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	
9	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2015

Additional Science
Unit Biology B2

BL2FP

F

Biology
Unit Biology B2

Tuesday 12 May 2015 1.30 pm to 2.30 pm

For this paper you must have:
- a ruler.

You may use a calculator.

A

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 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.

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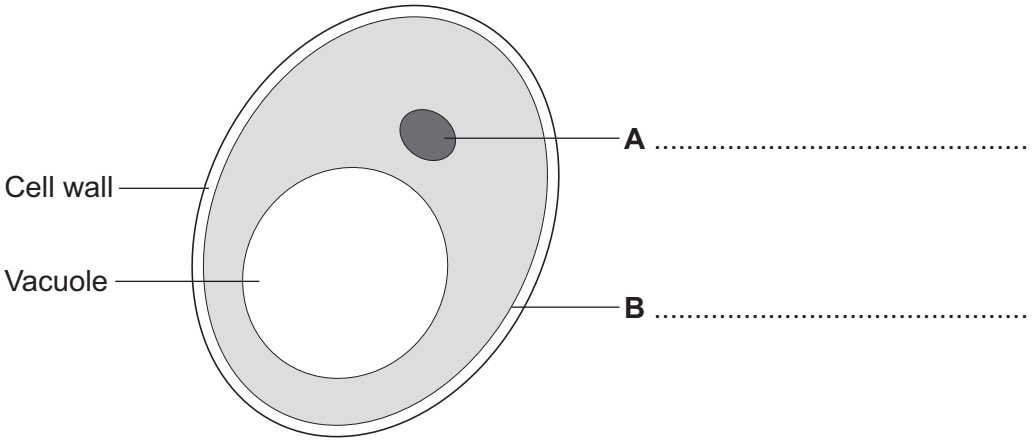
Answer **all** questions in the spaces provided.

1 Human cells and yeast cells have some parts that are the same.

1 (a) **Figure 1** shows a yeast cell.

Figure 1



Parts **A** and **B** in **Figure 1** are found in human cells and in yeast cells.
On **Figure 1**, label parts **A** and **B**.

[2 marks]

1 (b) Many types of cell can divide to form new cells.

Some cells in human skin can divide to make new skin cells.

Why do human skin cells need to divide?

[1 mark]

.....

.....

Do not write outside the box

1 (c) Human stem cells can develop into many different types of human cell.

1 (c) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

embryos	**hair**	**nerve cells**

Human stem cells may come from ..... .

1 (c) (ii) Use the correct answer from the box to complete the sentence.

[1 mark]

cystic fibrosis	**paralysis**	**polydactyly**

Human stem cells can be used to treat ..... .

5

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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2 (a) Enzymes are used in body cells.

2 (a) (i) What is an enzyme?

Draw a ring around the correct answer.

[1 mark]

an antibody **a catalyst** **a hormone**

2 (a) (ii) All enzymes are made of the same type of substance.

What is this substance?

Draw a ring around the correct answer.

[1 mark]

carbohydrate **fat** **protein**

2 (a) (iii) Where is the enzyme amylase produced in the human body?

Draw a ring around the correct answer.

[1 mark]

liver **salivary glands** **stomach**

2 (b) Enzymes are sometimes used in industry.

Draw **one** line from each enzyme to the correct industrial use of that enzyme.

[3 marks]

Enzyme	Industrial use
Carbohydrase	Changes starch into sugars
Isomerase	Removes grease stains from clothes
Protease	Pre-digests proteins in some baby foods
	Changes glucose syrup into fructose syrup

6

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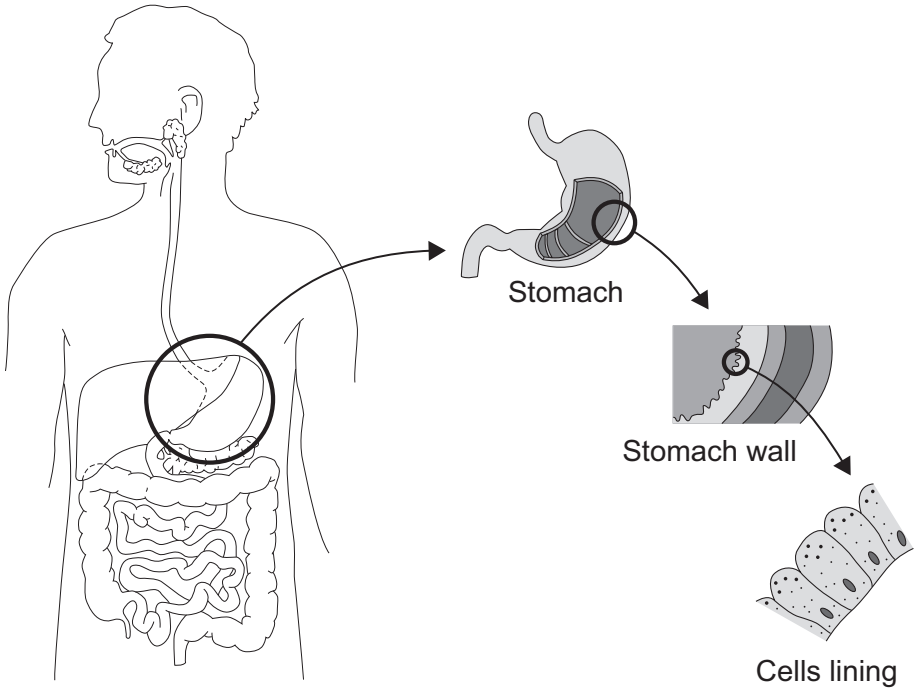
3 **Figure 2** shows the parts of the body that digest and absorb food.

Figure 2 also shows some details about the structure of the stomach.

Figure 2



3 (a) Complete **Table 1** to show whether each structure is an organ, an organ system or a tissue.

For each structure, tick (✓) **one** box.

[2 marks]

Table 1

Structure	Organ	Organ system	Tissue
Stomach			
Cells lining the stomach			
Mouth, oesophagus, stomach, liver, pancreas, small and large intestine			

Do not write outside the box

3 (b) (i) The blood going to the stomach has a high concentration of oxygen.
The cells lining the stomach have a low concentration of oxygen.

Complete the following sentence.

[1 mark]

Oxygen moves from the blood to the cells lining the stomach by

the process of ..... .

3 (b) (ii) What other substance must move from the blood to the cells lining the stomach so that respiration can take place?

Draw a ring around the correct answer.

[1 mark]

glucose **protein** **starch**

3 (b) (iii) In which part of a cell does aerobic respiration take place?

Draw a ring around the correct answer.

[1 mark]

cell membrane **mitochondria** **nucleus**

5

Turn over for the next question

Do not write outside the box

4 Photosynthesis uses carbon dioxide to make glucose.

4 (a) (i) Complete the equation for photosynthesis.

[2 marks]

carbon dioxide + ... $\xrightarrow{\text{energy}}$ glucose + ...

4 (a) (ii) What type of energy does a plant use in photosynthesis?

[1 mark]

.....

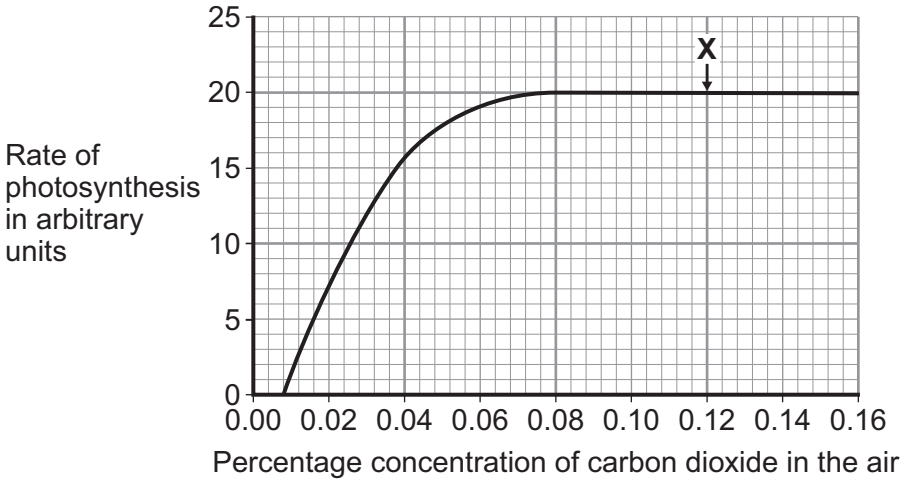
4 (a) (iii) Which part of a plant cell absorbs the energy needed for photosynthesis?

[1 mark]

.....

4 (b) **Figure 3** shows the effect of the concentration of carbon dioxide on the rate of photosynthesis in tomato plants at 20 °C.

Figure 3



4 (b) (i) What is the maximum rate of photosynthesis of the tomato plants shown in **Figure 3**?

[1 mark]

..... arbitrary units

4 (b) (ii) At point **X** on **Figure 3**, carbon dioxide is **not** a limiting factor of photosynthesis.

Suggest **one** factor that is limiting the rate of photosynthesis at point **X**.

[1 mark]

.....

Do not write outside the box

4 (c) A farmer plans to grow tomatoes in a large greenhouse.

The concentration of carbon dioxide in the atmosphere is 0.04%.
The farmer adds carbon dioxide to the greenhouse so that its concentration is 0.08%.

4 (c) (i) Why does the farmer use 0.08% carbon dioxide?

[1 mark]

Tick (✓) **one** box.

To increase the rate of growth of the tomato plants ☐

To increase the rate of respiration of the tomato plants ☐

To increase water uptake by the tomato plants ☐

4 (c) (ii) Why does the farmer **not** use a concentration of carbon dioxide higher than 0.08%?

[2 marks]

Tick (✓) **two** boxes.

Because it would cost more money than using 0.08% ☐

Because it would decrease the temperature of the greenhouse ☐

Because it would not increase the rate of photosynthesis of the tomato plants any further ☐

Because it would increase water loss from the tomato plants ☐

9

Turn over for the next question

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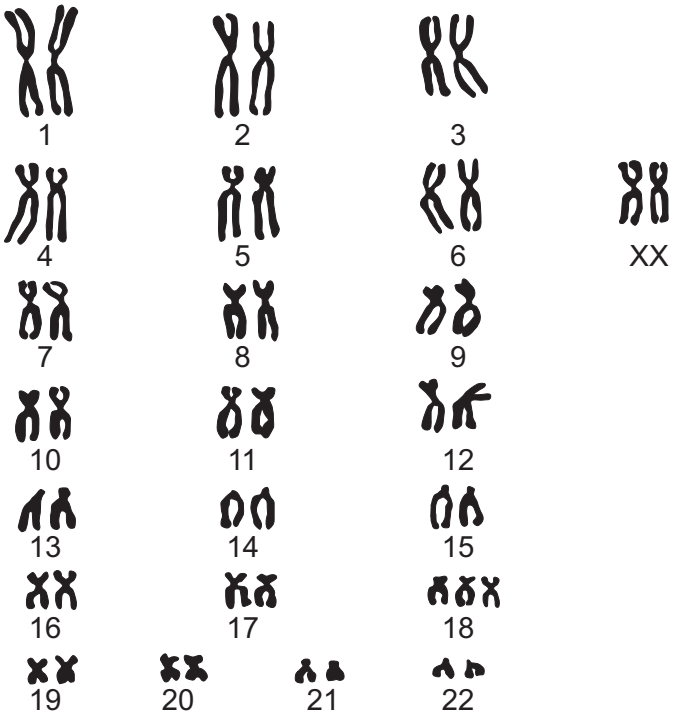
5 Genetic disorder **E** is a condition caused by a change in the chromosomes.

5 (a) **Figure 4** shows the chromosomes from one cell of a person with genetic disorder **E**.

Figure 4



5 (a) (i) How do you know this person is female?

Use information from **Figure 4**.

[1 mark]

.....

.....

5 (a) (ii) Describe how the chromosomes shown in **Figure 4** are different from the chromosomes from a person who does not have genetic disorder **E**.

[2 marks]

.....

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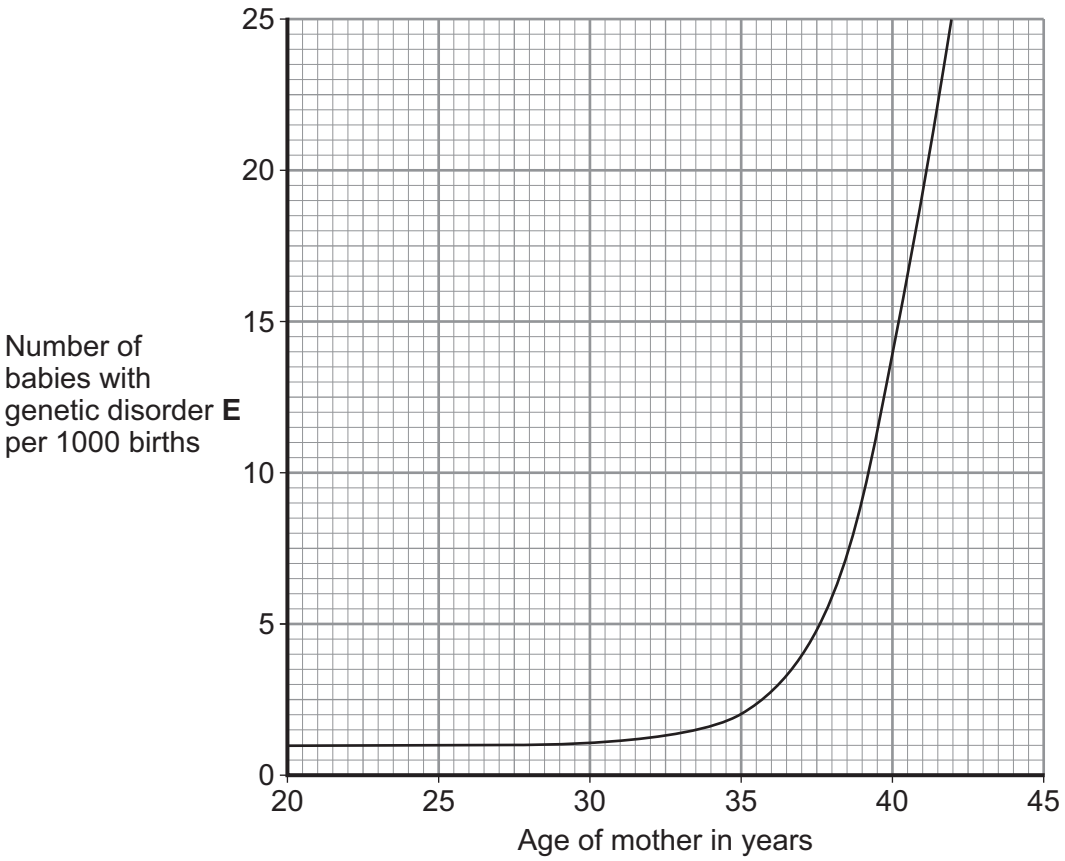
5 (b) As a woman gets older, the chance of her having a baby with genetic disorder **E** increases.

Figure 5 shows this.

Figure 5



5 (b) (i) The chance of a 35-year-old woman having a baby with genetic disorder **E** is 2 per 1000 births.

What is the chance of a 40-year-old woman having a baby with genetic disorder **E**?

[1 mark]

..... per 1000 births

5 (b) (ii) A 40-year-old woman is more likely than a 35-year-old woman to have a baby with genetic disorder **E**.

How many times more likely?

[1 mark]

..... times

Question 5 continues on the next page

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5 (c) A 41-year-old woman wants to have a baby. A 41-year-old woman has an increased chance of having a baby with genetic disorder **E**.

Doctors can screen embryos for genetic disorder **E**.

Table 2 gives some information about two methods of embryo screening.

Table 2

Method 1	Method 2
1 The woman is given hormones to cause the release of a few eggs. The eggs are taken from her body in a minor operation. The eggs are fertilised in a glass dish.	1 The woman gets pregnant in the normal way.
2 One cell is taken from each embryo when the embryo is 3 days old.	2 Cells are taken when the embryo is 10 weeks old.
3 Cells are screened for genetic disorder **E**.	3 Cells are screened for genetic disorder **E**.
4 An unaffected embryo is placed in the woman's uterus. Embryos that are not used are destroyed or used in medical research.	4 An unaffected fetus is allowed to develop. If the fetus has genetic disorder **E**, the woman can choose to have an abortion.
5 This method costs about £6000.	5 This method costs about £600.

Use information from **Table 2** to give **two** advantages and **one** disadvantage of **Method 1** compared with **Method 2** for detecting genetic disorder **E**.

[3 marks]

Advantages of **Method 1**:

1 .....

.....

2 .....

.....

Disadvantage of **Method 1**:

.....

.....

8

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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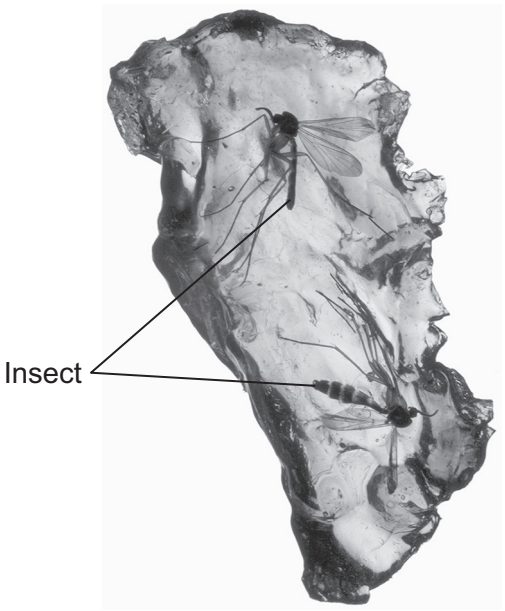
6 Fossils give us information about organisms from a long time ago.

6 (a) Amber is a solid, glass-like material. Amber is formed from a thick, sticky liquid which oozes out of pine trees.

Figure 6 shows two fossil insects in amber.

Figure 6



6 (a) (i) Suggest how the insects came to be preserved in the amber.

[2 marks]

.....

.....

.....

.....

6 (a) (ii) Give **two** other ways fossils are formed.

[2 marks]

1 .....

.....

2 .....

.....

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6 (b) The fossil record shows that many organisms, including the dinosaurs, became extinct 65 million years ago.

One theory was that volcanic activity might have caused this mass extinction. Many scientists believe that this extinction was caused when an asteroid collided with the Earth.

6 (b) (i) A new scientific theory may replace an old theory.

Why might this happen?

[1 mark]

Tick (✓) **one** box.

Evidence from amber is unreliable. ☐

Internet evidence is more reliable than fossil evidence. ☐

New technology provides more valid evidence. ☐

6 (b) (ii) Give **three** reasons, other than volcanic activity and collision with an asteroid, why a species may become extinct.

[3 marks]

1 .....

.....

2 .....

.....

3 .....

.....

8

Turn over for the next question

Do not write outside the box

7 Lipase is an enzyme that digests fat.

7 (a) (i) Complete the equation to show the digestion of fat.

Use the correct answer from the box.

[1 mark]

glucose	**glycerol**	**glycogen**

fat $\xrightarrow{\text{lipase}}$ fatty acids + ...

7 (a) (ii) Name **one** organ that makes lipase.

[1 mark]

.....

7 (b) Some students investigated the effect of bile on the digestion of fat by lipase.

The students:
1 mixed milk and bile in a beaker
2 put the pH sensor of a pH meter into the beaker
3 added lipase solution
4 recorded the pH at 2-minute intervals
5 repeated steps 1 to 4, but used water instead of bile.

Suggest **two** variables that the students should have controlled in this investigation.

[2 marks]

1 .....

.....

2 .....

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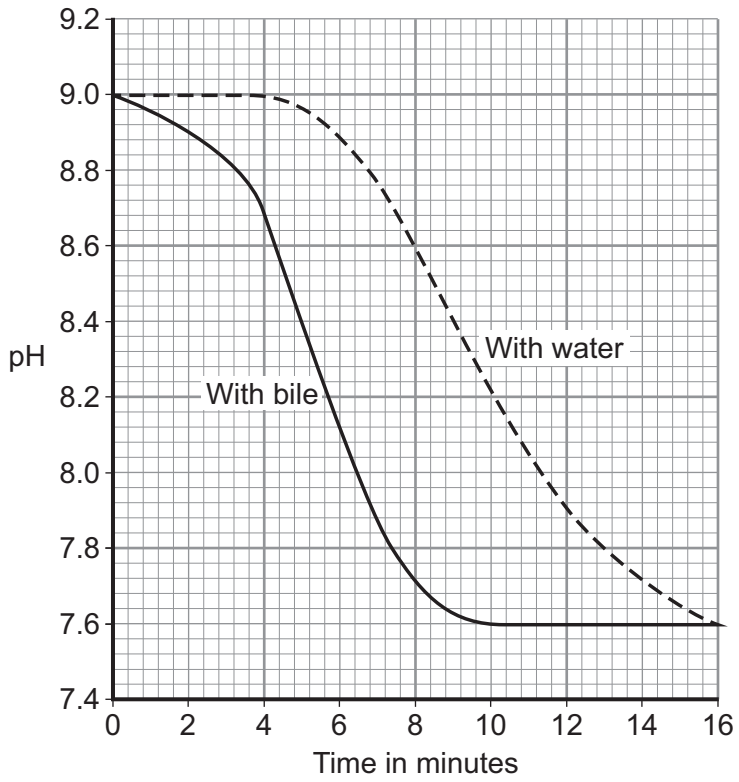
7 (c) **Figure 7** shows the students' results.

Figure 7



7 (c) (i) Why did the pH decrease in both investigations?

[1 mark]

.....

.....

7 (c) (ii) Bile helps lipase to digest fat.

What evidence is there in **Figure 7** to support this conclusion?

[1 mark]

.....

.....

7 (c) (iii) Suggest **one** reason why the contents of both beakers had the same pH at the end of the investigations.

[1 mark]

.....

.....

7

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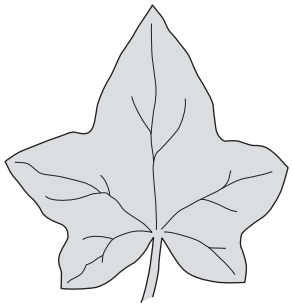
8 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

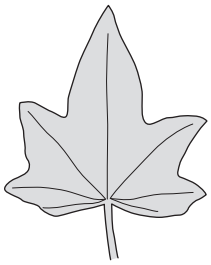
Ivy plants can grow up trees and walls.

Figure 8 shows two ivy leaves. One leaf is from an ivy plant growing up a tree in the centre of a shady woodland area. The other leaf is from an ivy plant growing up a tree in a sunny area at the edge of the woodland.

Figure 8



Ivy leaf from shady woodland area (centre of woodland)



Ivy leaf from sunny area (edge of woodland)

A student makes the following hypothesis.

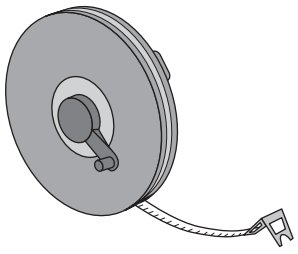
"The size of ivy leaves decreases as light intensity increases."

How would you use the apparatus shown in **Figure 9** to test this hypothesis?

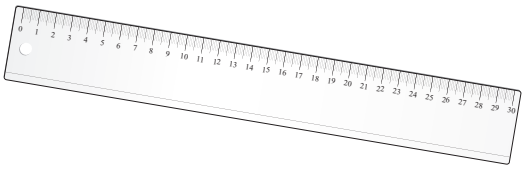
You should include details of how you would make sure the results are valid.

[6 marks]

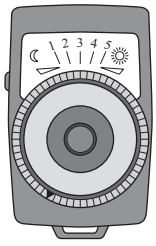
Figure 9



100 m tape measure



Ruler



Light meter

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Extra space .....

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Turn over for the next question

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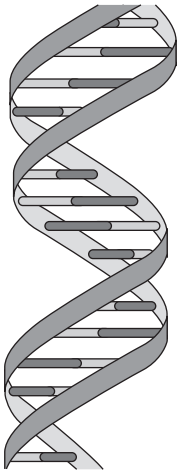
9 DNA is the genetic material of human cells.

Figure 10 shows the structure of part of a DNA molecule.

Figure 10



9 (a) (i) Describe where DNA is found in a human cell.

[2 marks]

.....

.....

.....

9 (a) (ii) When a cell divides by mitosis the new cells are genetically identical.

What causes the cells to be genetically identical?

[1 mark]

.....

.....

9 (b) Many genes have different forms called alleles.

9 (b) (i) A person has polydactyly (extra fingers or toes). Polydactyly is caused by a dominant allele.
What is the smallest number of copies of the dominant allele for polydactyly that could be found in a body cell of this person?

[1 mark]

.....

9 (b) (ii) Another person has cystic fibrosis. Cystic fibrosis (CF) is caused by a recessive allele.
How many copies of the recessive CF allele are there in a body cell of this person?

[1 mark]

.....

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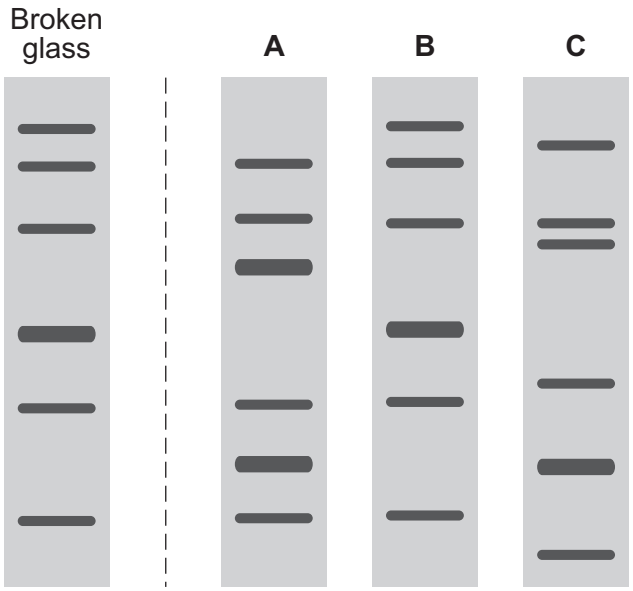
9 (c) A burglar broke into a house. The burglar cut his hand on some broken glass. Scientists extracted DNA from the blood on the broken glass.

The scientists analysed the DNA from the glass and DNA from three suspects, **A**, **B** and **C**. The scientists used a method called DNA fingerprinting.

Figure 11 shows the scientists' results.

Figure 11



Which suspect, **A**, **B** or **C**, is most likely to have been the burglar?

[1 mark]

Tick (✓) **one** box.

A ☐

B ☐

C ☐

6

END OF QUESTIONS

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