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Surname		Other names	
<b>Pearson Edexcel</b> <b>GCSE (9 - 1)</b>	Centre Number	Candidate Number	
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<b>Combined Science (Biology)</b>			
<b>and Biology</b>			
<b>GCSE to A level Transition Test</b>			
<b>Time: 1 hour 45 minutes</b>		Paper Reference <b>1SC0 / 1BIO</b>	
<b>You must have:</b> Ruler, pencil			Total Marks

### 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.
- You must **show all your working out** with **your answer clearly identified** at the end of your solution.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You may use a calculator.

### Information

- The total mark for this paper is 100.
- 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.

**SECTION A (Combined Science: Biology)**

- 1 (a) Figure 3 shows a diagram of a red blood cell from a turtle and a diagram of a red blood cell from a human.



**Figure 3**

- (i) These cells are animal cells.

Animal cells do not have

- A cytoplasm
- B a cell membrane
- C a cell wall
- D mitochondria

(1)

- (ii) The actual length of the red blood cell from a turtle is  $20.5 \mu\text{m}$ .

Calculate the length of the magnified image of the red blood cell of the turtle when magnified  $400\times$ .

(2)

..... $\mu\text{m}$

- (iii) The width of the human red blood cell, when magnified  $400\times$ , is  $3.08 \text{ mm}$ .

Calculate the actual width of the cell and show your answer in standard form.

(2)

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(b) Red blood cells are carried in veins and arteries.

Figure 4 shows the equipment used to measure the elasticity of an artery.

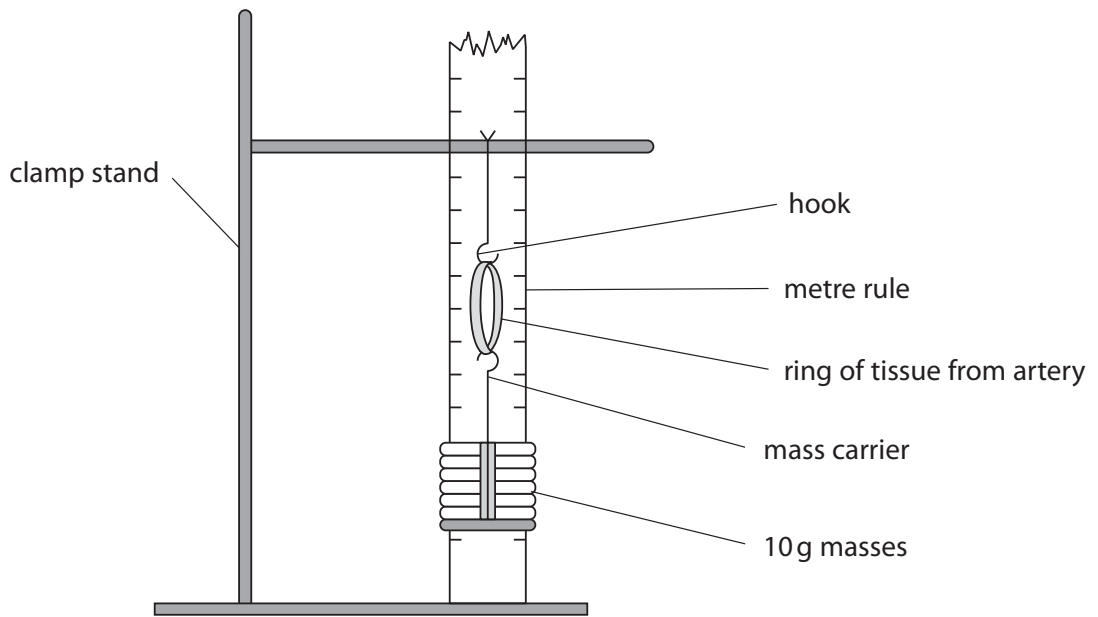


Figure 4

(i) Describe a method you could use to see how much the ring of tissue from an artery could stretch before it no longer returned to its original size.

(3)

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(ii) Give **one** safety precaution you need to take when handling animal tissue such as blood vessels.

(1)

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(Total for Question 1 = 9 marks)

Turn over ►

- 2 Chemotherapy is often used to help people with cancer. Chemotherapy kills cancer cells but may affect haemoglobin production in the body.

A drug called EPO increases haemoglobin production in the body. Scientists investigated the effect of EPO on patients who had received chemotherapy.

They injected EPO into these patients and blood samples were taken for several months to measure their haemoglobin levels.

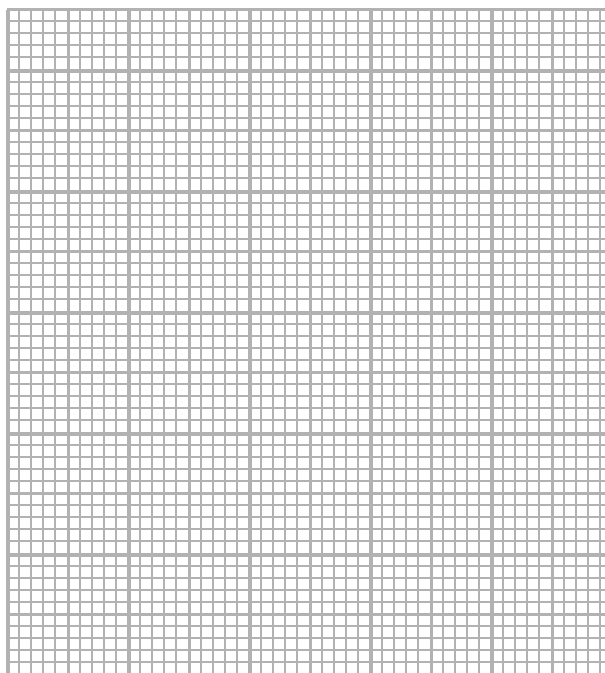
The table shows the results.

Time after EPO injection in months	Average (mean) haemoglobin level in g per 100 cm <sup>3</sup>
0	5.0
1	7.6
2	8.2
3	9.3
4	9.8
5	10.2

- (a) Plot a line graph to show the relationship between time and average haemoglobin level.

Use a ruler to join the points with straight lines.

(5)



(b) (i) Name the dependent variable in this investigation. (1)

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(ii) Explain how the scientists made sure their results were reliable. (2)

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(iii) The scientists controlled biotic (living) factors so their results would be valid.  
Name two biotic factors that the scientists should have controlled. (2)

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(c) Cancer patients often complain of tiredness after chemotherapy.  
Explain how EPO helps to reduce tiredness in these patients. (4)

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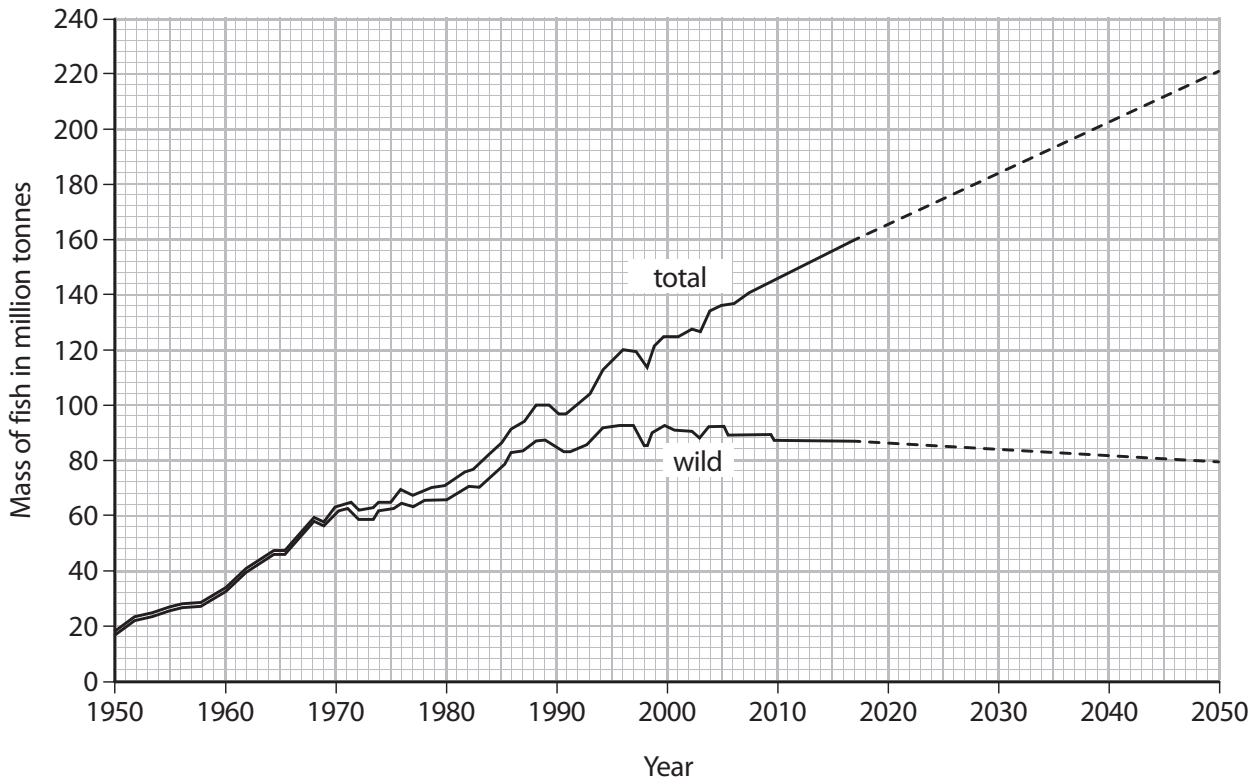
**(Total for Question 2 = 14 marks)**

3 The world supply of wild fish is decreasing.

Fish farming provides an alternative method of supplying fish.

(a) The graph shows the change in total supply of fish and the supply of wild fish between 1950 and 2017.

The graph also shows the predicted total supply of fish and supply of wild fish from 2017 to 2050.



(i) The total supply of fish is the sum of the supply of wild fish and the supply of farmed fish.

Describe the change in the supply of wild fish and the supply of farmed fish between 1950 and 2017.

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(ii) Calculate the predicted rate of increase in the total supply of fish in tonnes per year between 2017 and 2050.

Give your answer in tonnes per year.

Show your working.

(2)

rate of increase = ..... tonnes per year

(b) To increase production, fish farmers maintain water quality and food quality on a fish farm.

Explain three other ways that farmers could increase production on a fish farm.

(6)

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3 .....

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**(Total for Question 3 = 10 marks)**

Turn over ►

4 *Streptococcus* bacteria can cause a sore throat or skin infection.

An illness called scarlet fever can also develop during an infection with this bacterium.

(a) (i) Give **two** precautions a doctor should take when treating a patient who is infected with *Streptococcus*.

(2)

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(ii) From September 2013 to March 2014 there were 2 830 cases of scarlet fever in the UK.

From September 2014 to March 2015 there were 5 943 cases of scarlet fever.

Calculate the percentage increase of the number of cases of scarlet fever between the periods September 2014 to March 2015 and September 2013 to March 2014.

(2)

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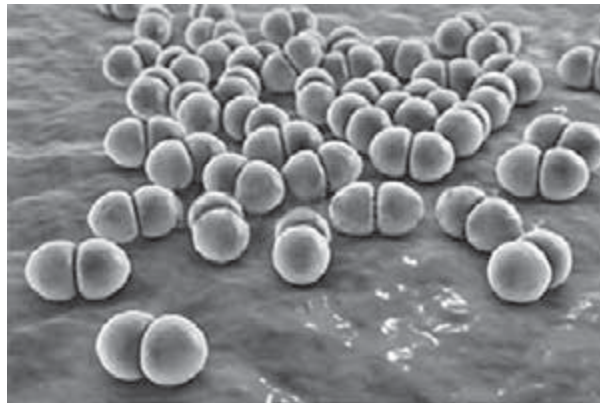
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(iii) Figure 10 shows some *Streptococcus* bacteria.



© Kateryna Kon/Shutterstock

**Figure 10**

Some bacteria are motile, meaning they can move themselves.

Why is a *Streptococcus* bacterium not motile?

(1)

- A** it does not have flagella
- B** it does not have plasmids
- C** it does not have ribosomes
- D** it does not have acrosomes

(b) Patients with scarlet fever can be treated with antibiotics.

New antibiotics need to be tested before they can be used in patients.

Which is the correct sequence for the development of a new medicine?

(1)

- A** testing in healthy volunteers → testing using cultured cells → double blind trials on patients
- B** testing using cultured cells → double blind trials on patients → testing in healthy volunteers
- C** testing in healthy volunteers → double blind trials on patients → testing using cultured cells
- D** testing using cultured cells → testing in healthy volunteers → double blind trials on patients

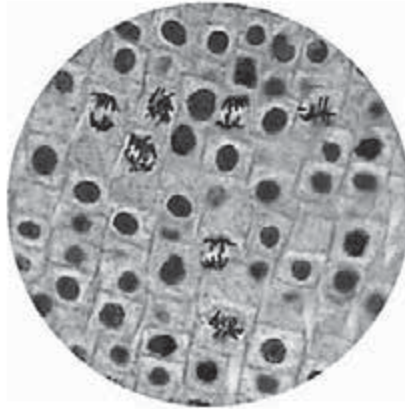
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5 Plant roots grow when cells in the root tip divide by mitosis.

Cells in the process of dividing by mitosis can be identified because their chromosomes become visible when viewed with a microscope.

The photograph shows the cells of a squashed root tip seen using a microscope.



(a) How many cells in this diagram are dividing by mitosis?

(1)

(b) Scientists measure growth in root tips by calculating the mitotic index.

The equation shows how to calculate the mitotic index.

$$\text{mitotic index} = \frac{\text{number of cells showing mitosis}}{\text{total number of cells}} \times 100$$

Root tips that are growing rapidly have a high mitotic index.

(i) Calculate the mitotic index for a root tip with 9 cells showing mitosis and 110 cells not showing mitosis.

(2)

mitotic index = .....

(ii) Explain why it is difficult to obtain the data to calculate the mitotic index.

(2)

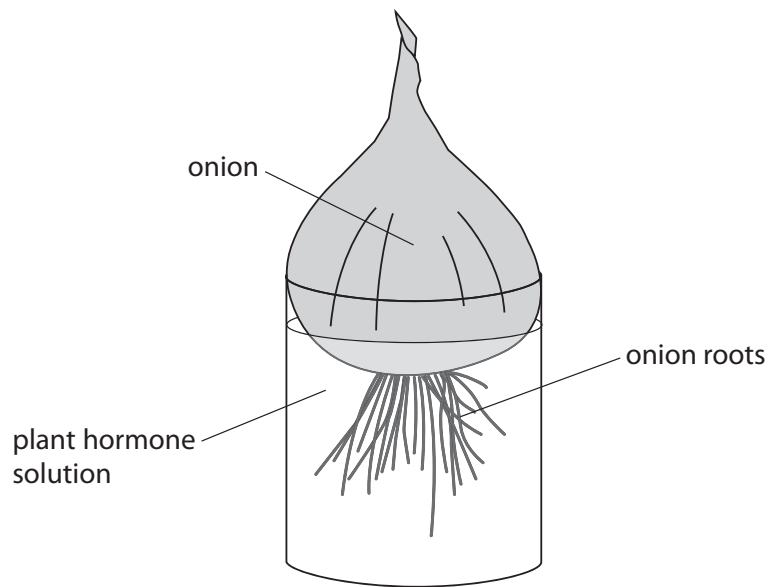
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- (c) A student uses this apparatus to investigate the effect of a plant hormone on the mitotic index in onion roots.



The student puts onions in different concentrations of plant hormone solution.

She then squashes samples of the root tips and calculates the average (mean) mitotic index for each concentration.

The table shows her results.

Concentration of plant hormone in parts per million	Average mitotic index
0.0	4.65
0.005	9.65
0.05	6.55
0.5	4.10

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(i) Describe the results of this investigation.

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(ii) Name three abiotic (non-living) factors that the student should control in her investigation.

(3)

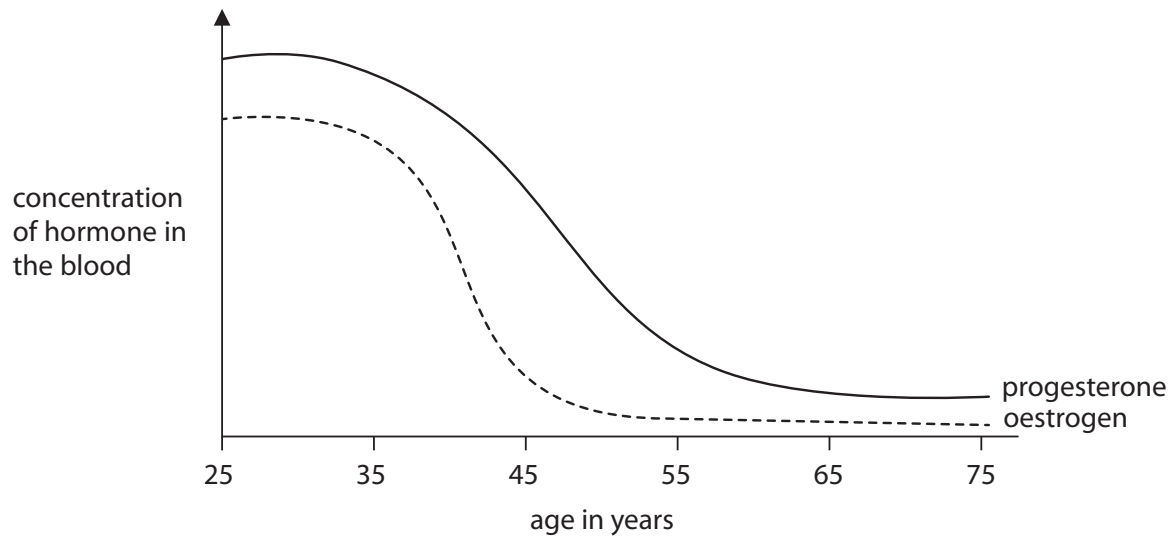
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3 .....

**(Total for Question 5 = 10 marks)**

- 6 (a) Figure 17 shows the concentration of the hormones oestrogen and progesterone in the blood of women of different ages.



**Figure 17**

- (i) Use information from Figure 17 to explain why women over the age of 50 are less likely to ovulate.

(2)

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- (ii) Use information from Figure 17 to explain why women are less likely to menstruate after the age of 60.

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- 7 Figure 10 shows the estimated blood flow through some parts of the body when a person is at rest and during exercise.

part of the body	estimated rate of blood flow in cm <sup>3</sup> per minute	
	at rest	during exercise
brain	750	748
heart muscle	350	1 150
digestive system	2 500	1 200
other muscles	1 200	14 500
all other organs (except lungs)	1 423	1 420

**Figure 10**

- (a) Compare the rate of blood flow through the body when this person is at rest and during exercise.

(3)

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- (b) Explain why there is a change in the rate of blood flow through the digestive system during exercise.

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(c) The stroke volume is the amount of blood leaving one chamber of the heart per beat.

From which chamber of the heart does this volume of oxygenated blood flow?

(1)

- A left atrium
- B left ventricle
- C right atrium
- D right ventricle

(d) A person has a cardiac output of 4.9 litres per minute. The stroke volume of each heart beat is 70 ml.

Calculate the heart rate.

(2)

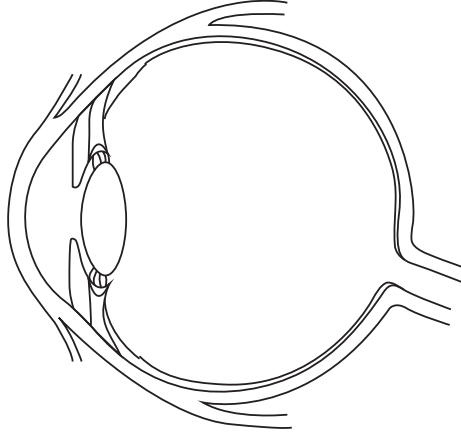
..... beats per minute

**(Total for Question 7 = 8 marks)**

Turn over ►

**SECTION B (Biology)**

**8** Figure 1 shows an eye.



**Figure 1**

(a) (i) When the eye changes from focusing on a distant object to focusing on a near object (1)

- A** the lens gets thinner to bend the light rays more
- B** the lens gets thicker to bend the light rays more
- C** the lens gets thinner to bend the light rays less
- D** the lens gets thicker to bend the light rays less

(ii) Give a reason why people who are short-sighted cannot see distant objects clearly. (1)

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(iii) State the type of lens that can be used to correct short-sightedness.

(1)

(b) A student was given the hypothesis 'People with brown eyes are more likely to be short-sighted than people with blue eyes.'

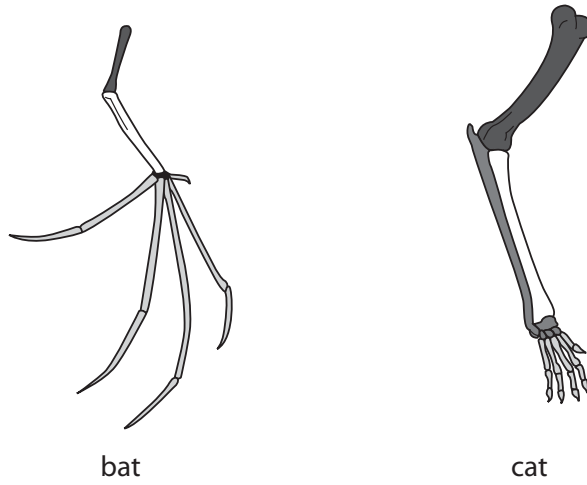
Devise a plan to test this hypothesis.

(3)

**(Total for Question 8 = 6 marks)**

Turn over ►

9 (a) Figure 13 shows the pentadactyl limb of a bat and a cat.



**Figure 13**

(i) Describe the reasons why the anatomy of the pentadactyl limb suggests that bats and cats evolved from a common ancestor.

(2)

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(ii) Genetic analysis also provides evidence for evolution.

Scientists can sequence genes from different organisms.

Describe how this type of genetic analysis provides evidence for evolution.

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(b) Mendel's research on pea plants showed that genetic traits are inherited.

(i) Which term is used to describe the expression of traits in an organism? (1)

- A genotype
- B phenotype
- C allele
- D gamete

(ii) Mendel crossed pea plants that produced round seeds with pea plants that produced wrinkled seeds.

All the offspring produced round seeds.

He then crossed these offspring with each other.

Some pea plants in the next generation produced round seeds and the others produced wrinkled seeds.

Explain how this showed that some inherited traits are not expressed in an organism. (3)

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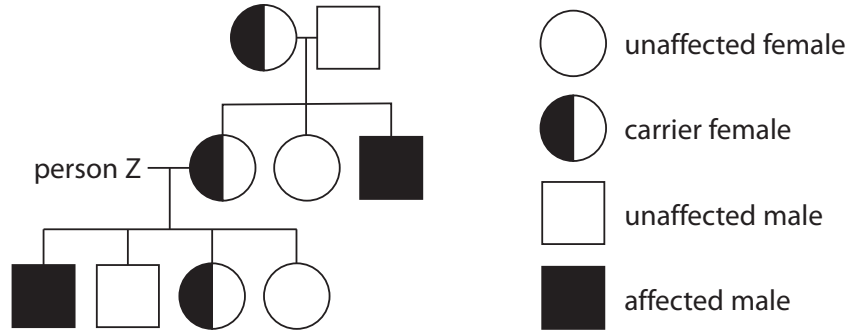
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- (c) Duchenne muscular dystrophy is a recessive sex-linked genetic disorder. This disorder causes muscle weakness.

Figure 14 shows the inheritance of Duchenne muscular dystrophy in a family.



**Figure 14**

State and explain the phenotype of person Z.

(3)

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**(Total for Question 9 = 11 marks)**

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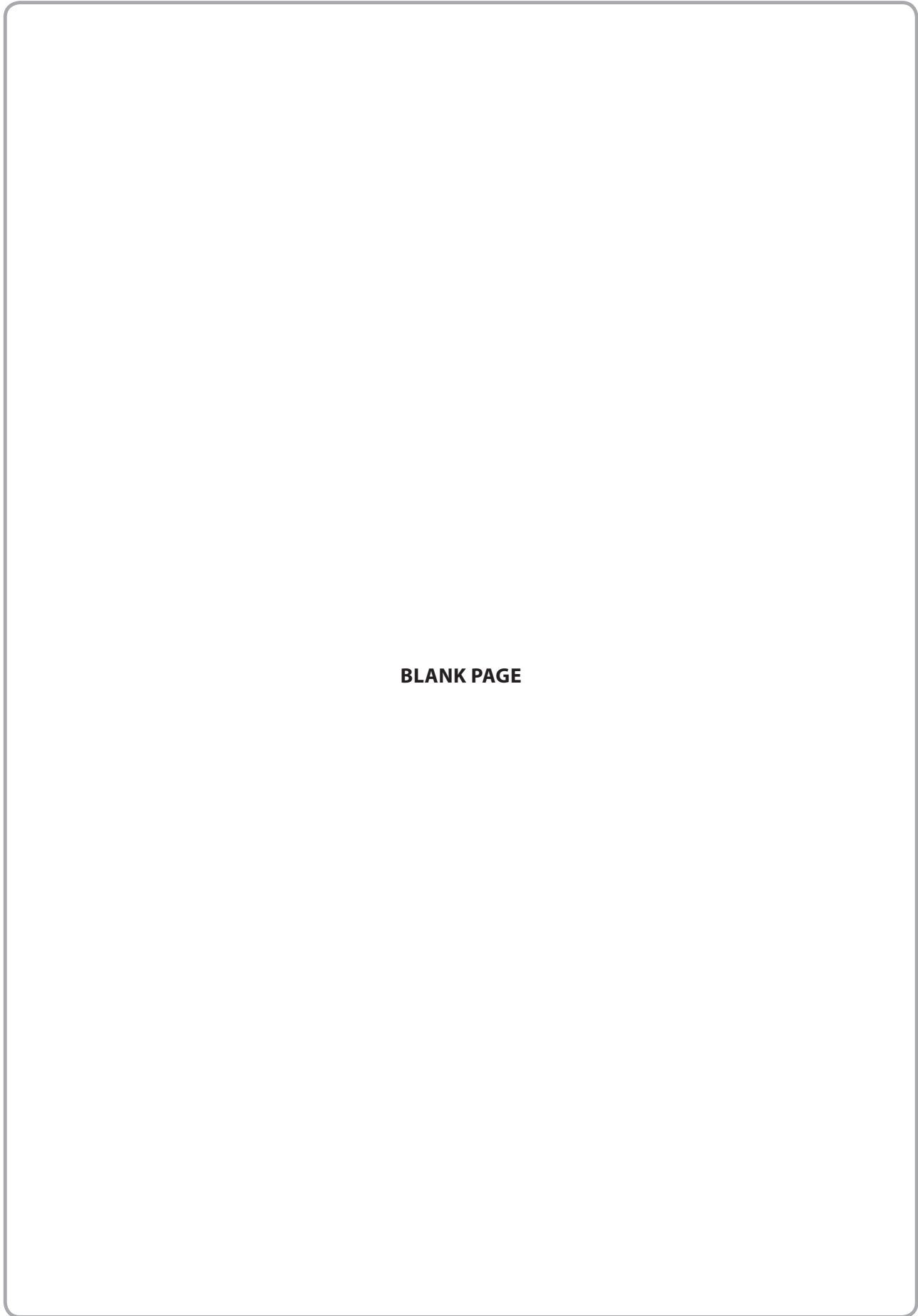
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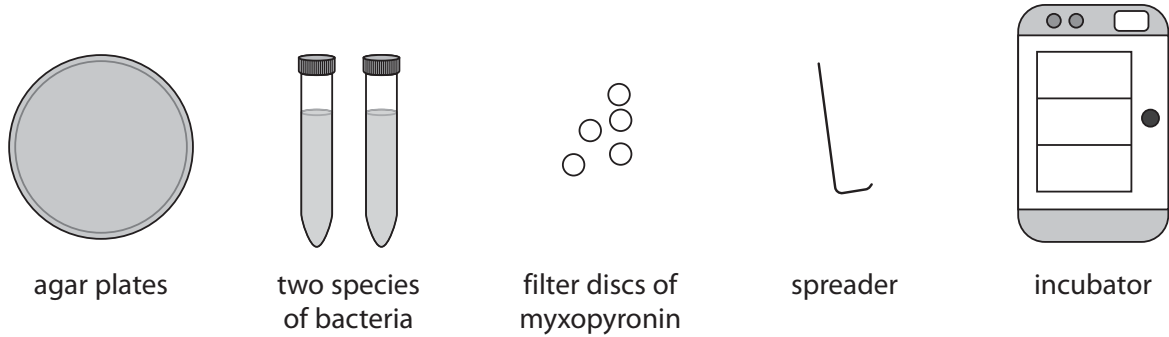
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10 A scientist was planning to compare the effectiveness of the antibiotic myxopyronin on two different species of bacteria.

Figure 18 shows the equipment the scientist can use.



**Figure 18**

(a) (i) Describe how the scientist could determine the effectiveness of myxopyronin on the two species of bacteria.

(2)

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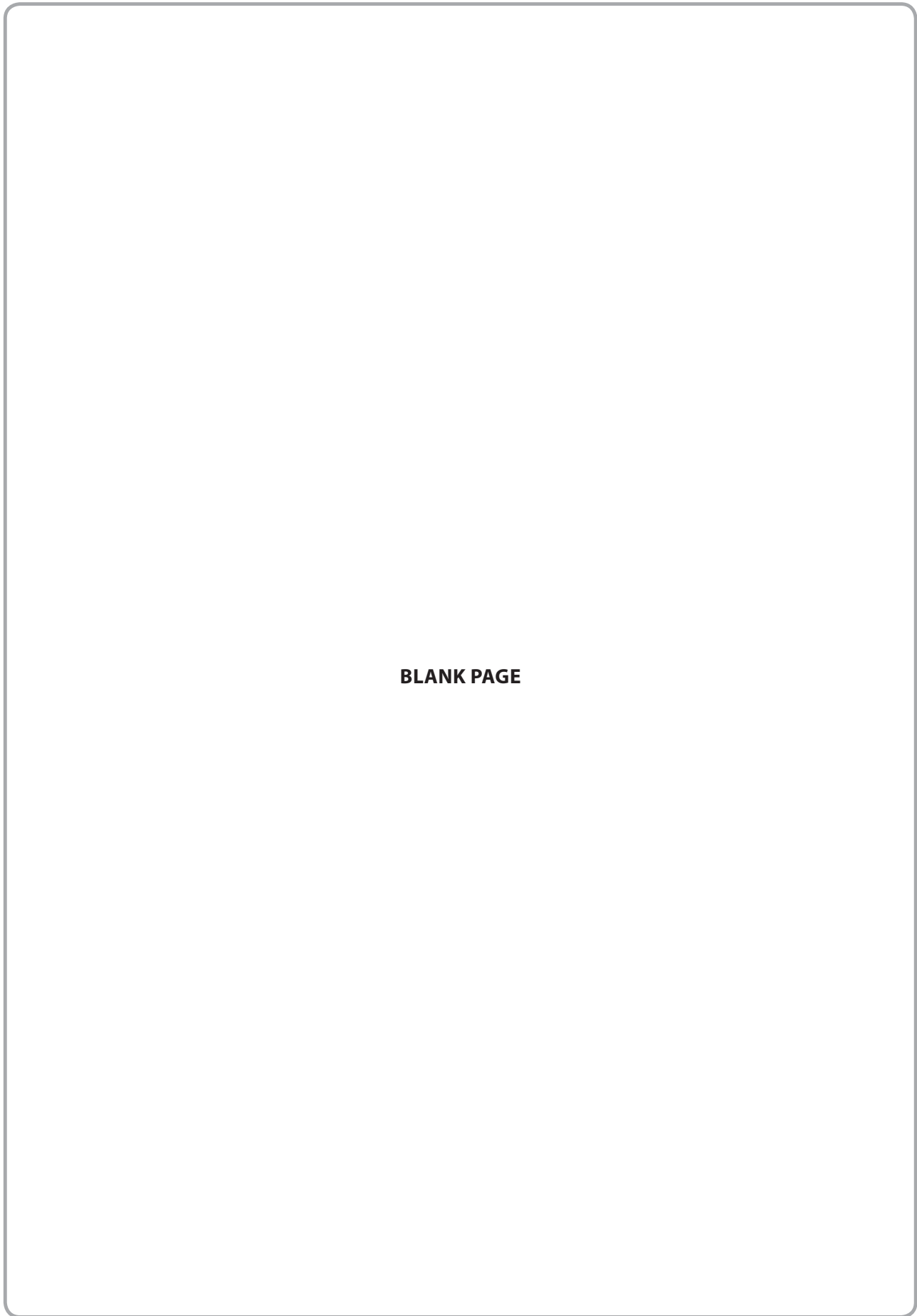
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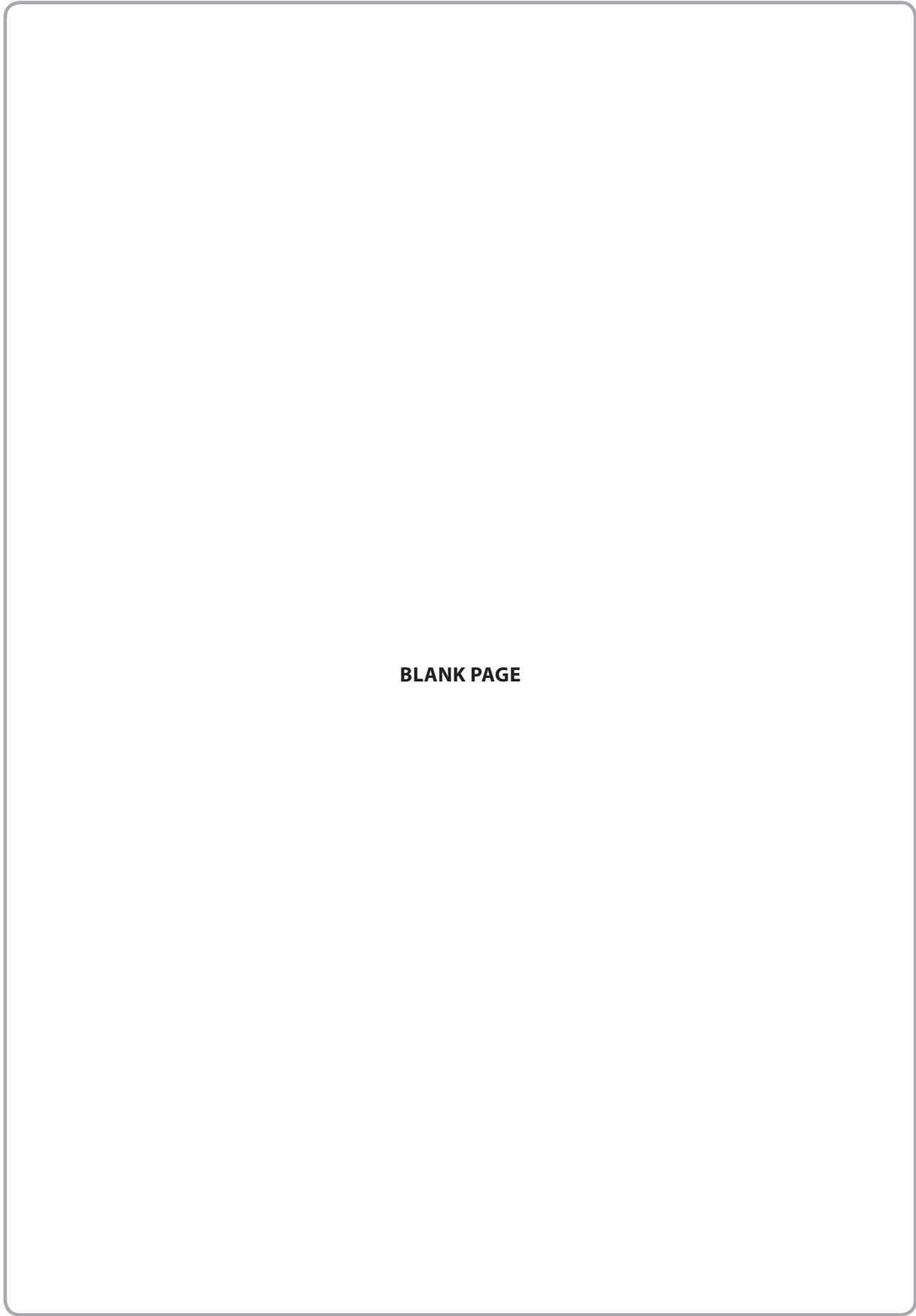
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