



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

**GCSE**

**COMBINED SCIENCE: TRILOGY**

Higher Tier

Biology Paper 1H

**8464/B/1H**

Tuesday 15 May 2018

Afternoon

Time allowed: 1 hour 15 minutes

**H**

For this paper you must have:

- a ruler
- a scientific calculator.

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



**BLANK PAGE**



## INSTRUCTIONS

- Use black ink or black ball-point pen.
- Answer ALL questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

## INFORMATION

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



**0 1** This question is about cell structures.

**0 1 . 1** Draw **ONE** line from each cell structure to the type of cell where the structure is found.  
[2 marks]

**Cell Structure**

**Type of cell where the structure is found**

**Nucleus**

**Prokaryotic cells**

**Permanent vacuole**

**Plant cells only**

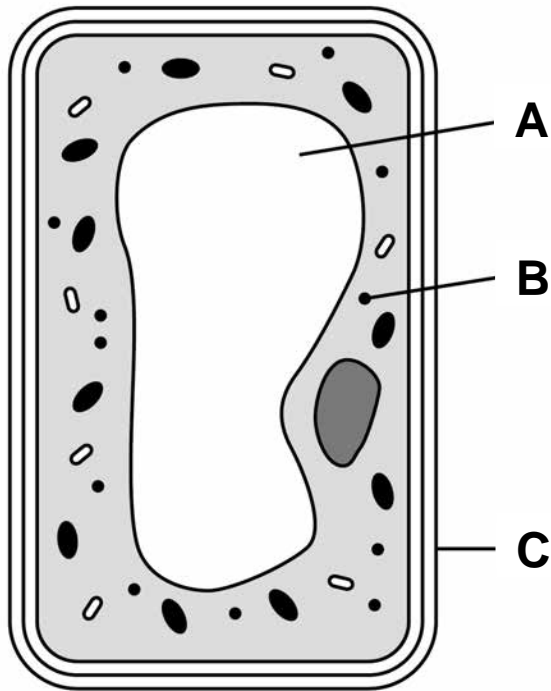
**Plasmid**

**Eukaryotic cells**



**0 1 . 2** FIGURE 1 shows a plant cell.

**FIGURE 1**



**What are the names of structures A, B and C?  
[1 mark]**

**Tick ONE box.**

Structure A	Structure B	Structure C
Chloroplast	Vacuole	Cell wall
Nucleus	Chloroplast	Cell membrane
Vacuole	Mitochondrion	Cell membrane
Vacuole	Ribosome	Cell wall

**[Turn over]**

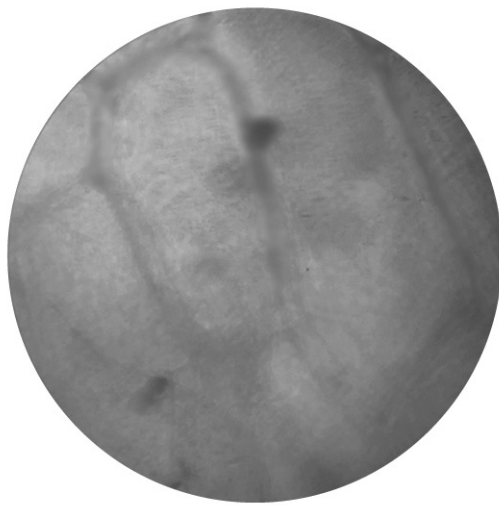


A student observed slides of onion cells using a microscope.

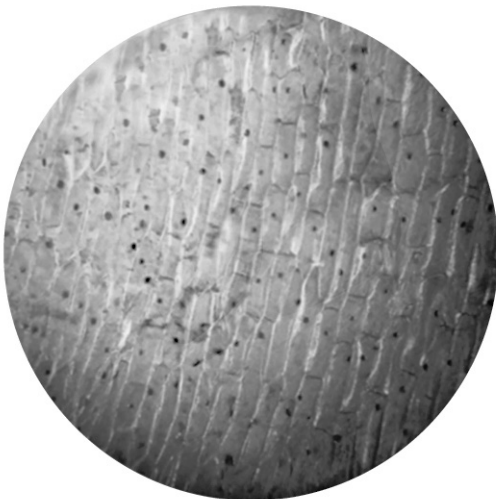
FIGURE 2 shows two of the slides the student observed.

FIGURE 2

SLIDE A



SLIDE B



The cells on the slides are NOT clear to see.



**0 1 . 3** Describe how the student should adjust the microscope to see the cells on SLIDE A more clearly. [1 mark]

---

---

---

**0 1 . 4** Describe how the student should adjust the microscope to see the cells on SLIDE B more clearly. [2 marks]

---

---

---

---

---

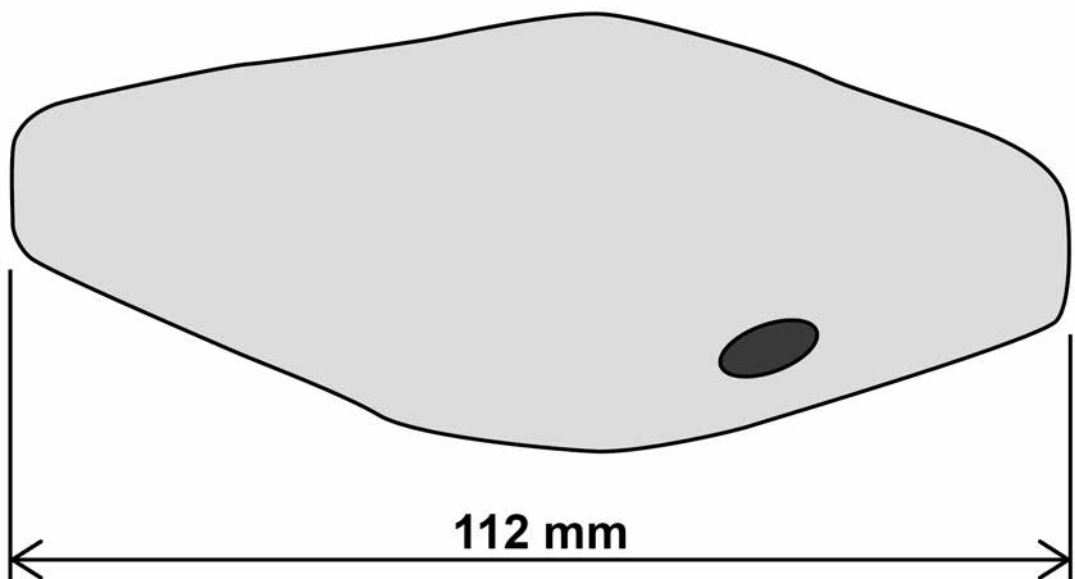
**[Turn over]**



**01.5** The student made the necessary adjustments to get a clear image.

**FIGURE 3** shows the student's drawing of one of the cells.

**FIGURE 3**





The real length of the cell was 280 micrometres ( $\mu\text{m}$ ).

Calculate the magnification of the drawing.  
[3 marks]

---

---

---

---

---

---

---

---

---

---

---

---

Magnification =  $\times$  \_\_\_\_\_

9

[Turn over]



0 2

**Coronary heart disease (CHD) is a non-communicable disease.**

**CHD is caused when fatty material builds up in the coronary arteries.**

0 2 . 1

**Explain what a non-communicable disease is. [2 marks]**

---

---

---

---

---

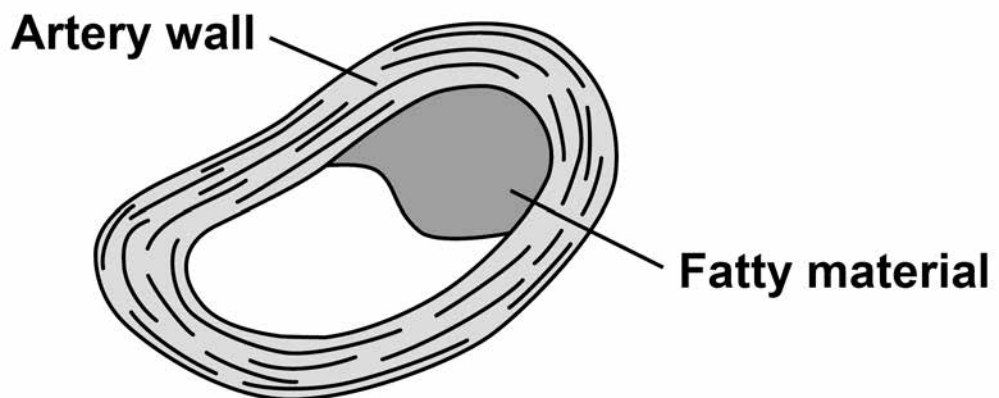
---

---

---

**FIGURE 4 shows a coronary artery of someone with CHD.**

**FIGURE 4**



**0 2 . 2** Explain how CHD can cause a heart attack.  
[3 marks]

---

---

---

---

---

---

---

---

---

---

---

**[Turn over]**



**0 2 . 3** Explain how lifestyle and medical risk factors increase the chance of developing CHD.  
**[6 marks]**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

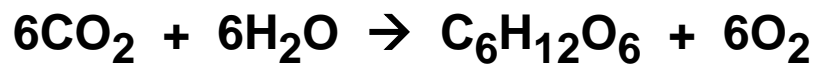
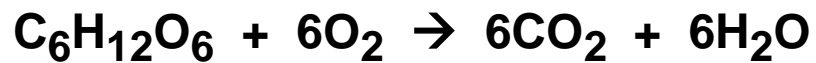
---

---

11

[Turn over]



**03****This question is about photosynthesis.****03.1****What is the correct balanced equation for photosynthesis? [1 mark]****Tick ONE box.**

**03.2** What type of reaction is photosynthesis?  
[1 mark]

Tick **ONE** box.

**Aerobic**

**Endothermic**

**Exothermic**

**Oxidation**

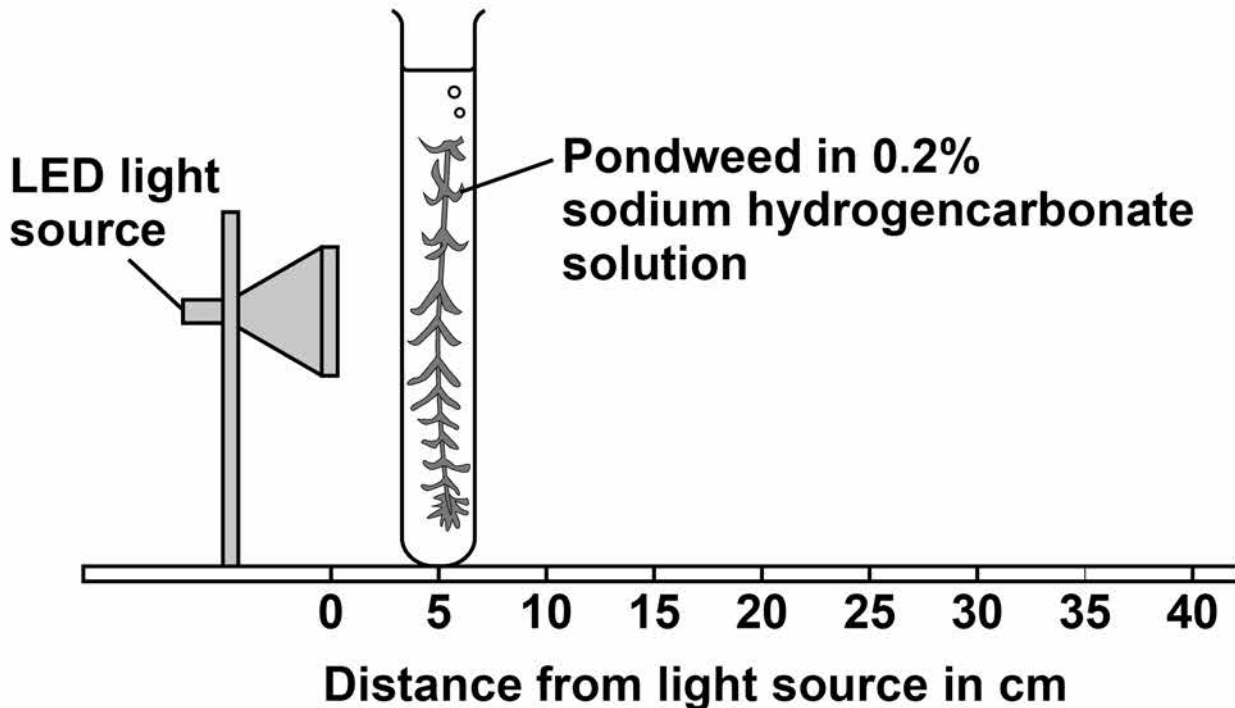
**[Turn over]**



A student investigated the effect of light intensity on the rate of photosynthesis.

FIGURE 5 shows the apparatus used.

FIGURE 5



Sodium hydrogencarbonate solution releases carbon dioxide gas for the pondweed.

This is the method used.

1. Place the pondweed at 5 cm from the light source.
2. Measure the rate of photosynthesis by counting the number of bubbles produced in 1 minute.
3. Repeat with the pondweed at 10 cm and at 20 cm from the light source.





**03.3** Counting the number of bubbles produced in 1 minute is NOT an accurate way to measure the rate of photosynthesis.

**Suggest TWO ways the method could be improved to measure the rate of photosynthesis more accurately. [2 marks]**

**1**

---

---

---

**2**

---

---

---

**[Turn over]**



**03.4** The LED light source does NOT get hot.

Explain why it is important that the pondweed remains at a constant temperature. [2 marks]

---

---

---

---

---

---

---

---

**03.5** Light intensity can be calculated using the inverse square law:

$$I \propto \frac{1}{d^2}$$

Where  $I$  is light intensity and  $d$  is the distance of the pondweed from the light source.

The student placed the pondweed at 5, 10 and 20 cm from the light source.

Explain how light intensity changes as the distance of the pondweed from the light source is doubled.



**You MUST include calculations in your answer.  
[3 marks]**

---

---

---

---

---

---

---

---

---

---

---

**[Turn over]**



**03.6** The student's results are shown in TABLE 1

**TABLE 1**

<b>Distance of the pondweed from the light source in cm</b>	<b>Number of bubbles produced in 1 minute</b>
<b>5</b>	<b>129</b>
<b>10</b>	<b>31</b>
<b>20</b>	<b>8</b>

**Predict how many bubbles of gas would be produced in 1 minute if the pondweed was placed 40 cm from the light source.**

**Give a reason for your prediction. [2 marks]**

---

---

---

---

---

---

---

---



**03.7** Describe how the student could change the method to investigate the effect of carbon dioxide concentration on the rate of photosynthesis.

You should include:

- how to change the independent variable
- TWO control variables.

Use FIGURE 5 on page 16 to help you answer this question. [3 marks]

---

---

---

---

---

---

---

---

---

---

---

---

---

14

[Turn over]



0	4
---	---

A student investigated the effect of different concentrations of sugar solution on pieces of carrot.

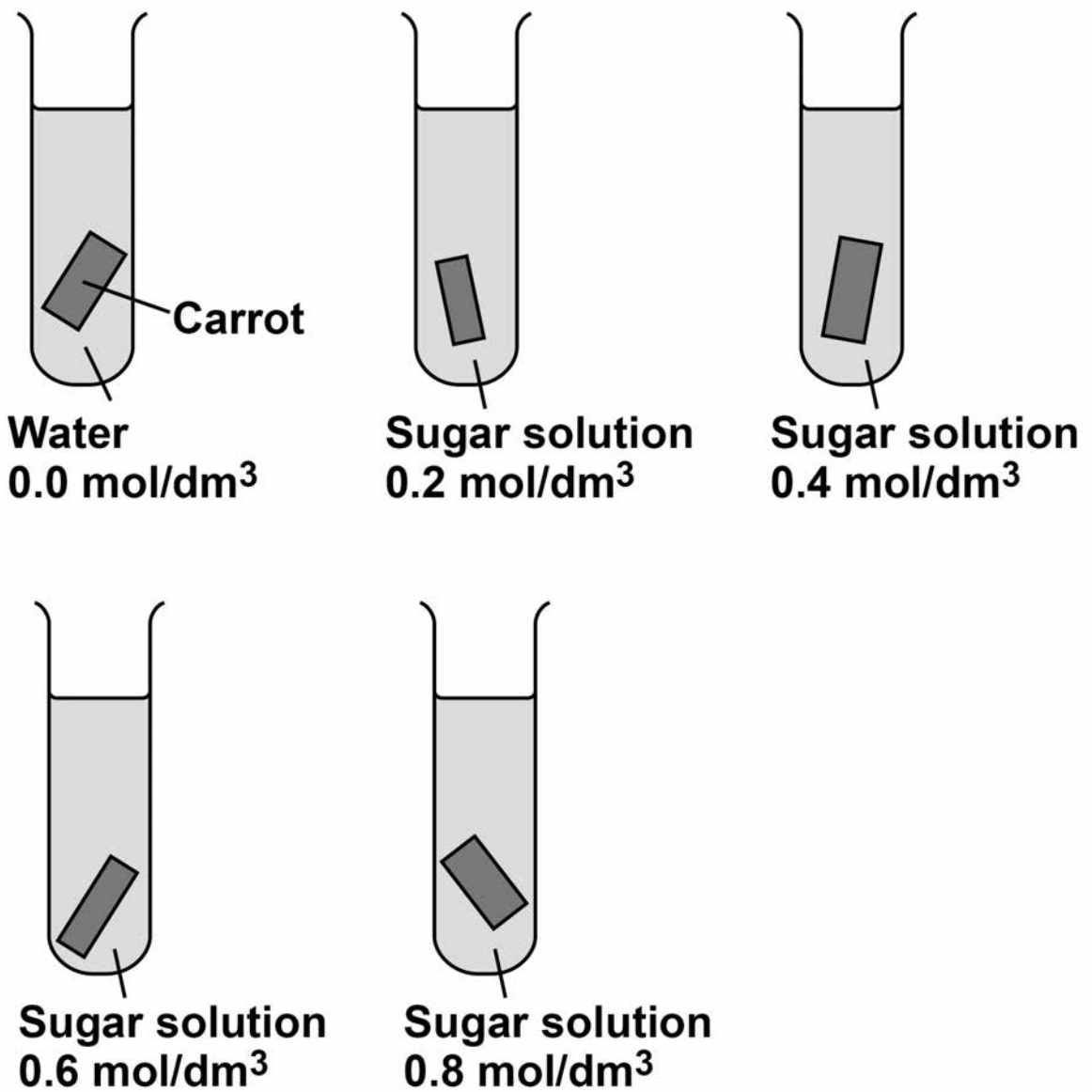
This is the method used.

1. Weigh five pieces of carrot.
2. Place each piece into a different tube.
3. Into each tube add 20 cm<sup>3</sup> of water or one of the sugar solutions as shown in FIGURE 6
4. Leave the apparatus for 2 hours.
5. Remove the carrot and dry each piece on paper towel.
6. Reweigh each piece.
7. Calculate the percentage (%) change in mass of each piece.

FIGURE 6, on page 23, shows how the investigation was set up.



FIGURE 6



[Turn over]



TABLE 2 shows the results.

TABLE 2

Concentration of sugar solution in mol/dm <sup>3</sup>	Percentage (%) change in mass
0.0	+24
0.2	+12
0.4	+1
0.6	-8
0.8	-15

**0 4 . 1** Suggest why the student calculated the percentage (%) change in mass of each piece of carrot. [1 mark]

---

---

---

**0 4 . 2** Complete Figure 7, on page 25, using the results in TABLE 2

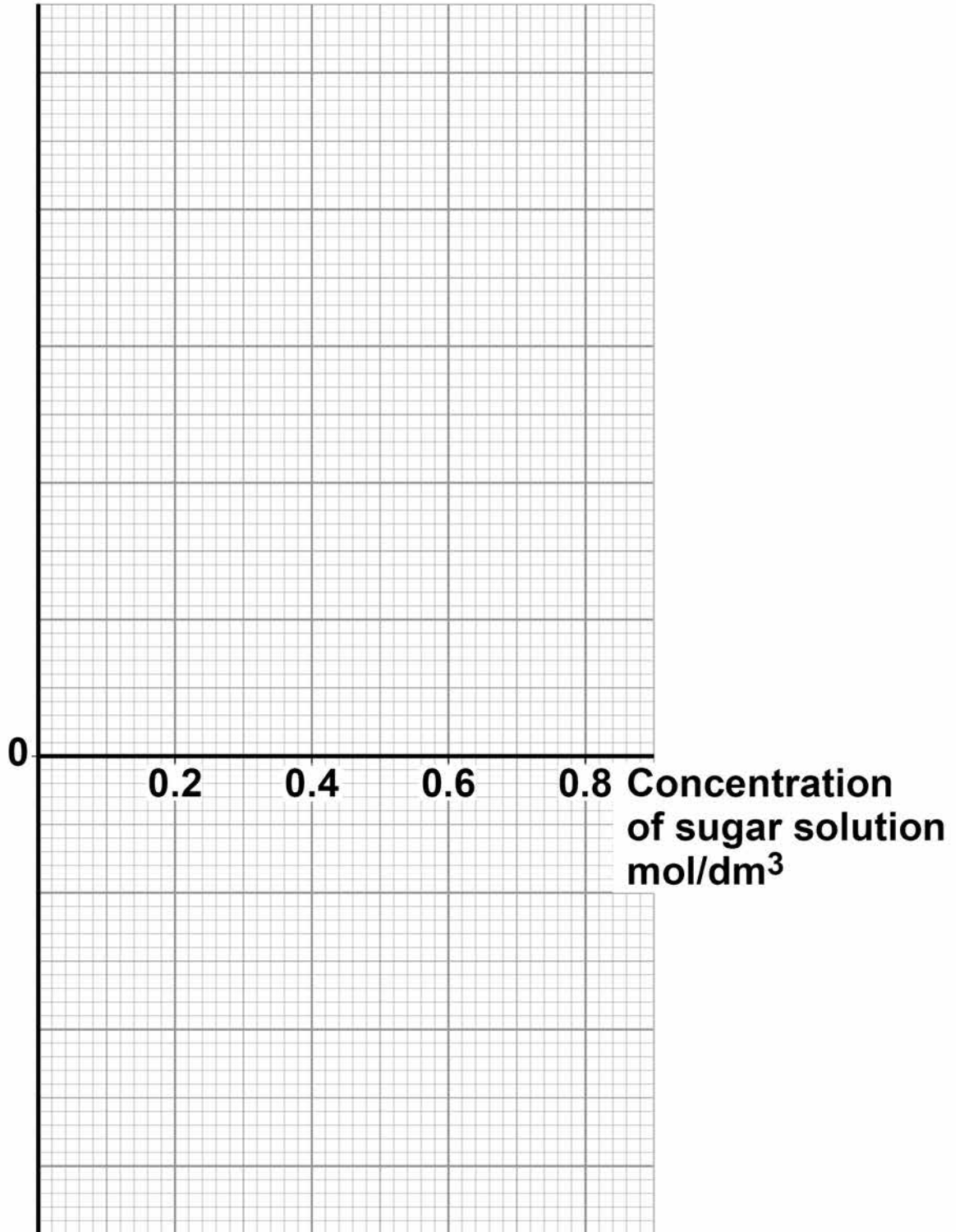
- Choose a suitable scale and label for the y-axis.
- Plot the results.
- Draw a line of best fit.

[4 marks]





FIGURE 7



[Turn over]



- 04.3** Estimate the concentration of sugar solution inside the carrot cells.

Use your completed graph on **FIGURE 7** on page 25. [1 mark]

Concentration = \_\_\_\_\_ mol/dm<sup>3</sup>

- 04.4** Explain why the mass of the carrot in the 0.6 mol/dm<sup>3</sup> sugar solution changed. [4 marks]

---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---

---

---

**0 4 . 5** The student repeated the investigation using boiled pieces of carrot.

The pieces of carrot did NOT change in mass.

Suggest why. [1 mark]

---

---

---

11

[Turn over]



- 0 5** Measles is a serious disease. A person can die from measles.

**TABLE 3** shows the number of medically confirmed cases of measles in England and Wales between 2012 and 2015

**TABLE 3**

<b>Year</b>	<b>Number of medically confirmed cases of measles</b>
<b>2012</b>	<b>2030</b>
<b>2013</b>	<b>1843</b>
<b>2014</b>	<b>121</b>
<b>2015</b>	<b>91</b>

- 0 5 . 1** Suggest **ONE** reason why the actual number of cases of measles in England and Wales might be higher than is shown in **TABLE 3** [1 mark]

---

---

---



**0 5 . 2** Calculate the percentage decrease in the number of medically confirmed cases of measles between 2012 and 2015 [2 marks]

---

---

---

---

---

---

---

Percentage decrease = \_\_\_\_\_ %

[Turn over]



BLANK PAGE



**05.3** One reason for the decrease in the number of cases of measles is that more children were vaccinated against the disease.

**Vaccinating a large proportion of the population reduces the spread of the measles virus.**

**Explain why. [2 marks]**

---

---

---

---

---

---

---

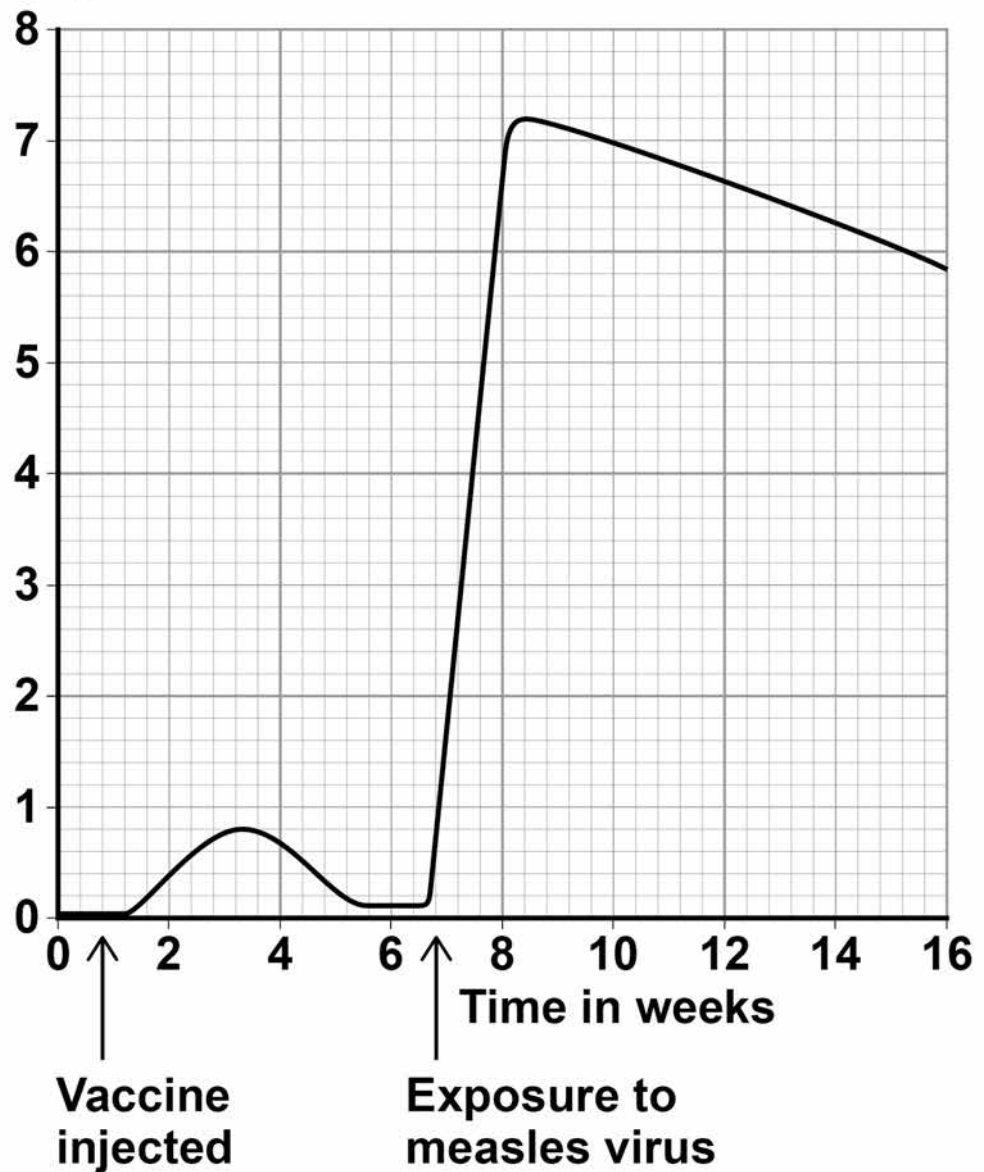
---

**[Turn over]**

**05.4** FIGURE 8 shows the concentration of measles antibodies in the blood of a boy.

**FIGURE 8**

Concentration  
of measles  
antibodies  
in blood in  
arbitrary units





Explain the differences between antibody production after the vaccine injection and after exposure to the measles virus.

You should include data from **FIGURE 8**  
[6 marks]

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

[Turn over]



---

---

---

---

---

---

---

---

11



**0 6** This question is about stem cells.

**0 6 . 1** Give ONE place in a plant where stem cells are found. [1 mark]

---

---

---

**0 6 . 2** What is ONE economic use of plant stem cells? [1 mark]

Tick ONE box.

To create genetically modified crops

To create new species of plants

To increase variation in plants

To produce large numbers of identical plants

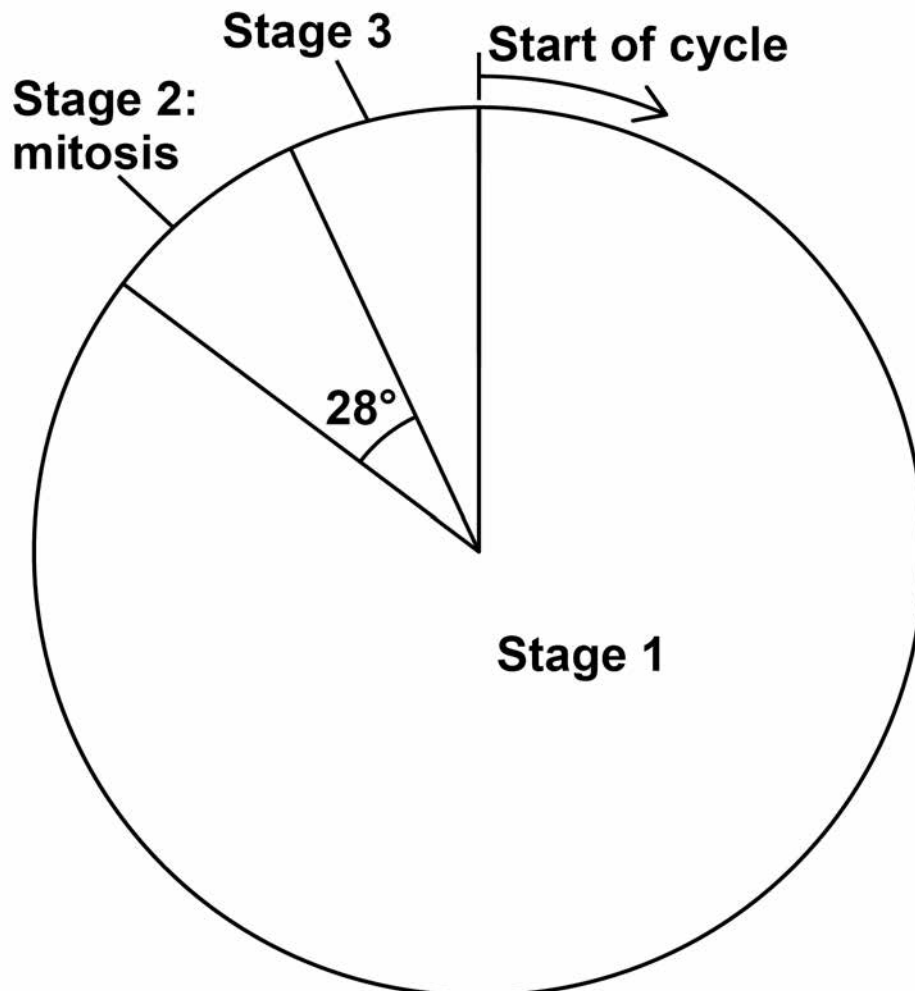
[Turn over]



Embryonic stem cells divide by mitosis.

FIGURE 9 represents a cell cycle for a human embryonic stem cell.

FIGURE 9



**06.3** The mass of DNA in the cell at the start of the cycle is 6 picograms.

A picogram is  $10^{-3}$  nanograms.

Convert 6 picograms to grams.



Give your answer in standard form. [1 mark]

---

---

---

Mass = \_\_\_\_\_ g

**06.4** The time taken for this complete cell cycle is 15 hours.

Calculate how many hours the cell spent in mitosis.

Give your answer to 3 significant figures.  
[2 marks]

---

---

---

---

---

---

---

---

Time spent in mitosis = \_\_\_\_\_ hours

[Turn over]



**0 6 . 5** Describe what happens in each of the three stages of the cell cycle. [5 marks]

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

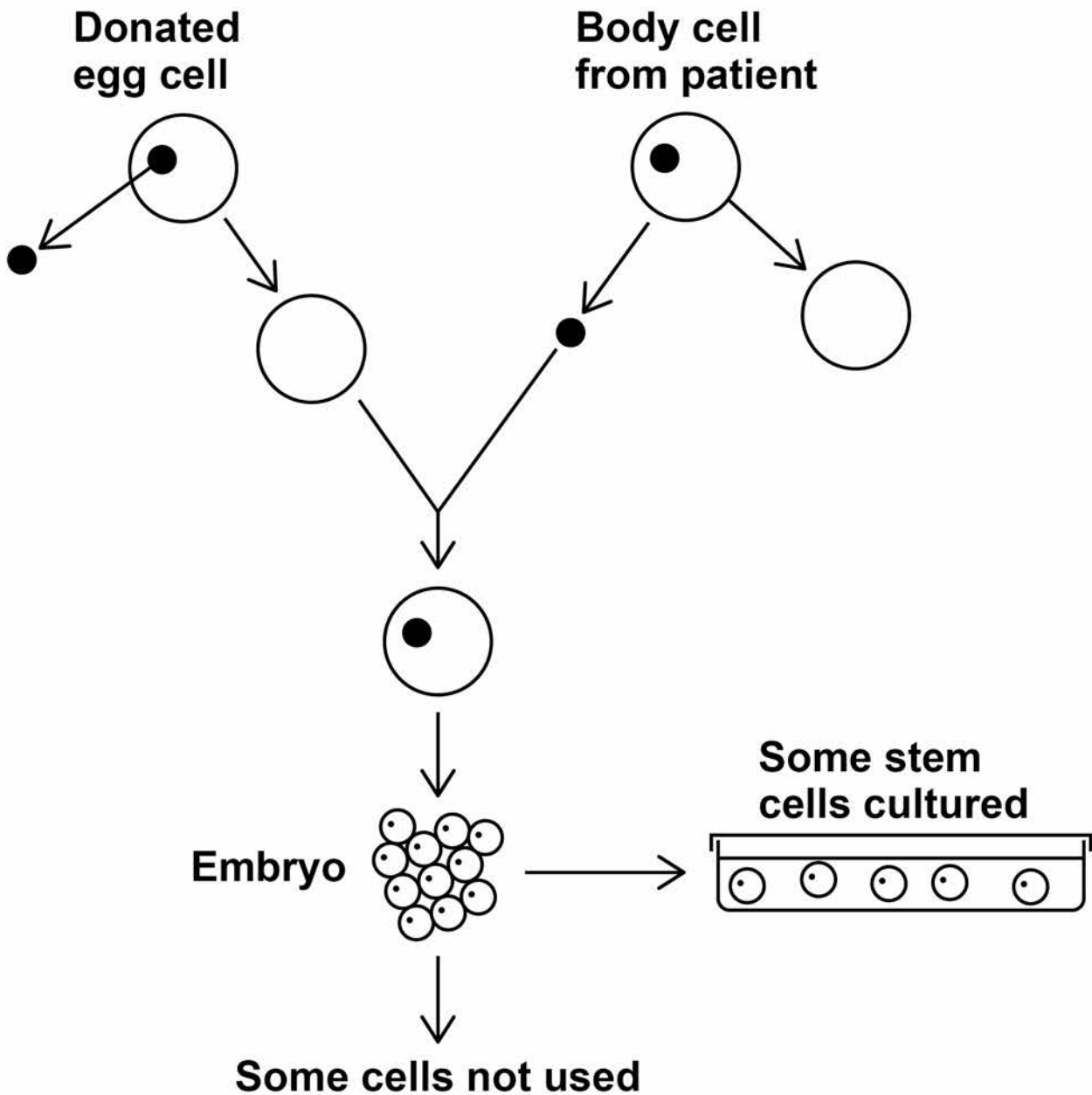
---

**[Turn over]**



**06.6** FIGURE 10 shows how embryonic stem cells are produced in therapeutic cloning for use in patients.

**FIGURE 10**





**Give TWO advantages and TWO disadvantages of therapeutic cloning in medical treatments.**

**Use FIGURE 10 to help you. [4 marks]**

**Advantage 1** \_\_\_\_\_

---

---

**Advantage 2** \_\_\_\_\_

---

---

**Disadvantage 1** \_\_\_\_\_

---

---

**Disadvantage 2** \_\_\_\_\_

---

---

<b>14</b>

**END OF QUESTIONS**



**There are no questions printed on this page**

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
<b>TOTAL</b>	

### **Copyright information**

For confidentiality purposes, from the November 2015 examination series, acknowledgements of third party copyright material will be published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from [www.aqa.org.uk](http://www.aqa.org.uk) after the live examination series.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2018 AQA and its licensors. All rights reserved.

**IB/M/Jun18/CD/8464/B/1H/E3**

