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2925064921

BIOLOGY **0610/32**

Paper 3 Theory (Core) **February/March 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 **20** pages. Any blank pages are indicated.

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1 **(a)** The nutrient content of five different foods was analysed.

The mass of each nutrient per 100 g of food was estimated.

Table 1.1 shows the results.

Table 1.1

	mass of nutrient per 100 g of food / g			
food	carbohydrates	fats	protein	fibre
A	12	1	5	6
B	23	8	14	2
C	0	36	25	0
D	7	54	28	7
E	21	7	5	8

The recommended daily allowance for these nutrients for an adult is:

- fat – a maximum of 70 g per day
- protein – 50 g per day.

(i) Identify the food in Table 1.1 which contains the most carbohydrate per 100 g.

..... [1]

(ii) A person eats 200 g of each food.

Using the information in Table 1.1, identify the **two** foods that would provide **more** than the recommended daily allowance of fat.

..... and .....

[2]

(iii) Using the information in Table 1.1, calculate the number of grams of food **C** needed to provide the recommended daily allowance of protein.

..... g [1]

(iv) State **two** groups of nutrients missing from Table 1.1 that are needed as part of a balanced diet.

1 .....

2 .....

[2]

(v) Explain why food **E** is recommended as part of a balanced diet.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Most foods contain some carbohydrates.

State the names of the chemical elements contained in carbohydrates.

..... [1]

(c) Starch is a type of carbohydrate.

Circle the names of **two** other carbohydrates from the list.

amino acids	**amylase**	**cellulose**	**ethanol**
glycogen	**oil**	**protein**	**urea**

[2]

[Total: 12]

2 **(a)** A student investigated the rate of water loss from leaves at two different temperatures.

The student measured the mass of one leaf at the same time every day for seven days.

The leaf was kept at 15 °C.

The student repeated this with a similar-sized leaf kept at 25 °C.

Fig. 2.1 shows some of the apparatus used.

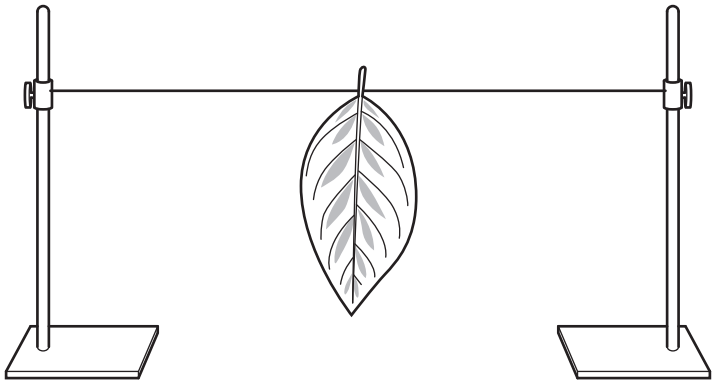

Fig. 2.1

The results are shown in Fig. 2.2.

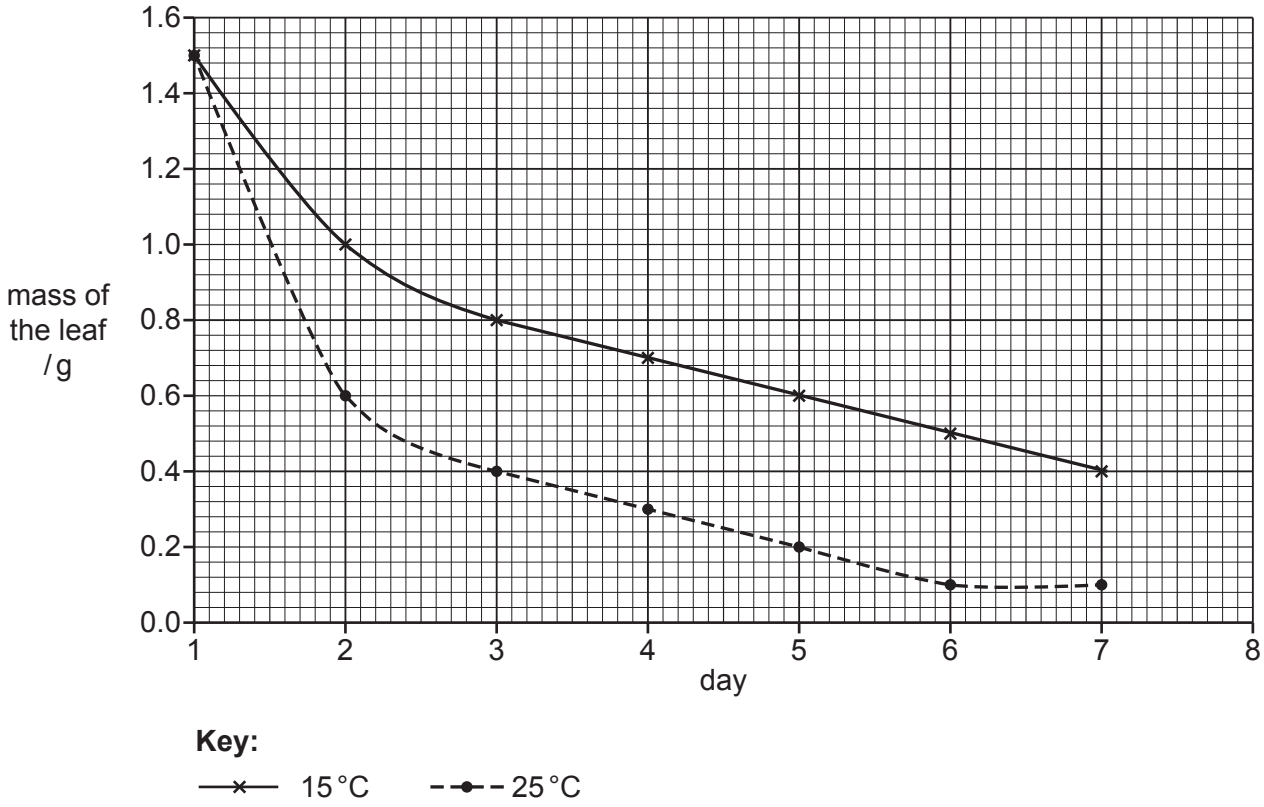

Fig. 2.2

(i) Describe the results shown in Fig. 2.2.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Complete the sentences to explain the process shown by the results in Fig. 2.2.

Water evaporates from the surfaces of the ..... cells in the leaf.

The water evaporates into the ..... spaces.

Water vapour moves out of the leaf through the ..... by diffusion.

This process is called ..... .

[4]

(iii) State the name of the vessels that transport water to the leaves from the roots.

..... [1]

(b) Fig. 2.3 is a photomicrograph of the lower surface of a leaf.

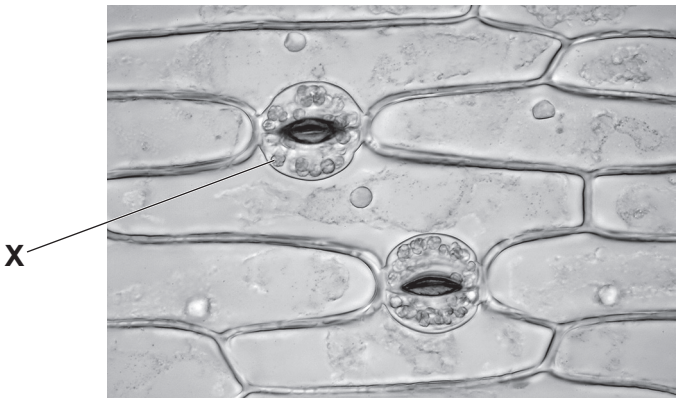

Fig. 2.3

(i) State the name of the cell labelled **X** in Fig. 2.3.

..... [1]

(ii) Identify **one** structure that identifies the cells in Fig. 2.3 as plant cells.

..... [1]

(c) Explain why leaves usually have a large surface area.

.....

.....

.....

.....

..... [2]

[Total: 12]

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3 Huntington's disease is a genetic disease caused by a mutation in a single gene.

The allele for Huntington's disease is dominant and is represented by the letter **H**.

The allele for **no** Huntington's disease is recessive and is represented by the letter **h**.

Fig. 3.1 is a pedigree diagram showing the inheritance of Huntington's disease in one family.

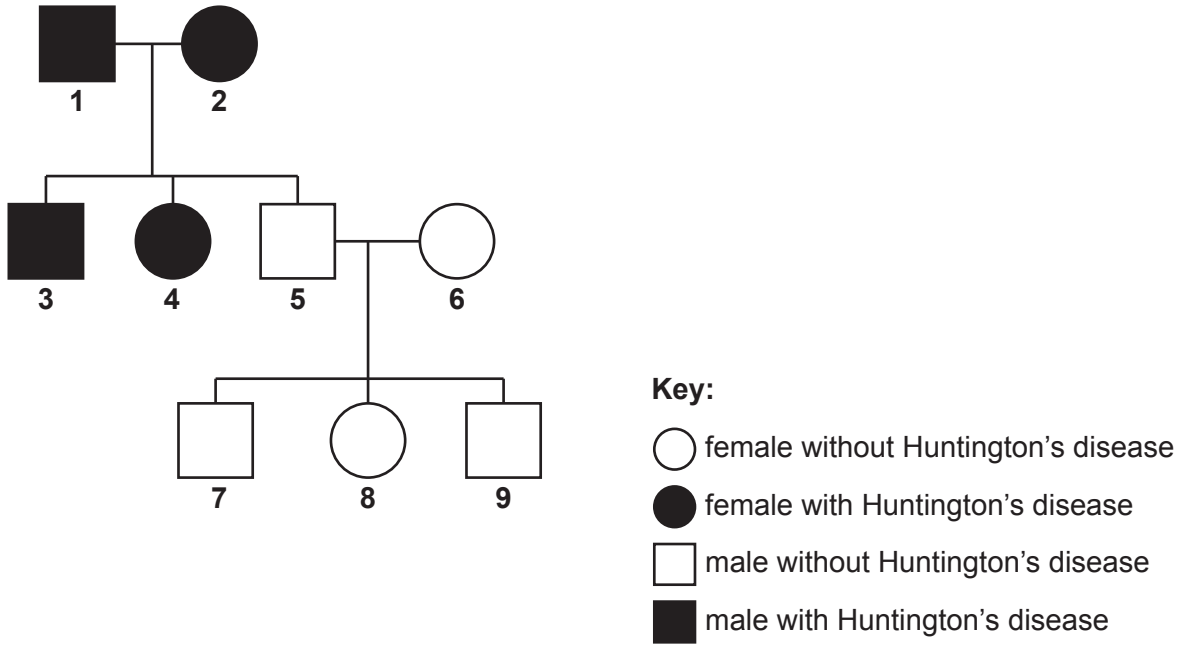

Fig. 3.1

(a) (i) State the number of males with Huntington's disease in Fig. 3.1.

..... [1]

(ii) State the **two** possible genotypes for person **3** in Fig. 3.1.

..... and .....

[2]

(iii) State the evidence from Fig. 3.1 that suggests that the allele for Huntington's disease is dominant.

.....

.....

..... [1]

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(b) A person that is heterozygous for Huntington's disease has a child with a person that is homozygous recessive.

Complete the Punnett square in Fig. 3.2 by writing in the gametes and offspring for this cross and calculate the percentage chance of the child inheriting Huntington's disease.

	.....	.....
.....	.....	.....
.....	.....	.....

Percentage chance of the child inheriting Huntington's disease .....

[3]

Fig. 3.2

(c) Chromosomes contain genetic information in the form of genes.

(i) Define the term gene.

.....

..... [2]

(ii) State where chromosomes are found in cells.

..... [1]

(iii) State the chromosomes involved in the inheritance of sex in humans.

..... [1]

[Total: 11]

4 **(a)** Fig. 4.1 is a diagram of a bacterial cell.

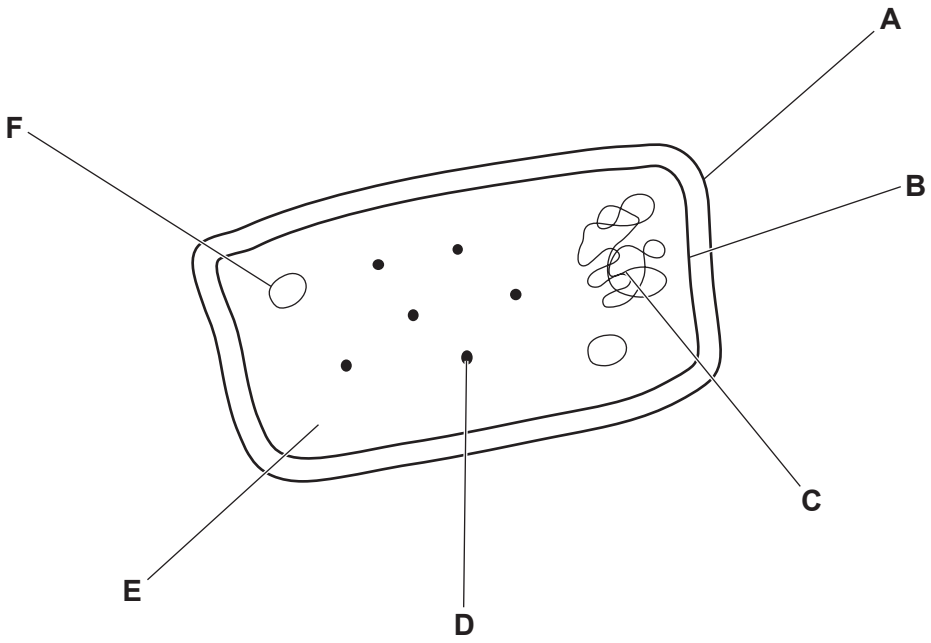

Fig. 4.1

(i) Identify the letters of **two** parts from Fig. 4.1 that contain DNA.

..... and .....

[2]

(ii) State the name of the part labelled **A** in Fig. 4.1.

..... [1]

(iii) State the function of the part labelled **D** in Fig. 4.1.

..... [1]

(b) Some bacteria cause transmissible diseases.

Describe what is meant by the term transmissible disease.

.....

.....

..... [2]

(c) Disease can be transmitted indirectly or directly.

State **one** way that disease can be transmitted directly.

..... [1]

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(d) *Salmonella* bacteria can cause food poisoning. *Salmonella* bacteria are able to reproduce when the temperature is between 5.2 °C and 46.0 °C. *Salmonella* bacteria are killed after 10 minutes at 75 °C.

Using this information and your knowledge, suggest ways of preventing the spread of food poisoning caused by *Salmonella* bacteria.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 11]

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5 Fig. 5.1 is a diagram of the breathing system in humans.

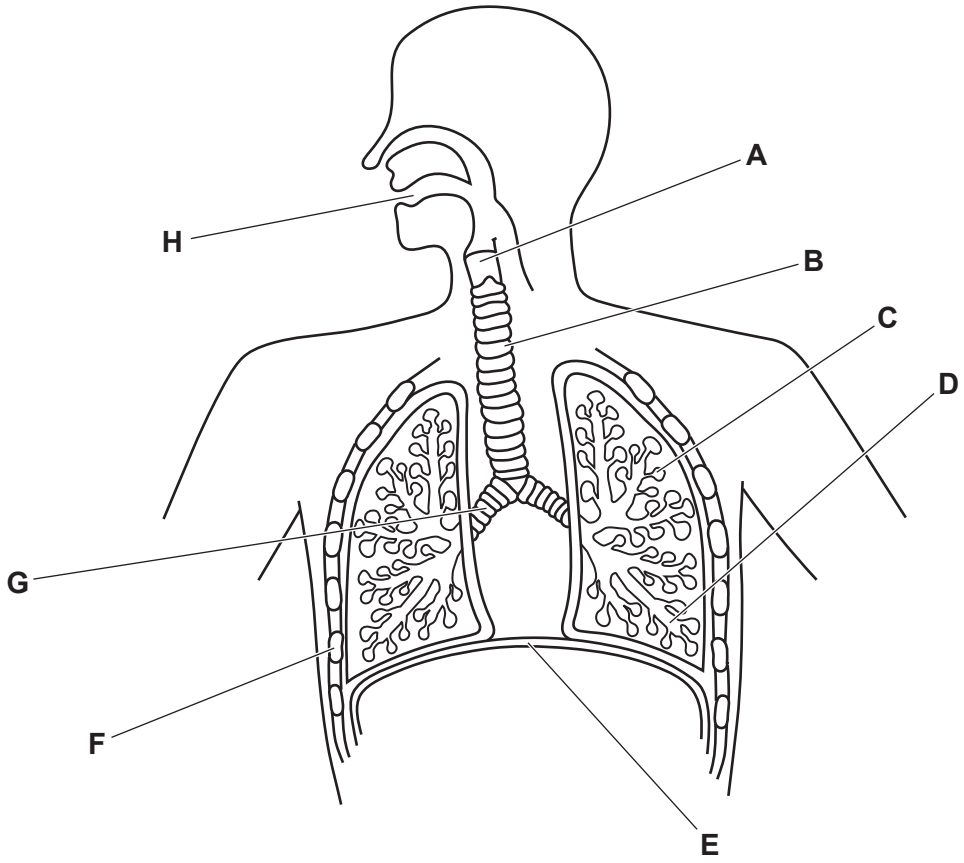

Fig. 5.1

(a) State the names of the parts labelled **A**, **D** and **E** in Fig. 5.1.

A .....

D .....

E .....
[3]

(b) Part **B** in Fig. 5.1 contains specialised cells that move mucus.

State the name of these specialised cells.

..... [1]

(c) State the letter of a part shown in Fig. 5.1 that also has a role in digestion and name **one** type of digestion that occurs here.

letter .....

type of digestion .....
[2]

(d) The alveoli are the gas exchange surface.

Scientists estimated the total alveolar surface area in seven different species.

The results are shown in Fig. 5.2.

Species **A** to **G** are placed in order of body size from smallest (**A**) to largest (**G**).

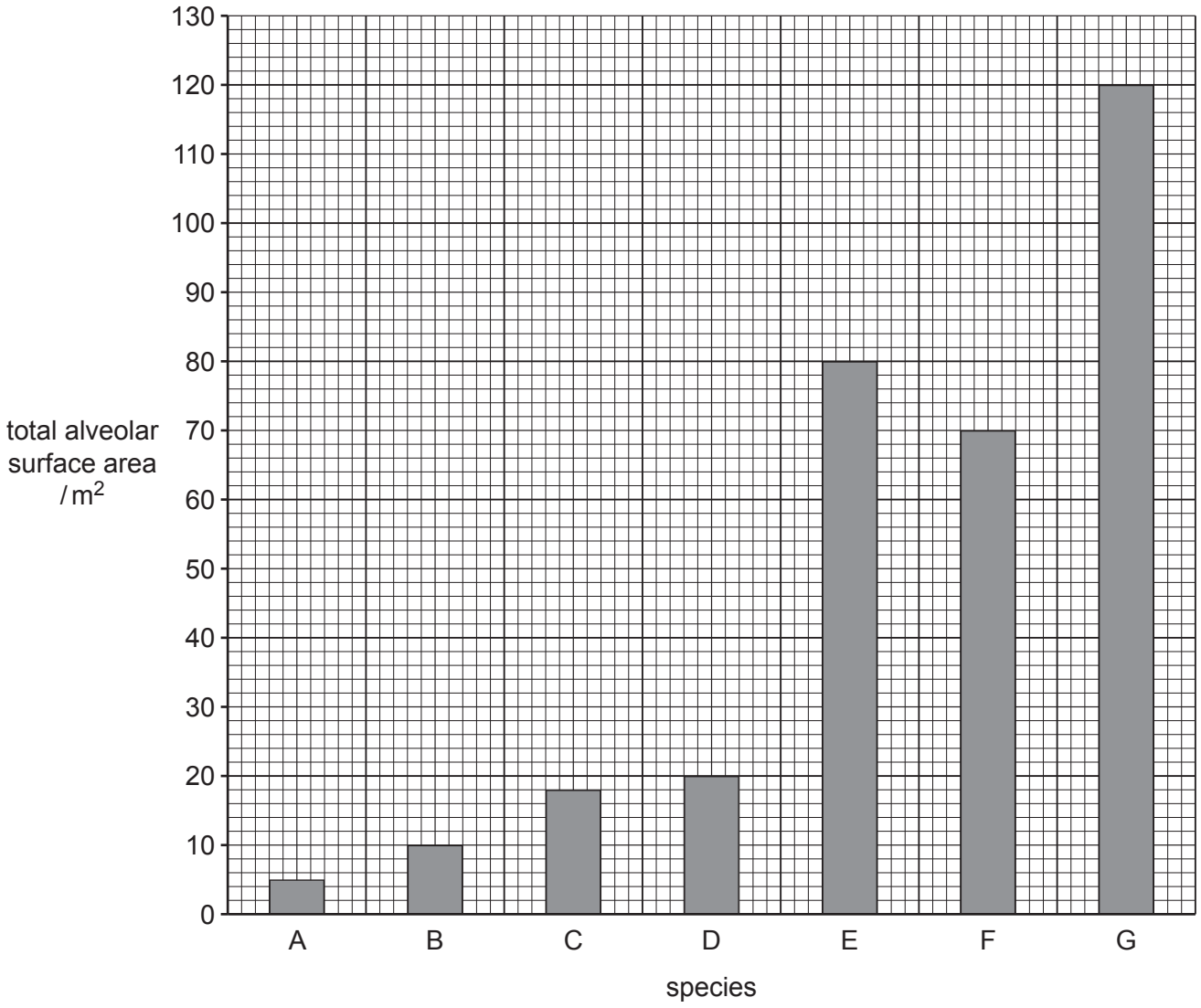

Fig. 5.2

A student made this statement:

'The larger the species, the larger the total alveolar surface area.'

(i) State **one** piece of evidence from Fig. 5.2 that supports this statement **and one** piece of evidence that does **not** support this statement.

supports .....

.....

does **not** support .....

.....

[2]

(ii) Calculate the difference in total alveolar surface area between species **D** and **G** shown in Fig. 5.2.

..... m^2 [1]

(e) A large surface area is one feature of gas exchange surfaces in humans.

State **two** other features.

1 .....

2 .....
[2]

[Total: 11]

6 Fig. 6.1 is a diagram representing part of the carbon cycle.

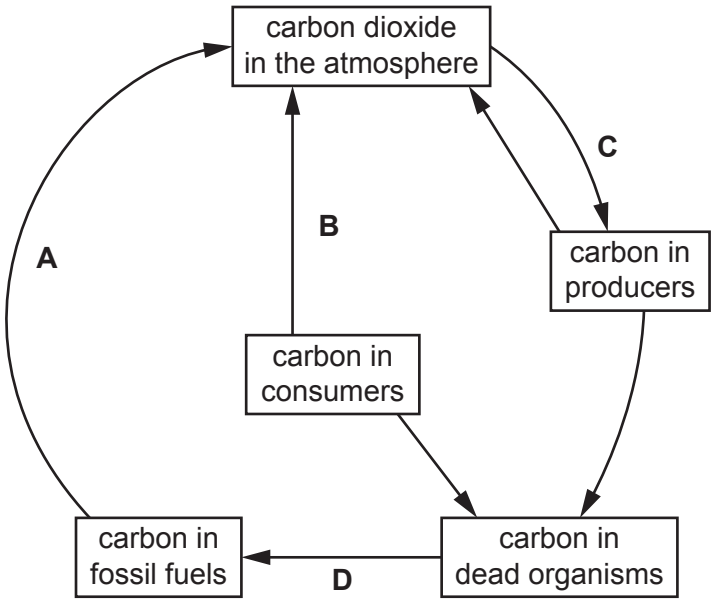

Fig. 6.1

(a) Using the information in Fig. 6.1, identify the number of processes that remove carbon dioxide from the atmosphere.

..... [1]

(b) The boxes on the left show letters representing processes in Fig. 6.1.

The boxes on the right show the names of some processes.

Draw lines to link each letter to the correct process.

Draw **four** lines.

letter in Fig. 6.1	**process**
	combustion
A	
	decomposition
B	
	formation of fossil fuel
C	
	photosynthesis
D	
	respiration

[4]

(c) Energy is transferred through feeding in food webs.

(i) Draw an arrow **on Fig. 6.1** to represent the process of herbivores feeding. [1]

(ii) State the principal source of energy in most food webs.

..... [1]

(d) Explain why fossil fuels **cannot** be described as a sustainable resource.

.....

.....

.....

.....

.....
[2]

(e) Deforestation can cause an increase in the carbon dioxide concentration in the atmosphere.

State **two other** undesirable effects of deforestation.

1 .....

2 .....
[2]

(f) Adding extra carbon dioxide to the atmosphere causes an enhanced greenhouse effect.

(i) State the usual concentration of carbon dioxide in the atmosphere.

..... % [1]

(ii) State **one other** pollutant that causes an enhanced greenhouse effect.

..... [1]

[Total: 13]

7 **(a)** The list shows some of the organs and glands in the human body.

adrenal	**ovary**	**prostate**
pancreas	**salivary**	**testis**

Using words from the list, state the names of:

the glands positioned directly above each kidney

.....

the organ that releases insulin

.....

the **two** organs that release hormones that regulate the development of secondary sexual characteristics.

..... and .....

[4]

(b) One of the effects of adrenaline is to increase pupil diameter.

(i) Suggest the target **organ** of adrenaline in this response.

..... [1]

(ii) State **two other** effects of adrenaline on the body.

1 .....

2 .....

[2]

(iii) State the part of the blood that transports adrenaline.

..... [1]

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(c) The statements describe hormonal and nervous control.

Tick **two** statements that are true for nervous control.

Information is only sent as chemical substances.	
Information is transported by neurones.	
Reflex actions are an example of this type of control.	
The effects of the control are long-lasting.	
The speed of transmission is slow.	

[2]

[Total: 10]

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