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BIOLOGY **0610/43**

Paper 4 Theory (Extended) **May/June 2026**

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. Do **not** use correction fluid or tape.
- 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.

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1 **(a)** Figure 1.1 shows the five kingdoms of living organisms.

View solution

(i) Complete Figure 1.1 by naming the missing kingdoms.

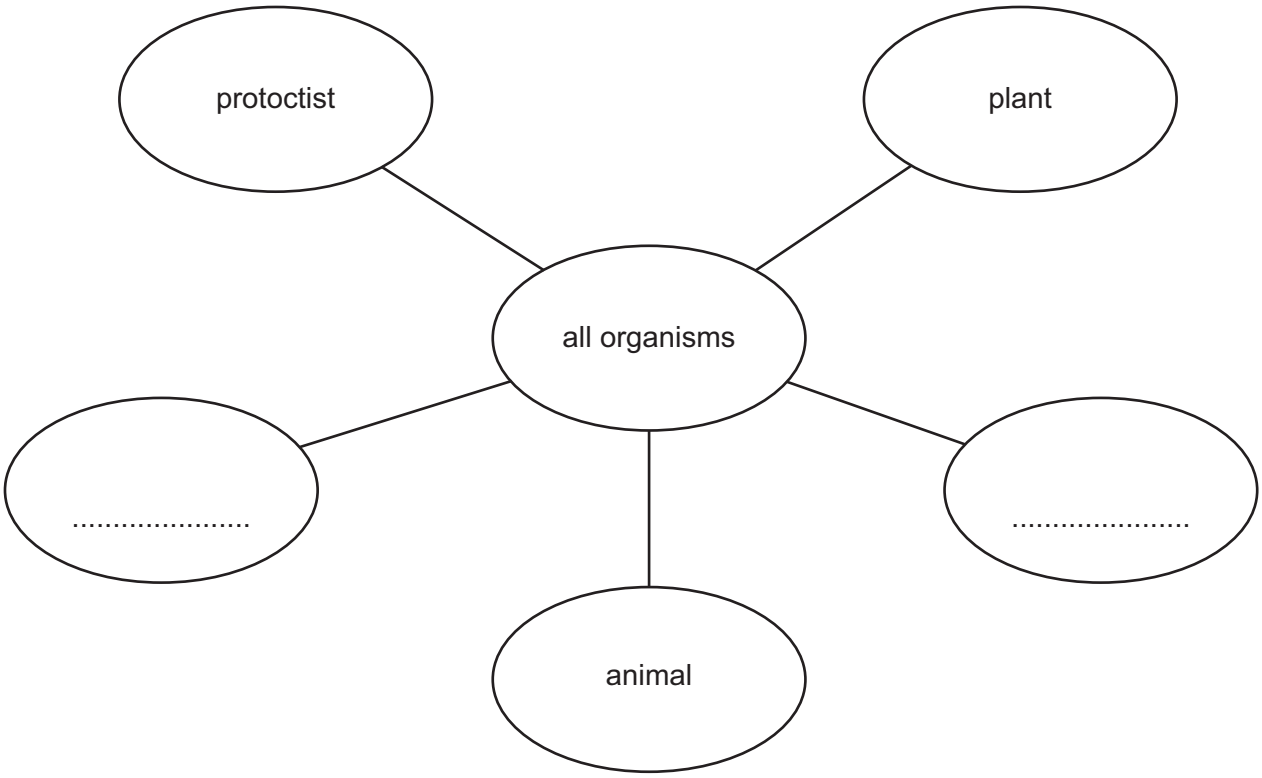

Figure 1.1

[2]

(ii) State the names of **two** cell structures that are found in both plant and animal cells.

View solution

1 .....

2 .....

[2]

(b) Figure 1.2 is a diagram of a single-celled protoctist called *Euglena*.

View solution

Euglena can act as a producer and as a consumer.

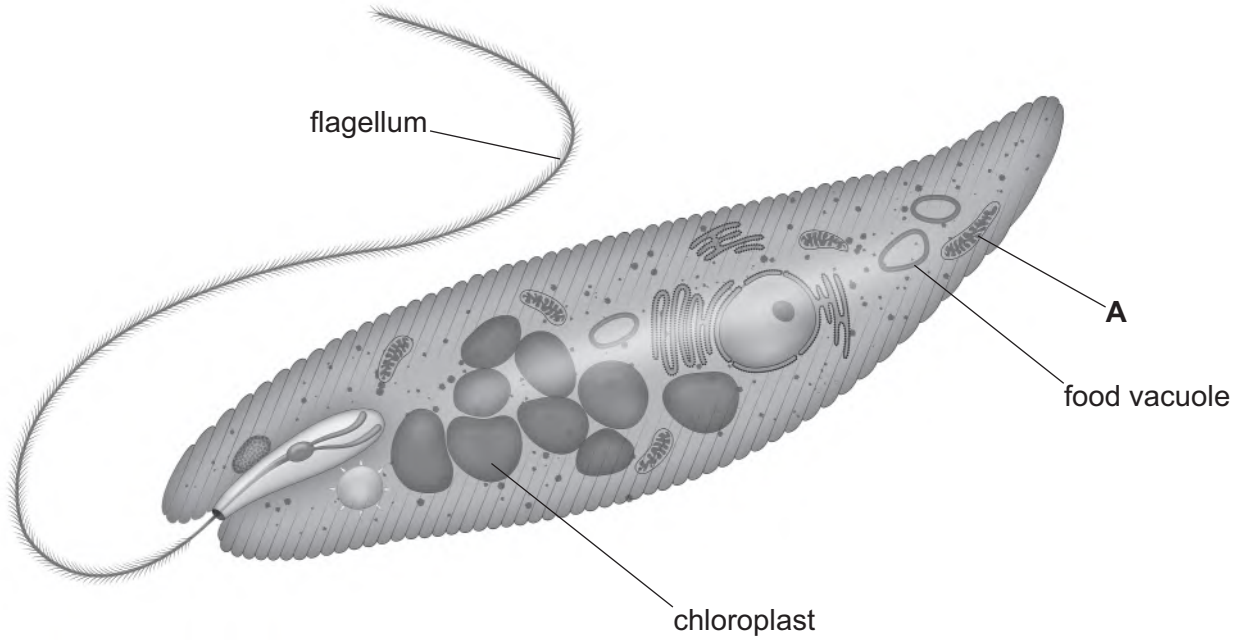

Figure 1.2

(i) State the evidence shown in Figure 1.2, that *Euglena* are producers.

.....

.....

..... [1]

(ii) Suggest the advantages to this organism of being a producer and a consumer.

View solution

.....

.....

.....

.....

..... [2]

(iii) State the function of the structure labelled **A** in Figure 1.2.

View solution

.....

..... [1]

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(iv) The protoctist in Figure 1.2 takes up magnesium ions from its surroundings.

View solution

Suggest **one** use of the magnesium ions.

..... [1]

(v) The protoctist in Figure 1.2 has specialised structures that detect light.

View solution

Suggest which characteristic of living organisms is provided by the structures that detect light.

..... [1]

(c) State the name of a human cell that has a flagellum **and** describe the function of the flagellum.

View solution

human cell .....

function .....

.....

[2]

[Total: 12]

2 **(a)** Metabolism produces waste substances that are excreted.

View solution

Complete Table 2.1 about the excretion of substances.

Table 2.1

substance	process that produces the substance	organ that excretes the substance
carbon dioxide	.....	.....
.....	photosynthesis	.....

[2]

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(b) Figure 2.1 shows the movement of nitrogen-containing substances through the human body.

View solution

key

substance

organ

direction of movement

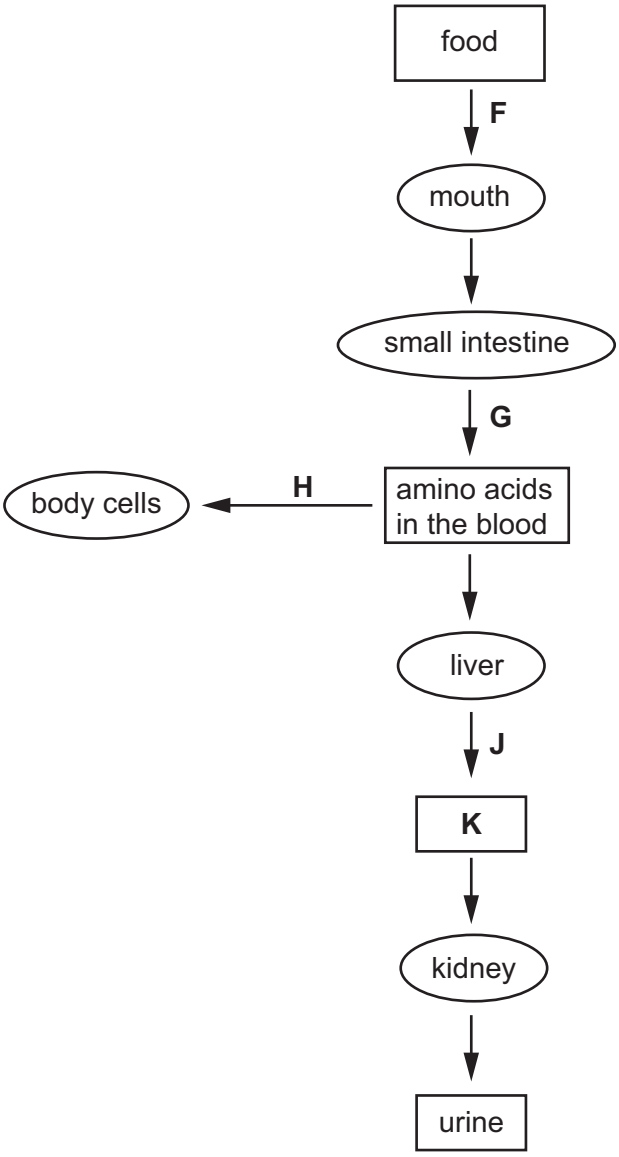

Figure 2.1

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(i) Identify the processes occurring at **F**, **G**, **H** and **J** in Figure 2.1.

F .....

G .....

H .....

J .....

[4]

(ii) State the name of substance **K** in Figure 2.1.

..... [1]

View solution

(c) Figure 2.2 is a diagram of a nephron from a human kidney and its associated blood vessels.

The arrows show the direction of blood flow.

View solution

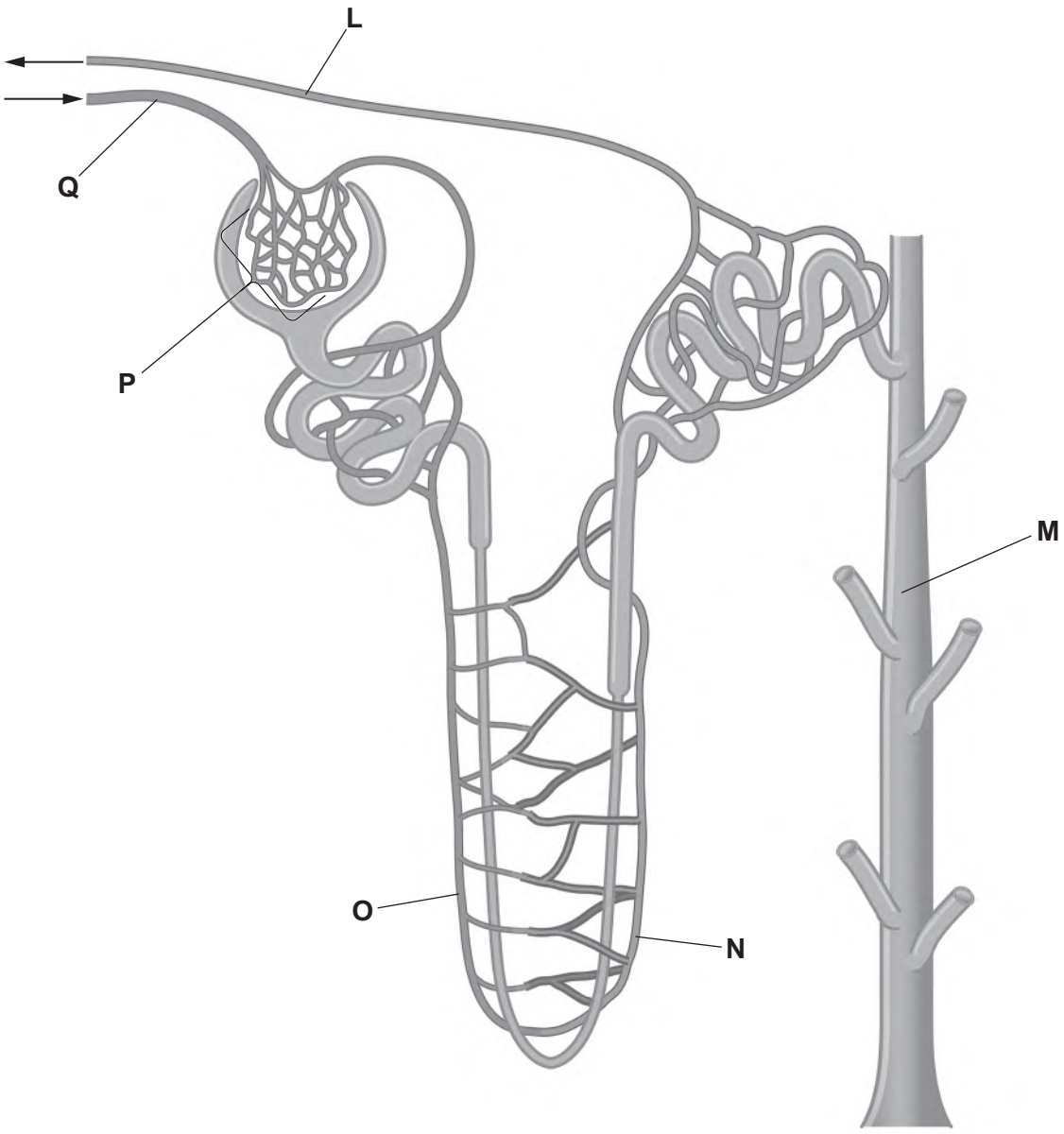

Figure 2.2

(i) State the letter in Figure 2.2 that identifies the glomerulus **and** describe its function.

letter .....

function .....

.....

[2]

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(ii) The oxygen concentrations of the blood in blood vessel **Q** and blood vessel **L** are different.

State **and** explain the difference in oxygen concentration between blood vessel **Q** and blood vessel **L**.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 13]

View solution

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3 Figure 3.1 shows the thickness of the uterus lining during one menstrual cycle.

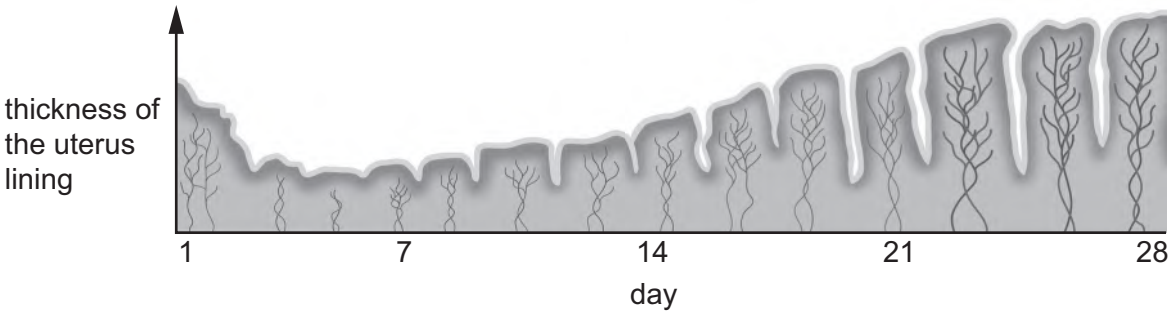

Figure 3.1

View solution

(a) Explain how oestrogen and progesterone are involved in the changes shown in Figure 3.1.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

View solution

(b) Complete the sentences about egg cells by writing words or phrases in the gaps.

The egg cell is the female ..... .

Egg cells form when a cell divides by the process of ..... .

Egg cells have ..... features such as a jelly coat

and ..... .

The nucleus of an egg cell contains a single set of chromosomes and is therefore described

as a ..... nucleus.

[5]

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(c) If pregnancy occurs, a placenta will form.

View solution

Describe **two** functions of the placenta.

1 .....

.....

2 .....

.....

[2]

(d) FSH and LH are two of the hormones that regulate the menstrual cycle.

View solution

State the roles of FSH and LH.

FSH .....

.....

LH .....

.....

[2]

(e) State **two** effects of testosterone during puberty in human males.

View solution

1 .....

.....

2 .....

.....

[2]

(f) State the name of the component of blood that transports hormones.

View solution

..... [1]

[Total: 16]

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4 **(a)** Figure 4.1 shows a cross between a chicken that is pure-breeding for white feathers and a chicken that is pure-breeding for black feathers. All of the offspring have black and white feathers that are described as speckled.

View solution

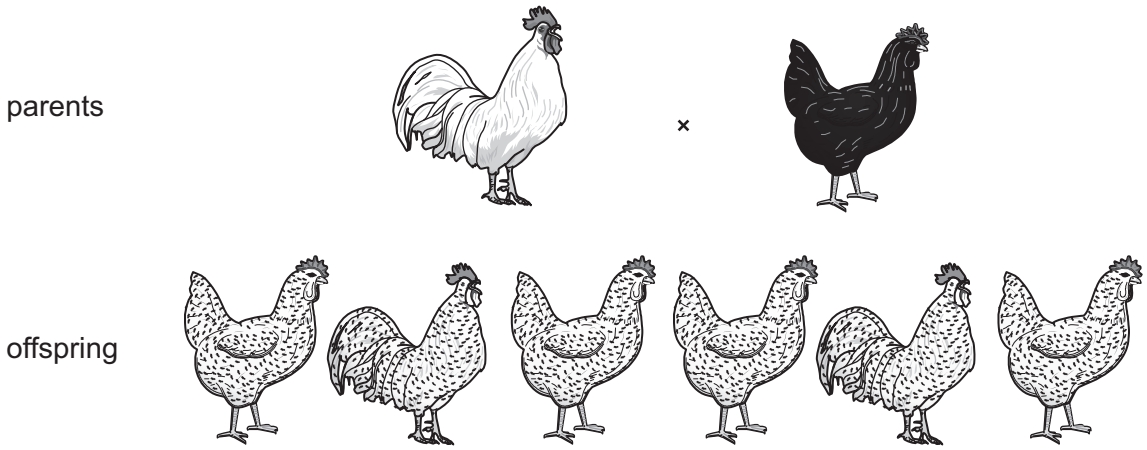

Figure 4.1

The allele for white feathers is represented by $\mathbf{F^W}$.

The allele for black feathers is represented by $\mathbf{F^B}$.

The genotype of all of the speckled chicken offspring is $\mathbf{F^W F^B}$.

(i) State the term that is used to describe the situation where both alleles in heterozygous organisms contribute to the phenotype.

..... [1]

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(ii) Two of the speckled chicken offspring were bred together.

View solution

Complete the Punnett square to determine the genotypes and phenotypic ratio of the offspring from this cross.

		male speckled chicken	
		.....	.....
female speckled chicken	.....	.....	.....
	.....	.....	.....

The phenotypic ratio of the offspring is:

.....

[3]

(b) Chickens can be farmed intensively.

View solution

Describe **two** disadvantages of intensive livestock production.

1 .....

.....

2 .....

.....

[2]

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(c) DNA controls cell function by controlling the production of proteins.

View solution

Explain how a protein is made.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 12]

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Turn over

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5 Figure 5.1 shows a food web from a marine ecosystem.

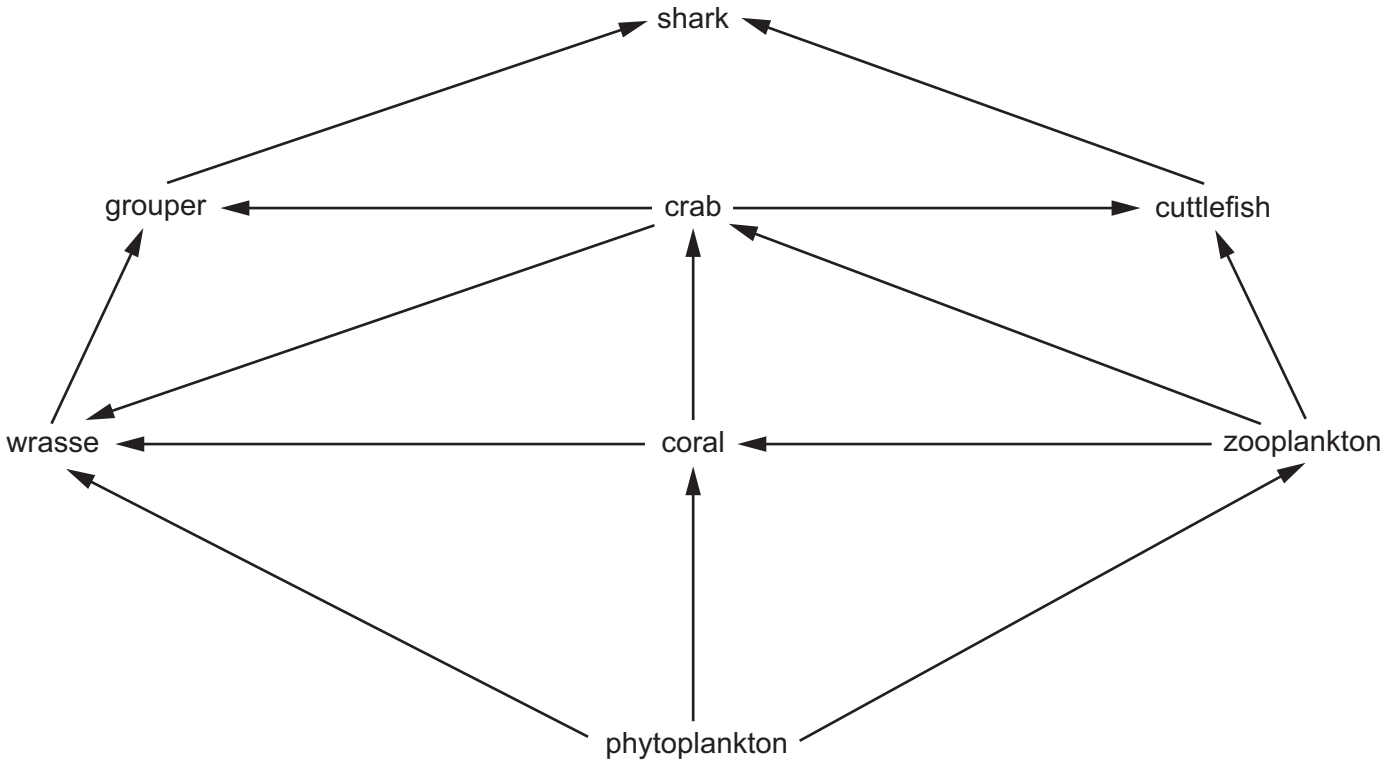

Figure 5.1

View solution

(a) Using Figure 5.1, identify:

an organism that **only** feeds as a secondary consumer

.....

an organism that consumes at three different trophic levels

.....

all of the quaternary consumers.

.....

[3]

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(b) Figure 5.2 shows a food chain.

View solution

phytoplankton ⟶ zooplankton ⟶ cuttlefish

Figure 5.2

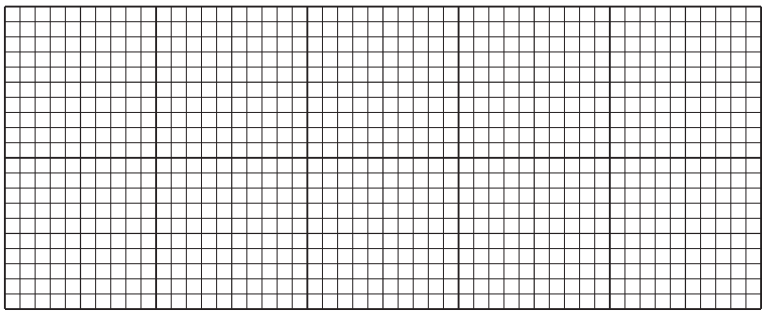
Table 5.1 shows the energy in the organisms shown in Figure 5.2.

Table 5.1

organism	energy / arbitrary units
phytoplankton	960
zooplankton	120
cuttlefish	10

(i) Use the information in Figure 5.2 and Table 5.1 to construct a pyramid of energy on the grid.

Label each trophic level.



[3]

(ii) State **one** reason for using a pyramid of energy rather than a pyramid of biomass.

View solution

.....

.....

..... [1]

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(c) Phytoplankton are aquatic producers.

View solution

Scientists investigated the factors that affect their rate of population growth. A sample of phytoplankton was grown in a container with conditions similar to those found in the wild.

The phytoplankton were provided with constant light.

The population of phytoplankton was measured as the number of organisms per cm^3.

Figure 5.3 shows the results of the investigation.

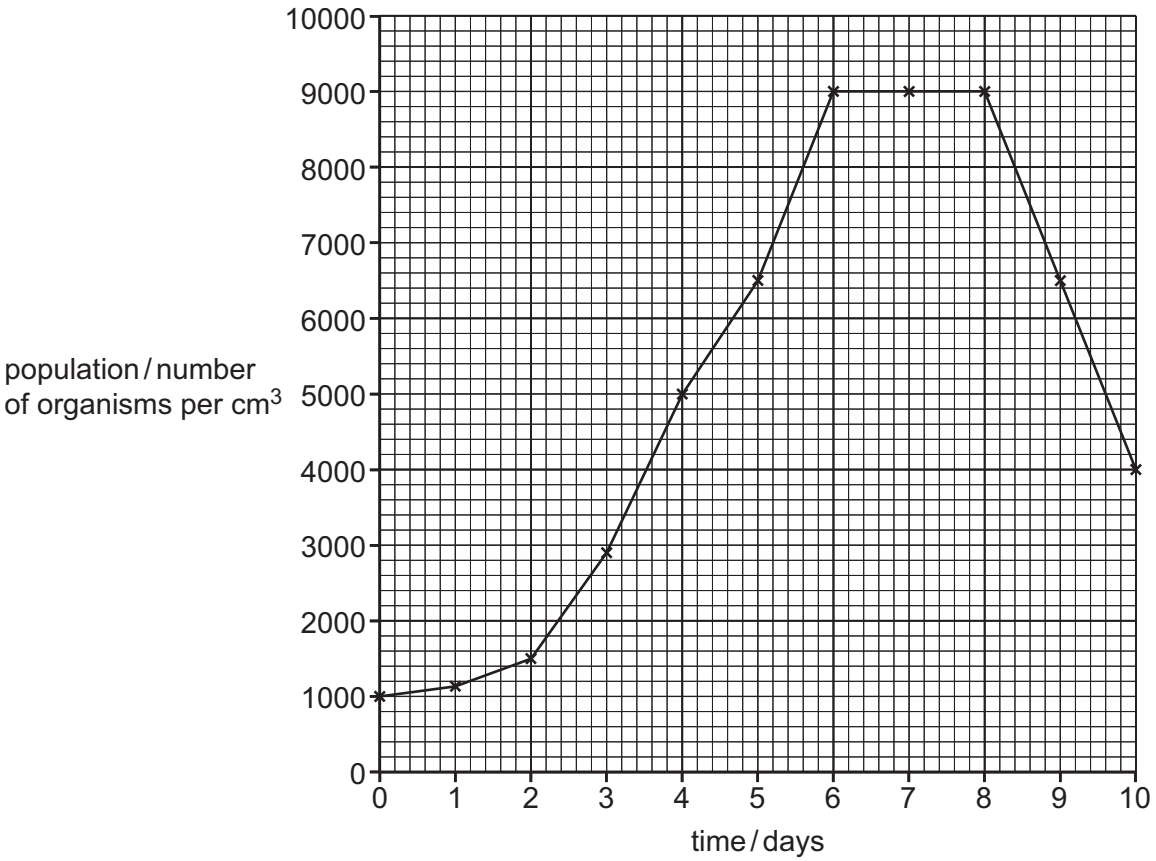

Figure 5.3

(i) Using Figure 5.3, calculate the population of phytoplankton in 0.5 dm^3 on day 4.

Give your answer in standard form.

Space for working.

..... [3]

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(ii) Identify **and** explain the phases of growth shown by the phytoplankton in Figure 5.3.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

[Total: 15]

View solution

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6 **(a)** Lipase is an enzyme found in the human digestive system.

View solution

Complete the word equation to show the substrate and products for a reaction catalysed by lipase.

..... → fatty acids + ...

[2]

View solution

(b) There are different types of lipase.

Figure 6.1 shows the effect of pH on the enzyme activity of two types of lipase, type **P** and type **Q**.

key

type **P** lipase

type **Q** lipase

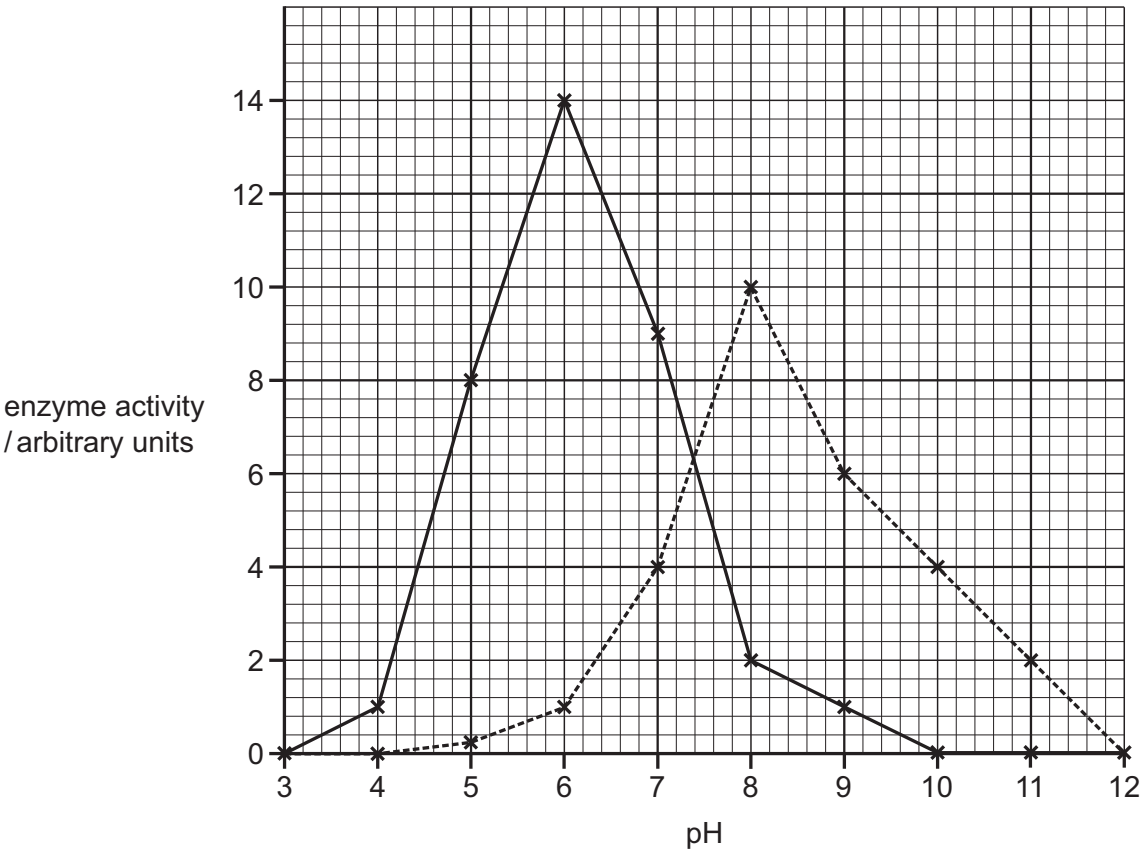

Figure 6.1

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(i) Describe **two** similarities and **two** differences between the effect of pH on the enzyme activity of type **P** lipase and type **Q** lipase.

similarity 1 .....

.....

similarity 2 .....

.....

difference 1 .....

.....

difference 2 .....

..... [4]

(ii) Using Figure 6.1, identify the pH values where type **Q** lipase has 50% of its maximum activity.

View solution

..... and ..... [1]

(iii) Explain the effect of pH on the enzyme activity of type **P** lipase shown in Figure 6.1.

View solution

.....

.....

.....

.....

.....

.....

..... [3]

(c) In the small intestine, bile provides a suitable pH for type **Q** lipase.

View solution

(i) State **one** other function of bile.

.....

..... [1]

(ii) State the name of the organ that produces bile.

View solution

..... [1]

[Total: 12]

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