OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

INTERNATIONAL GCSE

BIOLOGY

Paper 2

Tuesday 3 November 2020 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a ruler with millimetre measurements
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- There are 90 marks available on this paper.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice

In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

Answer **all** questions in the spaces provided.

Do not write outside the box

0 1 Regular exercise can reduce the risk of disease.

Table 1 shows the effect of regular exercise on reducing the risk of developing some diseases.

Table 1

Disease	Percentage reduction in risk with regular exercise
Colon cancer	30
Dementia	30
Heart disease	33
Stroke	27
Type 2 diabetes	40

0 1 . 1 Which disease shows the greatest reduction in risk with regular exercise?

[1 mark]

0 1 . 2 Give **one** way a person could reduce the risk of developing the disease you named in Question **01.1**.

Do **not** refer to exercise in your answer.

[1 mark]

Do not write outside the box

0 1 . 3 Which **two** substances do muscles use during exercise?

Tick (✓) **two** boxes.

[2 marks]

- Carbon dioxide ☐
- Glucose ☐
- Oxygen ☐
- Protein ☐
- Urea ☐

0 1 . 4 During vigorous exercise muscles become fatigued.

Which substance causes muscle fatigue?

Tick (✓) **one** box.

[1 mark]

- Glycogen ☐
- Lactic acid ☐
- Water ☐

Question 1 continues on the next page

Do not write outside the box

A student investigated the following prediction:

'The harder the muscles work, the sooner the muscles become fatigued.'

This is the method used.

1. Rest one arm on a table.
2. Hold a 1 kg mass in the hand.
3. Every 2 seconds lift the mass to the shoulder and back down to the table.
4. Record the time taken for the arm muscle to become too painful to continue lifting the mass.
5. Rest for 5 minutes.
6. Use the same arm and repeat steps 1 – 5 with different masses.

Table 2 shows the results.

Table 2

Mass lifted in kg	Time for arm muscle to become too painful to continue in seconds
1.0	70
2.0	68
3.0	64
4.0	56
5.0	40
6.0	8

0 1 . 5 What was the independent variable in the investigation?

[1 mark]

Do not write outside the box

0 1 . 6 Give **two** control variables the student used in the investigation.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 7 Describe the relationship between the mass lifted and the time for the arm muscle to become too painful to continue.

Use data from **Table 2**.

[3 marks]

_____

_____

_____

_____

_____

_____

0 1 . 8 The investigation was repeated by another student. The same method was used.

The results were different for the second student.

Suggest **two** reasons why the results were different for the second student.

[2 marks]

1 _____

_____

2 _____

_____

13

Turn over for the next question

Do not write outside the box

0 2 . 1 Groups of cells form tissues. Groups of tissues form organs in an organ system.

Draw **one** line from **each** type of cell to the organ system it is part of.

[3 marks]

Type of cell	**Organ system**
	Breathing
Light sensitive cell	Circulatory
Heart muscle cell	Digestive
Cell in lining of small intestine	Immune
	Nervous

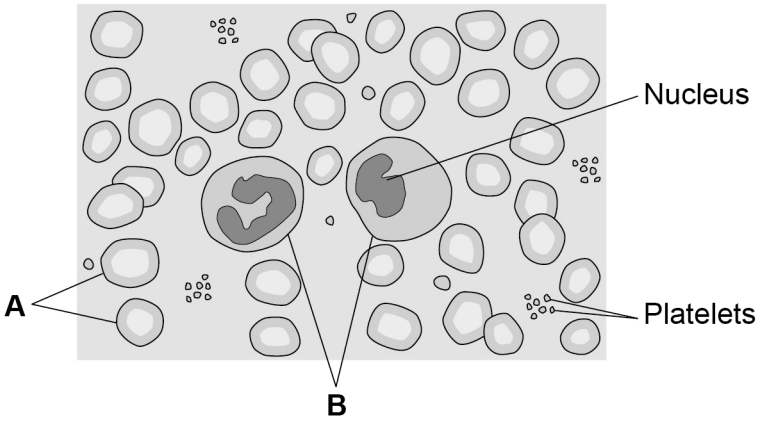
Do not write outside the box

Blood is a tissue consisting of:

- a liquid called plasma
- cells and platelets.

Figure 1 shows a sample of blood.

Figure 1



0 2 . 2 Name cells **A** and **B**.

[2 marks]

A _____

B _____

0 2 . 3 What is the function of platelets?

Tick (✓) **one** box.

[1 mark]

To ingest microorganisms ☐

To start blood clotting ☐

To transport oxygen ☐

To transport urea ☐

Question 2 continues on the next page

Do not write outside the box

Microorganisms can enter the body and cause disease.

0 2 . 4 What name is given to microorganisms that cause disease?

Tick (✓) **one** box.

[1 mark]

Pathogens ☐

Predators ☐

Toxins ☐

0 2 . 5 An antibiotic is used to kill one type of microorganism.

Scientists investigated the minimum concentration of an antibiotic required to kill the microorganism.

Table 3 shows the results.

Table 3

Test	Minimum concentration of antibiotic required to kill the microorganism in µg per cm^3
1	7.4
2	7.6
3	7.3
4	7.5
5	7.4
Mean	**X**

Calculate mean value **X**.

[2 marks]

Mean value **X** = _____ µg per cm^3

Do not write outside the box

0 2 . 6 Some microorganisms cause a mild infection leading to a sore throat.

Give **two** reasons why a person should **not** take antibiotics for a sore throat.

[2 marks]

1 _____

_____

2 _____

_____

11

Turn over for the next question

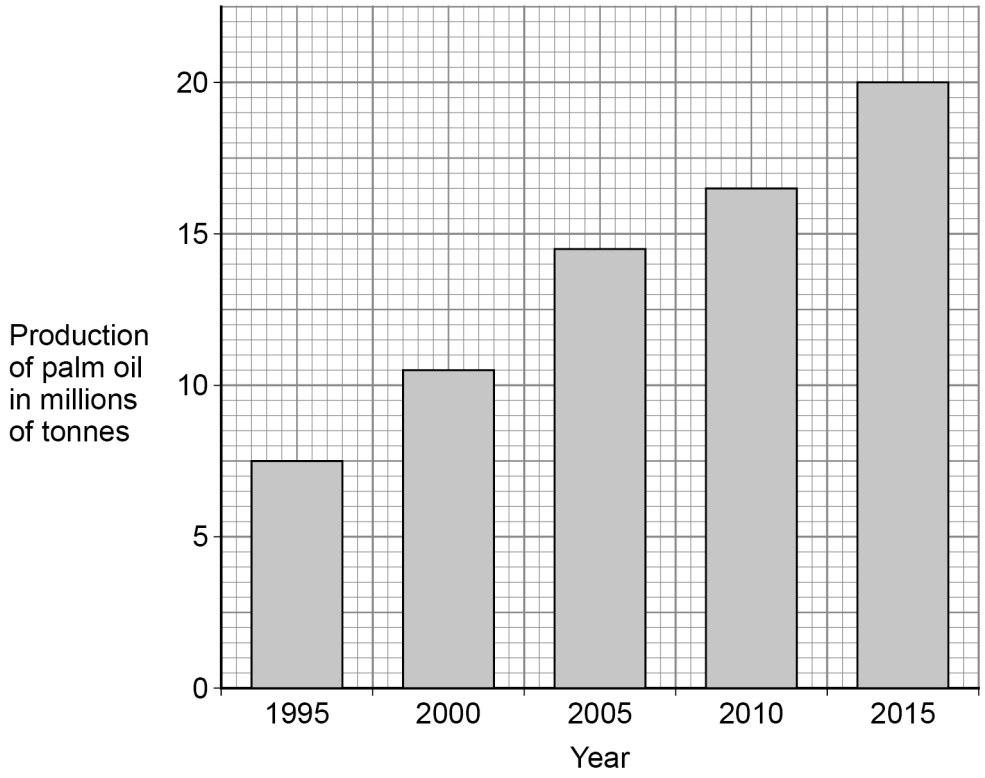
Do not write outside the box

0 3 Large areas of tropical forest are cleared to grow palm oil trees.

Palm oil is produced from the fruit of these trees.

Figure 2 shows the production of palm oil in one country.

Figure 2



0 3 . 1 Calculate the percentage increase in palm oil production from 1995 to 2015.

[4 marks]

Percentage increase = _____ %

Do not write outside the box

0 3 . 2 Oil can be obtained from different plant sources.

Table 4 shows the mean oil yield from four plant sources.

Table 4

Source of oil	Palm fruit	Rapeseed	Soya bean	Sunflower seed
Mean oil yield in tonnes per km^2 per year	408	75	38	60

Compare the mean oil yield from palm fruit with the mean oil yield from the other plant sources.

Use data from **Table 4**.

[2 marks]

Question 3 continues on the next page

Do not write outside the box

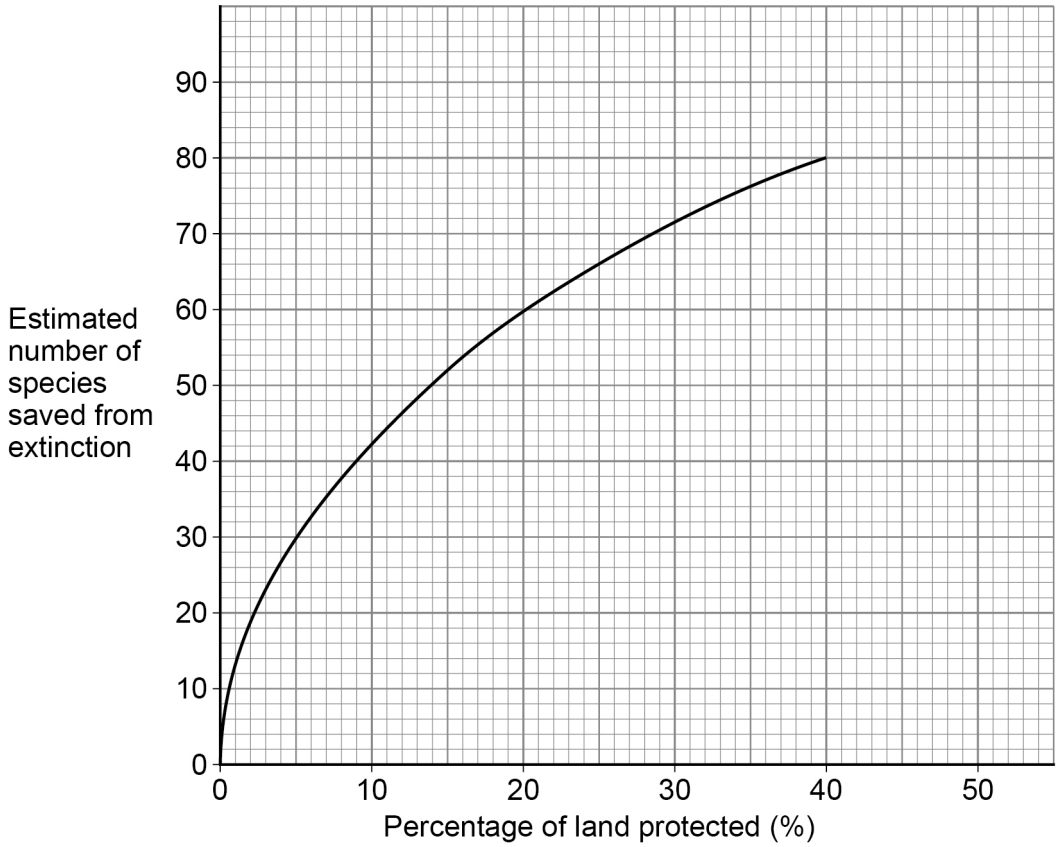
0 3 . 3 The negative effects of palm oil production can be reduced by protecting land.

Protecting land involves monitoring and controlling human activity on the land.

A scientist predicted the effect of protecting an area of land on the number of species saved from extinction.

Figure 3 shows the scientist's predicted results.

Figure 3



How many species are estimated to be saved from extinction if 25% of the land is protected?

[1 mark]

Number of species = _____

Do not write outside the box

0 3 . 4 Suggest **one** reason why it is important to prevent a species from becoming extinct.

Do **not** refer to biodiversity in your answer.

[1 mark]

0 3 . 5 Palm oil is the most widely used vegetable oil. Palm oil is used in foods, cosmetics, detergents and as a biofuel.

Explain the advantages and disadvantages of palm oil production.

[6 marks]

14

Turn over for the next question

Do not write outside the box

0 4 Plants take in raw materials to produce food molecules by photosynthesis.

0 4 . 1 Complete **Table 5** to show how the raw materials needed for photosynthesis are taken in by the plant.

[4 marks]

Table 5

Name of raw material	How it is taken in by the plant
_____	_____ _____ _____
_____	_____ _____ _____

0 4 . 2 Light is also needed for photosynthesis.

Name the substance in plants which absorbs light.

[1 mark]

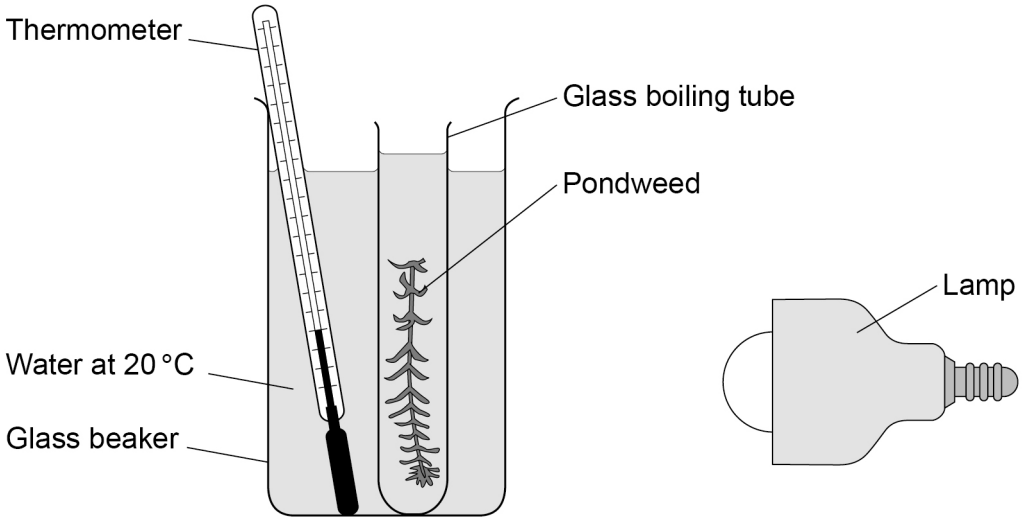
_____

Do not write outside the box

A student investigated the effect of light intensity on the rate of photosynthesis.

Figure 4 shows the apparatus the student used.

Figure 4



0 4 . 3 Describe **one** way the student could vary the intensity of the light on the pondweed.

[1 mark]

0 4 . 4 The boiling tube was placed into a beaker of water during the investigation.

Explain why it was necessary to use the beaker of water.

[2 marks]

Question 4 continues on the next page

Do not write outside the box

0 4 . 5 What measurements should the student take to calculate the **rate** of photosynthesis?

[2 marks]

The student calculated the rate of photosynthesis at various light intensities.

Table 6 shows the results.

Table 6

Light intensity in lux	**Rate of photosynthesis in arbitrary units**
10 000	45
20 000	60
30 000	76
40 000	82
50 000	82
60 000	82

Do not write outside the box

0 4 . 6 Light was **not** a limiting factor for photosynthesis at a light intensity of 50 000 lux.

What evidence is there for this in **Table 6**?

[1 mark]

0 4 . 7 Give **two** factors that could be limiting the rate of photosynthesis at a light intensity of 50 000 lux.

[2 marks]

1 _____

2 _____

Question 4 continues on the next page

A scientist investigated the effect of different wavelengths of light on photosynthesis.

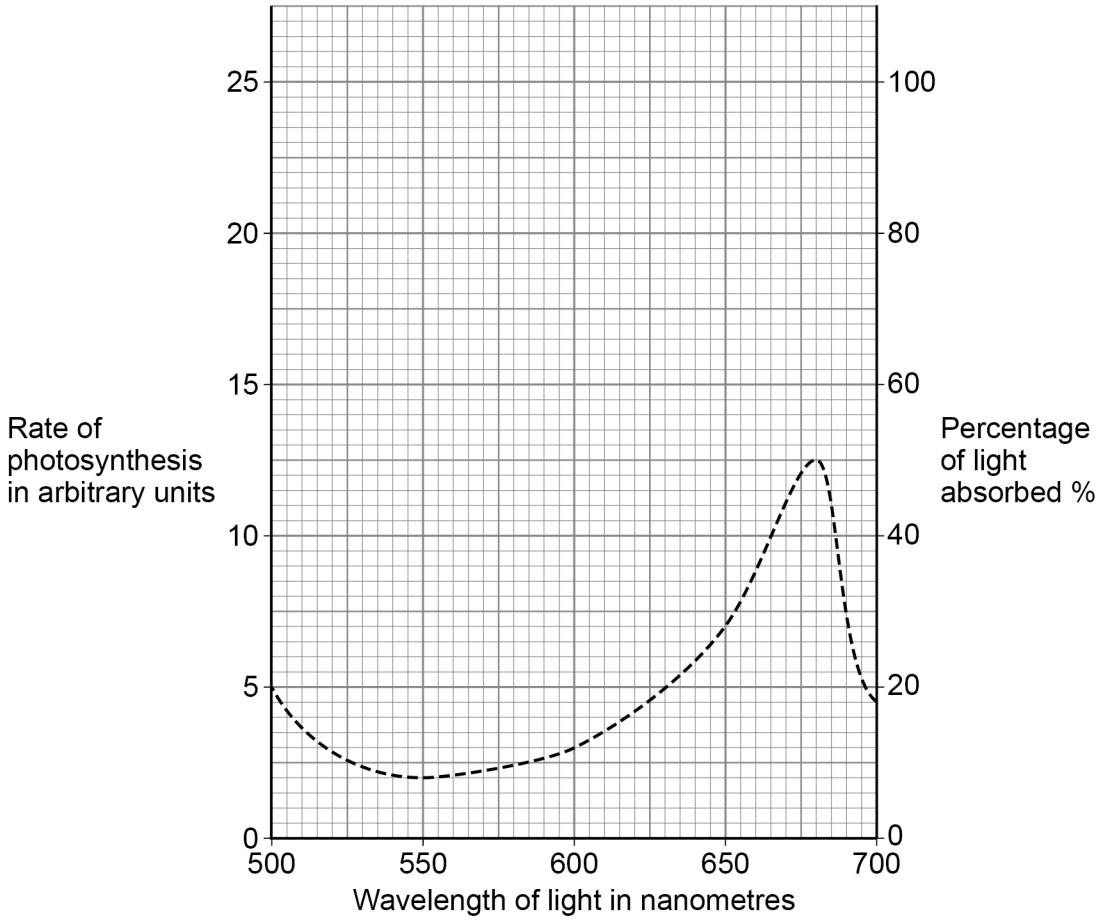
Table 7 shows the results.

Table 7

Wavelength of light in nanometres (nm)	Rate of photosynthesis in arbitrary units
500	24
550	6
600	10
650	17
700	19

Figure 5 shows how the wavelength of light affects the percentage of light absorbed.

Figure 5



Key

----- Percentage of light absorbed

Do not write outside the box

0 4 . 8 Plot the results for the rate of photosynthesis from **Table 7** on **Figure 5**.

Draw a line of best fit.

[3 marks]

0 4 . 9 Explain why the rate of photosynthesis is lowest at a wavelength of 550 nm.

Use information from **Figure 5**.

[2 marks]

18

Turn over for the next question

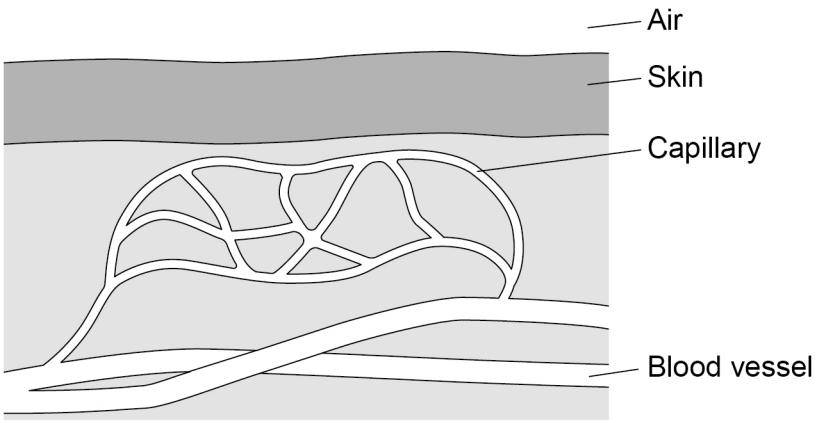
Do not write outside the box

0 5 This question is about gas exchange and breathing.

Frogs exchange gases through their skin as well as through their lungs.

Figure 6 shows a section through the skin of a frog.

Figure 6



0 5 . 1 Draw arrows on **Figure 6** to show:

- the movement of carbon dioxide between the air and the blood
- the movement of oxygen between the air and the blood.

[1 mark]

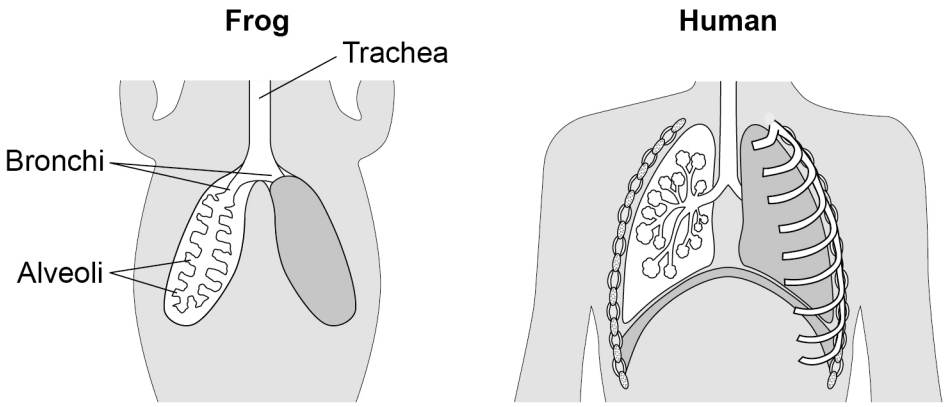
0 5 . 2 Name the process by which gases move into and out of the blood through the skin of the frog.

[1 mark]

Do not write outside the box

0 5 . 3 **Figure 7** shows the breathing system of a frog and of a human.

Figure 7



Give **two** differences in the structure of the breathing systems of a frog and a human shown in **Figure 7**.

Do **not** refer to size or shape.

[2 marks]

1 _____

_____

2 _____

_____

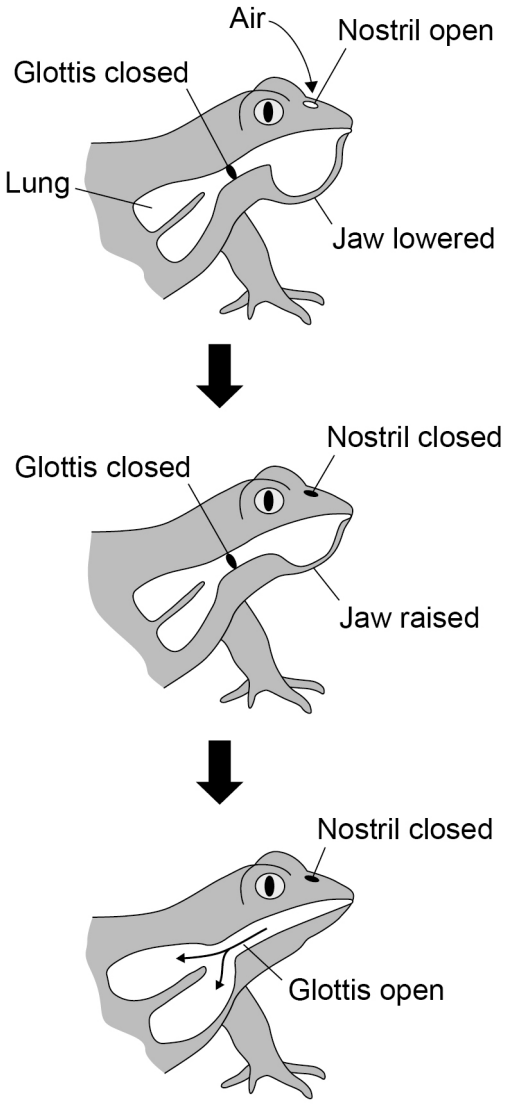
Question 5 continues on the next page

Do not write outside the box

0 5 . 4 **Figure 8** shows how air enters the lungs of a frog.

The glottis is a piece of tissue which can open and close the entrance to the lungs.

Figure 8



Explain how air enters the lungs of a frog.

[3 marks]

Do not write outside the box

0 5 . 5 Automatic breathing is controlled by the brain in humans.

Explain why the ability to breathe can be lost if the person suffers a spinal cord injury.

[4 marks]

Question 5 continues on the next page

Do not write outside the box

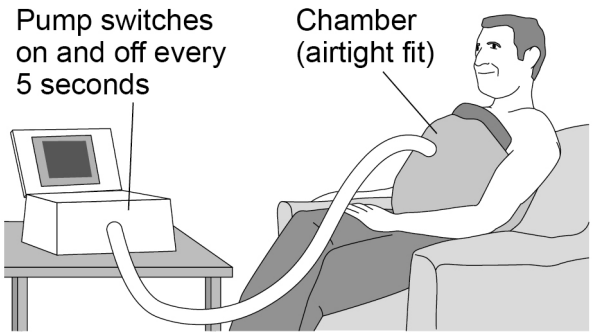
A person who is unable to breathe for themselves can be kept alive by a mechanical ventilator.

There are two main types of ventilator:

- negative pressure ventilator
- positive pressure ventilator.

0 5 . 6 **Figure 9** shows a negative pressure ventilator being used.

Figure 9



Describe how the negative pressure ventilator helps a person to breathe in and out.

[4 marks]

Do not write outside the box

0 5 . 7 **Figure 10** shows one type of positive pressure ventilator being used.

Figure 10

Suggest **two** disadvantages of this type of ventilator compared with the negative pressure ventilator.

[2 marks]

1 _____

_____

2 _____

_____

17

Turn over for the next question

Do not write outside the box

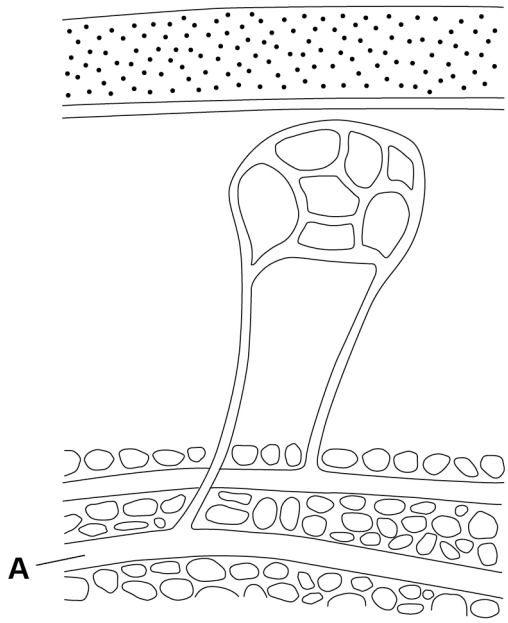
0 6 . 1 The brain is a coordination centre which receives and processes information.

Name **one other** coordination centre.

[1 mark]

0 6 . 2 **Figure 11** shows a section through human skin.

Figure 11



Explain how structure **A** helps to maintain the core body temperature on a cold day.

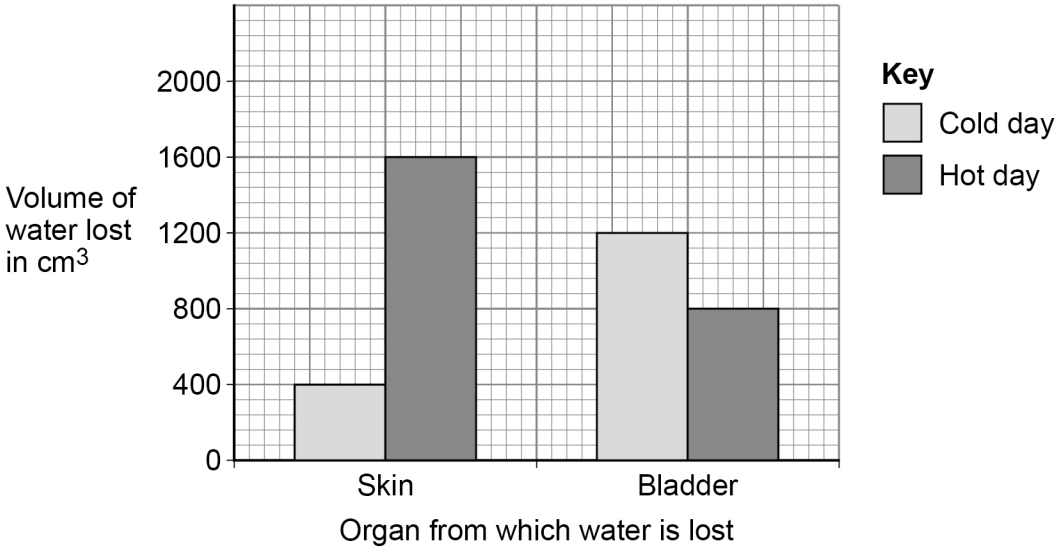
[3 marks]

Do not write outside the box

0 6 . 3 **Figure 12** shows the volume of water lost from two organs of the body.

The information is shown for a cold day and for a hot day.

Figure 12



Explain the differences in the volumes of water lost on a hot day compared to a cold day.

[5 marks]

Question 6 continues on the next page

Do not write outside the box

A mammal which lives in the desert takes in very little water in its food and very rarely drinks.

0 6 . 4 Name a chemical reaction in cells which provides the mammal with water.

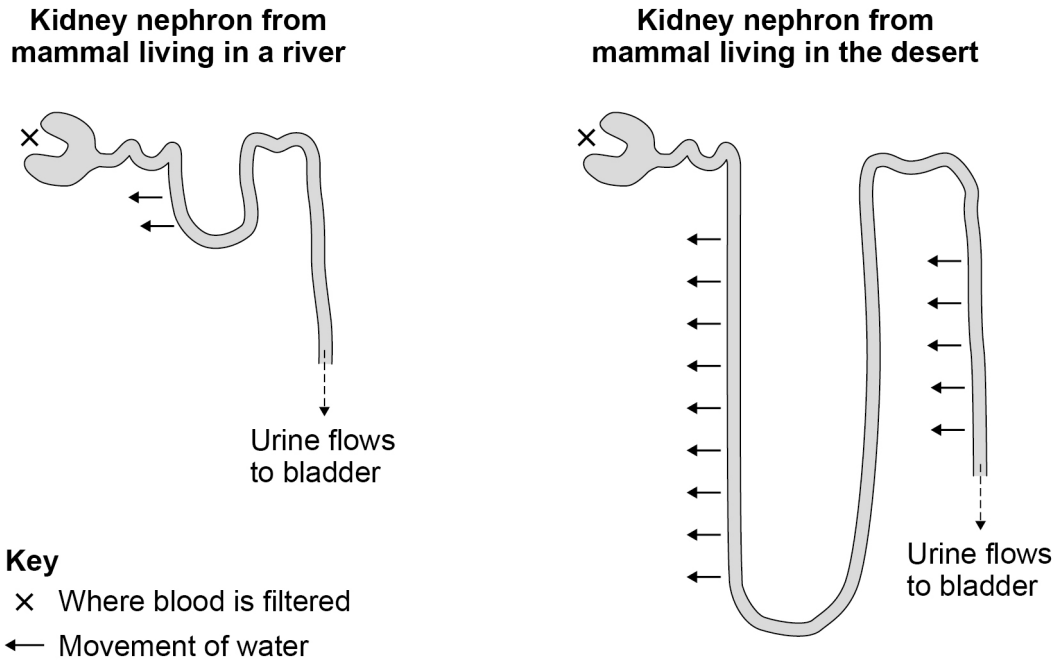
[2 marks]

0 6 . 5 A kidney contains thousands of tiny tubes called nephrons.

The nephrons carry liquid which has been filtered from the blood.

Figure 13 shows a nephron from a mammal living in a river and a nephron from a mammal living in a desert.

Figure 13



Explain why mammals living in the desert have very long nephrons.

[3 marks]

Do not write outside the box

0 6 . 6 Aldosterone is a hormone which acts on the kidneys to change the amount of sodium ions lost in urine.

Aldosterone is released when the concentration of sodium ions in the blood falls too low.

Explain how a negative feedback system might work to control the production of aldosterone.

[3 marks]

17

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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