Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an asterisk (*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

Pearson

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

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 (a) Figure 1 shows a cross section of an artery.

artery wall width 26 mm
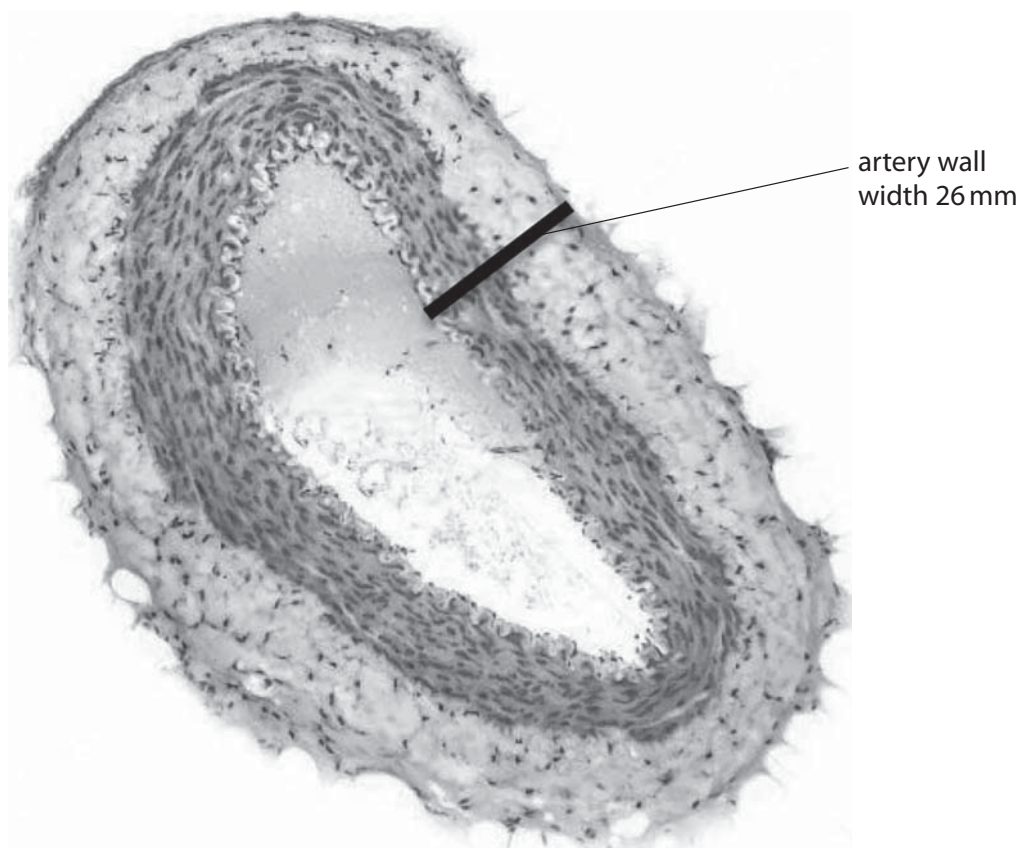
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Figure 1

(i) Select words from the box to complete the sentence.

(2)

| acidity | concentration | thick | permeable | pressure | thin |

Blood in arteries is at high ....

so arteries have .... elastic walls.

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(ii) The image in Figure 1 shows an artery magnified 20×.

The width of the artery wall, labelled on Figure 1, is 26 mm.

Calculate the actual width of the artery wall.

(2)

....mm

(iii) The aorta is an artery.
Which statement is true for the aorta?

(1)

☒ **A** the aorta transports oxygenated blood towards the heart

☒ **B** the aorta transports oxygenated blood away from the heart

☒ **C** the aorta transports deoxygenated blood towards the heart

☒ **D** the aorta transports deoxygenated blood away from the heart

(b) The blood in an artery has several components.

Draw one straight line from each blood cell to its description.

(2)

blood cell   **description**

produces glucose

has a nucleus

red blood cell •

transports urea

white blood cell •

contains haemoglobin

releases adrenalin

(c) How does oxygen move from the blood into respiring cells?

(1)

☒ **A** by active transport

☒ **B** by osmosis

☒ **C** by diffusion

☒ **D** by translocation

(Total for Question 1 = 8 marks)

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2 (a) A plant cell contains ribosomes, mitochondria and a large vacuole.

Which row of the table identifies the function of each structure?

(1)

	ribosomes	mitochondria	large vacuole
☒ **A**	respiration	support and storage	protein synthesis
☒ **B**	protein synthesis	respiration	support and storage
☒ **C**	respiration	protein synthesis	support and storage
☒ **D**	support and storage	respiration	protein synthesis

(b) Figure 2 shows a section of the root of a maize plant, as seen using a light microscope.

A root hair is labelled.

Figure 2

(i) Give **one** function of a root hair.

(1)

....

(ii) The surface area of this root hair can be estimated using the equation

surface area = circumference × length

The circumference of the root hair is 0.06 mm and the length of the root hair is 0.24 mm.

Use the equation to estimate the surface area of this root hair.

State the units in your answer.

(2)

....

(iii) Root hairs can be viewed using an electron microscope.

Describe the benefits of using an electron microscope to view root hairs.

(2)

....

....

....

....

(Total for Question 2 = 6 marks)

3 (a) Complete the word equation for photosynthesis.

(1)

carbon dioxide + water ⟶ .... + oxygen

(b) The rate of photosynthesis can be measured using the equipment shown in Figure 3.

gas

water + sodium hydrogencarbonate

lamp
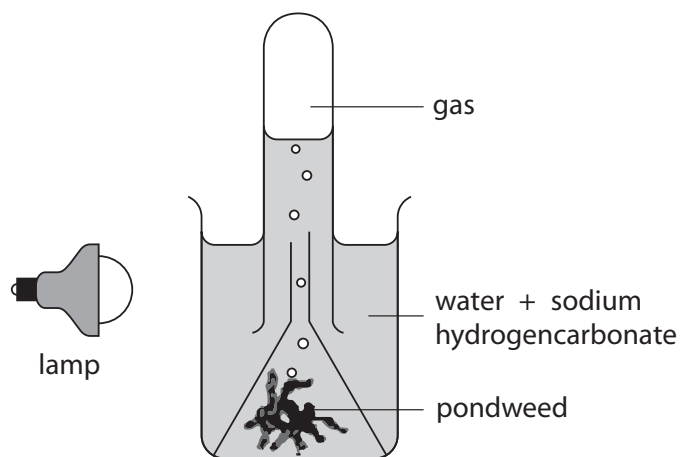
pondweed

Figure 3

A student investigated the effect of carbon dioxide on the rate of photosynthesis.

Sodium hydrogencarbonate provides the pondweed with carbon dioxide.

(i) Name **two** variables that the student would need to keep constant in this investigation.

(2)

1 ....

....

2 ....

....

(ii) Which would be the best piece of equipment for measuring the volume of gas collected?

(1)

☒ **A** ruler

☒ **B** potometer

☒ **C** gas syringe

☒ **D** mass balance

(iii) The student added different volumes of a sodium hydrogencarbonate solution to the water and measured the volume of gas collected in 1 hour.

Figure 4 shows the results the student obtained.

volume of sodium hydrogencarbonate solution added in cm³	volume of gas collected in 1 hour in cm³
0	1
5	2
10	4
15	5
20	6
25	6
30	6

Figure 4

Describe the effect of increasing the volume of sodium hydrogencarbonate solution on the volume of gas collected.

(2)

....

....

....

....

....

....

S 6 0 2 2 9 A 0 9 2 4

(c) Figure 5 shows nettle leaves taken from plants on two sides of a hill.

shaded side of hill   sunny side of hill
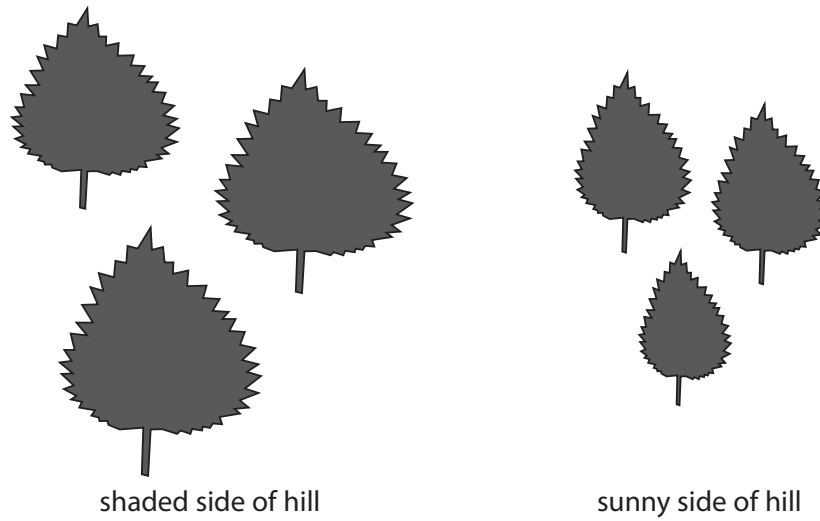
Figure 5

Explain the difference in the surface area of the leaves on the shaded and sunny side of the hill.

(2)

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(d) Describe the vessels that transport water up the stem of a plant.

(2)

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....

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(Total for Question 3 = 10 marks)

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S 6 0 2 2 9 A 0 1 1 2 4

4 (a) The government is trying to reduce the level of sugar in processed food by 20%.

(i) A biscuit contains 7g of sugar.

Calculate the mass of sugar in this biscuit if the mass of sugar is reduced by 20%.

(3)

....grams

(ii) One aim of reducing sugar levels in food is to reduce the number of people with type 2 diabetes.

Figure 6 shows the percentage of males and females of different ages diagnosed with type 2 diabetes in England.
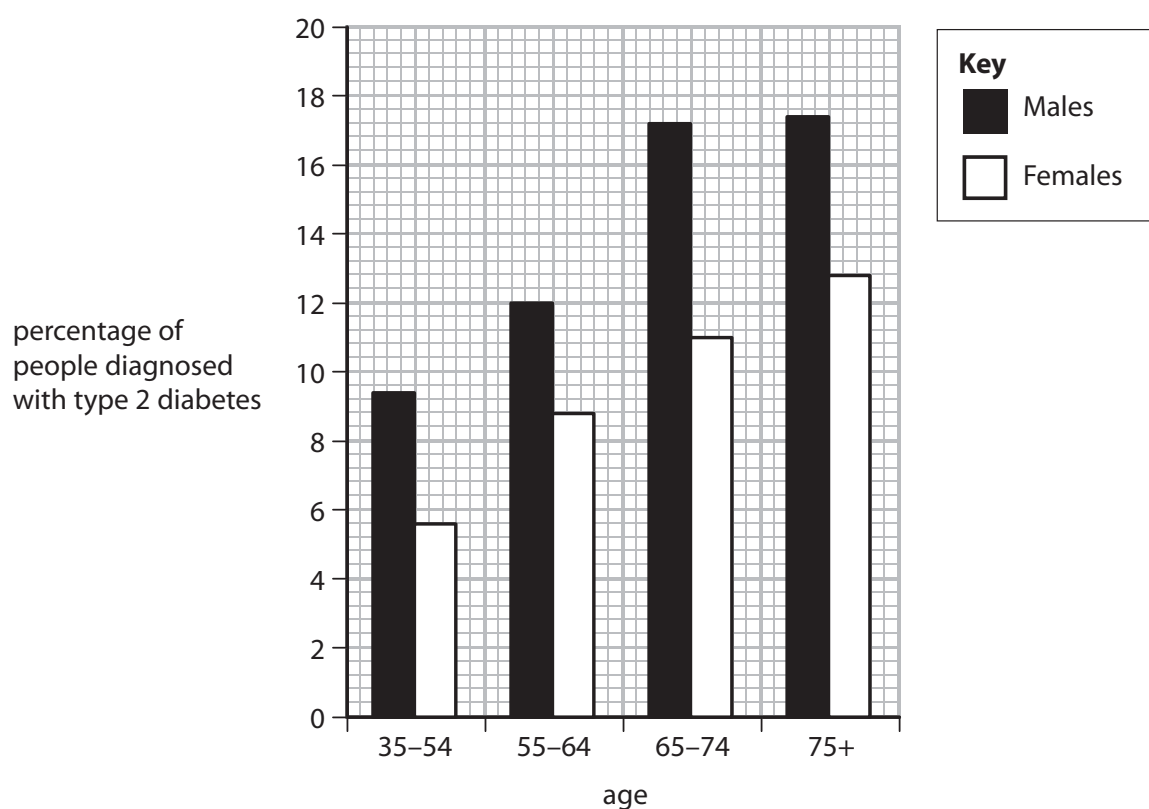
Figure 6

Describe **two** trends shown in Figure 6.

(2)

1 ....

....

2 ....

....

(iii) Explain why reducing the level of sugar in food should decrease the number of people developing type 2 diabetes.

(4)

....

....

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....

....

(iv) Food products that are lower in sugar will help people with type 1 diabetes to control their condition.

Give **one** other way that type 1 diabetes is controlled.

(1)

....

....

(b) Figure 7 shows the percentage possibility of people with diabetes developing other health problems.
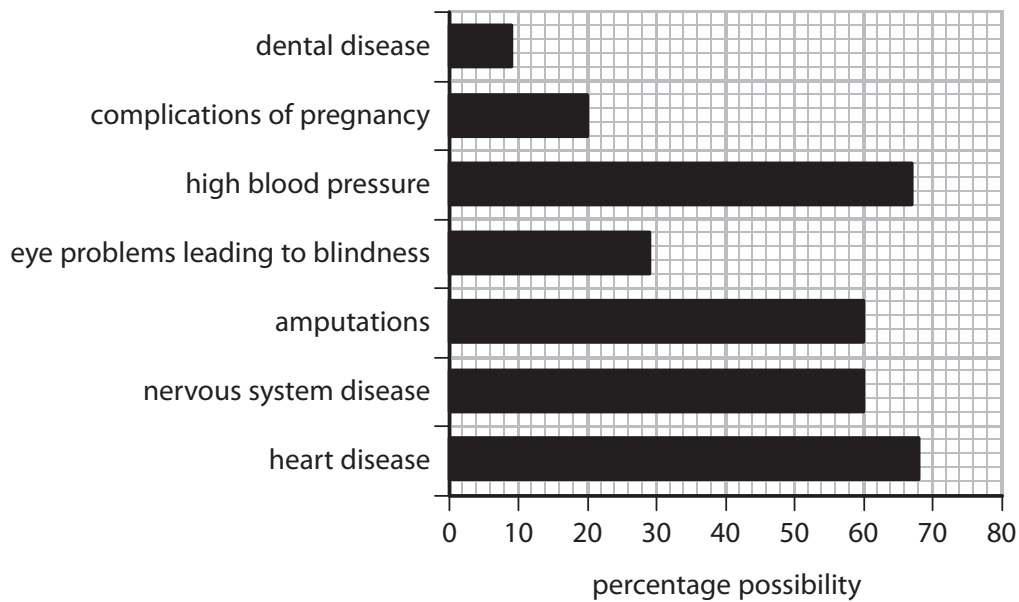
Figure 7

(i) Which health problem would a person with diabetes be most likely to develop?

(1)

☒ **A** dental disease

☒ **B** high blood pressure

☒ **C** heart disease

☒ **D** nervous system disease

(ii) High blood pressure damages capillaries.

Give a reason why capillaries are damaged by high blood pressure.

(1)

....

....

(Total for Question 4 = 12 marks)

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5 (a) A student investigated the distribution of poppy plants in a park.

Figure 8 shows a sketch of the park and a diagram of a poppy plant.
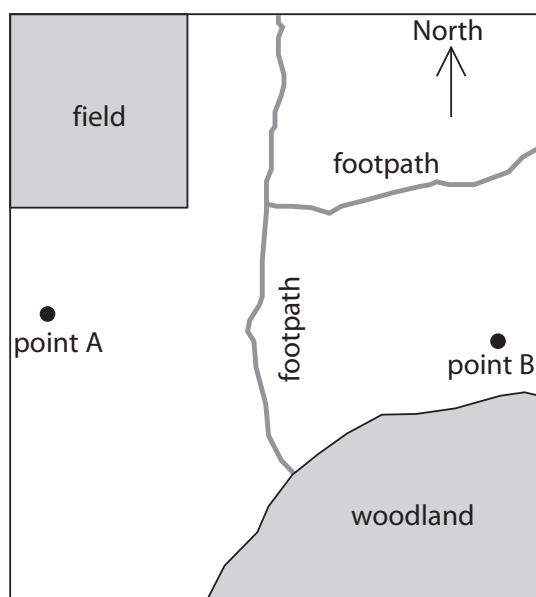
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Figure 8

The student placed a 1 m² quadrat at 10 metre intervals between point A and point B and recorded the number of poppy plants in each quadrat.

(i) Name the technique the student used to study the distribution of poppy plants.

(1)

....

Figure 9 shows the number of poppy plants at 10 metre intervals from point A to point B.

distance from point A in metres	number of poppy plants in the 1 m² quadrat
0 (point A)	12
10	10
20	11
30	8
40 (point B)	6

Figure 9

(ii) Explain the effect of the woodland on the distribution of poppy plants.

(3)

....

....

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....

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(iii) Devise a plan, that uses a quadrat, to estimate the number of poppy plants in the field.

(3)

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(b) The woodland is a protected conservation area.

Explain why this woodland increases the biodiversity of the park.

(2)

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(c) Figure 10 shows part of a food web for the woodland.
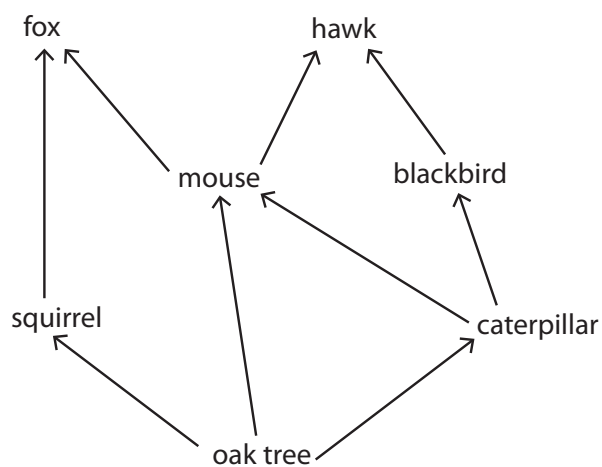
Figure 10

State **two** effects on this food web if the number of mice decreases.

(2)

1 ....

....

2 ....

....

(Total for Question 5 = 11 marks)

6 Figure 11 shows a peak flow meter.

A peak flow meter is used to measure the rate at which air is blown out of the lungs.

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Figure 11

To use a peak flow meter a person takes a deep breath and exhales the air as hard and as fast as possible into the peak flow meter.

People with asthma can have a reduced peak flow.

A student investigated the peak flow of five people with asthma and five people without asthma.

All the people were male and the same age.

(a) Give **two** other factors the student should control when selecting the people for this investigation.

(2)

1 ....

....

2 ....

....

(b) The mean peak flow for people without asthma was 630 dm^3 per minute.

The mean peak flow for people with asthma was 480 dm^3 per minute.

Use the mean peak flow values to calculate the percentage decrease in peak flow for the people with asthma.

(2)

....%

(c) Explain the effect of reduced airflow in the lungs on aerobic respiration.

(3)

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*(d) During high intensity exercise a person respires aerobically and anaerobically.

Compare aerobic and anaerobic respiration in humans.

(6)

....
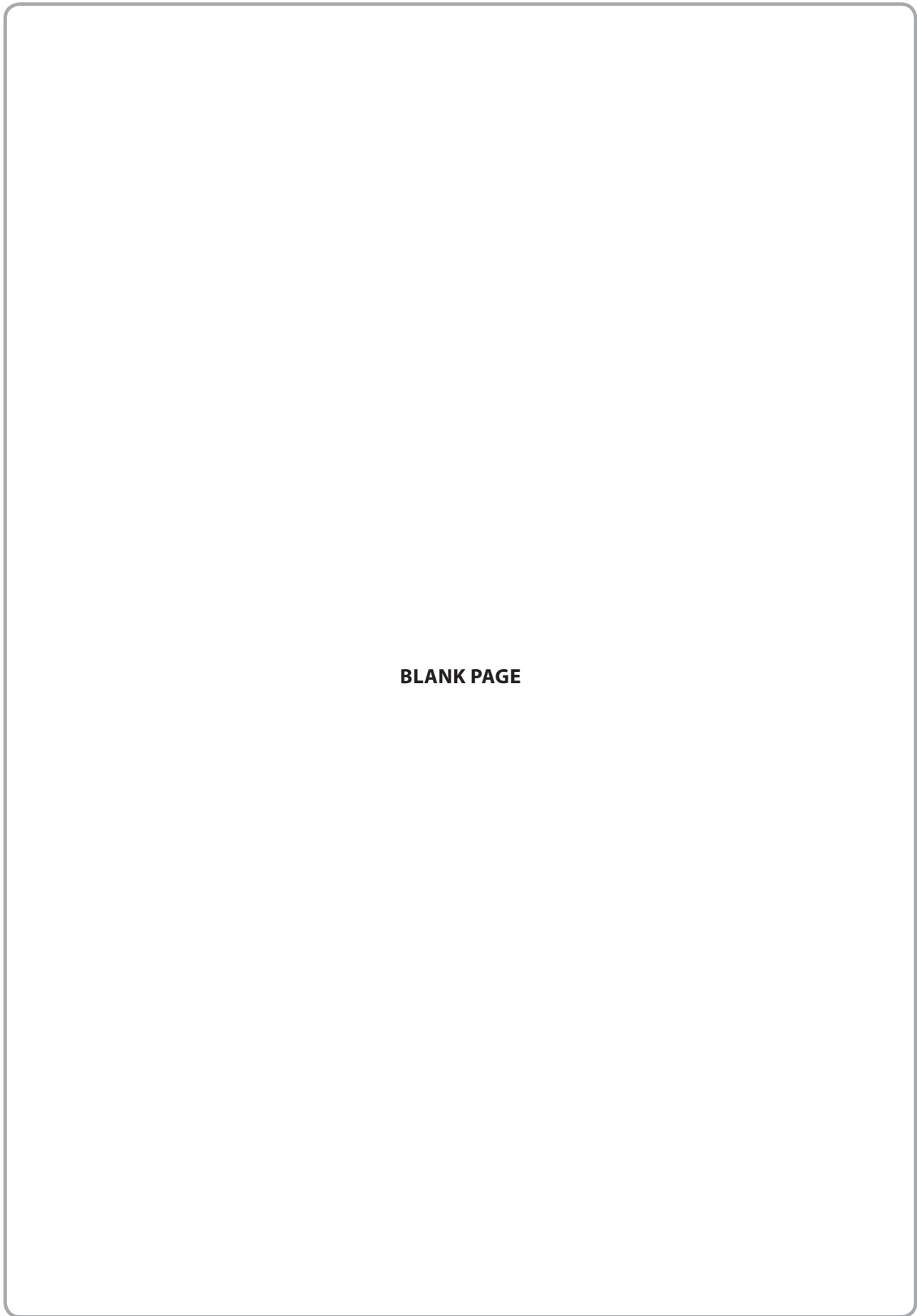
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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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