A

AQA

**Surname** _____

**Forename(s)** _____

**Centre Number** _____

**Candidate Number** _____

**Candidate Signature** _____

**I declare this is my own work.**

# GCSE
# BIOLOGY

**F**

**Foundation Tier Paper 1F**

# 8461/1F

**Tuesday 16 May 2023 Morning**

**Time allowed: 1 hour 45 minutes**

**At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.**

**[Turn over]**

**MATERIALS**

**For this paper you must have:**

- **a ruler**
- **a scientific calculator.**

## INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **Pencil should only be used for drawing.**
- **Answer ALL questions in the spaces provided.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **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 100.**
- **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**

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

**0 1**

**Plants are made of cells, tissues and organs.**

**0 1 . 1**

**Which part of a plant is the largest? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **A guard cell**
- ☐ **A leaf**
- ☐ **A root hair**

**[Turn over]**

**Students investigated the effect of concentration of salt solution on the mass of pieces of potato.**

**This is the method used.**

1. **Cut two pieces of potato to the same size.**
2. **Record the mass of each piece of potato.**
3. **Place one piece of potato into a beaker containing a dilute salt solution.**
4. **Place the other piece of potato into a beaker containing a concentrated salt solution.**
5. **After 20 minutes, remove each piece of potato from its solution.**
6. **Record the change in mass of each piece of potato.**
7. **Repeat steps 1 to 6 two more times.**

**TABLE 1 shows the results.**

**TABLE 1**

| SOLUTION | Change in mass of piece of potato in grams | | | |
|---|---|---|---|---|
| | TEST 1 | TEST 2 | TEST 3 | MEAN |
| Dilute salt solution | 1.1 | 1.1 | 1.4 | X |
| Concentrated salt solution | −7.2 | −6.8 | −32.4 | −7.0 |

**0 1 . 2**

**Calculate mean value X in TABLE 1. [2 marks]**

**X = _____ grams**

**There is an anomalous result for the concentrated salt solution in TABLE 1.**

**0 1 . 3**

**Draw a ring around the anomalous result in TABLE 1, on the opposite page. [1 mark]**

**[Turn over]**

**0 1 . 4**

**What did the students do with the anomalous result when calculating the mean in TABLE 1, on page 6? [1 mark]**

**0 1 . 5**

**What name is given to a variable that is kept the same during an investigation? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Control variable**
- ☐ **Dependent variable**
- ☐ **Independent variable**

**0 1 . 6**

**One variable the students kept the same during the investigation was the size of the pieces of potato.**

**Which other variable did the students keep the same? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Change in mass of pieces of potato**
- ☐ **Concentration of salt solution**
- ☐ **Time in the salt solution**

**[Turn over]**

**0 1 . 7**

**The pieces of potato in the concentrated salt solution decreased in mass.**

**Complete the sentence.**

**Choose the answer from the list. [1 mark]**

- **excretion**
- **osmosis**
- **respiration**

**Water moved out of the potato by the process of**

**_____ .**

**0 1 . 8**

**The potato cells have a partially permeable membrane.**

**Which particles can pass through a partially permeable membrane? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **No particles**
- ☐ **Some particles**
- ☐ **All particles**

**0 1 . 9**

**How could the students improve their investigation? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Boil the pieces of potato at the start.**
- ☐ **Leave the skin on some pieces of potato.**
- ☐ **Use more concentrations of salt solution.**

**[Turn over]**

**10**

**0 2**

**Viruses cause disease.**

**0 2 . 1**

**What name is given to microorganisms that cause disease? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Pathogens**
- ☐ **Predators**
- ☐ **Producers**

**0 2 . 2**

**The body has defences to stop viruses entering.**

**Draw ONE line from each defence to the part of the body that provides the defence. [2 marks]**

| Defence | Part of the body that provides the defence |
|---|---|
| | Brain |
| A physical barrier that stops viruses entering | Heart |
| Mucus that traps viruses | Nose |
| | Skin |

**[Turn over]**

**Some viruses can cause tumours to develop.**

**0 2 . 3**

**Complete the sentence.**

**Choose the answer from the list. [1 mark]**

- **digestion**
- **division**
- **metabolism**

**A tumour can form when changes to cells cause uncontrolled cell _____ .**

**0 2 . 4**

**Malignant tumours are cancers.**

**Which TWO sentences describe malignant tumours? [2 marks]**

**Tick (✓) TWO boxes.**

- ☐ **Malignant tumours are only found in the reproductive system.**
- ☐ **Malignant tumours contain digestive enzymes.**
- ☐ **Malignant tumours do not change in size.**
- ☐ **Malignant tumours have cells that can spread to other parts of the body.**
- ☐ **Malignant tumours may form secondary tumours.**

**[Turn over]**

**HPV is a virus that can cause one type of cancer in females.**

**In the UK since 2008, most 12 to 13-year-old females have been vaccinated against HPV.**

**Scientists investigated the percentage of 16 to 18-year-old females with HPV.**

**TABLE 2 shows the results.**

**TABLE 2**

| YEAR | Percentage (%) of 16 to 18-year-old females with HPV |
|---|---|
| 2010 | 8.2 |
| 2012 | 3.2 |
| 2014 | 2.0 |
| 2016 | 1.6 |

**0 2 . 5**

**What does TABLE 2 show about the percentage of females with HPV from 2010 to 2016? [1 mark]**

**0 2 . 6**

**Suggest the reason for the change you described in Question 02.5. [1 mark]**

**[Turn over]**

**The HPV vaccine contains an inactive form of the virus.**

**The inactive form of the virus is injected into the body.**

**0 2 . 7**

**Which part of the blood responds to the inactive virus? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Platelets**
- ☐ **Red blood cells**
- ☐ **White blood cells**

**0 2 . 8**

**What is produced by the body in response to the inactive virus? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Antibiotics**
- ☐ **Antibodies**
- ☐ **Antiseptics**

**0 2 . 9**

**Suggest ONE reason why some PARENTS refuse to allow their children to have the HPV vaccine.**

**Do NOT refer to the pain of the injection in your answer. [1 mark]**

_____

_____

_____

**[Turn over]**

**11**

**0 3**

**Photosynthesis produces oxygen.**

**0 3 . 1**

**Complete the word equation for photosynthesis.**

**Choose answers from the list. [3 marks]**

- **carbon dioxide**
- **fat**
- **glucose**
- **nitrogen**
- **protein**
- **water**

_____ **+** _____ $\longrightarrow$

_____ **+ oxygen**

**0 3 . 2**

**Explain how oxygen is used in cells. [2 marks]**

**[Turn over]**

**A student investigated the effect of light from different coloured light bulbs on photosynthesis.**

**The student:**

- **used pondweed in a beaker of water**
- **used different coloured light bulbs in a lamp**
- **counted the number of bubbles of oxygen the pondweed produced in 2 minutes for each colour of light bulb.**

**0 3 . 3**

**Give ONE hazard the student would need to consider when using the apparatus in this investigation.**

**Give the risk the hazard would cause. [2 marks]**

**Hazard** _____

_____

_____

**Risk** _____

_____

_____

**0 3 . 4**

**The student needed to keep the temperature of the water in the beaker the same throughout the investigation.**

**Describe how the student could keep the temperature of the water the same. [1 mark]**

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**0 3 . 5**

**The beaker of water contained the pondweed.**

**Explain why the temperature of the water in the beaker needed to be kept the same throughout the investigation. [2 marks]**

**TABLE 3 shows the results.**

**TABLE 3**

| Colour of light bulb | Number of bubbles of oxygen produced in 2 minutes |
|---|---|
| Blue | 46 |
| Green | 8 |
| Red | 38 |
| Yellow | 29 |

**0 3 . 6**

**Which colour of light caused the highest rate of photosynthesis in the pondweed? [1 mark]**

**Tick (✓) ONE box.**

☐ **Blue**

☐ **Green**

☐ **Red**

☐ **Yellow**

**0 3 . 7**

**What is the best way to display the data in TABLE 3, on the opposite page? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Bar graph**
- ☐ **Line graph**
- ☐ **Scatter graph**

**0 3 . 8**

**The student wanted to measure the VOLUME of oxygen the pondweed produced in 2 minutes.**

**Name ONE piece of apparatus the student could use to measure the volume of oxygen. [1 mark]**

_____

_____

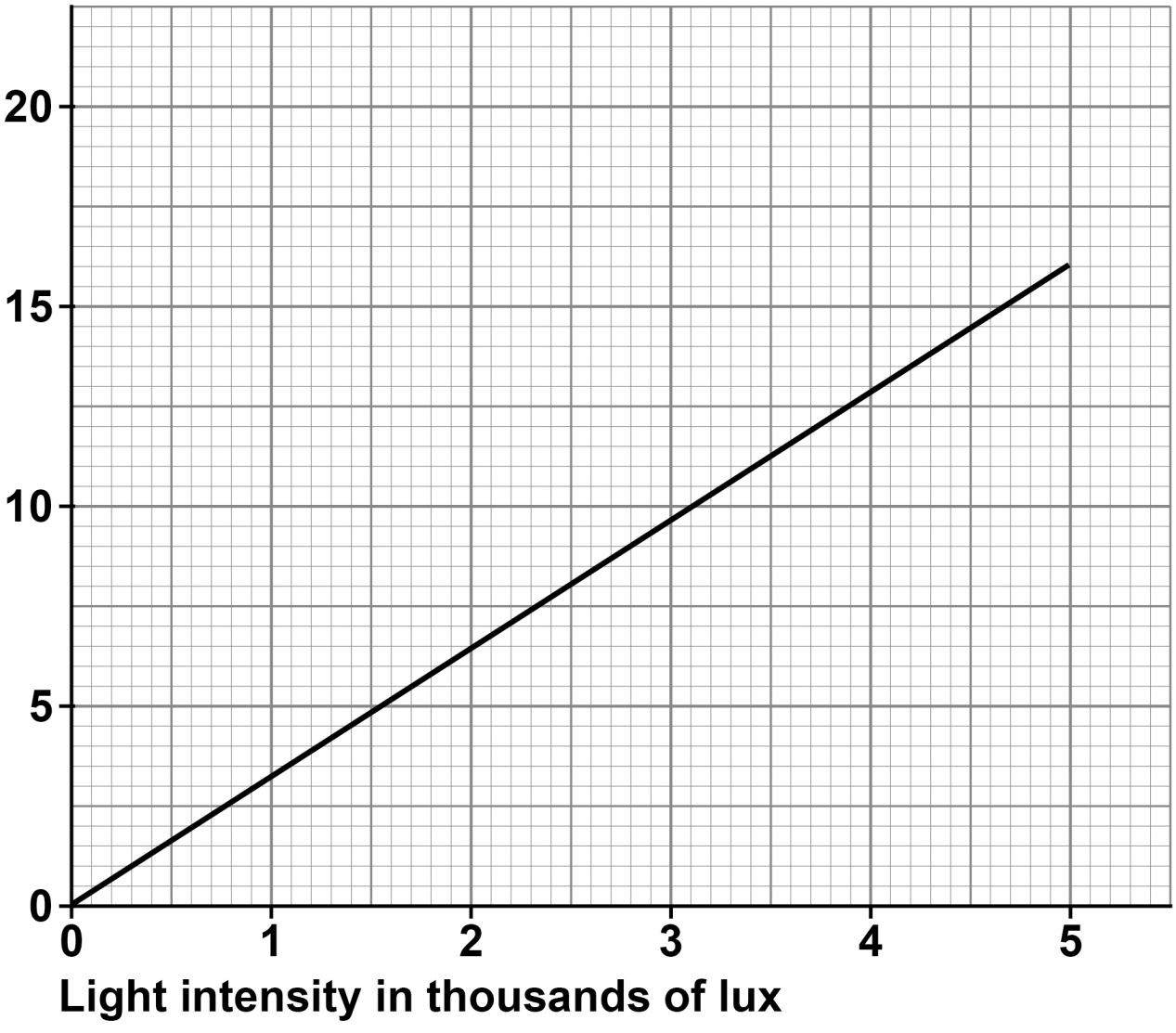
**[Turn over]**

**0 3 . 9**

**Another student investigated the effect of light intensity on the rate of photosynthesis.**

**FIGURE 1 shows the results.**

**FIGURE 1**



**Describe what FIGURE 1, on the opposite page, shows about the relationship between light intensity and the rate of photosynthesis. [2 marks]**



15

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**0 4**

**Malaria is caused by a protist.**

**The protist is passed from one person to another person by mosquitos.**

**0 4 . 1**

**Which term describes the mosquito? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Bacterium**
- ☐ **Gene**
- ☐ **Vector**

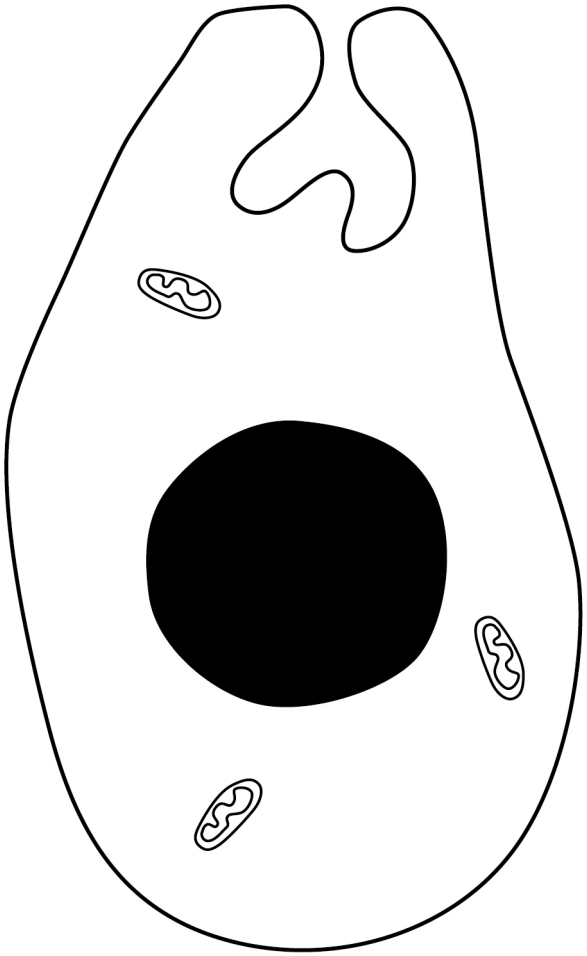
**[Turn over]**

**0 4 . 2**

**The malarial protist is a eukaryotic cell.**

**FIGURE 2 shows a malarial protist.**

**FIGURE 2**



**Give TWO features of the malarial protist that show the cell is eukaryotic and NOT prokaryotic. [2 marks]**

**1** _____

_____

_____

**2** _____

_____

_____

**[Turn over]**

**0 4 . 3**

**Which organism is prokaryotic? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Cow**
- ☐ **Grass**
- ☐ **Salmonella**

**0 4 . 4**

**The malarial protist reproduces asexually.**

**What is a feature of asexual reproduction? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Only one parent is involved.**
- ☐ **The offspring show genetic variation.**
- ☐ **Two gametes fuse.**

**[Turn over]**

**0 4 . 5**

**Mitosis occurs in the malarial protist during asexual reproduction.**

**The protist has 14 chromosomes.**

**How many chromosomes will each new protist cell have after mitosis? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **7**
- ☐ **14**
- ☐ **21**
- ☐ **28**

**0 4 . 6**

**When a person has malaria, the protists destroy red blood cells.**

**What change would happen in the blood of a person with malaria? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Decreased antibodies**
- ☐ **Decreased haemoglobin**
- ☐ **Increased plasma**
- ☐ **Increased platelets**

**[Turn over]**

**0 4 . 7**

**It is estimated that 210 million people are infected with malaria every year.**
**Half of these infected people survive the disease.**

**Calculate how many people would survive the disease in 3 years if the estimate is correct.**

**Give your answer in standard form. [4 marks]**

**Number of people (in standard form) =**

**0 4 . 8**

**The spread of malaria can be controlled by using mosquito nets to avoid being bitten.**

**Describe TWO other ways that people can reduce the chance of being bitten by mosquitos.**

**Do NOT refer to mosquito nets in your answer.**
**[2 marks]**

**1** _____

_____

_____

**2** _____

_____

_____

**[Turn over]**

**0 4 . 9**

**Different types of disease may interact.**

**Scientists studied how having disorder S interacts with malaria.**

**The scientists calculated the chance of children with disorder S getting malaria.**

**TABLE 4 shows the results.**

**TABLE 4**

| Age in years | Percentage (%) chance of children with disorder S getting malaria |
|---|---|
| 2 | 70 |
| 4 | 65 |
| 6 | 50 |
| 8 | 45 |

**Describe the trend shown in TABLE 4.**

**Use data from TABLE 4. [2 marks]**

**[Turn over]**

**15**

**0 5**

**This question is about food and digestion.**

**0 5 . 1**

**Proteins are needed to make new body cells by mitosis.**

**Give ONE reason why a person needs new body cells.**
**[1 mark]**

**0 5 . 2**

**What are proteins made of? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Amino acids**
- ☐ **Fatty acids**
- ☐ **Glucose**
- ☐ **Starch**

**[Turn over]**

**0 5 . 3**

**Which chemical is used to test for protein in food? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Benedict's reagent**
- ☐ **Biuret reagent**
- ☐ **Ethanol**

**0 5 . 4**

**What colour would be seen in a positive test for protein? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Black**
- ☐ **Purple**
- ☐ **Red**
- ☐ **White**

**Enzymes break down food molecules in the human body.**

**0 5 . 5**

**Characteristics of enzymes are linked to their function.**

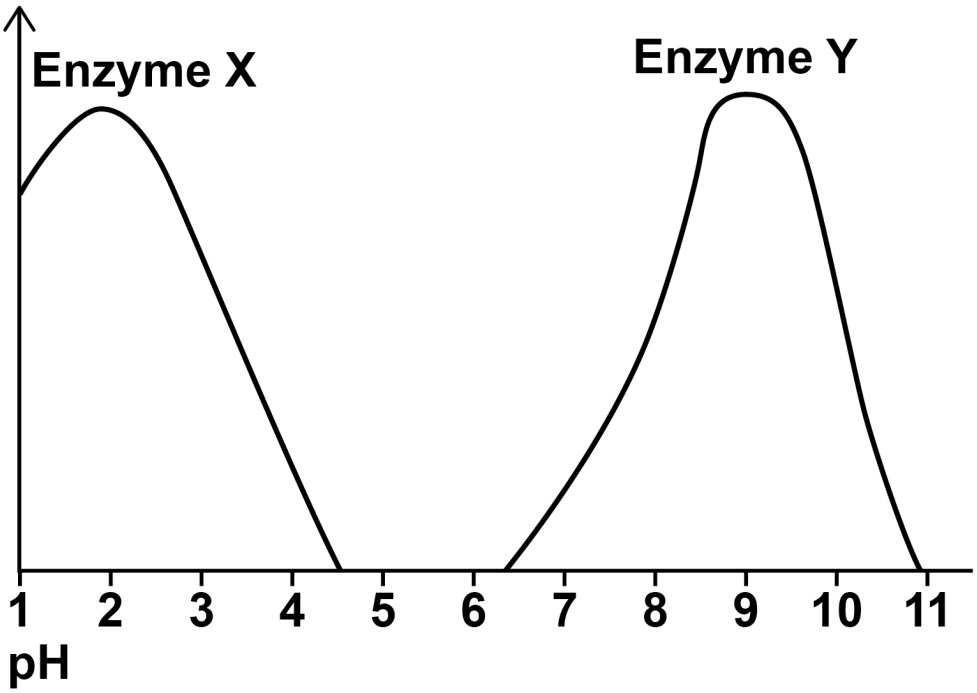
**Draw ONE line from each characteristic to its effect on enzyme function. [2 marks]**

| CHARACTERISTIC | EFFECT ON ENZYME FUNCTION |
| --- | --- |
| Has a special shape | Only fits one molecule |
| Is a catalyst | Speeds up reactions |
| | Works fast at high pH |

**[Turn over]**

**FIGURE 3 shows how pH affects the rate of breakdown of protein.**

**FIGURE 3**




**0 5 . 6**

**Which pH does enzyme Y work fastest at? [1 mark]**

**pH = _____**

**0 5 . 7**

**Explain why enzyme X works best in the stomach.**
**[2 marks]**

**0 5 . 8**

**Complete the sentences.**

**Choose answers from the list. [2 marks]**

- **active site**
- **antigen**
- **glucose**
- **starch**
- **substrate**

**Enzyme Y does NOT break down protein at pH 6 because the shape of the enzyme has changed.**

**The part of the enzyme that changes shape is the**

**_____ .**

**The change in shape means the enzyme cannot bind to the _____ .**

**0 5 . 9**

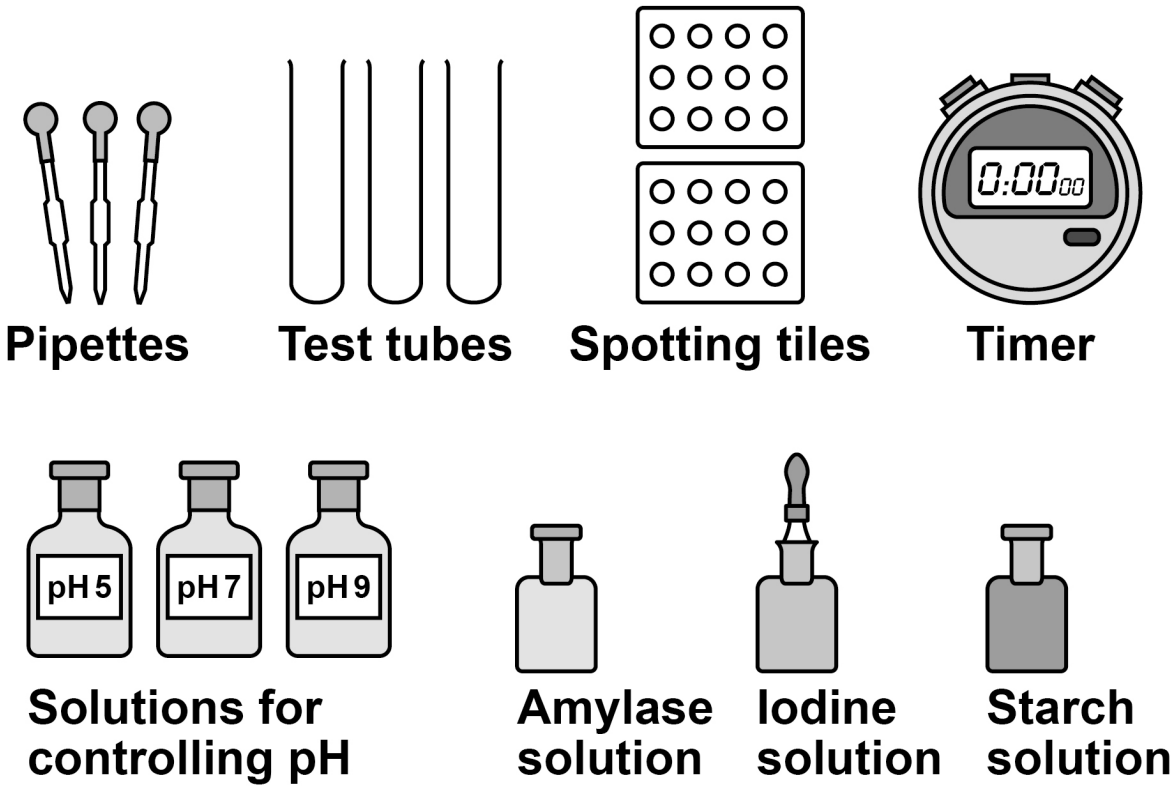
**Amylase is an enzyme which breaks down starch.**

**A student investigated the effect of pH on the rate of starch breakdown by amylase.**

**FIGURE 4, on page 50, shows some of the apparatus the student used.**

**[Turn over]**

**FIGURE 4**


Pipettes
Test tubes
Spotting tiles
Timer
pH 5
pH 7
pH 9
Solutions for controlling pH
Amylase solution
Iodine solution
Starch solution
cm3
10
9
8
7
6
5
4
3
2
1
10 cm3 measuring cylinder

**Describe a method to investigate the effect of pH on the rate of starch breakdown by amylase.**

**You should include the apparatus shown in FIGURE 4, on the opposite page. [6 marks]**

**[Turn over]**

17

**0 6**

**A root is a plant organ.**

**Plant roots contain many different types of tissue.**

**0 6 . 1**

**What is a tissue? [1 mark]**

**0 6 . 2**

**Tissue in the tip of a plant root contains stem cells.**

**Stem cells can differentiate into any type of cell.**

**Name the type of tissue in plants that contains stem cells. [1 mark]**

**[Turn over]**

**In the past many drugs were extracted from plants.**

**0 6 . 3**

**Aspirin is a painkiller.**

**Which plant does aspirin originate from? [1 mark]**

---

**Scientists have extracted chemical A from the deadly nightshade plant.**

**Chemical A can be used as a painkiller.**

**TABLE 5 shows information about where chemical A is found.**

**TABLE 5**

| Part of deadly nightshade plant | Mass of chemical A in 100 g of plant tissue in grams |
|---|---|
| Roots | 1.3 |
| Leaves | 1.2 |
| Berries | 0.7 |

**0 6 . 4**

**The scientists usually extract chemical A from the berries of the deadly nightshade plant.**

**Suggest ONE reason why berries are used instead of leaves or roots. [1 mark]**

**A deadly nightshade plant has chlorosis (yellow leaves).**

**The mass of chemical A found in the LEAVES of the plant is 60% of the mass shown in TABLE 5.**

**REPEAT OF TABLE 5**

| Part of deadly nightshade plant | Mass of chemical A in 100 g of plant tissue in grams |
|---|---|
| Roots | 1.3 |
| Leaves | 1.2 |
| Berries | 0.7 |

**0 6 . 5**

**Calculate the mass of chemical A in 200 g of the leaves with chlorosis.**

**Give your answer in mg. [4 marks]**

**Mass of chemical A = _____ mg**

**0 6 . 6**

**Suggest ONE reason why the leaves of the deadly nightshade plant have chlorosis. [1 mark]**

**[Turn over]**

**Chemical A has NOT been tested in large-scale clinical trials in the UK.**

**0 6 . 7**

**It is important for drugs to be tested in clinical trials before the drugs are approved for use by the public.**

**Give TWO reasons why. [2 marks]**

**1** _____

_____

_____

**2** _____

_____

_____

**There are many online reports making claims about the effects of chemical A.**

**Some of these reports are biased.**

**0 6 . 8**

**Suggest ONE reason why a report making claims about the effects of chemical A may be biased. [1 mark]**

**0 6 . 9**

**How can scientists be sure that claims about new drugs are valid? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **Advertise the claims on social media.**
- ☐ **Ask an international company to produce the drug.**
- ☐ **Have the claims peer reviewed.**
- ☐ **Publish the claims in a newspaper.**

**13**

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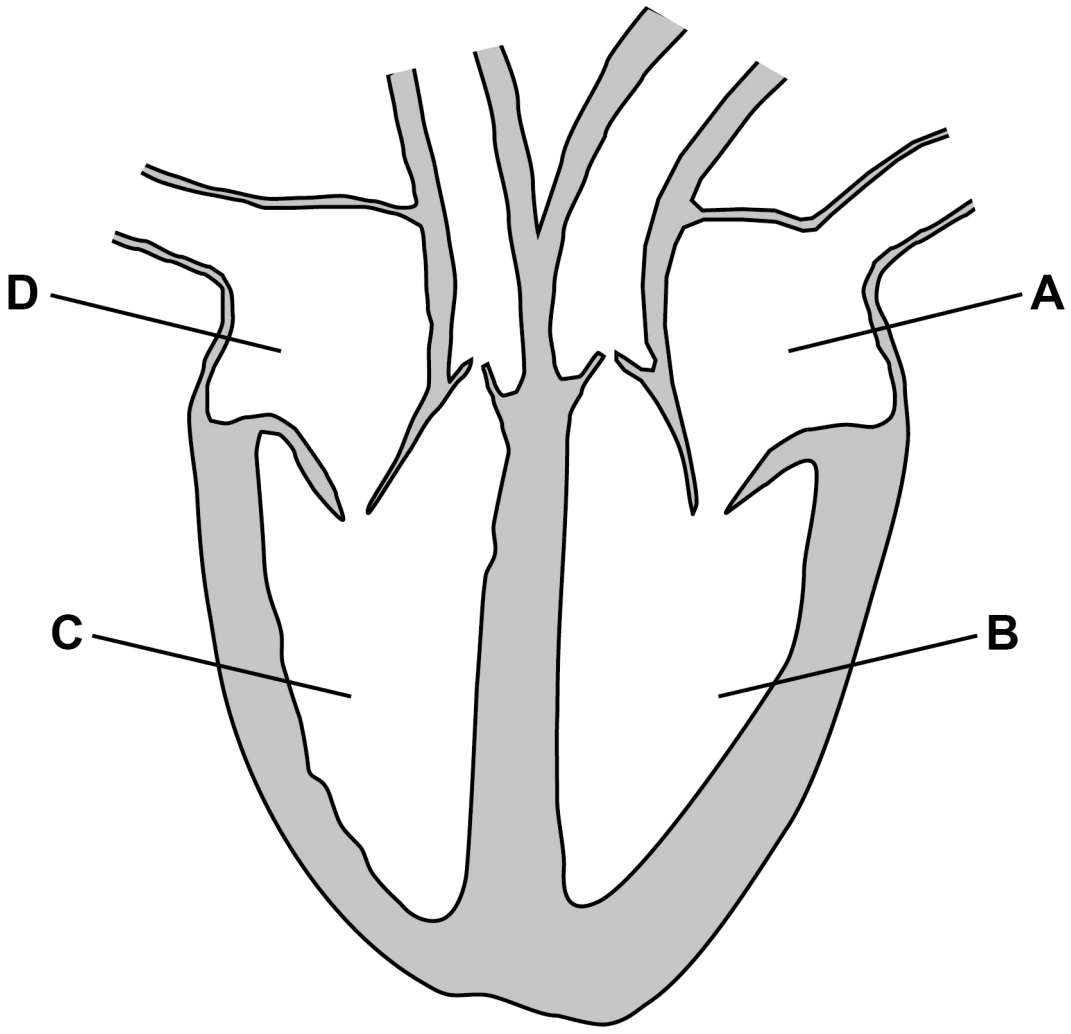
**[Turn over]**

**0 7**

**This question is about the circulatory system.**

**FIGURE 5 shows the human heart.**

**FIGURE 5**



**0 7 . 1**

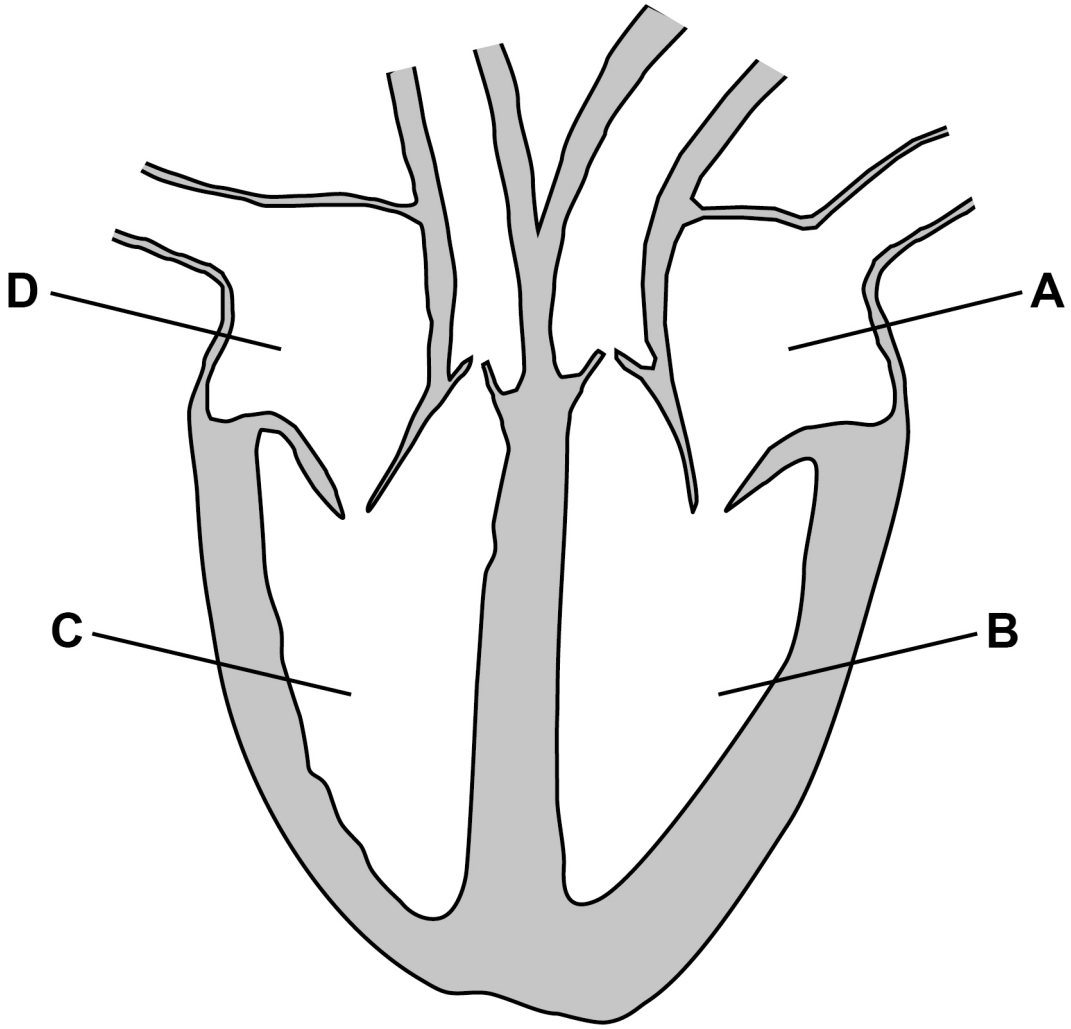
**Which part of the heart receives oxygenated blood from the lungs? [1 mark]**

**Tick (✓) ONE box.**

- ☐ **A**
- ☐ **B**
- ☐ **C**
- ☐ **D**

**[Turn over]**

**REPEAT OF FIGURE 5**




**0 7 . 2**

**Which part of the heart pumps deoxygenated blood to the lungs? [1 mark]**

**Tick (✓) ONE box, on the opposite page.**

☐ A

☐ B

☐ C

☐ D

**0 7 . 3**

**A group of cells called the pacemaker controls the resting heart rate.**

**Where in the heart is the pacemaker found? [1 mark]**

**Tick (✓) ONE box.**

☐ Left atrium

☐ Left ventricle

☐ Right atrium

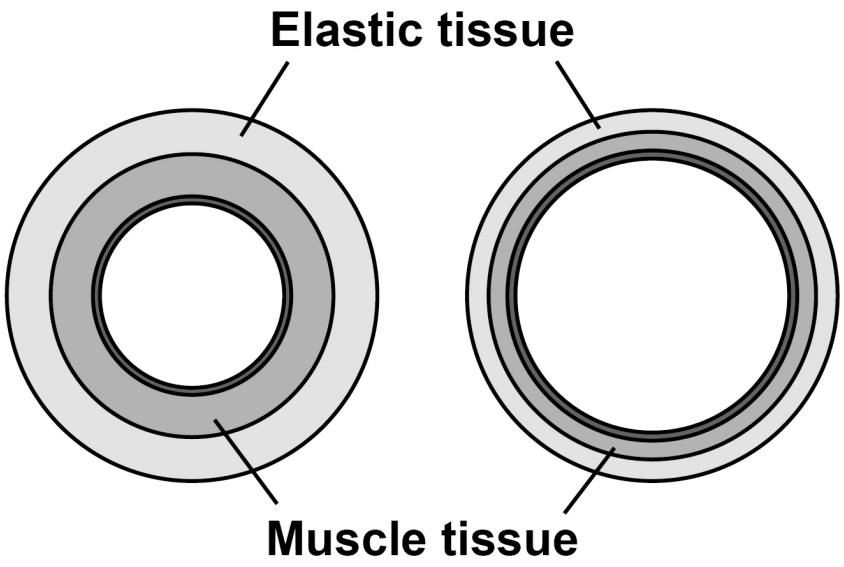
☐ Right ventricle

**[Turn over]**

**0 7 . 4**

**FIGURE 6 shows a cross section of an artery and of a vein.**

**FIGURE 6**



**Describe TWO ways that the structure of an artery is different from the structure of a vein. [2 marks]**

**1** _____

_____

_____

**2** _____

_____

_____

**[Turn over]**

**0 7 . 5**

**In coronary heart disease, the coronary arteries become narrower.**

**A build-up of fatty material can cause a blockage in a coronary artery.**

**TABLE 6 shows how a blockage in a coronary artery affects blood flow.**

**TABLE 6**

| Percentage (%) of coronary artery that is blocked | Blood flow in $cm^3$/minute |
|---|---|
| 0 | 100 |
| 10 | 64 |
| 20 | 42 |
| 50 | 8 |
| 80 | 2 |

**Describe the trend shown in TABLE 6. [1 mark]**

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**[Turn over]**

**REPEAT OF TABLE 6**

| Percentage (%) of coronary artery that is blocked | Blood flow in $cm^3$/minute |
|---|---|
| 0 | 100 |
| 10 | 64 |
| 20 | 42 |
| 50 | 8 |
| 80 | 2 |

**0 7 . 6**

**Complete FIGURE 7, on the opposite page.**

**You should:**

- **use a suitable scale for the y-axis**
- **plot the data from TABLE 6**
- **draw a line of best fit.**

**[4 marks]**

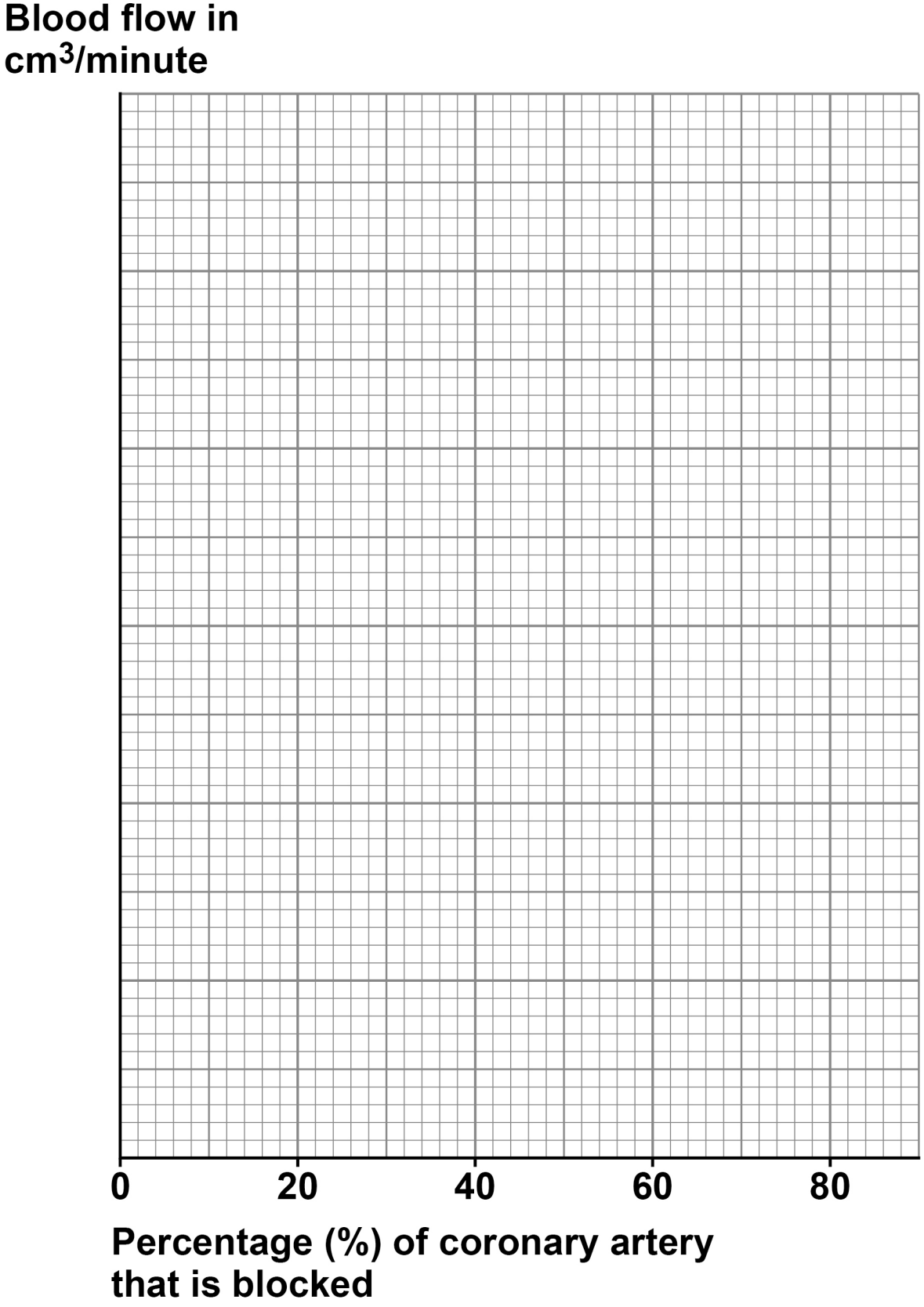
**0 7 . 7**

**Predict the blood flow in a coronary artery with a 35% blockage.**

**Use FIGURE 7, on the opposite page. [1 mark]**

**Blood flow = _____ $cm^3$/minute**

**FIGURE 7**




**[Turn over]**

**0 7 . 8**

**Explain the effect of a partly blocked coronary artery on the human body. [6 marks]**

[Turn over]

**0 7 . 9**

**There are different treatments for a blockage in a coronary artery.**

**Explain how ONE treatment for a blockage in a coronary artery works. [2 marks]**

**END OF QUESTIONS**

**19**

**Additional page, if required.**

**Write the question numbers in the left-hand margin.**

**Additional page, if required.**

**Write the question numbers in the left-hand margin.**

**Additional page, if required.**

**Write the question numbers in the left-hand margin.**

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| For Examiner's Use | |
|---|---|
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| **TOTAL** | |