AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
ADDITIONAL SCIENCE
BIOLOGY

F

Foundation Tier Unit Biology B2

Friday 10 June 2016 Morning Time allowed: 1 hour

Materials
For this paper you must have:
- a ruler

You may use a calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8 should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

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

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

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

1 Living organisms are made of cells.

1 (a) Animal and plant cells have several parts. Each part has a different function.

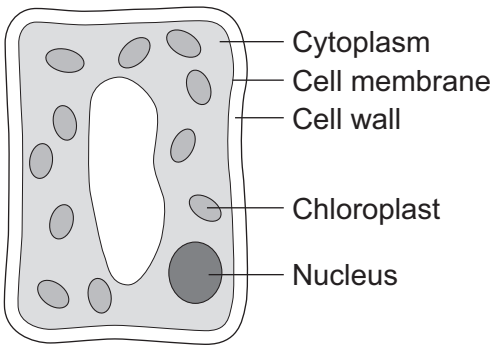
Draw **one** line from each cell part to the correct function of that part.

[3 marks]

Cell part	Function
Cell membrane	Where most energy is released in respiration
Mitochondria	Controls the movement of substances into and out of the cell
Nucleus	Controls the activities of the cell
	Where proteins are made

1 (b) **Figure 1** shows a cell from a plant leaf.

Figure 1



Which **two** parts in **Figure 1** are **not** found in an animal cell?

[2 marks]

1 _____

2 _____

5

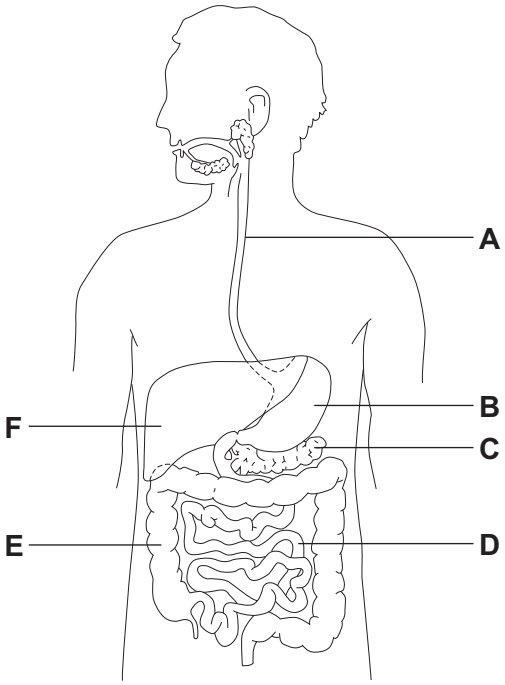
Turn over ▶

2 The digestive system breaks down food into small molecules.

The small molecules can be absorbed into the blood.

Figure 2 shows the human digestive system.

Figure 2



2 (a) (i) Which letter, **A**, **B**, **C**, **D**, **E** or **F**, shows each of the following organs?

[3 marks]

Write **one** letter in each box.

large intestine ☐

small intestine ☐

stomach ☐

2 (a) (ii) Different organs in the digestive system have different functions.

Draw **one** line from each function to the organ with that function.

[3 marks]

Function	Organ
Digestion of fat	Large intestine
Absorption of water into the blood	Liver
Production of hydrochloric acid	Small intestine
	Stomach

2 (b) Glucose is absorbed into the blood in the small intestine.

Most of the glucose is absorbed by diffusion.

How does the glucose concentration in the blood compare to the glucose concentration in the small intestine?

[1 mark]

Tick (✓) **one** box.

The concentration in the blood is higher. ☐

The concentration in the blood is lower. ☐

The concentration in the blood is the same. ☐

7

3 Ragwort is a plant that often grows as a weed in grassland.

Figure 3 shows a ragwort plant.

Figure 3

Some students estimated the number of ragwort plants growing in a field on a farm.

The students:

- placed a quadrat at 10 random positions in the field
- counted the number of ragwort plants in each quadrat.

The quadrat measured 1 metre × 1 metre. The area of the field was 80 000 m^2.

Table 1 shows the students' results.

Table 1

Quadrat number	Number of ragwort plants
1	1
2	0
3	3
4	0
5	0
6	0
7	5
8	0
9	0
10	2

3 (a) Complete the following calculation to estimate the number of ragwort plants in the field.

Use information from **Table 1**.

[2 marks]

Total number of ragwort plants in 10 quadrats = _____

Mean number of ragwort plants in 1 m^2 = _____

Therefore estimated number of ragwort plants in field = _____

3 (b) What could the students do to get a more accurate estimate?

[1 mark]

Tick (✓) **one** box.

Place the quadrat in 100 random positions. ☐

Place the quadrat only in areas where they could see ragwort plants. ☐

Place the quadrat in positions at the edge of the field. ☐

Question 3 continues on the next page

3 (c) The farmer who owned the field kept horses.

If horses eat ragwort, the ragwort can poison them.

The farmer considered two methods of controlling ragwort in his field.

Method 1: Spraying with a selective weed killer

Method 2: Pulling out the ragwort plants by hand

In **Method 1**:

- the cost of the weed killer was £420
- the weed killer would not harm the grass but would kill all other plants
- the farmer could apply the weed killer from a sprayer towed by a tractor.

Method 2 could be done by local volunteers.

What are the advantages and disadvantages of using **Method 2** instead of **Method 1** for controlling ragwort?

[3 marks]

Advantages of **Method 2** _____

_____

_____

_____

Disadvantages of **Method 2** _____

_____

_____

_____

6

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

4 In humans, hair colour is an inherited characteristic.

Red hair is caused by a recessive allele.

4 (a) When does a recessive allele control the development of a characteristic?

[1 mark]

Tick (✓) **one** box.

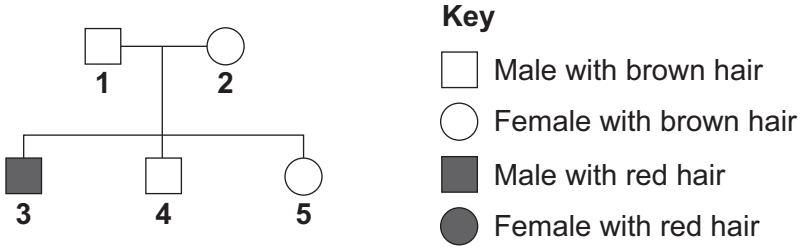
When the allele is present on only one of the chromosomes. ☐

When the dominant allele is not present. ☐

When the allele is inherited from the female parent. ☐

4 (b) **Figure 4** shows the inheritance of hair colour in one family.

Figure 4



4 (b) (i) Brown hair is caused by a dominant allele, **B**.

Red hair is caused by the recessive allele, **b**.

What combination of alleles does person **1** have?

[1 mark]

Tick (✓) **one** box.

BB ☐

Bb ☐

bb ☐

4 (b) (ii) Person **3** married a woman with brown hair.

Figure 5 shows how hair colour could be inherited by their children.

Figure 5

		Woman Brown hair	
		B	b
Person 3 Red hair	b	Bb	
	b		

Complete **Figure 5** to show the combination of alleles that the children would inherit. One has been done for you.

[2 marks]

4 (b) (iii) What is the probability that one of the children would have red hair?

[1 mark]

Tick (✓) **one** box.

1 in 2 ☐

1 in 3 ☐

1 in 4 ☐

5

Turn over for the next question

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

5 Over millions of years:

- new groups of organisms have evolved
- other groups of organisms have become extinct.

5 (a) If an asteroid collided with the Earth, large amounts of dust and water vapour would be thrown up into the air. This would mean less light and heat would reach the Earth's surface from the Sun.

5 (a) (i) A reduced amount of light and heat could have caused the extinction of plants.

Suggest how.

[1 mark]

5 (a) (ii) How could the extinction of plants have caused the extinction of some animals?

[1 mark]

5 (a) (iii) Give **two** reasons, other than collision with an asteroid, why groups of animals may become extinct.

[2 marks]

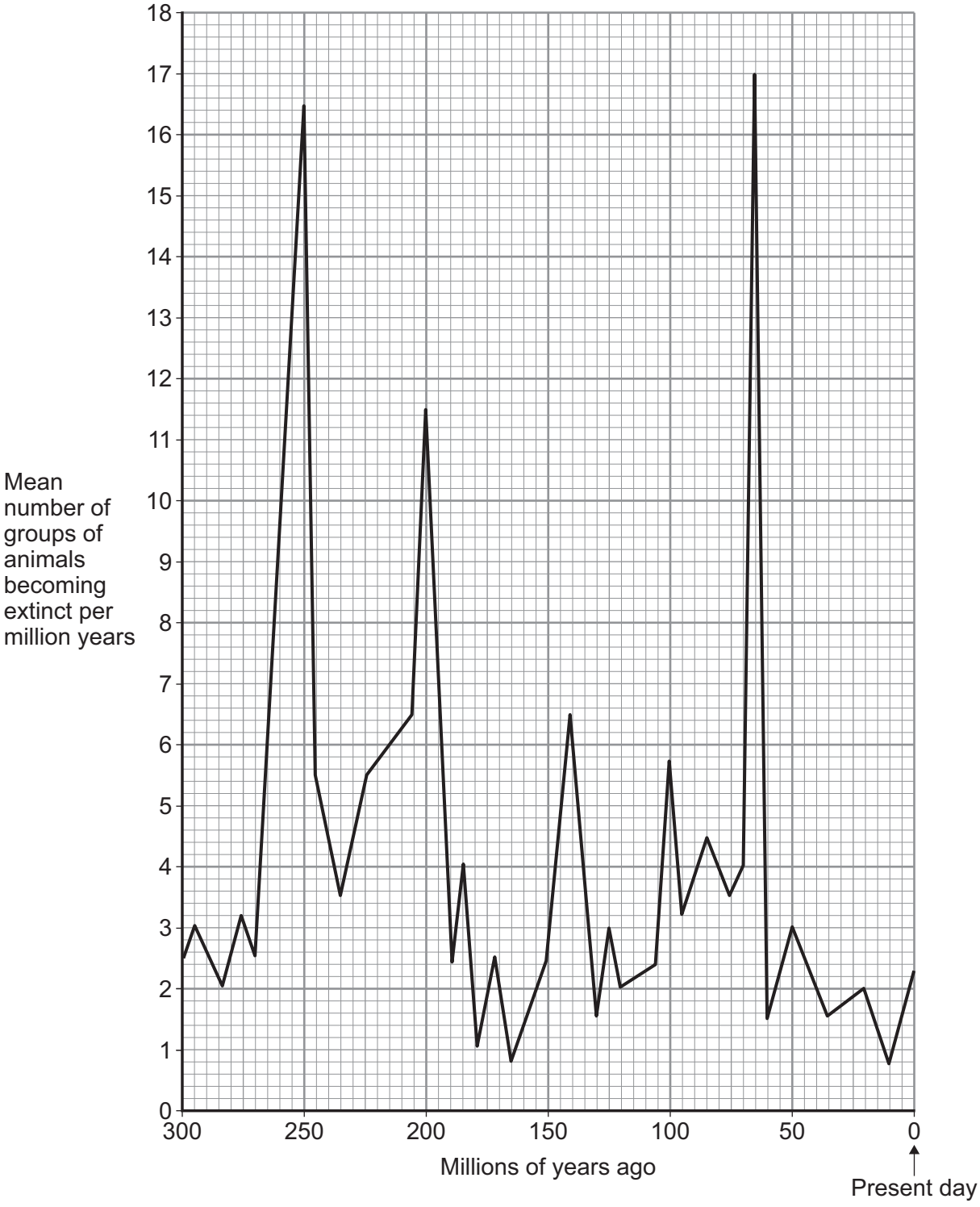
1

2

Question 5 continues on the next page

5 (b) **Figure 6** shows how the rate of extinction of groups of animals has varied over the past 300 million years.

Figure 6



5 (b) (i) If more than 10 groups of animals become extinct in a 1 million year period, scientists call this a 'mass extinction'.

How many mass extinctions occurred over the past 300 million years?

[1 mark]

_____

5 (b) (ii) How do we know what types of animals lived hundreds of millions of years ago?

[1 mark]

_____

_____

5 (c) Use information from **Figure 6** to answer questions **(c)(i)** and **(c)(ii)**.

5 (c) (i) How many years ago did the most recent mass extinction of animals occur?

[1 mark]

Tick (✓) **one** box.

50 million years ago ☐

65 million years ago ☐

250 million years ago ☐

5 (c) (ii) What was the mean number of groups of animals becoming extinct per million years in the most recent mass extinction?

[1 mark]

_____ groups per million years

5 (c) (iii) Why are scientists not sure how many groups of animals became extinct in the most recent mass extinction?

[1 mark]

_____

_____

9

6 (a) Which organ of the human body produces egg cells?

[1 mark]

Draw a ring around the correct answer.

liver **ovary** **testis**

6 (b) An egg joins with a sperm and develops into an embryo.

How many chromosomes are there in each cell of a human embryo?

[1 mark]

Draw a ring around the correct answer.

23 **46** **48**

6 (c) Some women find it difficult to have a baby. A doctor may suggest that these women should use In Vitro Fertilisation (IVF) to help them have a baby.

Table 2 shows how successful IVF was for women of different ages at one clinic.

Table 2

Age of women in years	Percentage of women who had a baby
<35	35
35–37	31
38–39	25
40–42	32
43–44	7
>44	0

6 (c) (i) A student thought that the result for women aged 40–42 was anomalous.

Suggest why the student thought this result was anomalous.

[1 mark]

_____

_____

6 (c) (ii) Describe the general trend in the results in **Table 2**.

You should ignore the anomalous result.

[1 mark]

_____

_____

6 (d) Some babies are born with a faulty chromosome.

Scientists investigated whether the chance of having a baby with a faulty chromosome is also related to the age of the woman.

Table 3 shows the scientists' results.

Table 3

Age of women in years	Number of women per 1000 who had a baby with a faulty chromosome
25	2.0
30	2.6
35	6.1
40	19.6
45	66.0

6 (d) (i) A 45-year-old woman is more likely than a 25-year-old woman to have a baby with a faulty chromosome.

How many times more likely?

[2 marks]

Answer = _____ times

6 (d) (ii) Suggest **two** reasons why many fertility clinics will **not** accept women over 40 years of age for IVF treatment.

Use information from **Table 2** and **Table 3** in your answer.

[2 marks]

1 _____

2 _____

8

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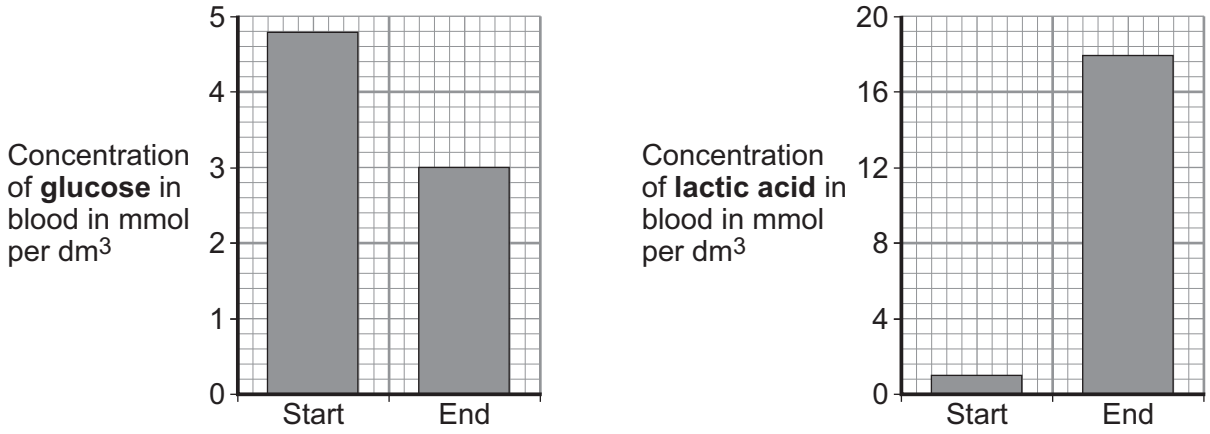
7 An athlete ran as fast as he could until he was exhausted.

7 (a) **Figure 7** shows the concentrations of glucose and of lactic acid in the athlete's blood at the start and at the end of the run.

Figure 7



7 (a) (i) Lactic acid is made during anaerobic respiration.

What does anaerobic mean?

[1 mark]

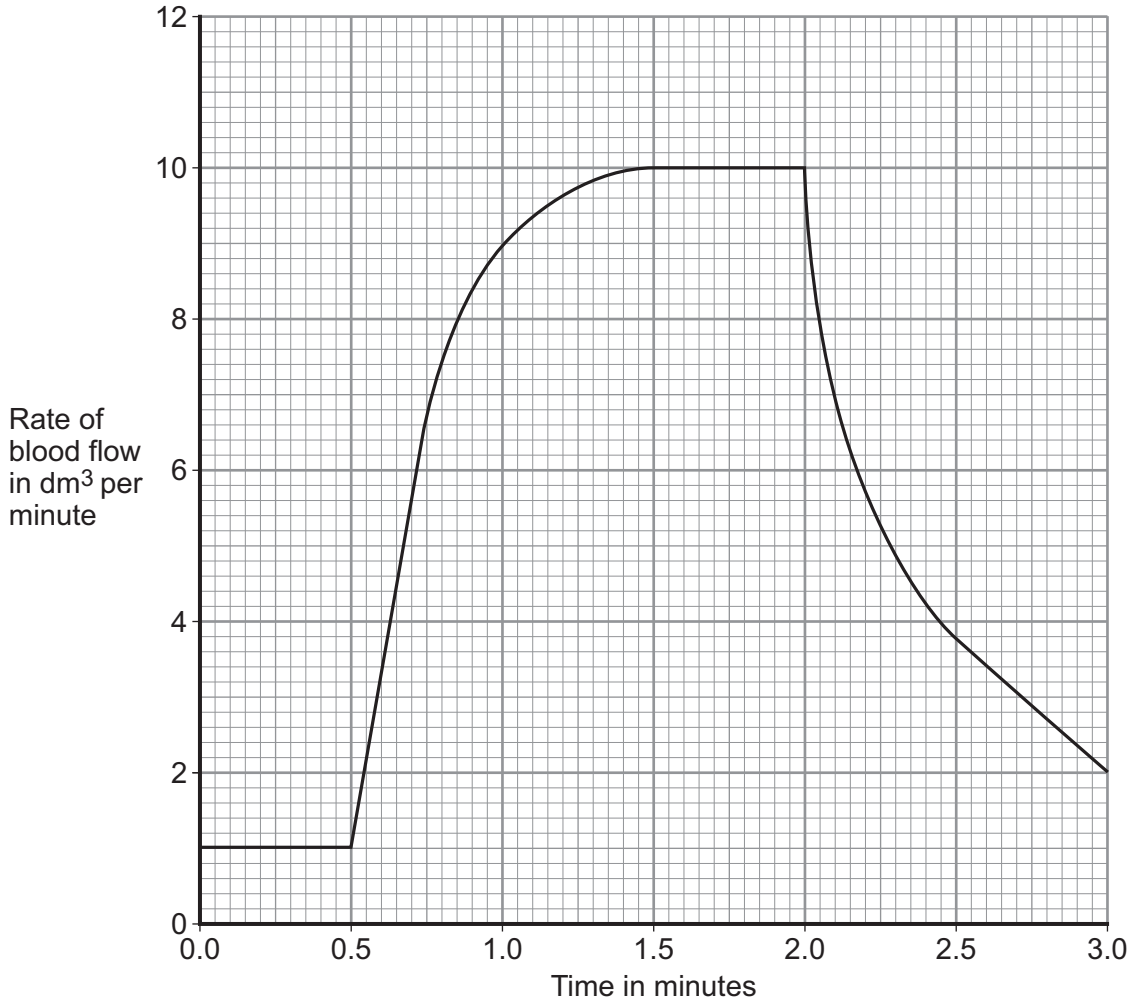
7 (a) (ii) Give evidence from **Figure 7** that the athlete respired anaerobically during the run.

[1 mark]

Question 7 continues on the next page

7 (b) **Figure 8** shows the effect of running on the rate of blood flow through the athlete's muscles.

Figure 8



7 (b) (i) For how many minutes did the athlete run?

[1 mark]

Time = _____ minutes

7 (b) (ii) Describe what happens to the rate of blood flow through the athlete's muscles during the run.

Use data from **Figure 8** in your answer.

[2 marks]

_____

_____

_____

_____

7 (b) (iii) Explain how the change in blood flow to the athlete's muscles helps him to run.

[4 marks]

9

Turn over for the next question

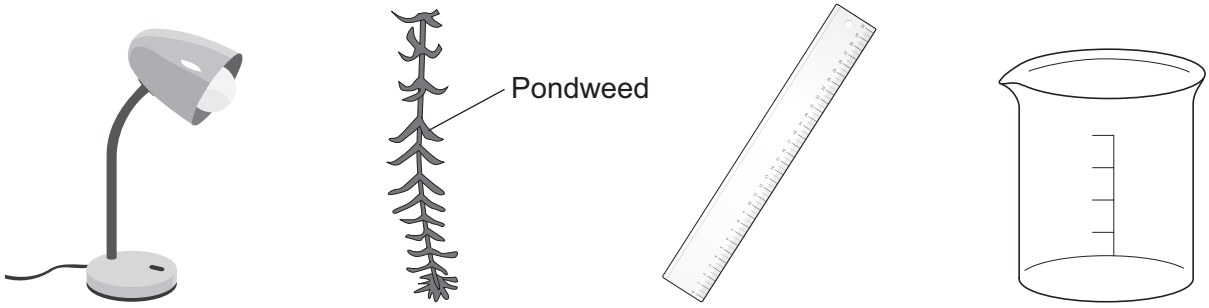
8 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Light intensity, carbon dioxide concentration and temperature are three factors that affect the rate of photosynthesis.

How would you investigate the effect of **light intensity** on the rate of photosynthesis?

Figure 9 shows some of the apparatus you might use.

Figure 9



Not to scale

You should include details of:

- how you would set up the apparatus and the materials you would use
- the measurements you would make
- how you could make this a fair test.

[6 marks]

Extra space _____

6

Turn over for the next question

9 Enzymes are made and used in all living organisms.

9 (a) What is an enzyme?

[2 marks]

9 (b) Many enzymes work inside cells.

In which part of a cell will most enzymes work?

[1 mark]

Draw a ring around the correct answer.

cell membrane **cytoplasm** **nucleus**

9 (c) We can also use enzymes in industry.

Hydrogen peroxide is a chemical that can be used to preserve milk.

Adding a small amount of hydrogen peroxide to the milk kills the bacteria that cause decay. Hydrogen peroxide does not kill all disease-causing bacteria.

The enzyme catalase can be added later to break down the hydrogen peroxide to oxygen and water.

A different way of preserving the milk is by heating it in large machines to 138 °C for a few seconds.

Suggest **one** advantage and **one** disadvantage of using hydrogen peroxide and catalase to preserve milk instead of using heat treatment.

[2 marks]

Advantage of hydrogen peroxide and catalase _____

_____

_____

Disadvantage of hydrogen peroxide and catalase _____

_____

_____

5

END OF QUESTIONS

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