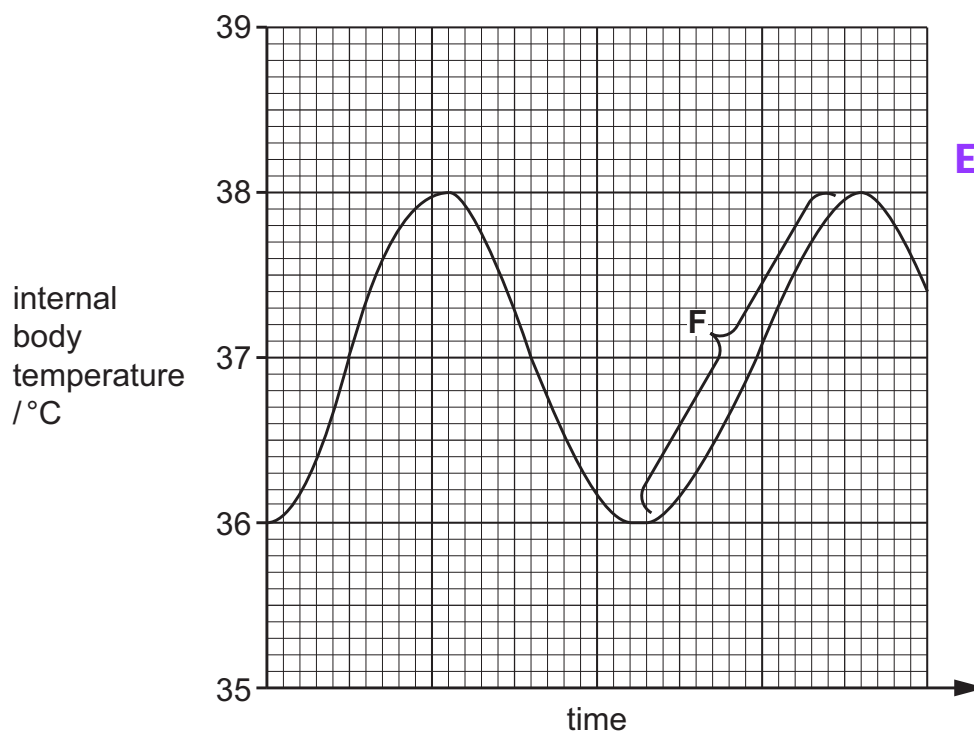


Fig. 2.1

- (i) Using the information in Fig. 2.1, calculate the temperature range for the internal body temperature of the person.

State the units.

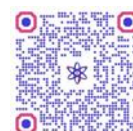
..... [1]

- (ii) On Fig. 2.1, draw a line to show the set point for the internal body temperature of the person. [1]

- (iii) The maintenance of internal body temperature is an example of homeostatic control.

State the name of the mechanism for homeostatic control.

..... [1]



(iv) On Fig. 2.1, region **F** shows a change in body temperature.

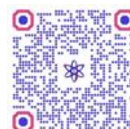
Explain how the body causes the change in body temperature shown.

As the temperature increases, the detects low temperature. of occurs. There is less blood flow to the skin surface or . Energy is retained or prevents . happens.

[5]



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(b) Fig. 2.2 shows a cross-section of human skin.

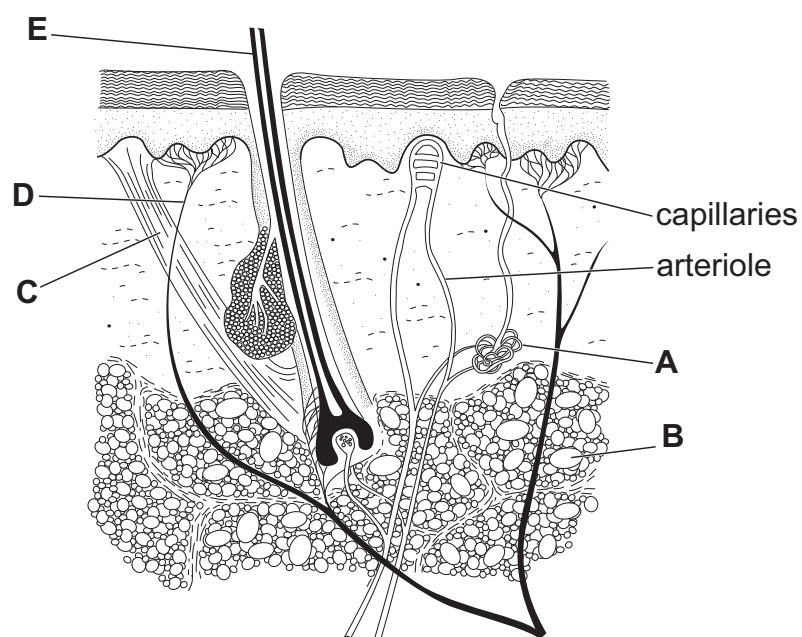


Fig. 2.2

(i) State the letter of the structure shown in Fig. 2.2 that produces sweat.

..... [1]

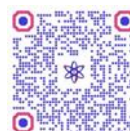
(ii) State the names of structures **C** and **D** shown in Fig. 2.2.

C

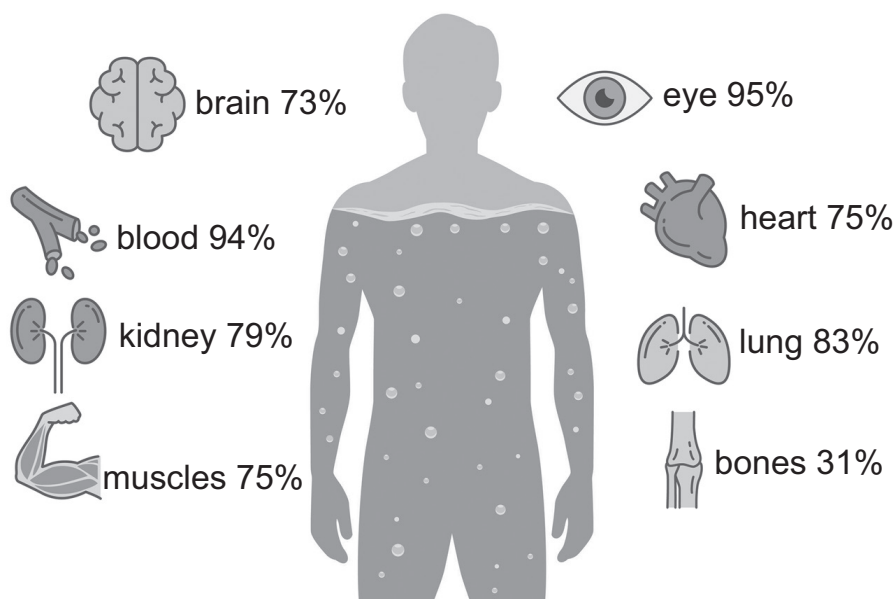
D

[2]

[Total: 11]



- 3 (a) Fig. 3.1 shows the percentage of water in different structures of the human body.



[CLICK FOR EXPLANATION](#)

Fig. 3.1

- (i) The mean mass of a human eye is 28 g.

Using information from Fig. 3.1, calculate the mass of water in a human eye.

Give your answer to **two** significant figures.

..... g
[2]

- (ii) Describe the importance of water in the human body.

Water is where take place

It is necessary to regulate body

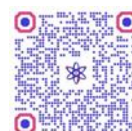
Water is needed for

And is necessary for

..... [3]



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- (b) Cholera is a disease caused by a pathogen in contaminated water.

Fig. 3.2 is a diagram of the cholera pathogen.

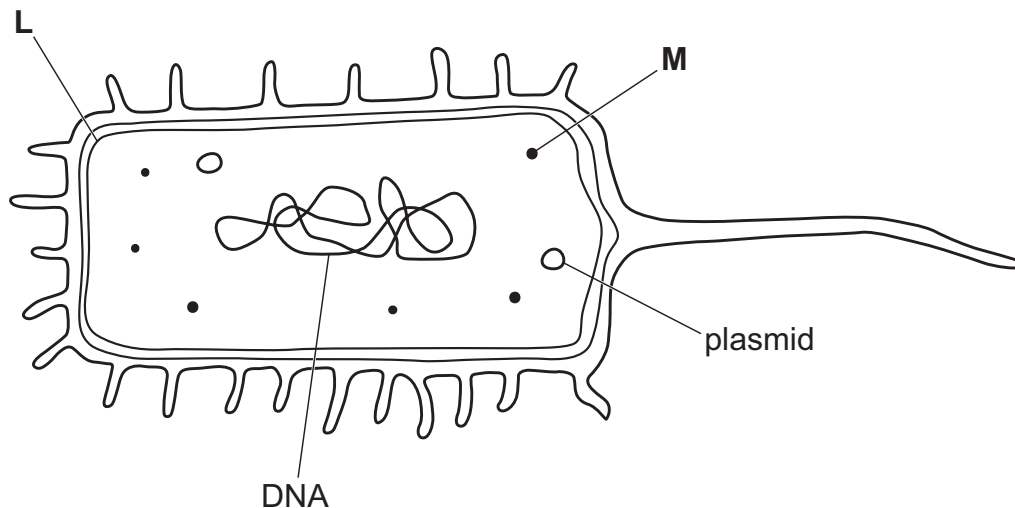


Fig. 3.2

- (i) State the name of structures **L** and **M** shown in Fig. 3.2.

L

M [2]

- (ii) Identify **two** features shown in Fig. 3.2 that are typical of prokaryotes.

1

2 [2]

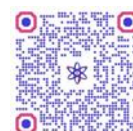
- (iii) State the type of pathogen that causes cholera.

..... [1]

- (iv) The scientific name for the pathogen that causes cholera is *Vibrio cholerae*.

State the genus name for this pathogen.

..... [1]



- (v) Explain how the cholera pathogen causes dehydration of the human body.

The organism produces a This toxin
causes the secretion of into
the small intestine or gut. Water moves to
the gut by . This results in

[3]

- (vi) Complete the sentences about the use of plasmids in genetic modification.

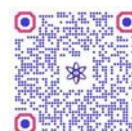
During genetic modification, human DNA and plasmid DNA are cut with a
restriction enzyme. This creates which are joined together
using an enzyme called The modified plasmid containing
the human gene is called a plasmid.

[3]

[Total: 17]



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- 4 (a) Fig. 4.1 shows part of a human placenta and umbilical cord. The arrows show the direction of blood flow.

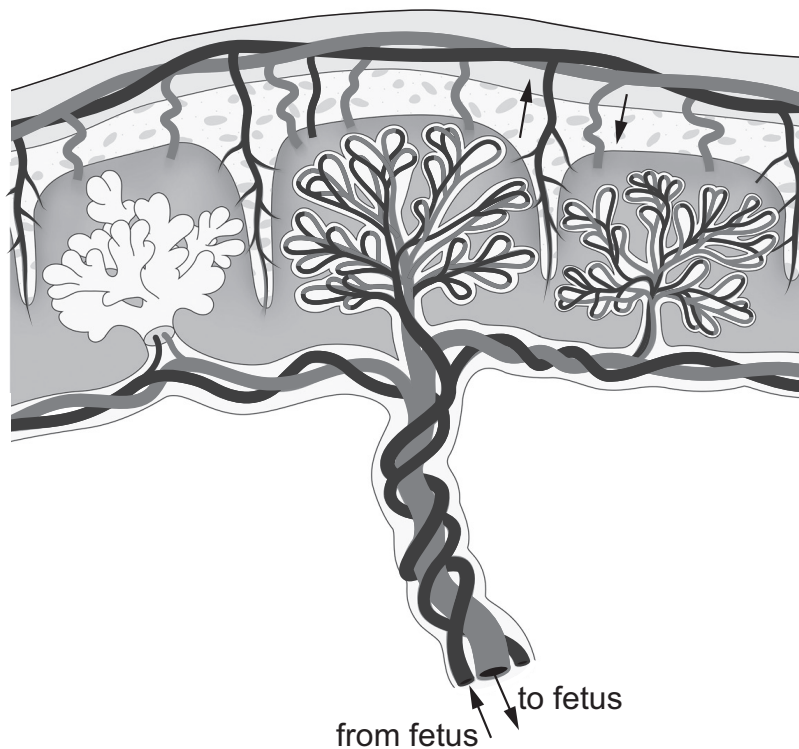


Fig. 4.1

- (i) Describe the functions of the placenta and the umbilical cord shown in Fig. 4.1.

The placenta is the site of It

acts as a to

It separates maternal and fetal

The umbilical cord the fetus to

the mother mother's

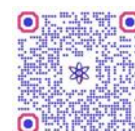
and are

transported to the

and in the opposite

direction

[4]



- (ii) A fetus develops inside an amniotic sac.

Describe the functions of the amniotic sac and amniotic fluid.

The sac and amniotic fluid.
This fluid acts as a It helps
 the temperature of the fetus. The
fluid allows the fetus to which
supports
.....
..... [3]

- (b) Syphilis is a sexually transmitted infection (STI) that can be passed from a mother to her fetus.

- (i) State the name of **one** other STI that can be passed from mother to fetus.

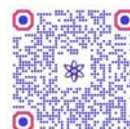
..... [1]

- (ii) State **two** ways to control the spread of STIs.

1

2 [2]

[Total: 10]



5 (a) Fig. 5.1 shows a cross-section of a leaf.



CLICK FOR EXPLANATION

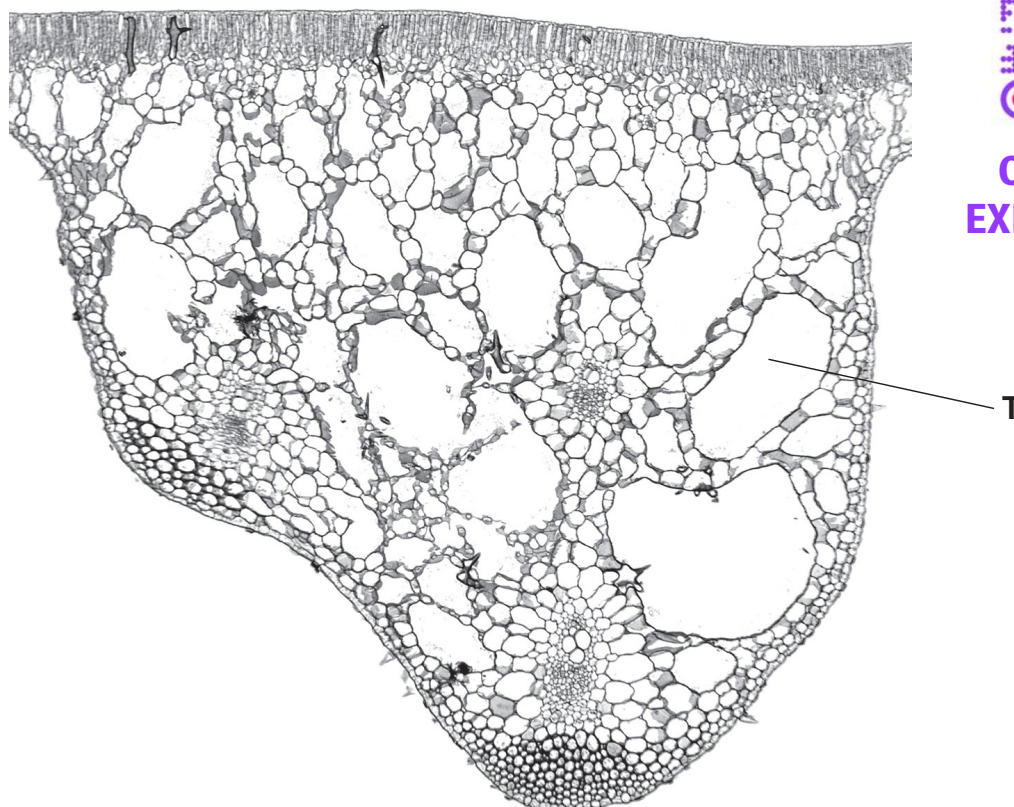


Fig. 5.1

- (i) On Fig. 5.1, draw a circle around **one** vascular bundle. [1]
- (ii) On Fig. 5.1, draw a label line and the letter **X** to identify the palisade mesophyll tissue. [1]
- (iii) State the name of the cell structure in palisade mesophyll cells where photosynthesis occurs.
..... [1]
- (iv) Describe the functions of the tissues in a vascular bundle in a leaf.

..... transports and
 from to the to by
 transport and from
 the to the, it is also
 necessary for



(b) The leaf shown in Fig. 5.1 is from an aquatic plant adapted to live in water. The leaves float on the surface of the water.

(i) State the term used to describe plants that are adapted to live in water.

..... [1]

(ii) Identify feature **T** shown in Fig. 5.1 **and** explain how this feature adapts the leaf to float on the surface of the water.

feature **T**

explanation

..... [2]

(iii) Explain **one** other adaptation of this group of aquatic plants.

on the upper epidermis

For

[2]

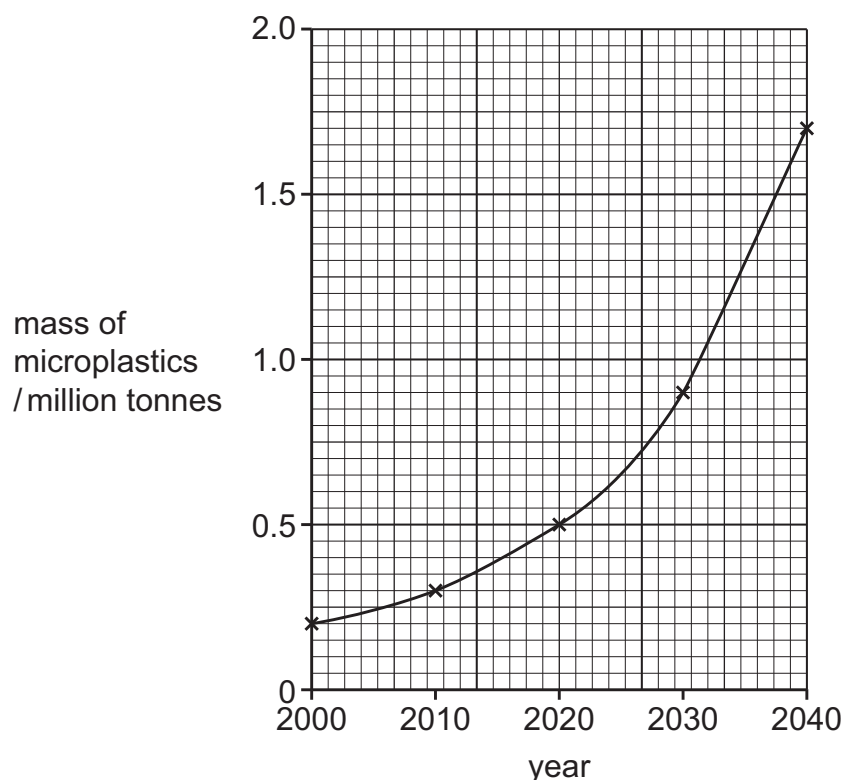
No need to

[Total: 12]



- 6 (a) Microplastics are pieces of plastic with a diameter less than 0.5 cm.

Fig. 6.1 shows the mass of microplastics in the oceans between 2000 and 2040. The data between 2000 and 2020 is an estimate. The data after 2020 is a prediction.



**CLICK FOR
EXPLANATION**

Fig. 6.1

- (i) Suggest why the mass of microplastics between 2000 and 2020, shown in Fig. 6.1, is an estimate.

.....

.....

.....

.....

..... [2]

- (ii) Using Fig. 6.1, calculate the predicted percentage increase in the mass of microplastics in the oceans between 2000 and 2040.

Space for working.

..... %
[2]



(b) Phytoplankton are producers found in the ocean. Phytoplankton absorb microplastics into their cells.

(i) Describe what is meant by the term producer.

.....

.....

.....

.....

..... [2]

(ii) Fig. 6.2 shows a shearwater bird.

Shearwater birds feed on fish in the ocean.



Fig. 6.2

Suggest how microplastics can end up in consumers such as shearwater birds.

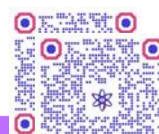
.....

.....

.....

.....

..... [2]



(iii) The population of shearwater birds is decreasing.

Describe **three** ways the population of shearwater birds can be conserved.

1

.....

2

.....

3

.....

[3]

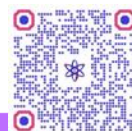
(iv) Explain the risks to a population if its population size decreases.

A reduction in leads to an
increased chance of which
results in less and chance of
.....

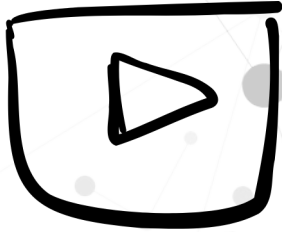
It also results in a higher chance of [3]
..... being expressed leading to

[Total: 14]

.....



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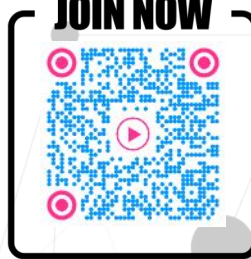


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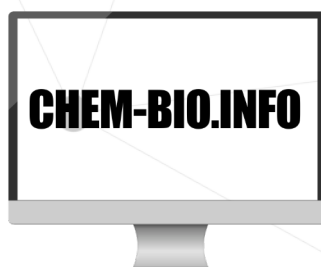
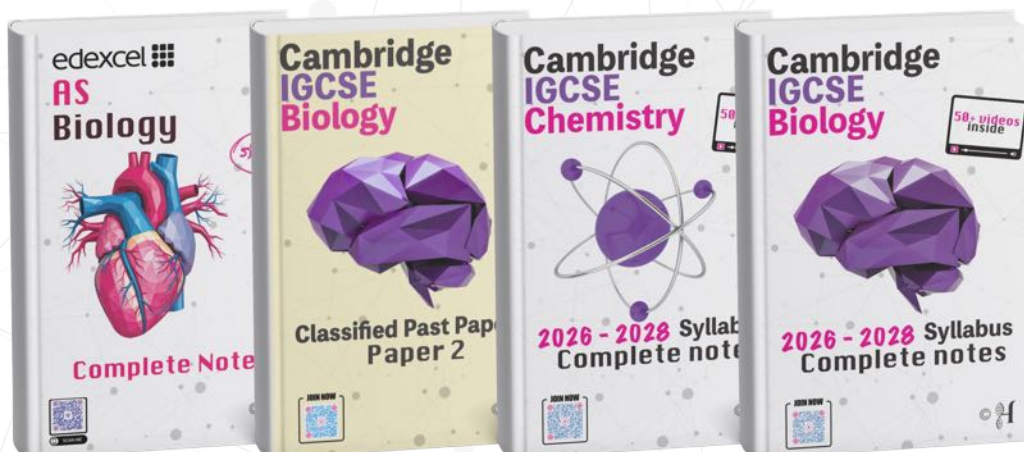


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