

1. (a) Lipase is an enzyme that helps the digestion of lipids (fats and oils).

(i) What is meant by the term **digestion**?

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.....
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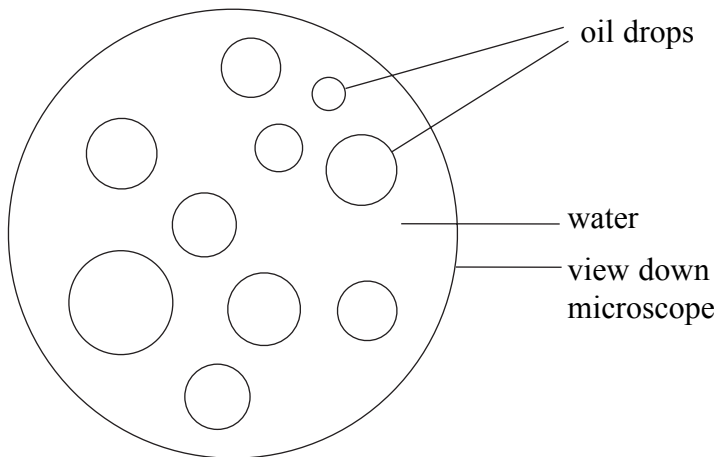
(2)

(ii) Name **one** substance produced when lipase digests fat.

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(1)

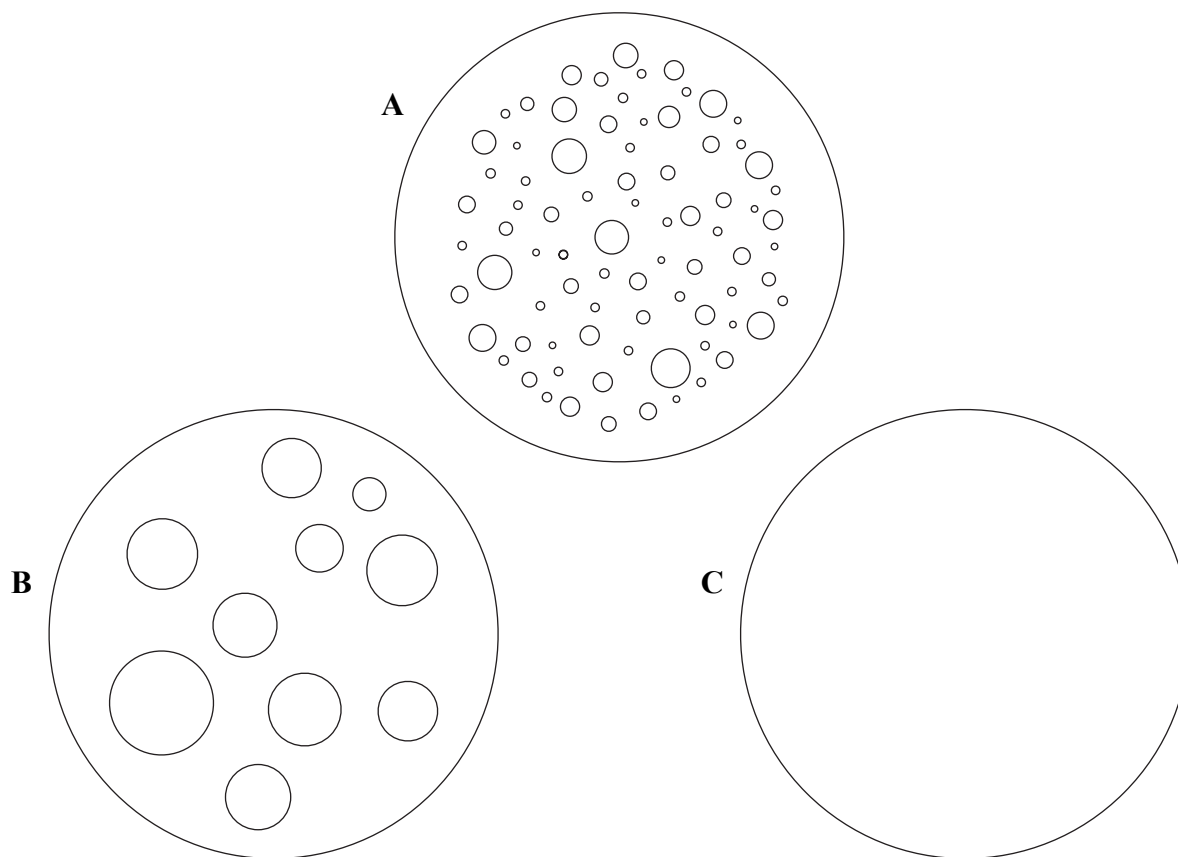
(b) The diagram below shows a mixture of cooking oil and water as seen under a microscope.



Four different substances (lipase, boiled lipase, amylase and bile) were added to separate samples of the mixture of oil and water. Each sample was left for 20 minutes.

Leave blank

The diagrams **A**, **B** and **C** below show the possible appearance for each sample after twenty minutes.



Write the correct appearance (**A**, **B** or **C**) in each box in the table below. Each letter may be used once, more than once or not at all. The first one has been done for you.

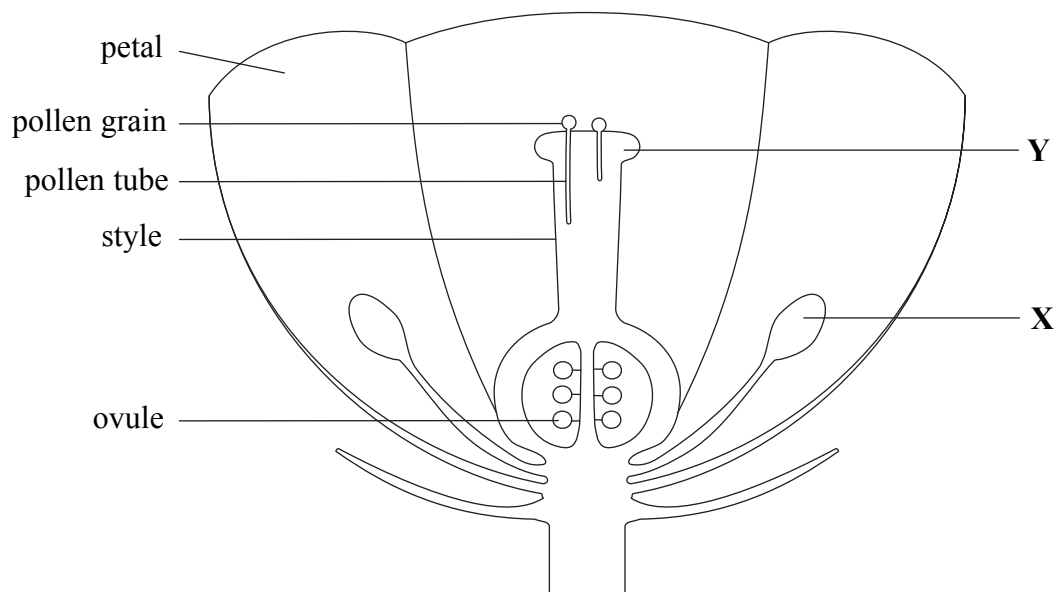
Treatment	Appearance
Oil and water mixture plus lipase	C
Oil and water mixture plus boiled lipase	
Oil and water mixture plus bile	

(2) **Q1**

(Total 5 marks)

2. The diagram below shows a flower cut in half. Pollination occurs when pollen grains from part X land on part Y. Tubes from the pollen grains grow through the style.

Leave blank



- (a) (i) Name part X.

..... (1)

- (ii) Name part Y.

..... (1)

- (b) Suggest how pollen is carried from part X to part Y.

.....
 (1)

- (c) On the diagram continue the drawing of one of the pollen tubes to show where it would go.

(1)

Q2

(Total 4 marks)

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3. The table below lists changes which take place in the human body.

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blank*

Complete the table to show the organ in which each change takes place.

The first one has been done for you.

Change	Name of organ
Amino acids to urea	liver
Diploid cell to haploid cell	
Glucose to glycogen	
Haemoglobin to oxyhaemoglobin	
High level of urea in blood to low level of urea in blood	
Thick lining to a thin lining, once a month	

Q3

(Total 5 marks)

4. The following advice is taken from the side of a cigarette packet.

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blank*

STOPPING SMOKING REDUCES
THE RISK OF SERIOUS DISEASES
Health Departments' Chief Medical Officers

Describe how smoking can affect the health of your lungs.

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Q4

(Total 5 marks)

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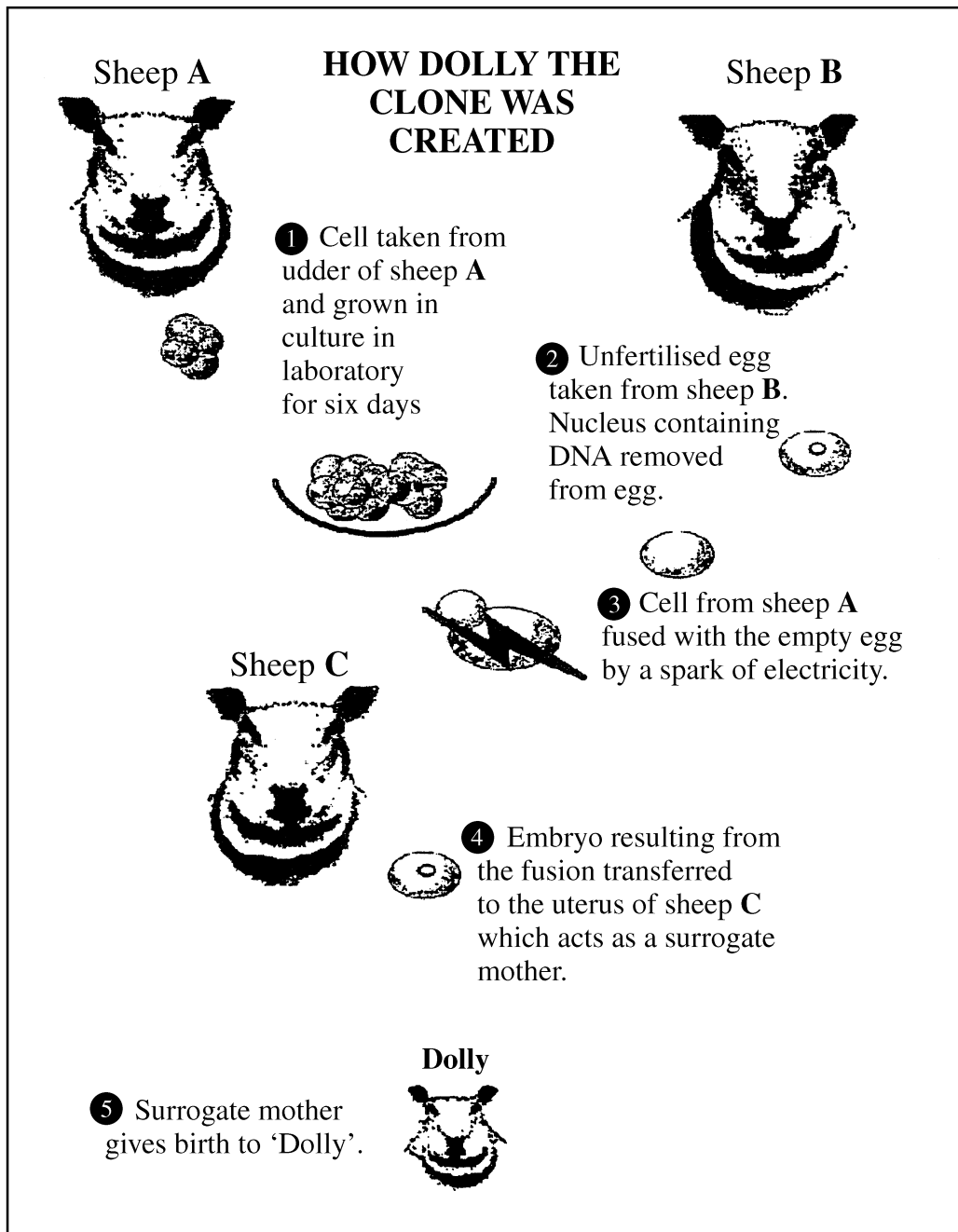
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TURN OVER FOR THE NEXT QUESTION

Turn over

5. The diagram shows how scientists produced Dolly the sheep.

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(a) (i) Dolly was produced with the help of an unfertilised egg.
Where did the scientists get the DNA from to put into this egg?

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(1)

(ii) How does the nucleus in a cell from the embryo differ from the nucleus removed from the egg?

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

(iii) Dolly is genetically identical to another sheep in the diagram. Which one?

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(1)

(b) Give **two** ways in which this method is different from the normal method of sheep reproduction.

1.
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2.
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(2)

(c) Suggest **two** advantages of producing animal clones.

1.
2.
(2)

Q5

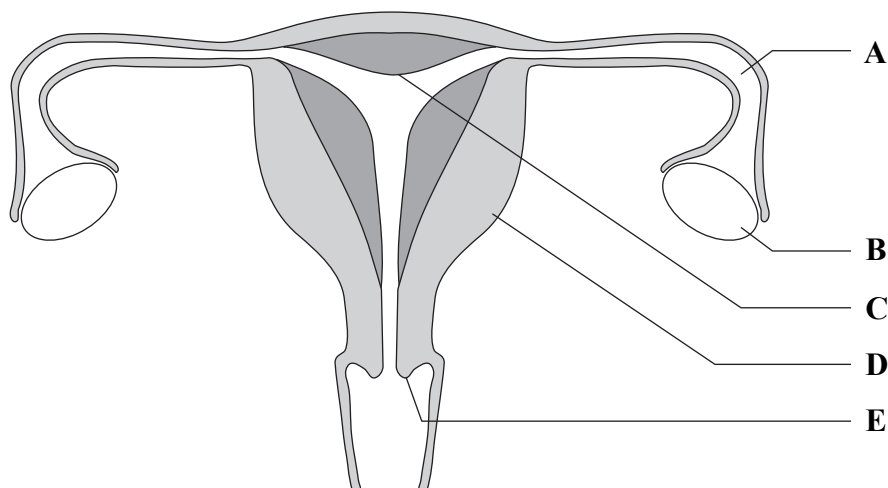
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(Total 7 marks)

Turn over

6. The diagram below shows the female reproductive system.

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The table below lists some events that occur in the female reproductive system.

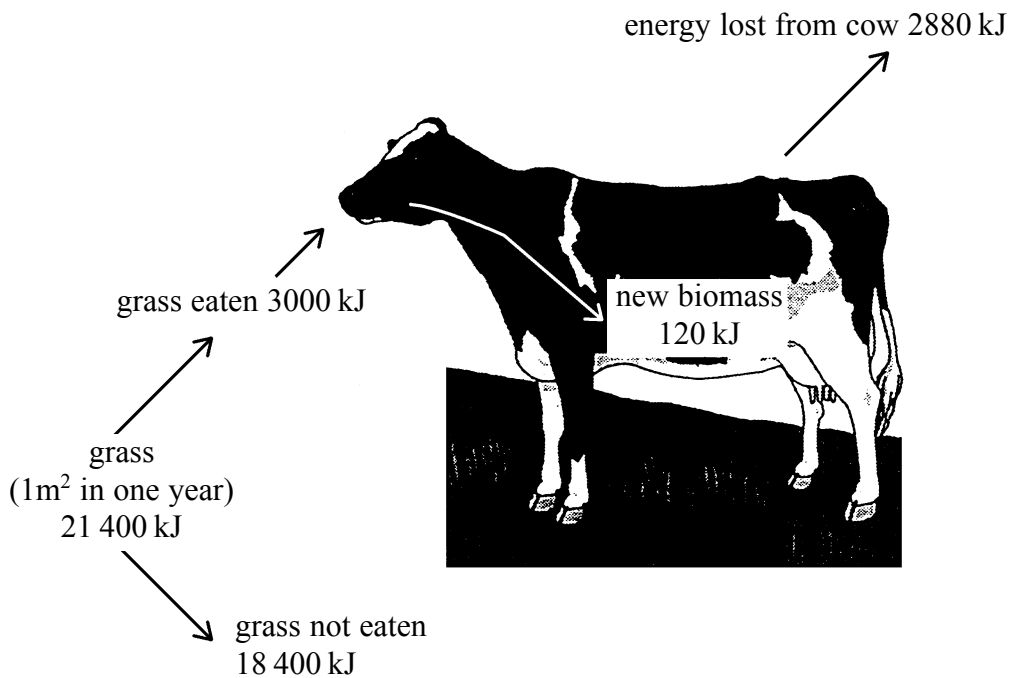
Complete the table using letters from the diagram to show the part where each event occurs. Write **one** letter only in each box. A letter may be used once, more than once, or not at all.

Event	Letter
Eggs produced	
Fertilisation occurs	
Repaired by oestrogen	
Progesterone secreted	

Q6

(Total 4 marks)

7. One year's growth of 1 m² of grass contains 21 400 kJ of energy.
The diagram shows how this energy is transferred when one cow feeds on the grass.



- (a) (i) The cow eats 3000 kJ in the grass. How much of this energy is lost from the cow?

Answer kJ
(1)

- (ii) Give **one** way in which energy would be lost from the cow.

.....
(1)

- (b) The energy efficiency of the cow is a measure of how much of the energy available to the cow becomes part of its biomass.

The equation below shows how to calculate energy efficiency.

$$\text{energy efficiency (\%)} = \frac{\text{energy that becomes part of biomass}}{\text{energy available}} \times 100$$

In the grass eaten, 3000 kJ of energy is available to the cow.

What is the energy efficiency of the cow?

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(1)

- (c) Suggest what may happen to the 18 400 kJ of energy in the grass that was not eaten by the cow.

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(1)

Q7

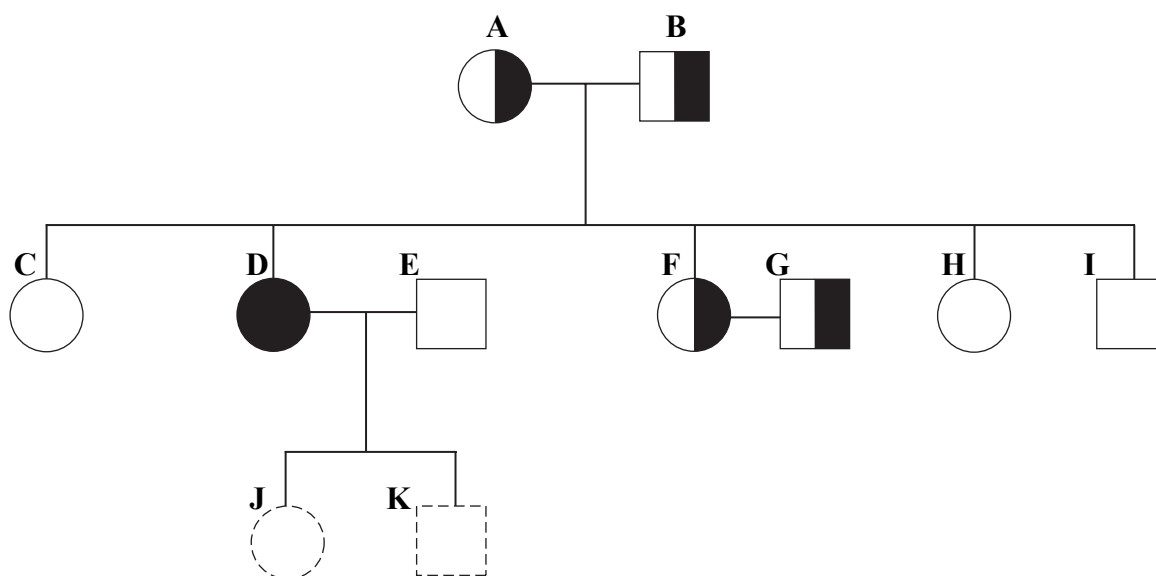
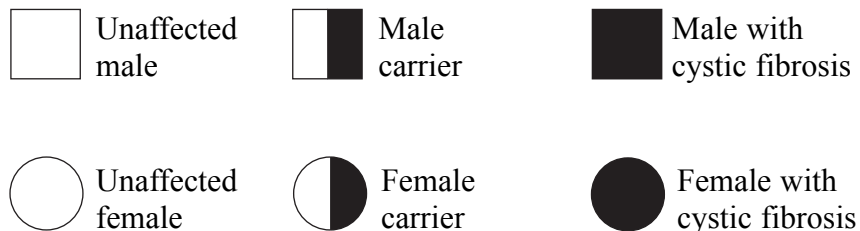
(Total 4 marks)

8. Cystic fibrosis is an inherited disease in which certain cells produce abnormal mucus. The allele for the disease is recessive.

Leave blank

The diagram shows how cystic fibrosis was inherited in one family.

Key



- (a) Complete the diagram by correctly shading the symbols for person **J** and person **K**. (1)
- (b) Persons **A** and **B** are carriers.

Suggest what is meant by the term 'carriers'.

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(2)

(c) How many of the children of **A** and **B** were homozygous dominant?

..... (1)

(d) What is the phenotype of **D**?

..... (1)

(e) What is the probability of **F** and **G** having a child with cystic fibrosis?

..... (1)

(f) What is the probability of **F** and **G** having a male child with cystic fibrosis?

..... (1)

(Total 7 marks)

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Q8

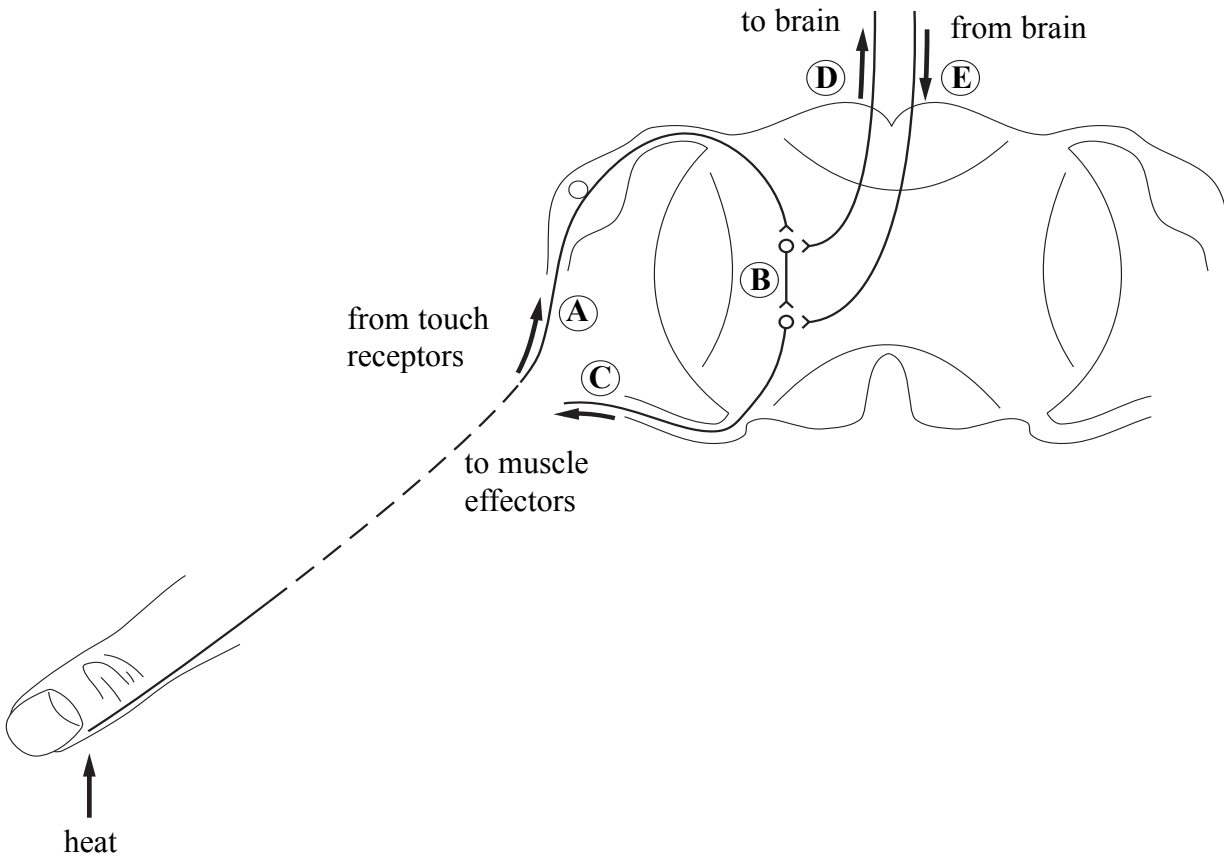
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Turn over

9. The diagram shows a finger touching a hot object.

It also shows neurones **A**, **B** and **C**, which pass electrical impulses from touch receptors to muscle effectors.

Neurones **D** and **E** pass impulses to and from the brain.



(a) Name the neurone labelled **A**.

..... (1)

(b) What name is given to the pathway of electrical impulses along neurones **A**, **B** and **C**.

..... (1)

(c) Neurones **D** and **E** are **not** involved in the response of the muscle effectors.

What is the advantage of this?

..... (1)

- (d) If one of the neurones **A**, **B**, **C**, **D** or **E** is cut, it may affect the ability to respond if you touch a hot object, or the ability to know that you have touched it.

Leave blank

Complete the table by putting the correct letter in each box.

Information about neurone	Letter of neurone
If this neurone is cut, you can remove your finger from a hot object, but you will not know that you have touched it.	
If this neurone is cut, you cannot remove your finger from a hot object even though you know you have touched it.	
If this neurone is cut, you cannot remove your finger from a hot object, and you will not know that you have touched it.	

(3)

Q9

(Total 6 marks)

Turn over

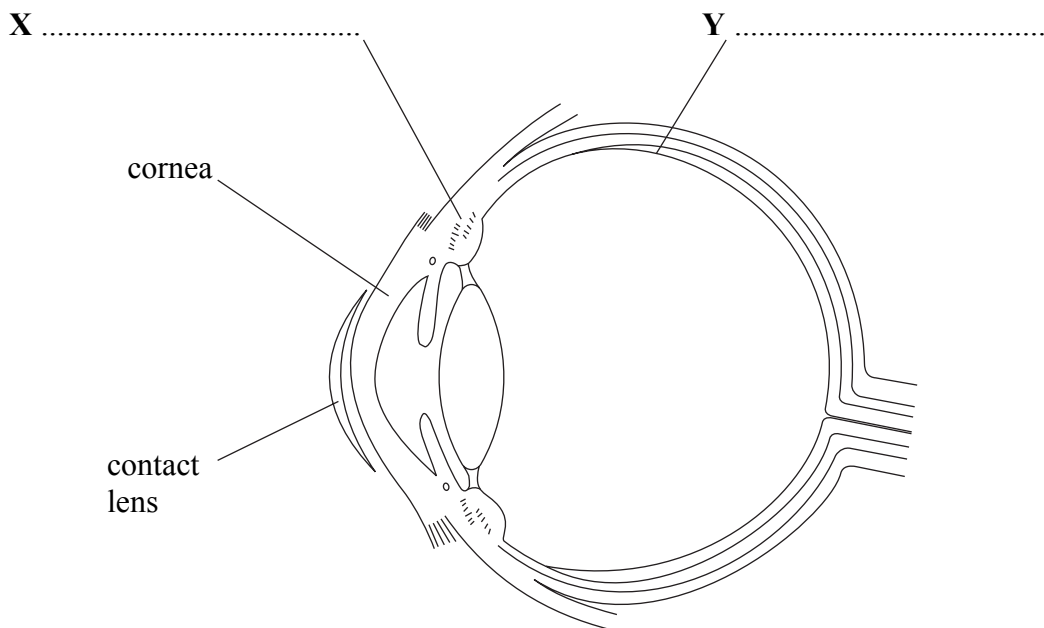
10. Read the passage below and answer the questions which follow.

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The cornea of the human eye does not contain blood vessels but the cells of the cornea need oxygen for aerobic respiration. Contact lenses fit closely over the surface of the eye. These lenses improve sight but they can reduce the amount of oxygen reaching the cells of the cornea. The cells then respire without oxygen and the concentration of the waste product from respiration increases in the corneal tissue.

Wearing contact lenses can also cause damage to the surface of the cornea. The cornea responds by increasing the normal rate of repair.

The diagram below shows a section of the human eye with a contact lens in front of the cornea.



(a) Name parts **X** and **Y** on the lines provided.

(2)

(b) (i) What is the function of the cornea?

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(1)

(ii) Suggest why it is important that the cornea does not contain blood vessels.

.....
(1)

*Leave
blank*

(c) Suggest how the cells of the cornea obtain oxygen for aerobic respiration.

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(2)

(d) Name the waste product formed when the cells of the cornea respire without oxygen.

.....

(1)

(e) Name the type of cell division which occurs during the repair of corneal tissue.

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(1)

(f) Increasing the rate of corneal repair reduces the amount of glycogen in the tissue.
Explain why this happens.

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(2)

Q10

(Total 10 marks)

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Turn over

11. The article below appeared in a newspaper.

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blank*

Ladybirds in Danger!

A genetically modified (GM) potato plant produces a natural insecticide against insects. In fields of these GM potato plants, insect numbers are 50% lower than in control fields. Farmers think that the decrease in insect population is not enough, so they are relying on ladybirds which are natural predators of insects.

There is a problem ahead. When ladybirds eat insects which have fed on the GM potato plants they are seriously affected. These ladybirds live half as long and lay fewer eggs each year. A quarter of these eggs fail to hatch.

Use the information in the article and your own knowledge to answer the following questions.

(a) Describe **one** method of biological pest control referred to in the article.

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(1)

(b) What suggests that some insects are resistant to the natural insecticide?

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.....
(1)

(c) What is meant by **control fields**?

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.....
(1)

(d) Why might growing the GM potato plant lead to the new crop failing after several years?

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.....
(1)

(e) Suggest a method that could have been used to produce genetically modified (GM) potato plants.

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(5)

Q11

(Total 9 marks)

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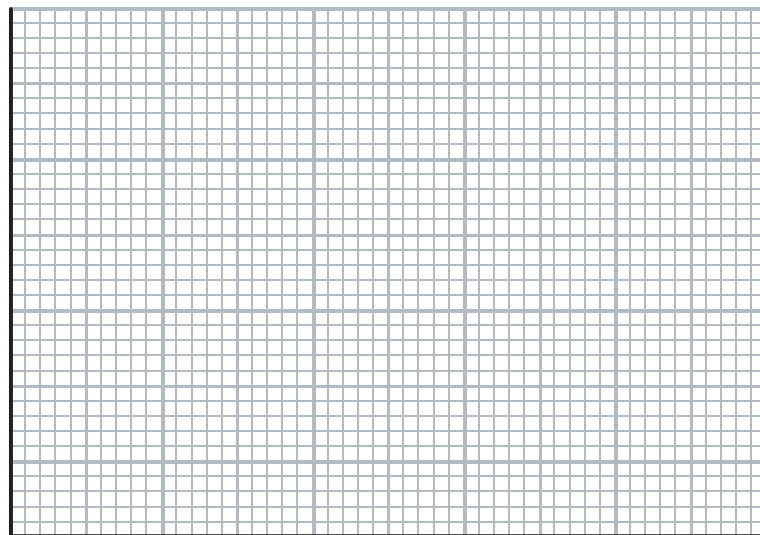
12. Farmers add nitrate fertiliser to their fields to increase wheat yield. The table gives the amount of wheat yield when different amounts of nitrate fertiliser were added.

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Amount of fertiliser added in kg per hectare	Wheat yield in tonnes per hectare
0	2
50	12
100	21
150	30
200	30
250	30

- (a) (i) Use the information in the table to draw a line graph on the grid below.

Wheat yield in tonnes per hectare



Amount of fertiliser added in kg per hectare

(4)

- (ii) What is the least amount of fertiliser that needs to be added to obtain maximum yield?

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(1)

- (b) Why is nitrate needed to help wheat plants grow?

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(1)

(c) Rain falling on the fields can wash the nitrate fertiliser into rivers. Explain the effects this could have on the river ecosystem.

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(5)

Q12

(Total 11 marks)

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Turn over

13. When people dance, they tend to sweat a lot. This increase in sweat production leads to an increase in the amount of ADH released in the body.

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blank*

(a) Explain why it is important that people sweat when dancing.

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.....
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(3)

(b) (i) Name the gland that releases ADH.

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(1)

(ii) Which organ does ADH target?

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(1)

Q13

(Total 5 marks)

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14. (a) What name describes the evaporation of water from plant leaves?

Leave blank

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(1)

(b) Name the apparatus that is used to measure the rate of evaporation from plant leaves.

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(1)

(c) Complete the table below by explaining how each named factor can increase the rate of evaporation from plant leaves.

Factor	Explanation for increase in rate of evaporation
High air temperature	
High light intensity	

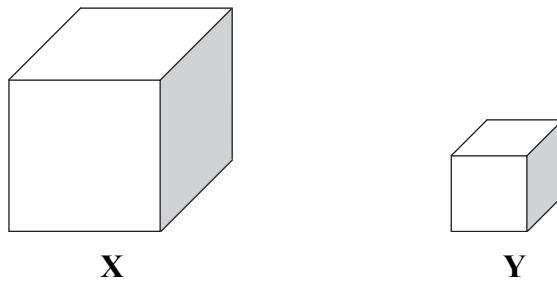
(2) Q14

(Total 4 marks)

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15. The diagram shows two different-sized potato cubes, X and Y, that were placed in distilled water for one hour.

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- (a) Explain why both cubes gained in mass after one hour.

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(3)

- (b) Put a tick in the row of the table that correctly describes the change in mass for cube X compared to cube Y.

Mass of water absorbed in g	Percentage increase in mass	Tick
More	Lower	
Less	Lower	
Less	Higher	
More	Higher	

(1)

Q15

(Total 4 marks)

TOTAL FOR PAPER: 90 MARKS

END