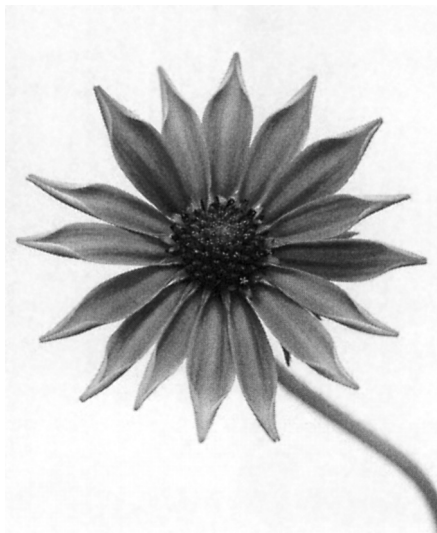


Answer ALL the questions. Write your answers in the spaces provided.

1. (a) The picture shows part of a plant.



What part of the plant does the picture show? Put a cross (☒) in the correct box.

leaf

flower

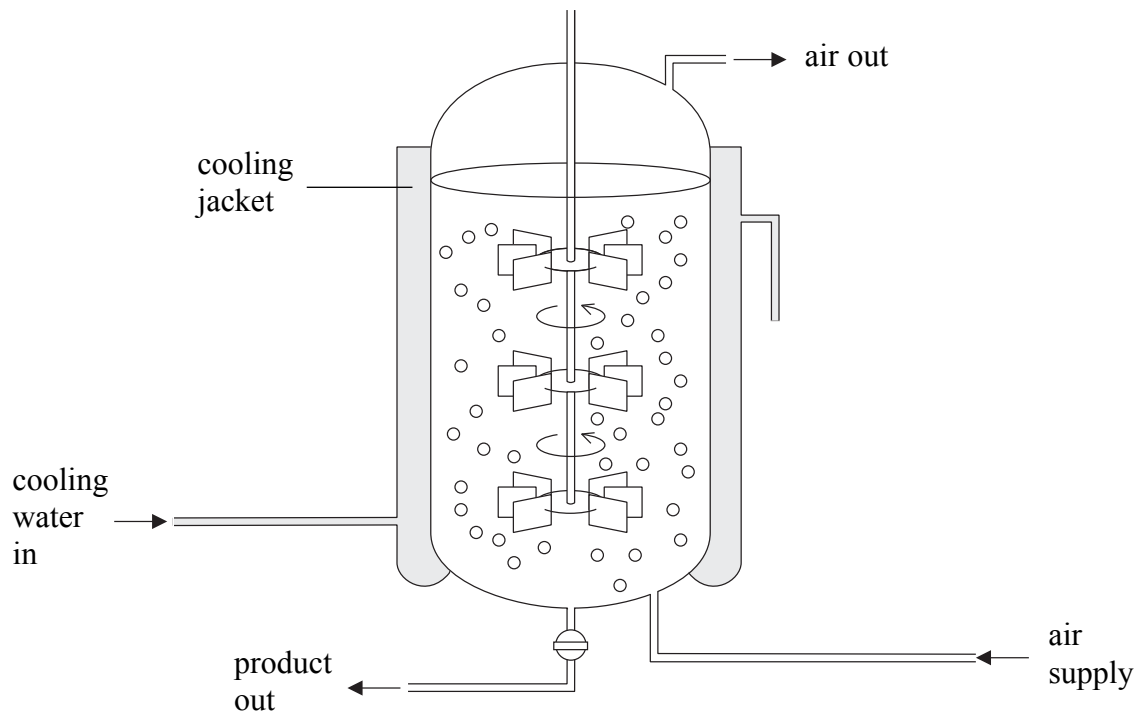
root

stem

(1)



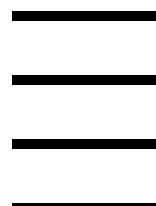
(b) The diagram shows the apparatus used to grow genetically modified bacteria.



What is the name given to the apparatus used? Put a cross (☒) in the correct box.

- beaker
- fermenter
- vacuum flask
- bottle

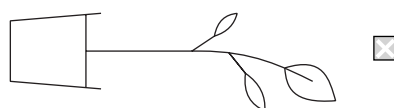
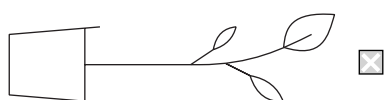
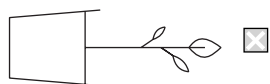
(1)



(c) The diagram shows a potted plant that has been knocked over onto its side.

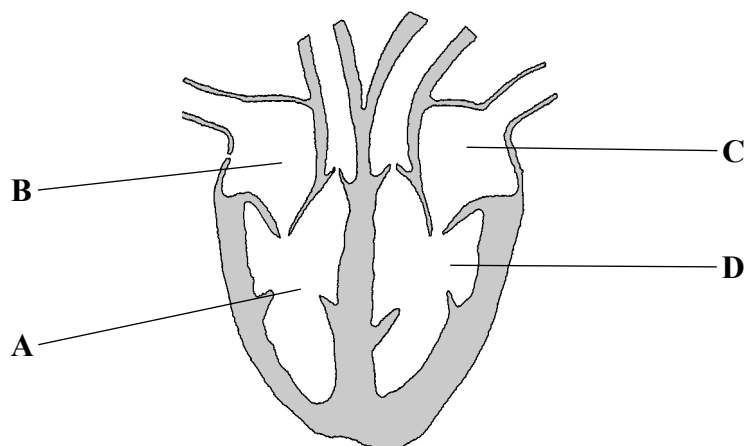


Which diagram shows the potted plant after 24 hours on its side? Put a cross (☒) in the correct box.



(1)

(d) The diagram shows a section through the human heart.



Which chamber pumps blood to the body? Put a cross (☒) in the correct box.

A

B

C

D

(1)

(e) Which process do plants use to make their food? Put a cross (☒) in the correct box.

diffusion

osmosis

photosynthesis

respiration

(1)



(f) Which row of the table shows the conditions that help seeds germinate? Put a cross (☒) in the correct box.

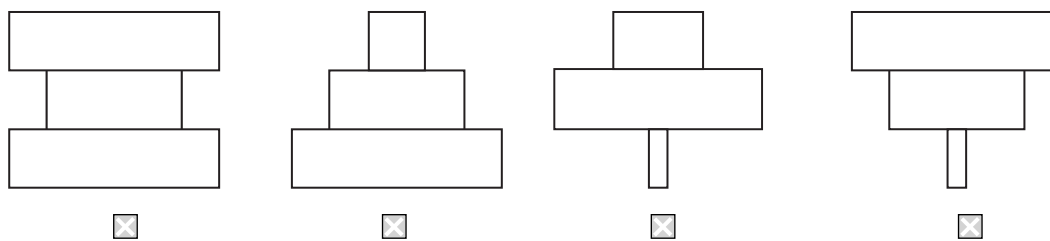
Warmth	Oxygen	Water	
no	no	no	<input type="checkbox"/>
no	no	yes	<input type="checkbox"/>
yes	no	yes	<input type="checkbox"/>
yes	yes	yes	<input type="checkbox"/>

(1)

(g) A simple food chain is shown below.

plants → small animals → large birds

Which is the pyramid of biomass for this food chain? Put a cross (☒) in the correct box.



(1)

(h) Magnesium is used to make

- nitrate
- protein
- haemoglobin
- chlorophyll

(1)

(i) Which gas is produced by yeast when beer is made? Put a cross (☒) in the correct box.

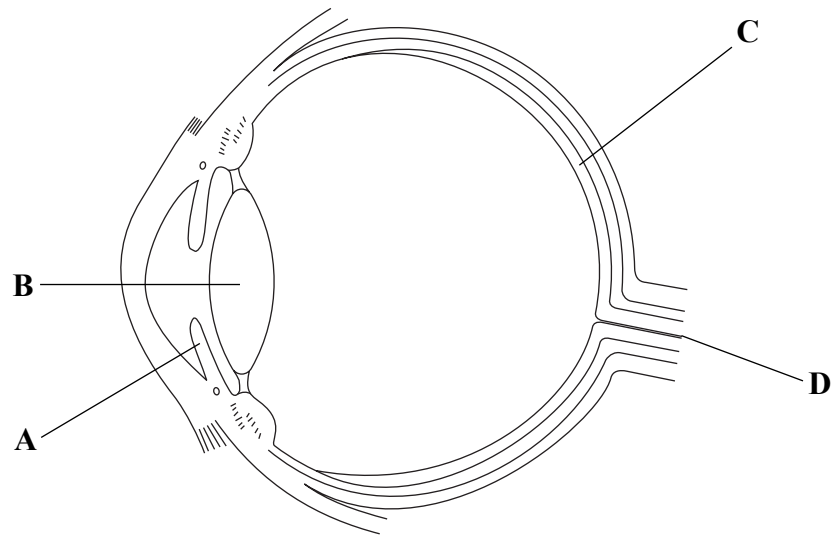
- carbon dioxide
- methane
- oxygen
- sulphur dioxide

(1)



Leave blank

(j) The diagram shows a section of the human eye.



Which part of the eye detects light? Put a cross (☒) in the correct box.

- A
- B
- C
- D

(1)

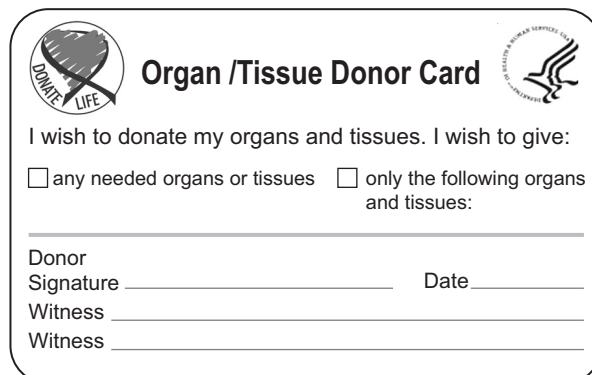
Q1

(Total 10 marks)



Leave
blank

2. Some people carry donor cards like the one shown.



Organ /Tissue Donor Card

I wish to donate my organs and tissues. I wish to give:

any needed organs or tissues only the following organs and tissues:

Donor
Signature _____ Date _____
Witness _____
Witness _____

This means that when they die, their body parts can be given to people who need them.

The table gives the function of body parts that are commonly donated. Complete the table by naming the donated body part. Choose words from the list to complete the table.

The first answer has been done for you.

cornea heart kidney
lung pancreas skin

Function	Donated body part
breaks down toxic chemicals	liver
produces urine	
pumps blood around the body	
fills with air during breathing	
bends light as it enters the eye	
secretes insulin	

(Total 5 marks)

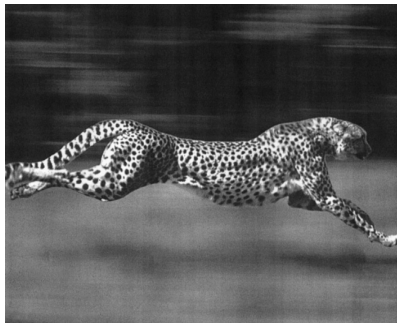
Q2

7



Turn over

3. The photograph shows a cheetah running.



The cheetah is the fastest mammal on land. A cheetah can run fast for only a few hundred metres. It then has to stop running. It can run as fast as 108 000 m per hour.

(a) Tick the box that shows how many metres a cheetah could run in one second.

Metres	Tick
30	
1800	
108 000	

(1)

(b) When running fast, the muscle cells of a cheetah use anaerobic respiration. The cells produce a waste product that stops the muscle cells working because it affects enzymes.

(i) What is anaerobic respiration?

.....

(1)

(ii) Name the waste product that would be produced in the muscles of a cheetah.

.....

(1)

(iii) Suggest how enzymes are affected by this waste product.

.....

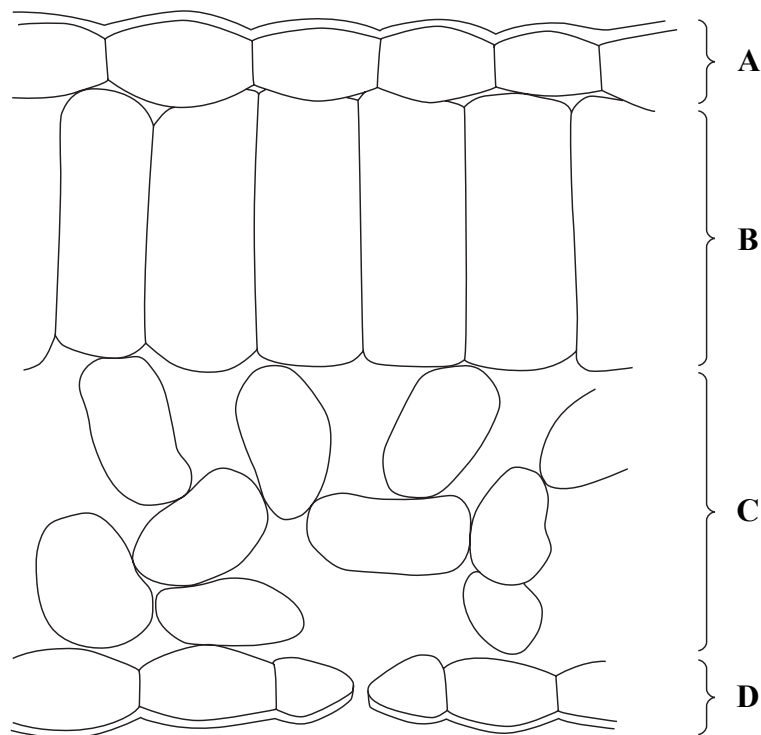
(1)

(Total 4 marks)

Q3



4. The diagram shows a section through a leaf separated into four regions A, B, C and D.



Answer the following questions by putting a cross (☒) in the correct box.

(a) In which region is the waxy cuticle found?

A ☒ B ☒ C ☒ D ☒

(1)

(b) In which region are stomata found?

A ☒ B ☒ C ☒ D ☒

(1)

(c) In which region are palisade cells found?

A ☒ B ☒ C ☒ D ☒

(1)

(d) In which region is the xylem found?

A ☒ B ☒ C ☒ D ☒

(1)

(Total 4 marks)

Q4



5. Mammals produce milk to feed their young.

The table shows the amount of three food substances in milk from four different mammals.

Mammal	Amount of food substance in g per dm ³		
	Fat	Protein	Sugar
cow	37	34	48
human	38	10	70
polar bear	331	109	3
rabbit	183	139	21

(a) (i) Which mammal produces the most sugar in their milk?

.....
(1)

(ii) The table below lists three sugars.

Which sugar is found in milk?

Tick (✓) the correct answer.

Sugar	Tick
maltose	
lactose	
sucrose	

(1)

(iii) How much more protein is found in milk from rabbits compared to milk from cows?

..... g per dm³
(1)



Leave
blank

- (b) The sentences below describe what happens to milk protein in the stomach of a baby. Choose the correct word or phrase from the list to complete each sentence.

amino acids **amylase** **fatty acids**
hydrochloric acid **lactic acid** **protease**

The protein is digested into small molecules called

The enzyme used to digest the protein is called

The acid used to help this enzyme is called

(3)

- (c) Polar bear milk contains the most fat. Suggest how this would help a young polar bear to survive.

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

(2)

- (d) Babies are usually fed only on milk in the first few weeks of their lives. Fat, protein and sugar are needed in a balanced diet.

Name **two** other food substances that must be in breast milk to provide a balanced diet for a baby.

1

2

(2)

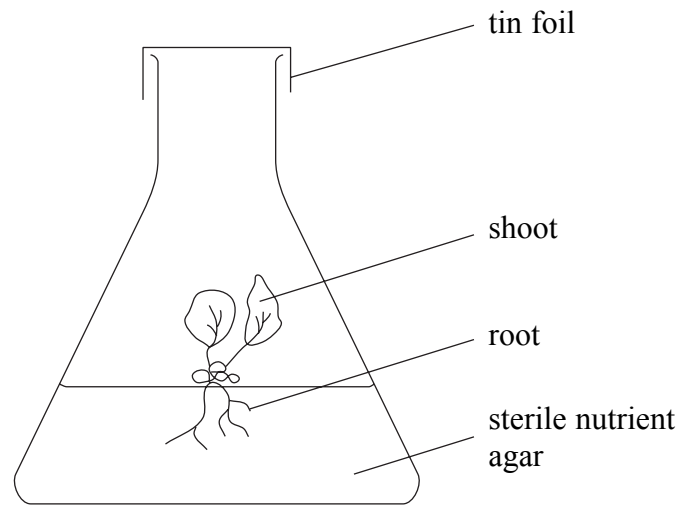
Q5

(Total 10 marks)

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6. Micropropagation (tissue culture) is used to produce lots of identical plants. The plants are grown inside glass flasks on a jelly called agar. The diagram shows one of these plants in a glass flask.



(a) Give **two** functions of the roots of the plant inside the glass flask.

- 1
- 2 (2)

(b) What does the word **sterile** mean?

..... (1)

(c) Name **one** mineral nutrient that should be in the agar.

..... (1)

(d) Suggest why it is important to cover the opening of the glass flask with tin foil.

.....
.....
..... (2)

(e) The glass flasks are kept in conditions so that photosynthesis can occur. Name **two** conditions that are needed for photosynthesis.

- 1
- 2 (2)



(Total 8 marks)

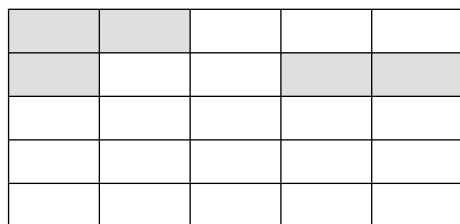
Q6



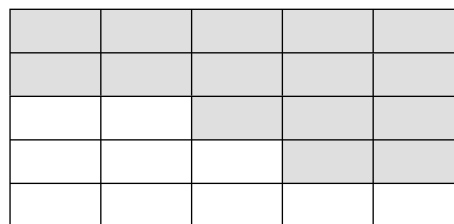
7. (a) The diagram shows two brick walls. One wall is near a source of sulphur dioxide pollution. The other wall is far from any source of sulphur dioxide pollution.

Some very small plants can grow on brick walls. The number of bricks covered by these small plants on each of these walls is recorded.

Key brick covered by plant 
 brick not covered by plant 



Wall near to sulphur dioxide source



Wall far from sulphur dioxide source

Use the key and the diagrams to complete the table below.

Results	Wall near to sulphur dioxide source	Wall far from sulphur dioxide source
total number of bricks	25	25
number of bricks covered by plant	5	
percentage of bricks covered by plant	20	

(2)

(b) What do these results suggest about the effect of sulphur dioxide gas on the growth of plants?

.....

(2)

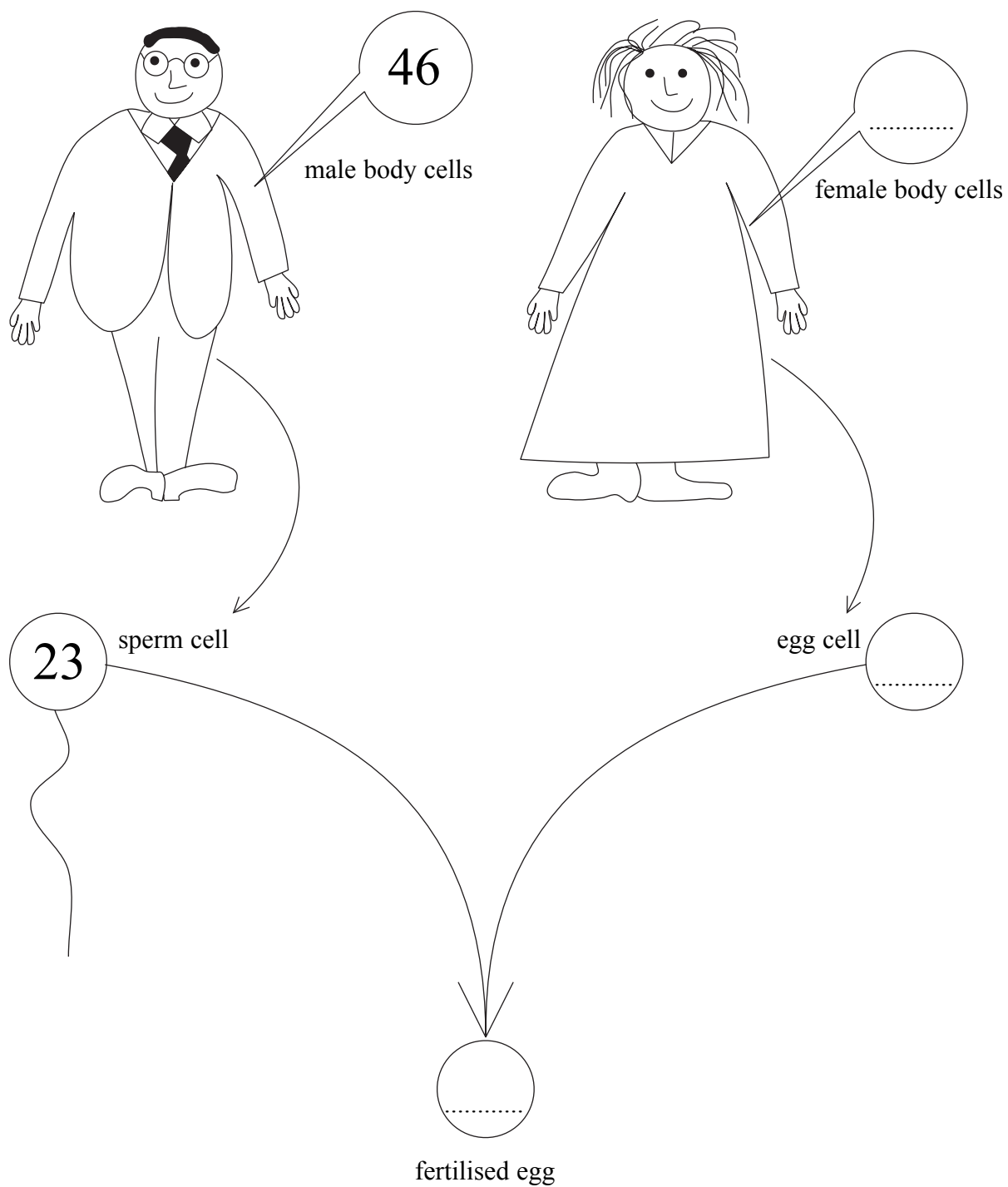
(Total 4 marks)

Q7



8. The diagram shows cells in the human body and how a sperm cell and an egg cell can combine to produce a fertilised egg. The number of chromosomes found in a male body cell and in a sperm cell are also shown.

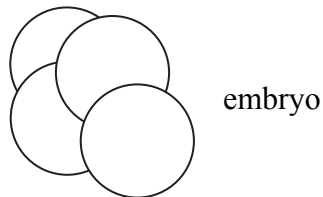
(a) Complete the diagram by showing the number of chromosomes found in the other cells.



(3)



(b) The fertilised egg divides to produce the four-celled embryo shown in the diagram.



(i) Tick the row in the table that correctly describes the type, and the number of cell divisions that produced this four-celled embryo.

Type of cell division	Number of cell divisions	Tick
mitosis	2	
mitosis	4	
meiosis	2	
meiosis	4	

(1)

(ii) One cell from this embryo can be removed and tested to see if it has any changes in its genetic material.

What term is used to describe changes in the genetic material?

.....

(1)

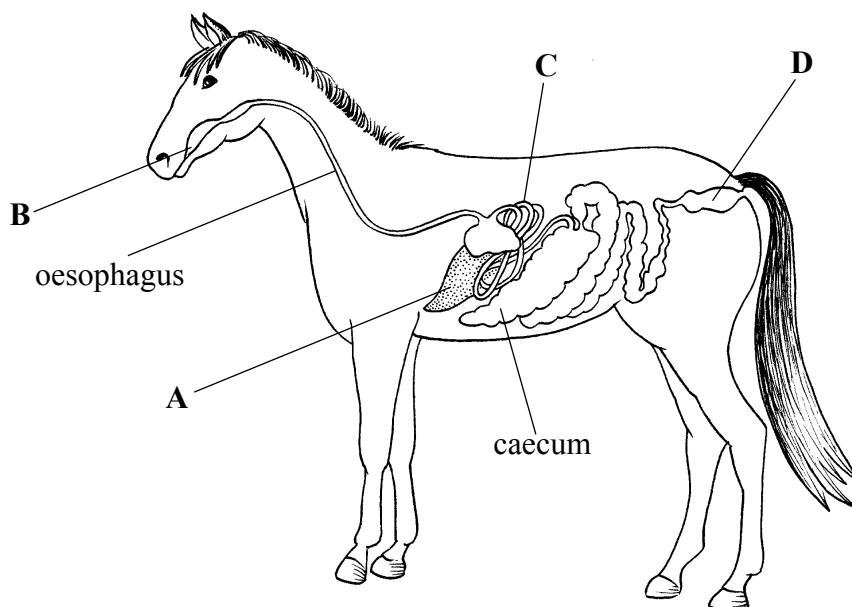
Q8

(Total 5 marks)



9. The horse is a mammal and the digestive system is similar to that of humans.

The diagram shows the digestive system of a horse with parts labelled A, B, C and D.



(a) The statements below are about the digestive system. Choose the correct letter to match each statement. Put a cross (☒) in the correct box.

- | | | | | | | | | |
|------------------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|
| This is where plant food is chewed | A | <input type="checkbox"/> | B | <input type="checkbox"/> | C | <input type="checkbox"/> | D | <input type="checkbox"/> |
| This is where faeces are stored | A | <input type="checkbox"/> | B | <input type="checkbox"/> | C | <input type="checkbox"/> | D | <input type="checkbox"/> |
| This is where most villi are found | A | <input type="checkbox"/> | B | <input type="checkbox"/> | C | <input type="checkbox"/> | D | <input type="checkbox"/> |

(3)

(b) Explain how food is moved along the oesophagus.

.....

.....

.....

.....

(2)



(c) The caecum contains bacteria. These bacteria help the horse by digesting the carbohydrate in plant cell walls and by making vitamin C.

(i) Name the carbohydrate found in plant cell walls.

.....
 (1)

(ii) Why does a horse need vitamin C?

.....

 (1)

(d) The table gives the energy needed by the horse at increasing levels of exercise from a slow walk to a gallop.

Level of exercise	Energy needed in kJ per kg per hour
slow walk	7.1
fast walk	10.5
slow trot	27.1
medium trot	39.7
fast trot	57.3
gallop	96.1

(i) Describe the relationship between the level of exercise and energy needed.

.....

 (1)

(ii) A horse weighing 500 kg walks fast for one hour. How much energy does it use?

.....
 kJ
 (1)

(Total 9 marks)

Q9



Leave
blank

10. Different types of cells may contain different structures.

Complete the table to show the structures contained in the different cells. If the cell contains the structure put a tick (✓) in the box. If the cell does not contain the structure put a cross (✗).

Some have been done for you.

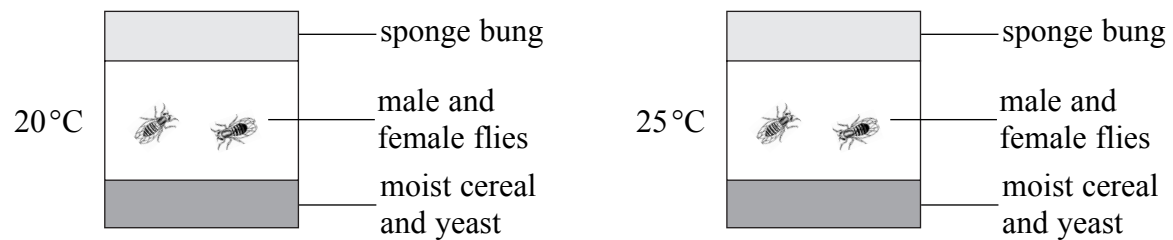
Cell	Structure			
	Nucleus	Cytoplasm	Cell wall	Chloroplast
neurone (an animal cell)		✓		
<i>Pneumococcus</i> (a bacterial cell)			✓	✗
yeast (a fungal cell)	✓			

Q10

(Total 4 marks)



11. The tubes below were used to breed insect flies. One tube was kept at 20°C and the other tube was kept at 25°C. Each tube contained one male and one female fly.



(a) (i) The sponge bung stops the flies escaping. It also allows gases to enter and leave the tube. Name **one** gas used by the flies and **one** gas produced by the flies.

gas used

gas produced

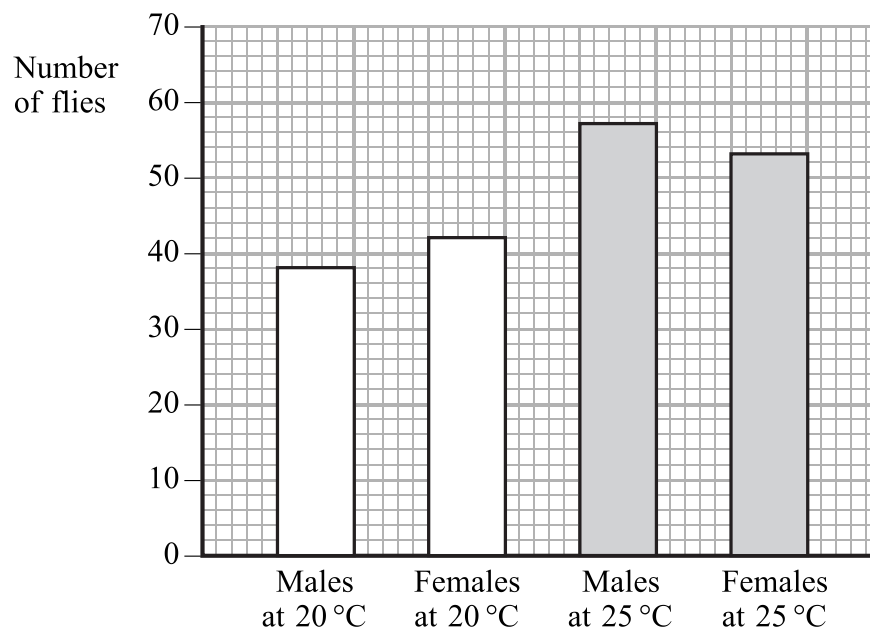
(1)

(ii) The flies feed on the yeast cells and the yeast cells feed on the cereal. Use this information to draw a food chain in the space below.

(2)



(b) The graph shows the number of male and female offspring produced in each tube after two weeks.



(i) How many male offspring were produced after two weeks at 20°C?

..... **(1)**

(ii) More male offspring were produced after 2 weeks at 25°C than at 20°C. Calculate the percentage increase at the higher temperature. Show your working.

..... % increase **(2)**

(c) Suggest why more offspring were produced after two weeks at 25°C.

.....
.....
.....
..... **(2)**



Leave
blank

(d) (i) Equal numbers of male and female offspring were expected at 20°C.

Use your knowledge of how sex chromosomes are inherited to show why. You may use a genetic diagram in your answer.

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

(5)

(ii) Suggest **one** reason why equal numbers of male and female offspring were not obtained at 20°C.

.....
.....

(1)

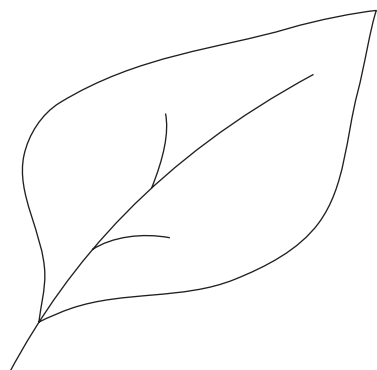
(Total 14 marks)

Q11

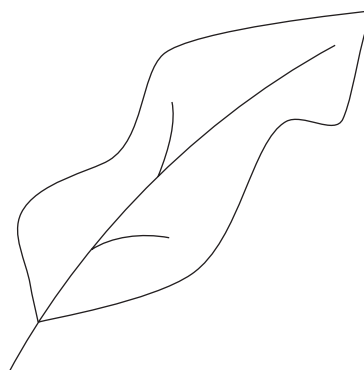
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12. The diagram shows a leaf from a crop plant before and after it was attacked by an insect pest.



Before



After

(a) Suggest how the insect pests would affect crop yield.

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

(3)

(b) Explain why farmers often spray pesticide onto their crops.

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

(2)



(c) The table shows the changes in the numbers of an insect pest in a glasshouse during a period of 50 days. The crop was sprayed with pesticide twice during this time.

Time in days	Number of insects in thousands
0	44
5	54
6	6
14	8
20	12
28	20
29	16
35	28
42	42
50	54

(i) The crop was first sprayed with pesticide on day 5. Use the data in the table to suggest the day on which the crop was sprayed with pesticide for the second time.

.....
(1)

(ii) What was the decrease in numbers of the insect after spraying with pesticide on day 5?

.....
(1)

(d) Give **two** disadvantages of using pesticides.

1

.....

.....

2

.....

.....

(2) **Q12**

(Total 9 marks)



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13. *Campylobacter jejuni* is a bacterium that causes food poisoning. Most people recover from this illness, but in some people serious problems occur.

The effects could lead to kidney failure and damage to red blood cells.

(a) (i) Name **one** substance that would not be removed from the body if the kidneys failed.

.....
(1)

(ii) Why would damage to red blood cells lead to problems?

.....
.....
(1)

(b) Another effect can be damage to nerve cells. This is caused when nerve cells are damaged by the antibodies that the body produces to attack the *Campylobacter* bacteria.

(i) Name the cells in the body that produce antibodies.

.....
(1)

(ii) Damage to nerve cells that control breathing can lead to paralysis. The paralysis occurs because the muscles involved in breathing do not receive impulses to make them contract.

Explain why paralysis of breathing muscles is dangerous.

.....
.....
.....
.....
.....
.....
.....
(3)

(Total 6 marks)

Q13



14. When a sample of water is tested, its water quality is measured by finding out how much of its oxygen is used up when it is kept sealed in the dark for five days. The oxygen is used by microorganisms breaking down organic matter in the water.

The amount of oxygen used up is called the biological oxygen demand or BOD, and is calculated in mg per litre.

(a) Suggest why the sealed samples are kept in the dark.

.....

(2)

(b) Farm waste contains organic matter and, by law, farms are not allowed to release waste that produces a BOD greater than 25 mg of oxygen per litre.

The table below gives readings for the BOD in the waste produced by four farms.

Farm	BOD in mg per litre	Volume of waste produced per week in litres
A	28	180
B	20	30
C	115	40
D	76	134

(i) Which of these farms are breaking the law?

..... (1)

(ii) What is the total amount of oxygen used up by microorganisms in one week when they breakdown waste from farm B?

..... mg (1)

(iii) Which farm causes the greatest total BOD problem?

..... (1)



Leave
blank

(c) Explain the possible effects on a river of releasing waste with a high BOD.

.....

.....

.....

.....

.....

.....

(3)

Q14

(Total 8 marks)

TOTAL FOR PAPER: 100 MARKS

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