

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



General Certificate of Secondary Education
Foundation Tier
January 2013

Additional Science
Unit Biology B2

BL2FP

Biology
Unit Biology B2

F

Tuesday 22 January 2013 9.00 am to 10.00 am

For this paper you must have:

- a ruler.

You may use a calculator.

Time allowed

- 1 hour

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 7(c) 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

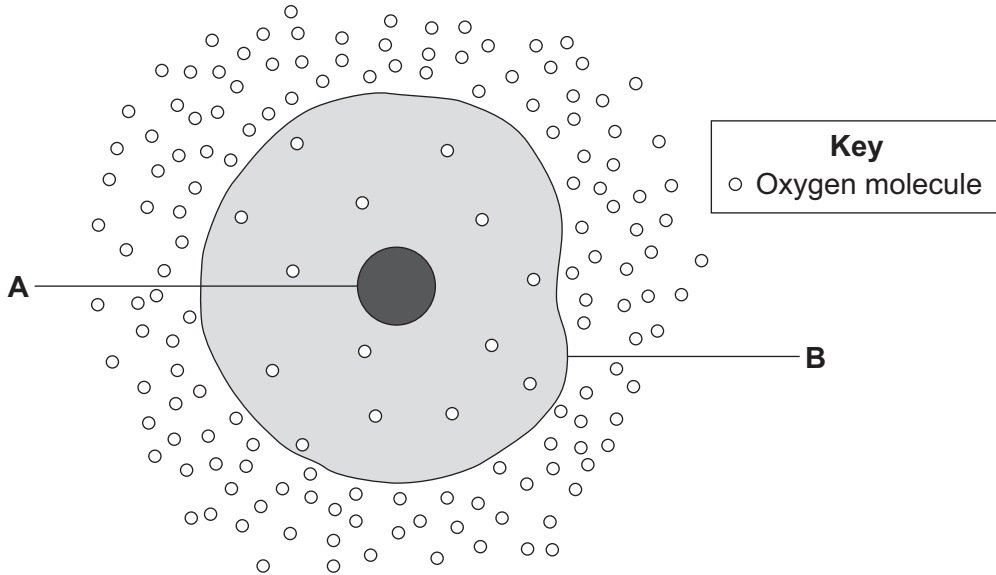
- In all calculations, show clearly how you work out your answer.



J A N 1 3 B L 2 F P O 1

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

1 The diagram shows a cell.



1 (a) (i) Use words from the box to name the structures labelled **A** and **B**.

cell membrane	chloroplast	cytoplasm	nucleus
---------------	-------------	-----------	---------

A

B

(2 marks)

1 (a) (ii) The cell in the diagram is an animal cell.

How can you tell it is an animal cell and **not** a plant cell?

Give **two** reasons.

1

.....

2

.....

(2 marks)



1 (b) Oxygen will diffuse into the cell in the diagram.

Why?

Use information from the diagram.

.....
.....

(1 mark)

1 (c) The cell shown in the diagram is usually found with similar cells.

Draw a ring around the correct answer to complete the sentence.

Scientists call a group of similar cells

an organ.

a system.

a tissue.

(1 mark)

6

Turn over for the next question

Turn over ►



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ANSWER IN THE SPACES PROVIDED**



2 When humans reproduce, chromosomes and genes are passed on to the next generation.

In each of the following questions, draw a ring around the correct answer to complete the sentence.

2 (a) A gene is a small section of

cellulose.
DNA.
protein.

(1 mark)

2 (b) The sex chromosomes in the human male are

X and X.
X and Y.
Y and Y.

(1 mark)

2 (c) (i) Most human body cells contain

23 chromosomes.
46 chromosomes.
92 chromosomes.

(1 mark)

2 (c) (ii) The number of chromosomes in a human gamete (sex cell)

is the same number as
half the number
twice the number in body cells.

(1 mark)

2 (d) Gametes are produced by

fertilisation.
meiosis.
mitosis.

(1 mark)

5

Turn over ►



3 The photograph shows a fossil footprint. The fossil was found in a rock at the bottom of a shallow river.

Scientists believe this is the footprint of a dinosaur. The dinosaur was alive 110 million years ago.



3 (a) (i) Suggest how the fossil shown in the photograph was formed.

.....
.....

(1 mark)

3 (a) (ii) Fossils may also be formed by other methods.

Describe **one** other method of forming a fossil.

.....
.....

(1 mark)

3 (b) Dinosaurs are now extinct.

Give **two** factors that can cause extinction.

1
.....

2
.....

(2 marks)



3 (c) How can fossils give evidence for evolution?

.....
.....

(1 mark)

3 (d) Scientists are uncertain about how life began on Earth.

Why?

.....
.....

(1 mark)

6

Turn over for the next question

Turn over ►



- 4** Some students wanted to find the number of thistle plants growing on a lawn. The students placed 10 quadrats at different positions on the lawn. Each quadrat measured 1 metre \times 1 metre. The students counted the number of thistle plants in each quadrat.

- 4 (a)** Which method should the students use to decide where to place the 10 quadrats?

Tick (✓) **one** box.

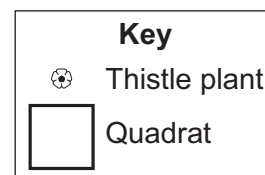
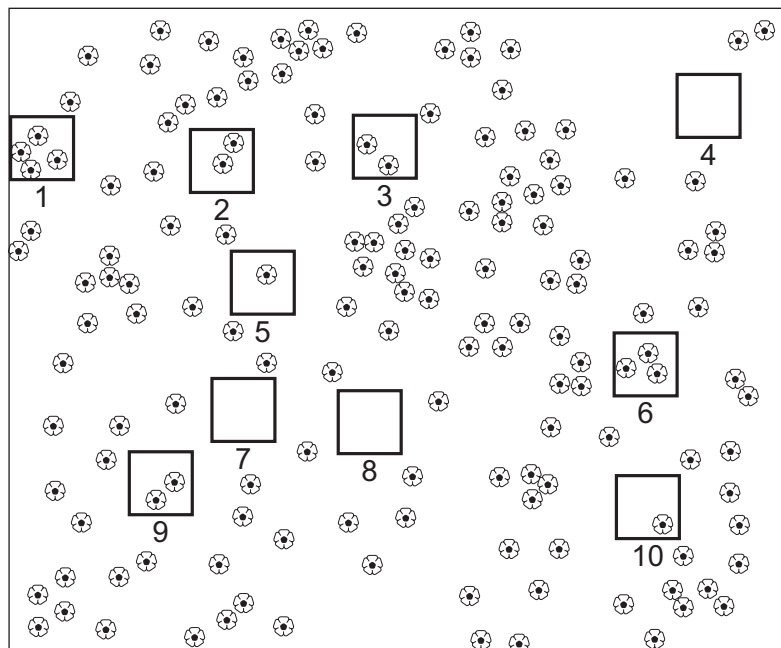
Place the quadrats as evenly as possible around the lawn.

Place 5 quadrats in areas with many thistle plants and 5 quadrats in areas with only a few thistle plants.

Place all the quadrats randomly on the lawn.

(1 mark)

- 4 (b)** The diagram shows the lawn with the positions of the thistle plants and the students' 10 quadrats.



4 (b) (i) Complete the table to show:

- how many thistle plants the students found in each of the first four quadrats
- the total number of thistle plants found in all 10 quadrats.

Quadrat number	Number of thistle plants in each quadrat
1	
2	
3	
4	
5	1
6	3
7	0
8	0
9	2
10	1
Total	

(2 marks)

4 (b) (ii) Calculate the mean number of thistle plants in one quadrat.

.....

Mean =

(1 mark)

4 (b) (iii) The lawn measured 12 metres long and 10 metres wide.

Use your answer from part (b)(ii) to estimate the number of thistle plants on the lawn.

.....

.....

Estimated number of thistle plants =

(2 marks)

4 (c) How could the students make their estimate more accurate?

.....

.....

(1 mark)

7

Turn over ►



5 In each question, draw a ring around the correct answer to complete the sentence.

5 (a) Our understanding of how genes are inherited is mostly because of

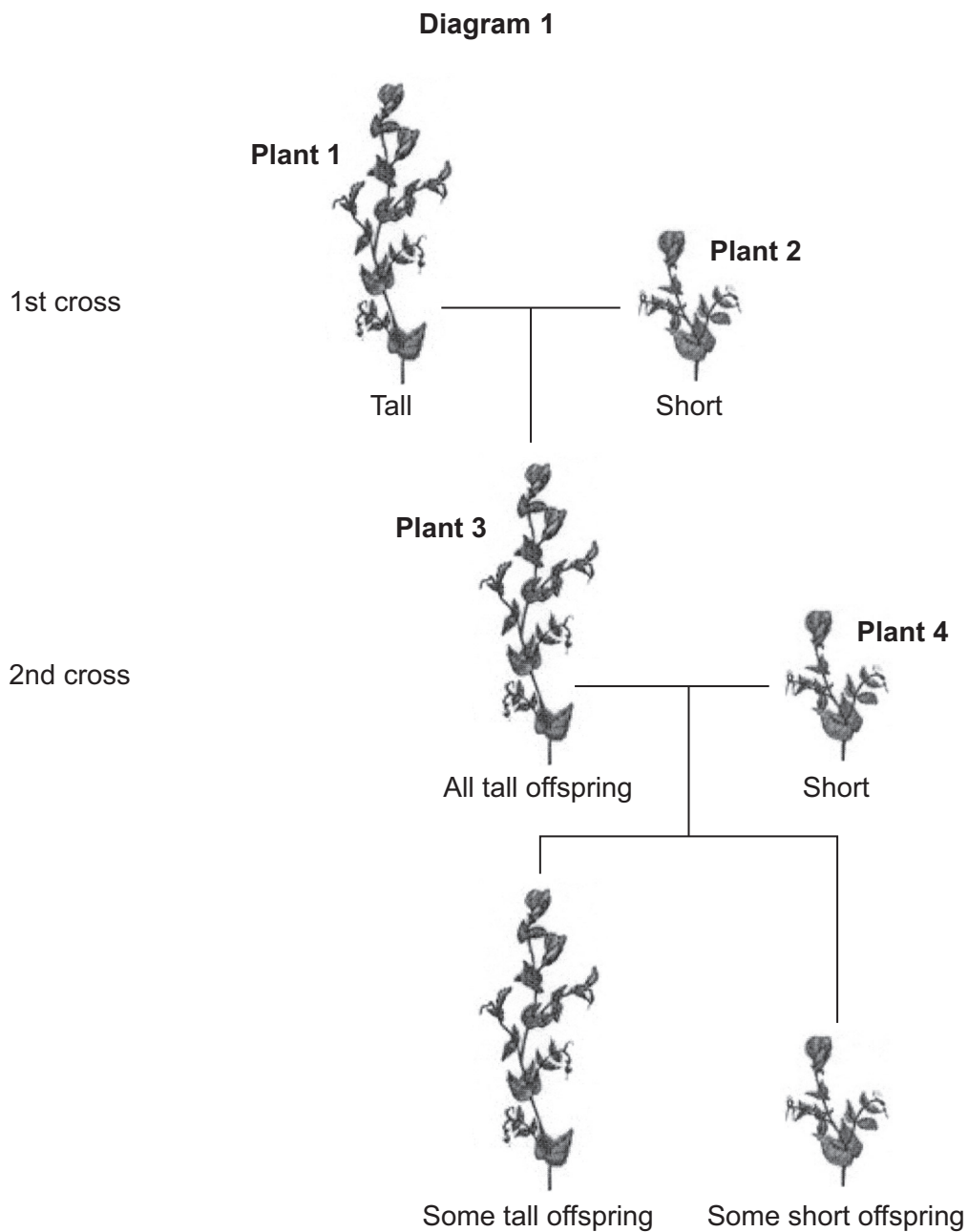
the work of

Darwin.
Lamarck.
Mendel.

(1 mark)

5 (b) A scientist investigated inheritance in pea plants.

The scientist crossed tall pea plants with short pea plants. **Diagram 1** shows the results.



In the rest of this question, the following symbols are used to represent alleles.

T = allele for tall

t = allele for short

- 5 (b) (i)** The 1st cross in **Diagram 1** produced 120 offspring. All of these offspring were tall.

This shows that **plant 1** contained the alleles

TT.

Tt.

tt.

(1 mark)

- 5 (b) (ii)** **Plant 3** is tall because of

a dominant allele.

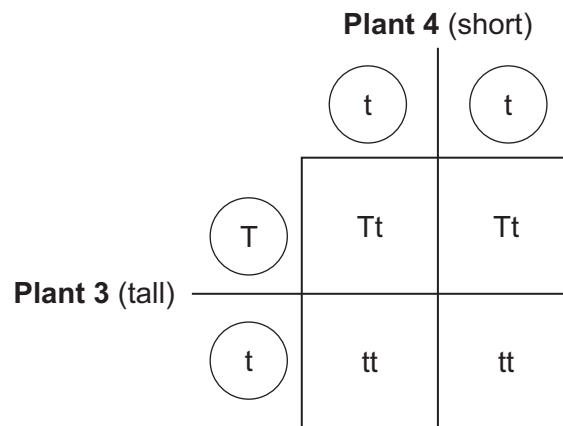
the environment.

a recessive allele.

(1 mark)

- 5 (c)** **Diagram 2** gives more information about the cross between **plant 3** and **plant 4**.

Diagram 2



This cross produced some tall offspring and some short offspring.

The ratio of tall to short offspring in **Diagram 2** is

1:1.

2:1.

3:1.

(1 mark)

Question 5 continues on the next page

Turn over ►



5 (d) Two short plants were crossed. This cross produced 100 offspring.

The expected offspring would be

100 short plants.

50 tall plants and 50 short plants.

75 tall plants and 25 short plants.

(1 mark)

5



Turn over for the next question

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Turn over ►



6 Scientists investigated how exercise affects blood flow to different organs in the body.

The scientists made measurements of blood flow to different organs of:

- a person resting in a room at 20°C
- the same person, in the same room, doing vigorous exercise at constant speed on an exercise cycle.

The table shows the scientists' results.

Organ	Blood flow in cm ³ per minute whilst ...	
	resting	doing vigorous exercise
Brain	750	750
Heart	250	1000
Muscles	1200	22 000
Skin	500	600
Other	3100	650

6 (a) In this investigation, it was better to do the exercise indoors on an exercise cycle than to go cycling outdoors on the road.

Suggest **two** reasons why.

Do **not** include safety reasons.

1

.....

.....

2

.....

.....

(2 marks)

6 (b) Blood flow to **one** organ did **not** change between resting and vigorous exercise.

Which organ?

(1 mark)



6 (c) (i) How much more blood flowed to the muscles during vigorous exercise than when resting?

.....
.....

Answer = cm³ per minute
(2 marks)

6 (c) (ii) Name **two** substances needed in larger amounts by the muscles during vigorous exercise than when resting.

1

2

(2 marks)

6 (c) (iii) Tick (✓) **one** box to complete the sentence.

The substances you named in part **(c)(ii)** helped the muscles to

make more lactic acid.

respire aerobically.

make more glycogen.

(1 mark)

Question 6 continues on the next page

Turn over ►



6 (c) (iv) The higher rate of blood flow to the muscles during exercise removed larger amounts of waste products made by the muscles.

Which **two** substances need to be removed from the muscles in larger amounts during vigorous exercise?

Tick (✓) **two** boxes.

Amino acids

Carbon dioxide

Glycogen

Lactic acid

(2 marks)

6 (d) The total blood flow was much higher during exercise than when resting.

One way to increase the total blood flow is for the heart to pump out a larger volume of blood each beat.

Give **one** other way to increase the blood flow.

.....
.....

(1 mark)

11



Turn over for the next question

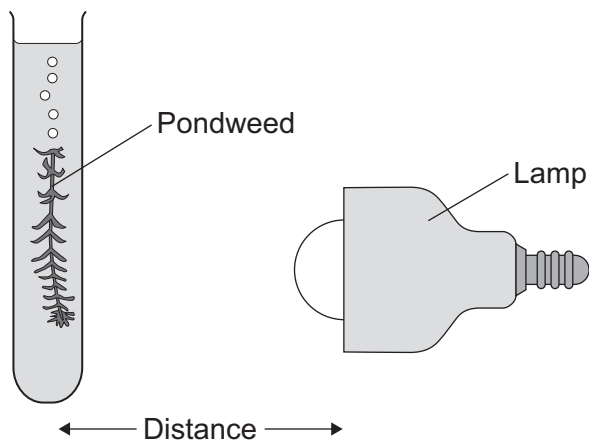
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- 7 Some students investigated the effect of light intensity on the rate of photosynthesis. They used the apparatus shown in **Diagram 1**.

Diagram 1



The students:

- placed the lamp 10cm from the pondweed
- counted the number of bubbles of gas released from the pondweed in 1 minute
- repeated this for different distances between the lamp and the pondweed.

- 7 (a) The lamp gives out heat as well as light.

What could the students do to make sure that heat from the lamp did **not** affect the rate of photosynthesis?

.....
.....

(1 mark)



7 (b) The table shows the students' results.

Distance in cm	Number of bubbles per minute
10	84
15	84
20	76
40	52
50	26

7 (b) (i) At distances between 15cm and 50cm, light was a limiting factor for photosynthesis.

What evidence is there for this in the table?

.....

.....

(1 mark)

7 (b) (ii) Give **one** factor that could have limited the rate of photosynthesis when the distance was between 10cm and 15cm.

.....

(1 mark)

Question 7 continues on the next page

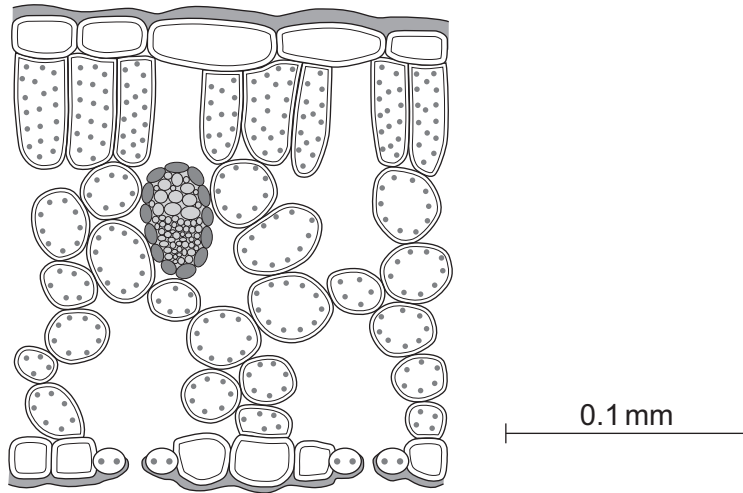
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7 (c) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Diagram 2 shows a section through a plant leaf.

Diagram 2



Describe the structure of the leaf and the functions of the tissues in the leaf.

You should use the names of the tissues in your answer.

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(6 marks)

9

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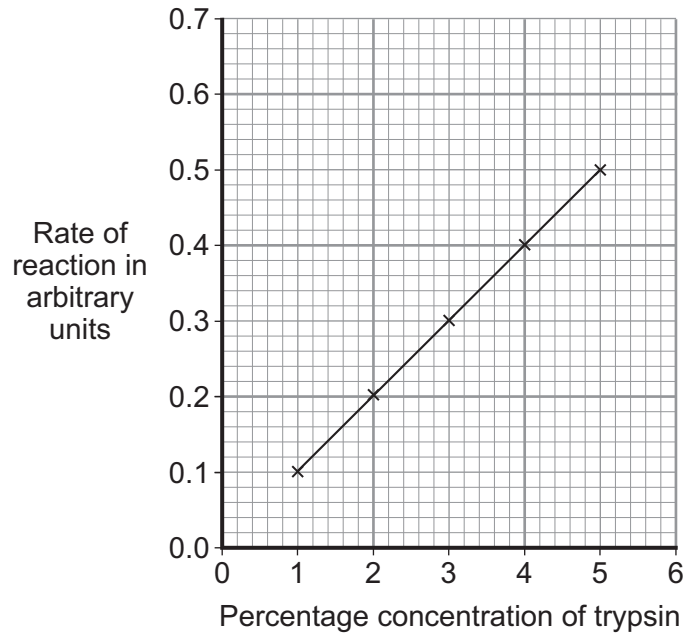


8 Trypsin is a protease enzyme. Trypsin will digest a protein called gelatine which covers the surface of photographic film.

Some students investigated the time taken to digest the gelatine with trypsin. The students used five different concentrations of trypsin.

The rate of reaction was calculated from the time taken for the gelatine to be digested.

The graph shows the students' results.



8 (a) (i) Describe the relationship between the concentration of trypsin and the rate of reaction.

.....

.....

.....

.....

(2 marks)

8 (a) (ii) Use the graph to predict the rate of reaction with 6% trypsin.

..... arbitrary units
(1 mark)



8 (b) In industry, trypsin is used to pre-treat some baby foods.
In their experiment, the students used 1–5% trypsin at 20°C.
The baby food manufacturers make most profit if they use 0.5% trypsin at 35°C.

Suggest why the manufacturers make most profit with these conditions.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

8 (c) (i) Describe the effect trypsin would have on the baby food.

.....

.....

.....

.....

(2 marks)

8 (c) (ii) Apart from protease enzymes, give **one** other use of a **named** enzyme in industry.

.....

.....

.....

.....

(2 marks)

11

END OF QUESTIONS



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