

BLANK PAGE



Leave blank

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

1. The table lists the names of different structures found within a human.

Complete the table by numbering each structure in order of its size.
Use number 1 for the smallest structure through to number 4 for the largest.

| Name of structure | Order of size |
|-------------------|---------------|
| brain | |
| nucleus | |
| nervous system | |
| nerve cell | |

Q1

(Total 3 marks)

2. Explain how sewage pollution can affect the plants and animals in a river.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

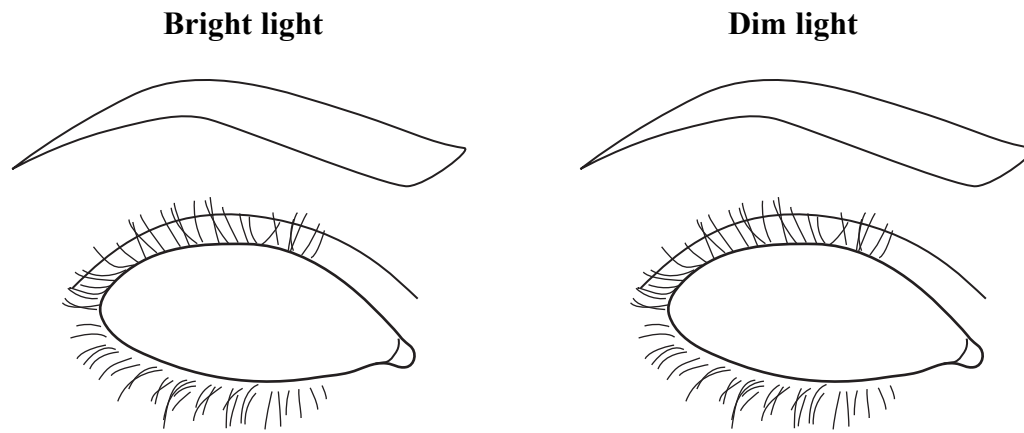
Q2

(Total 5 marks)



3. The iris of the eye helps the pupil to change as a person moves from an area of bright light to an area of dim light.

(a) (i) Draw and label the iris and the pupil in each eye below to show how they would appear in bright and dim light.



(3)

(ii) Explain how the iris produces this change in appearance in the pupil.

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

(2)

(iii) Explain why it is important to change the appearance of the pupil when moving from bright light into dim light.

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

(2)



(b) Changes in the eye also take place to help focus on near objects.
Describe these changes.

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

(3)

(Total 10 marks)

Leave
blank

Q3

| | |
|--|--|
| | |
|--|--|

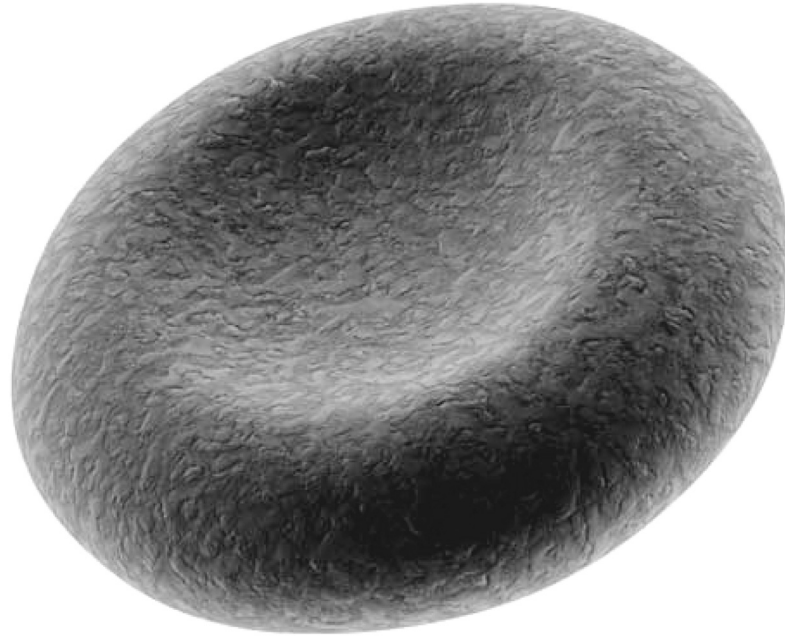


BLANK PAGE



Leave
blank

4. The diagram shows a normal red blood cell.



(a) Describe **two** ways in which the structure of a normal red blood cell helps it to absorb and transport oxygen.

1

.....

2

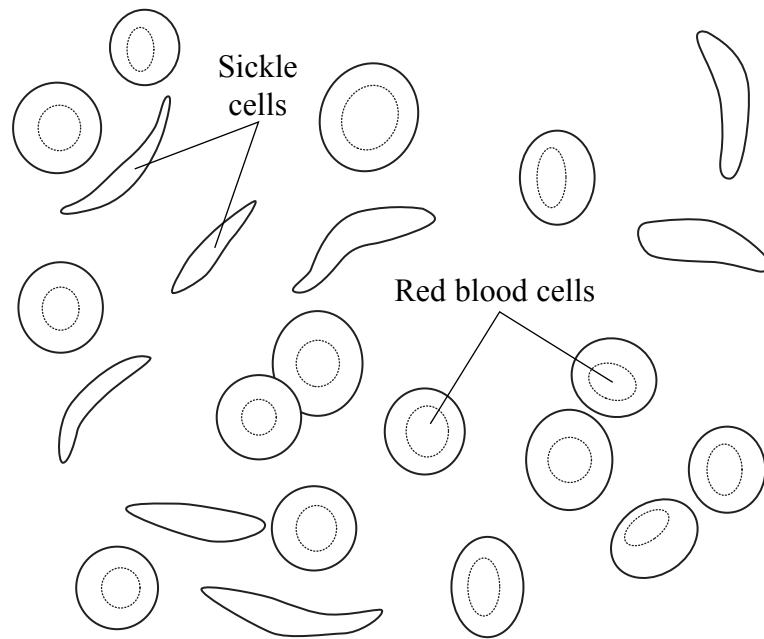
.....

(2)



(b) Sickle cell anaemia is an inherited condition that affects the shape of red blood cells. It is caused by a recessive allele, **n**, which causes the cells to buckle and look sickle-shaped. The dominant allele, **N**, allows red blood cells to develop normally.

The diagram shows normal red blood cells and sickle-shaped red blood cells.



(i) What is an allele?

.....

(1)



Leave
blank

(ii) Two parents know they are both heterozygous for sickle cell anaemia.

Complete the genetic diagram below to show the genotypes of the parents, their gametes and their possible offspring.
Use the letter **N** for the dominant allele and the letter **n** for the recessive allele.

Parent genotypes

Gamete genotypes

Possible offspring genotypes

(3)

(iii) What are the phenotypes of the possible offspring?

.....

(1)

Q4

(Total 7 marks)



BLANK PAGE



Leave blank

5. The heart rate of an athlete was measured every ten minutes for one hour during a training session.

The results are shown in the table.

| | | | | | | | |
|--------------------------------|----|----|----|-----|-----|-----|-----|
| Time in minutes | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
| Heart rate in beats per minute | 66 | 77 | 88 | 100 | 112 | 114 | 113 |

- (a) Describe how heart rate changes during the training session.

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

(2)

- (b) Explain the change in the results from 0 minutes to 40 minutes.

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

(4)

(Total 6 marks)

Q5

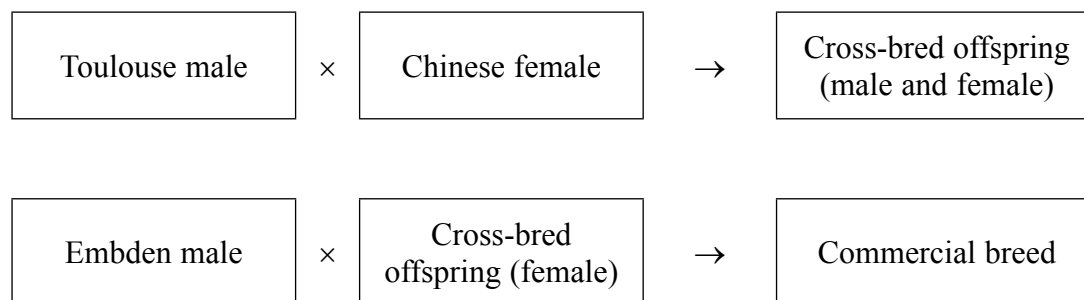


6. The photograph shows a bird called a goose.



Two breeds of goose called Toulouse and Embden grow quickly. However, both breeds lay very few eggs. Another breed of goose called Chinese lays lots of eggs but grows slowly.

Farmers have used a breeding process to produce a commercial breed of goose from these three different breeds. The diagram below shows the breeding process.



(a) Name the **two** desired characteristics farmers wanted to obtain with the commercial breed of goose.

1

2

(2)





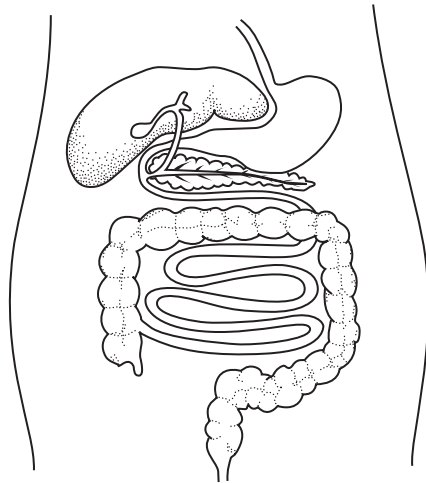
| | |
|--|---|
| <p>(b) Use the information opposite to suggest one difference in the characteristics of the cross-bred female and the Chinese female.</p> <p>.....</p> <p>.....</p> <p style="text-align: right;">(1)</p> <p>(c) The breeding process involves farmers choosing which birds breed with each other.</p> <p>What name describes a breeding process in which humans choose which animals breed together?</p> <p>.....</p> <p style="text-align: right;">(1)</p> <p style="text-align: right;">(Total 4 marks)</p> | <p>Leave blank</p> <p>Q6</p> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div> |
| Empty space for student response | Empty space for marking |



N 3 7 8 1 3 A 0 1 3 2 4



7. The diagram shows part of the human digestive system and some other organs.



- (a) (i) Using the letter **P** and a guideline, mark on the diagram the pancreas. **(1)**
- (ii) The pancreas secretes enzymes that digest large molecules into smaller molecules.

Complete the table to show the missing large molecule and enzymes.

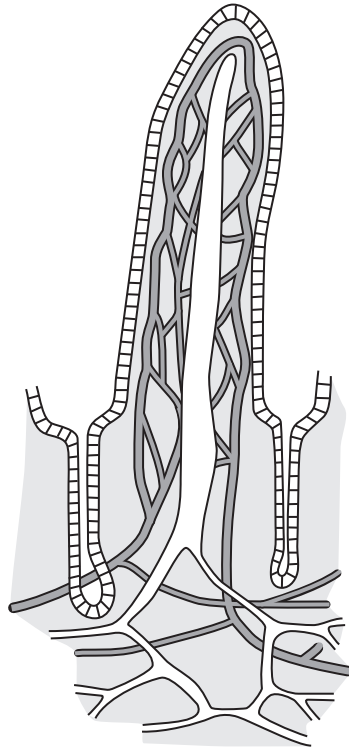
| Large molecule | Smaller molecule | Enzyme |
|----------------|--------------------------|--------|
| | fatty acids and glycerol | |
| starch | maltose | |

(3)



Leave blank

(b) The diagram shows a villus.



Explain how the structure of a villus helps it perform its function.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

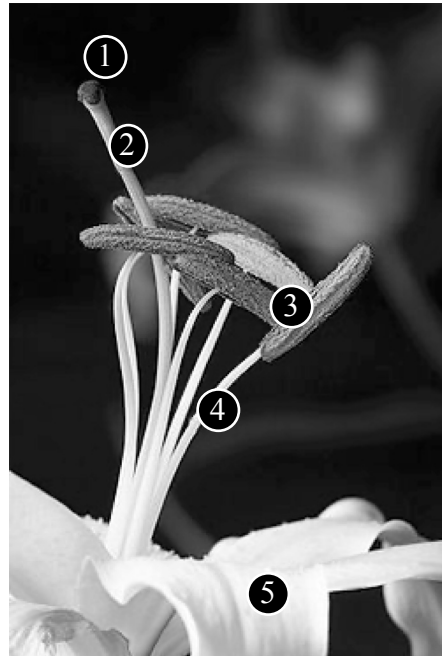
(5)

Q7

(Total 9 marks)



8. The photograph shows the reproductive structures of a flower called a lily.



(a) (i) Which number labels an anther?

..... (1)

(ii) What is the function of the anther?

..... (1)

(iii) Using the information in the photograph, suggest why this flower does not pollinate itself.

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



Leave
blank

(b) Lilies can be cloned and then mass produced using micropropagation.

(i) What does the term **cloned** mean?

.....
.....

(2)

(ii) Complete the following passage about micropropagation. Write the most suitable word on the dotted lines.

Micropropagation is sometimes known as tissue

Small pieces of plants called are grown on nutrient

jelly. All procedures must be carried out under

conditions to make sure that there are no fungi or

present. The small pieces of plants grow because the cells

..... and then develop into new plants.

(5)

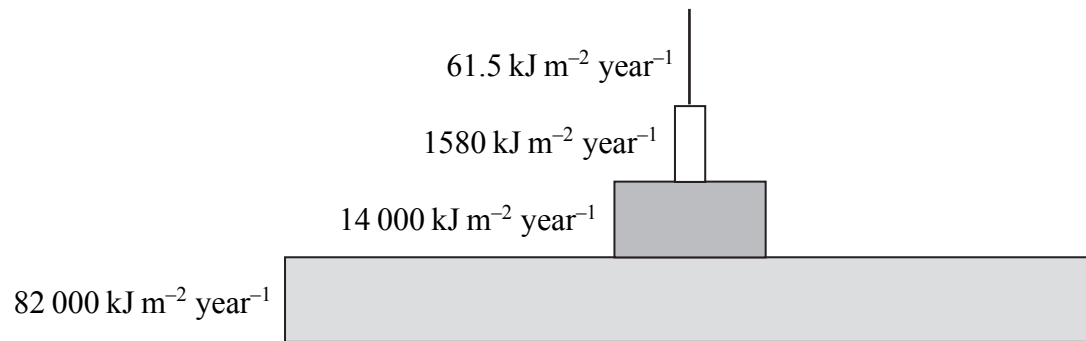
Q8

(Total 10 marks)



9. (a) Pyramids of energy show the rate of energy flow at successive trophic levels in a given area over a fixed period of time.

The diagram below shows a pyramid of energy.



(i) Calculate the percentage of energy transferred from the producer trophic level to the tertiary consumer trophic level.

Answer.....%
(2)

(ii) Explain why so little energy is transferred from one trophic level to the next.

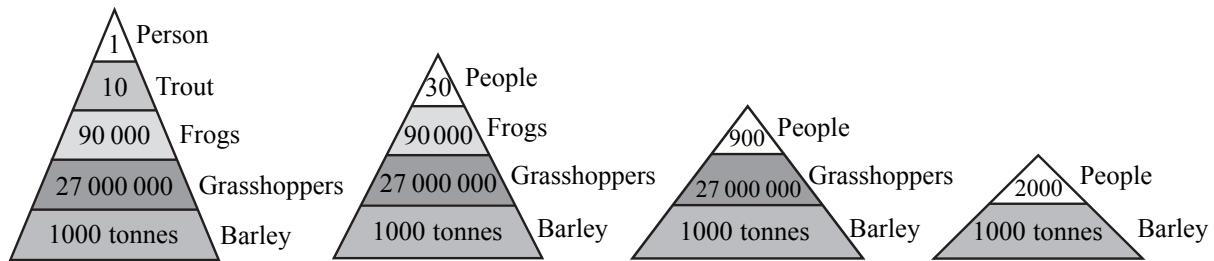
.....
.....
.....
.....
.....
.....

(3)



Leave blank

(b) The diagram below shows the different numbers of humans that can be supported in food chains of different lengths.



(i) How many more humans can be supported on a diet of barley compared to a diet of trout?

.....
(1)

(ii) What is the relationship between the length of a food chain and the number of people who can be supported by it? Explain your answer.

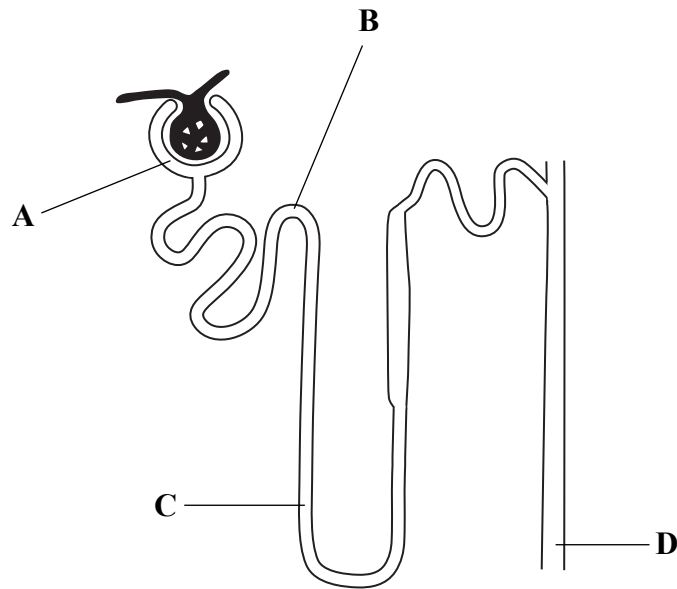
.....
.....
.....
.....
(2)

(Total 8 marks)

Q9



10. The diagram shows a nephron from a human kidney.



(a) Identify the parts of the nephron labelled **A**, **B**, **C** and **D**.

A

B

C

D

(4)

(b) In which part, **A**, **B**, **C** or **D**, does each of the following occur?

(i) Ultrafiltration

(ii) Reabsorption of glucose

(iii) Increased permeability to water in response to ADH

(3)



Leave blank

(c) The table shows the amount of some substances (in arbitrary units) filtered, excreted and reabsorbed by the kidneys in a day.

| Substance | Filtered | Excreted | Reabsorbed |
|-----------|----------|----------|------------|
| water | 180 | 1.50 | 178.5 |
| glucose | 800 | 0 | 800 |
| urea | 56 | 28 | 28 |

(i) Calculate the percentage of filtered urea that is reabsorbed.

Answer %
(2)

(ii) Suggest why it is important to excrete urea.

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

(iii) Suggest why it is important that all the glucose is reabsorbed.

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

(iv) Use the information in the table to name the process by which glucose is reabsorbed.
Give a reason for your answer.

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

(Total 13 marks)

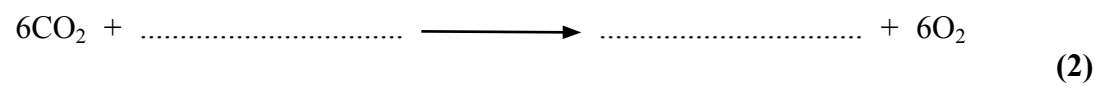
Q10



Leave blank

11. Green plants carry out the processes of photosynthesis and respiration.

(a) Complete the balanced chemical symbol equation for photosynthesis.



(b) Identify **two** environmental factors that can affect the rate of movement of carbon dioxide into the palisade cells of a plant.

1

2 (2)

(c) Describe and explain how the net exchange of carbon dioxide in a green plant is different during the day compared to the night.

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

(4)

Q11

(Total 8 marks)



Leave blank

12. Human body temperature is 37°C. When a person is in a hot environment where the air temperature is much higher than 37°C, changes take place to make sure that their body temperature remains at 37°C.

(a) Explain **two** changes that take place in the body to keep its temperature at 37°C in a hot environment.

1

.....

.....

2

.....

.....

(4)

(b) Maintaining a constant body temperature is an example of homeostasis.

Give **two** other examples of homeostasis in the human body.

1

2

(2)

(c) Homeostasis involves negative feedback.

With reference to body temperature, describe what is meant by the term **negative feedback**.

.....

.....

(1)

Q12

(Total 7 marks)

TOTAL FOR PAPER: 90 MARKS

END



BLANK PAGE

