**Oasis Academy South Bank**

**Year 11 Mock Revision**

**Biology Combined Paper 1: Foundation**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Class: \_\_\_\_\_\_\_\_\_**

**Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- | --- | --- | --- |
| **Step 1: Knowledge**  Learn each of the quiz questions and answers off by heart. This could be done by:   * turning them into **flash cards** and testing yourself * using **‘look, cover, write, check’** * asking a friend or family member to **quiz** you | | | | |
| **Topic** | **LCWC** | **Quiz 1** | **Quiz 2** | **Quiz 3** |
| Types of cells (B.1) |  |  |  |  |
| Specialised cells (B.2) |  |  |  |  |
| Microscopy (B.3) |  |  |  |  |
| Cell division (mitosis) (B.4) |  |  |  |  |
| Introducing pathogens and types of disease (B.7) |  |  |  |  |
| Detailed disease case studies (B.8) |  |  |  |  |
| Preventing pathogens from making us unwell (B.9) |  |  |  |  |
| Developing new medicines (B.10) |  |  |  |  |
| Breathing and respiration (B.14) |  |  |  |  |
| The Heart (B.15) |  |  |  |  |
| The Blood (B.16) |  |  |  |  |
| Digestion (B.17) |  |  |  |  |
| Transport in cells (diffusion, active transport and osmosis) (B.19) |  |  |  |  |
| Structure of a plant (B.21) |  |  |  |  |
| Transport in plants (B.23) |  |  |  |  |
| Transpiration and translocation (B.24) |  |  |  |  |
| Photosynthesis (B.25) |  |  |  |  |
| The products of photosynthesis (B.26) |  |  |  |  |
| Exercise and metabolism (B.40) |  |  |  |  |

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| --- | --- | --- | --- |
| **Step 2: Exam practice**   * Practice applying your knowledge using the **past exam questions** in each section. * Self-assess these using the **mark schemes** at the back and rewrite your answers. * Assess your **progress** using a ‘red, amber, green’ system (RAG) | | | |
| **Section** | **Completed** | **SA using green pen** |  |
| 1: Knowledge |  |  |  |
| 2. Required Practicals |  |  |  |
| 3. 6 marker questions |  |  |  |

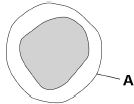
**Exam practice**

**Section 1: Knowledge**

**Q1.**

**Figure 1** shows one type of white blood cell.

**Figure 1**

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(a)  What is structure **A**?

Tick **one** box.

|  |  |
| --- | --- |
| Cell membrane |  |
| Cell wall |  |
| Cytoplasm |  |
| Nucleus |  |

**(1)**

(b)  White blood cells help to defend the body against pathogens.

How do the white blood cells do this?

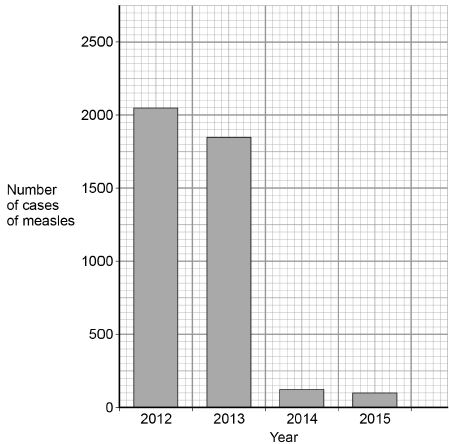
Tick **three** boxes.

|  |  |
| --- | --- |
| Clone pathogens |  |
| Engulf pathogens |  |
| Produce antibiotics |  |
| Produce antibodies |  |
| Produce antitoxins |  |
| Produce toxins |  |

**(3)**

Measles is a serious disease. A person can die from measles.

**Figure 2** shows the number of cases of measles in England and Wales between 2012 and 2015

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(c)  Use **Figure 2** to calculate the decrease in the number of cases of measles between 2012 and 2015

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Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cases

**(2)**

(d)  Suggest **one** reason for the decrease in the number of cases of measles between 2012 and 2015

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**(1)**

(e)  Antibiotics **cannot** be used to treat measles.

Suggest why.

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**(1)**

(f)  Gonorrhoea is a disease caused by a bacterium.

Gonorrhoea **can** be treated with antibiotics.

Give **one** other way to control the spread of gonorrhoea.

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**(1)**

A scientist investigated how effective different antibiotics were at killing gonorrhoea bacteria.

This is the method used.

1.   Grow gonorrhoea bacteria on agar in a Petri dish.

2.   Place one paper disc soaked in water onto the agar.

3.   Place four other paper discs, each soaked in a different antibiotic, **A**, **B**, **C**, and **D**, onto the agar.

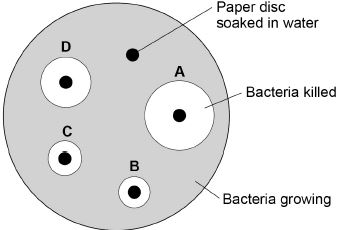
4.   Use the same sized paper discs and the same concentration of each antibiotic.

5.   Incubate the Petri dish for 3 days.

**Figure 3** shows the scientist’s results.

A clear area around the disc means the antibiotic has killed the bacteria.

**Figure 3**

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(g)  Give **one** control variable the scientist used.

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**(1)**

(h)  Suggest why **one** disc was soaked in water.

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**(1)**

(i)   Which antibiotic in **Figure 3** would be the best to treat gonorrhoea?

Give a reason for your answer.

Antibiotic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 13 marks)**

**Q2.**

This question is about cell structures.

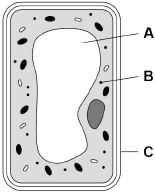
(a)  Draw **one** line from each cell structure to the type of cell where the structure is found.

|  |  |  |
| --- | --- | --- |
| **Cell Structure** |  | **Type of cell where the structure is found** |
|  | | |
| Nucleus |  | Prokaryotic cells |
|  | | |
| Permanent vacuole |  | Plant cells only |
|  | | |
| Plasmid |  | Eukaryotic cells |

**(2)**

(b)  **Figure 1** shows a plant cell.

**Figure 1**

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What are the names of structures **A**, **B** and **C**?

Tick **one** box.

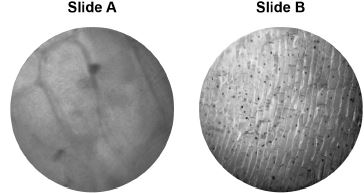
|  |  |  |  |
| --- | --- | --- | --- |
| **Structure A** | **Structure B** | **Structure C** |  |
| Chloroplast | Vacuole | Cell wall |  |
| Nucleus | Chloroplast | Cell membrane |  |
| Vacuole | Mitochondrion | Cell membrane |  |
| Vacuole | Ribosome | Cell wall |  |

**(1)**

A student observed slides of onion cells using a microscope.

**Figure 2** shows two of the slides the student observed.

**Figure 2**

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The cells on the slides are **not** clear to see.

(c)  Describe how the student should adjust the microscope to see the cells on Slide A more clearly.

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**(1)**

(d)  Describe how the student should adjust the microscope to see the cells on Slide B more clearly.

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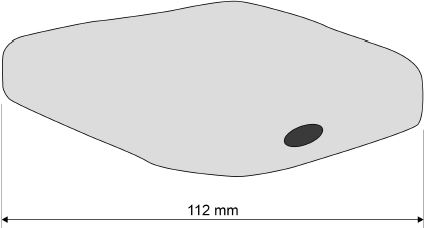
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**(2)**

(e)  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**

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The real length of the cell was 280 micrometres (µm).

Calculate the magnification of the drawing.

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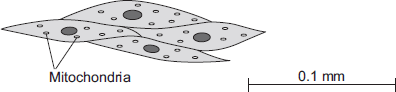
Magnification = × \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(3)**

**(Total 9 marks)**

**Q3.**

The image below shows some muscle cells from the wall of the stomach, as seen through a light microscope.



(a)     Describe the function of muscle cells in the wall of the stomach.

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**(2)**

(b)     The figure above is highly magnified.

The scale bar in the figure above represents 0.1 mm.

Use a ruler to measure the length of the scale bar and then calculate the magnification of the figure above.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**(2)**

(c)     The muscle cells in **Figure above** contain many mitochondria.

What is the function of mitochondria?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

(d)     The muscle cells also contain many ribosomes. The ribosomes cannot be seen in the figure above.

(i)      What is the function of a ribosome?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(ii)     Suggest why the ribosomes **cannot** be seen through a light microscope.

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**(1)**

**(Total 8 marks)**

**Q4.**

Muscle cells divide to form new muscle cells.

(a)  Which **two** cell components are copied before the muscle cells start to divide?

Tick **two** boxes.

|  |  |
| --- | --- |
| Cytoplasm |  |
| Mitochondria |  |
| Plasmids |  |
| Ribosomes |  |
| Vacuole |  |

**(2)**

(b)  Why do muscle cells need to divide by mitosis more often than most other cells?

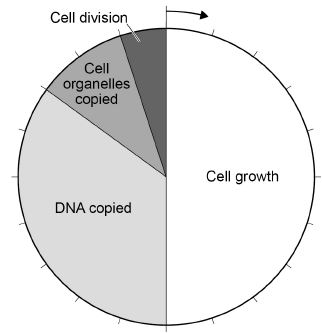
Tick **one** box.

|  |  |
| --- | --- |
| To contract the muscles |  |
| To repair the muscles |  |
| To supply more oxygen to the muscles |  |
| To transmit nerve impulses |  |

**(1)**

Mitosis is part of the cell cycle.

The diagram below shows the percentage of time taken by each stage of a cell cycle.



(c)  The cell cycle shown in the diagram above takes 21 hours in total.

Cell division takes 5% of the total time.

Calculate how many hours cell division takes.

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Time taken = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hours

**(2)**

(d)  What percentage of time is spent copying DNA in the cell cycle shown in the diagram above?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Percentage = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(e)  A sperm cell from a dog contains 39 chromosomes.

How many chromosomes are there in each dog muscle cell?

Tick **one** box.

|  |  |
| --- | --- |
| 39 |  |
| 78 |  |
| 156 |  |
| 312 |  |

**(1)**

(f)  A sperm cell fuses with an egg cell.

What is this process called?

Tick **one** box.

|  |  |
| --- | --- |
| Fertilisation |  |
| Meiosis |  |
| Ovulation |  |
| Respiration |  |

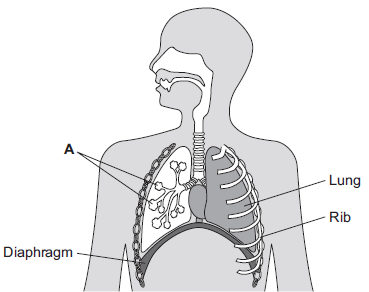
**(1)**

**(Total 9 marks)**

**Q5.**

Our lungs help us to breathe.

The image below shows the human breathing system.



(a)     (i)      Name part **A**.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(ii)     Give **one** function of the ribs.

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**(1)**

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

|  |  |  |
| --- | --- | --- |
| **active transport** | **diffusion** | **osmosis** |

Oxygen moves from the air inside the lungs into the blood by the

process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(1)**

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

|  |  |  |
| --- | --- | --- |
| **arteries** | **capillaries** | **veins** |

Oxygen moves from the lungs into the blood through the walls

of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(1)**

(iii)    Inside the lungs, oxygen is absorbed from the air into the blood.

Give **two** adaptations of the lungs that help the rapid absorption of oxygen into the blood.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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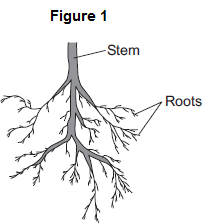
**(2)**

**(Total 6 marks)**

**Q6.**

Plants need different substances to survive.

**Figure 1** shows the roots of a plant.



(a)     (i)      Mineral ions are absorbed through the roots.

Name **one** other substance absorbed through the roots.

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**(1)**

(ii)     The plant in **Figure 1** has a higher concentration of mineral ions in the cells of its roots than the concentration of mineral ions in the soil.

Which **two** statements correctly describe the absorption of mineral ions into the plant’s roots?

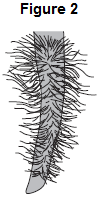
Tick () **two** boxes.

|  |  |
| --- | --- |
| The mineral ions are absorbed by active transport. |  |
| The mineral ions are absorbed by diffusion. |  |
| The mineral ions are absorbed down the concentration gradient. |  |
| The absorption of mineral ions needs energy. |  |

**(2)**

(iii)    The plant in **Figure 1** has roots adapted for absorption.

**Figure 2** shows a magnified part of a root from **Figure 1.**



Describe how the root in **Figure 2** is adapted for absorption.

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**(2)**

(b)     The leaves of plants have stomata.

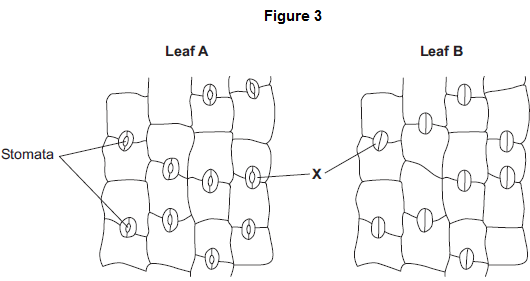
What is the function of the stomata?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(c)     **Figure 3** shows the underside of two leaves, **A** and **B**, taken from a plant in a man’s house.



(i)      In **Figure 3**, the cells labelled **X** control the size of the stomata.

What is the name of the cells labelled **X**?

Tick () **one** box.

|  |  |
| --- | --- |
| Guard cells |  |
| Phloem cells |  |
| Xylem cells |  |

**(1)**

(ii)     Describe how the appearance of the stomata in leaf **B** is different from the appearance of the stomata in leaf **A**.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(iii)    The man forgets to water the plant.

What might happen to the plant in the next few days if the stomata stay the same as shown in leaf **A** in **Figure 3**?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

**(Total 9 marks)**

**Q7.**

Substances can move into and out of cells.

(a)     (i)      How does oxygen move into and out of cells?

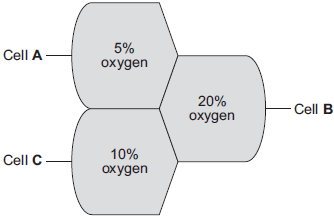
Draw a ring around **one** answer.

|  |  |  |
| --- | --- | --- |
| **diffusion** | **digestion** | **photosynthesis** |

**(1)**

(ii)     **Diagram 1** shows the percentage concentration of oxygen in three cells, **A**, **B** and **C**.

**Diagram 1**

****

Oxygen can move from cell to cell.

Into which cell, **A**, **B** or **C**, will oxygen move the fastest?

**(1)**

(b)     (i)      How does water move into and out of cells?

Draw a ring around **one** answer.

|  |  |  |
| --- | --- | --- |
| **breathing** | **osmosis** | **respiration** |

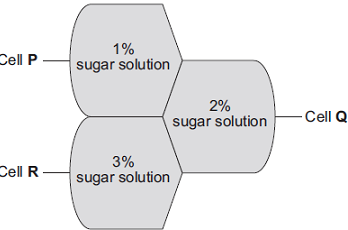
**(1)**

(ii)     Differences in the concentration of sugars in cells cause water to move into or out of cells at different rates.

**Diagram 2** shows three different cells, **P**, **Q** and **R**.

The information shows the percentage concentration of sugar solution  
in cells **P**, **Q** and **R**.

**Diagram 2**

****

Water can move from cell to cell.

Into which cell, **P**, **Q** or **R**, will water move the fastest?   

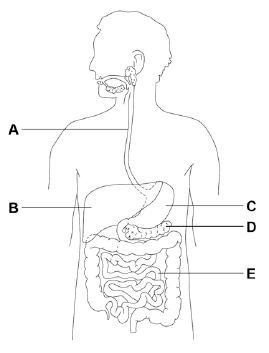
**(1)**

**(Total 4 marks)**

**Q8.**

**Figure 1** shows the human digestive system.

**Figure 1**

****

(a)     Which organ in **Figure 1** produces acid?

Tick **one** box.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** |  | **B** |  | **C** |  | **D** |  | **E** |  |

**(1)**

(b)     Which organ in **Figure 1** produces bile?

Tick **one** box.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** |  | **B** |  | **C** |  | **D** |  | **E** |  |

**(1)**

(c)     Where in **Figure 1** are digested foods absorbed into the blood?

Tick **one** box.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** |  | **B** |  | **C** |  | **D** |  | **E** |  |

**(1)**

(d)     Food molecules such as proteins **cannot** be absorbed unless they are digested.

Give **one** reason why.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

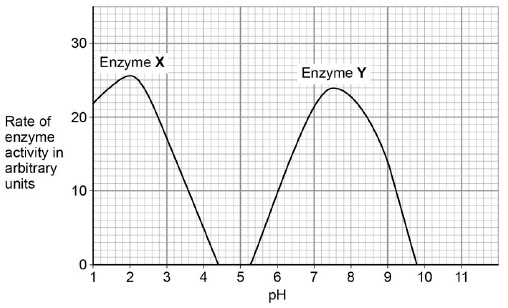
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**(1)**

A scientist investigated the effect of pH on the activity of two protease enzymes.

**Figure 2** shows the results.

**Figure 2**

****

(e)     What is the optimum pH for enzyme **Y**?

pH \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(f)      Where in the digestive system might the two protease enzymes be produced?

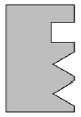
Tick **one** box.

|  |  |  |
| --- | --- | --- |
| **Enzyme X** | **Enzyme Y** |  |
| Mouth | Stomach |  |
| Pancreas | Mouth |  |
| Small intestine | Pancreas |  |
| Stomach | Small intestine |  |

**(1)**

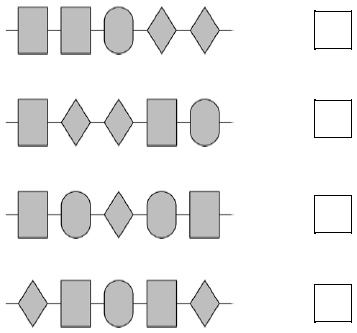
**Figure 3** shows a model of an enzyme molecule.

**Figure 3**

****

(g)     Which substrate fits the enzyme molecule in **Figure 3**?

Tick **one** box.



**(1)**

(h)     The enzyme and substrate diagrams are used as a model for a theory of enzyme action.

What is the name of this theory?

Tick **one** box.

|  |  |
| --- | --- |
| Evolution |  |
| Lock and key |  |
| Natural selection |  |
| Protein synthesis |  |

**(1)**

(i)      Explain why pH affects enzyme activity.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 10 marks)**

**Q9.**

An athlete decides to try a new type of protein drink after he exercises.

(a)     The athlete tests the protein drink to check it contains protein.

Which solution is used to test for protein in the drink?

Tick **one** box.

|  |  |
| --- | --- |
| Benedict’s |  |
| Biuret |  |
| Iodine |  |
| Universal indicator |  |

**(1)**

(b)     What colour will the solution turn to if there is protein in the drink?

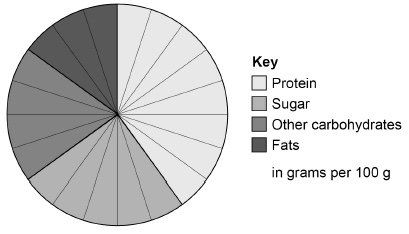
Tick **one** box.

|  |  |
| --- | --- |
| Blue-black |  |
| Purple |  |
| Red |  |
| Yellow |  |

**(1)**

**Figure 1** shows the proportion of different nutrients in the protein drink.

**Figure 1**

****

(c)     What is the ratio of sugar to protein in the protein drink?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1:1 |  | 1:0:6 |  | 1:2 |  | 1:1:6 |  |

**(1)**

(d)     Why is a high protein diet useful to an athlete?

Tick **one** box.

|  |  |
| --- | --- |
| Provides amino acids to make new muscle. |  |
| Provides fatty acids to produce urea. |  |
| Provides glucose for energy. |  |
| Provides lactic acid for anaerobic respiration. |  |

**(1)**

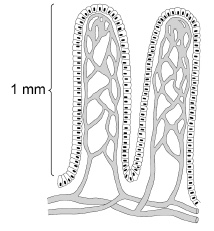
When the athlete drinks the protein drink the substances are digested.

The products of digestion are absorbed into the bloodstream.

Absorption happens in the small intestine.

**Figure 2** shows a section of the small intestine.

**Figure 2**

****

(e)     How is the small intestine in **Figure 2** adapted to absorb the products of digestion quickly?

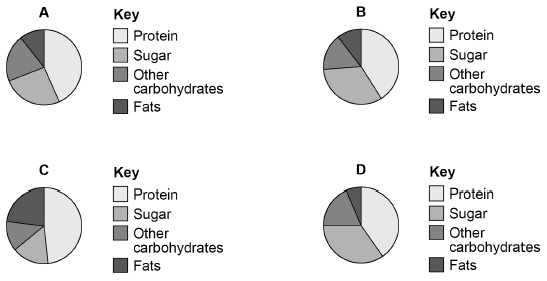
Tick **two** boxes.

|  |  |
| --- | --- |
| It has a large surface area. |  |
| It has a long diffusion pathway. |  |
| It has a thin surface. |  |
| The concentration inside the small intestine is low. |  |
| It has a poor blood supply. |  |

**(2)**

(f)      **Figure 3** shows the proportion of different nutrients in four protein drinks.

**Figure 3**

****

Which protein drink should an athlete with diabetes use?

Give a reason for your answer.

Drink \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

**(Total 8 marks)**

**Q10.**

The heart is part of the circulatory system.

(a)     (i)      Name **one** substance transported by the blood in the circulatory system.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

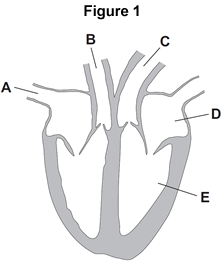
**(1)**

(ii)     What is the main type of tissue in the heart wall?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)     **Figure 1** shows the human heart.



(i)      Which blood vessel, **A**, **B** or **C**, takes blood to the lungs?       

**(1)**

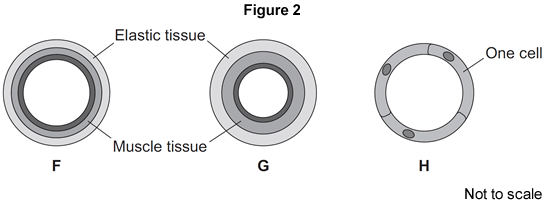
(ii)     Name parts **D** and **E** shown in **Figure 1**.

**D** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**E** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(c)     **Figure 2** shows three types of blood vessel, **F**, **G** and **H**.



(i)      What type of blood vessel is **F?**

|  |  |
| --- | --- |
| Tick (✔) **one** box. |  |
| an artery |  |
| a capillary |  |
| a vein |  |

**(1)**

(ii)      A man needs to have a stent fitted to prevent a heart attack.

In which type of blood vessel would the stent be placed?

|  |  |
| --- | --- |
| Tick (✔) **one** box. |  |
| an artery |  |
| a capillary |  |
| a vein |  |

**(1)**

(iii)      Explain how a stent helps to prevent a heart attack.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 9 marks)**

**Q11.**

Plants exchange substances with the environment.

(a)     Use words from the box to complete each sentence.

|  |  |  |  |
| --- | --- | --- | --- |
| **alveoli** | **phloem** | **root hairs** | **stomata** |
| **storage organs** | | **villi** | **xylem** |

(i)      Most water enters a plant through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(ii)     The water is transported up the stem to the leaves in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(iii)    Carbon dioxide enters leaves through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(iv)    A leaf uses the carbon dioxide to produce sugars.

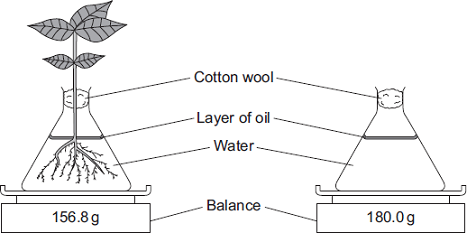
Sugars are transported to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through

the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(2)**

(b)     A student set up the apparatus shown in the diagram.

At the start of the experiment both balances showed a mass of 180.0 g.



The diagram shows the reading on each balance 24 hours later.

(i)      Look at the mass shown on each balance.

Calculate the difference between the two masses.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Difference in mass = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

**(1)**

(ii)     Suggest an explanation for the difference between the two masses.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 8 marks)**

**Q12.**

Obesity is linked to several diseases.

(a)     Name **two** diseases linked to obesity.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(b)     Scientists trialled a new slimming drug.

The table shows their results after one year.

|  |  |
| --- | --- |
| **Percentage change in mass of each volunteer** | **Number of volunteers** |
| gained mass or lost 0 to 3.9 % | 1900 |
| lost 4.0 to 4.9 % | 1100 |
| lost 5.0 to 9.9 % | 1500 |
| lost 10 % or more | 1500 |

(i)     Calculate the proportion of the volunteers who lost 10 % or more of their mass.

You should first calculate the total number of volunteers, then work out the proportion.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Proportion of volunteers = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(ii)     The National Health Service (NHS) gave permission for the drug to be used.

Use information from the table to suggest a reason why the NHS gave permission for the drug to be used.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

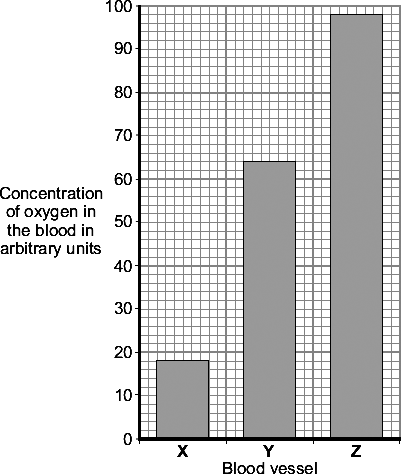
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

**(Total 5 marks)**

**Q13.**

The bar chart shows the concentration of oxygen in the blood in three different blood vessels, **X**, **Y** and **Z**.



(a)     (i)      What is the concentration of oxygen in blood vessel **X**?

Answer \_\_\_\_\_\_\_\_\_\_\_\_\_ arbitrary units.

**(1)**

(ii)     Which blood vessel, **X**, **Y** or **Z**, carries blood from the lungs to the heart?



**(1)**

(b)     Draw a ring around the correct answer to complete each sentence.

|  |  |  |
| --- | --- | --- |
|  |  | plasma. |
| (i) | Most of the oxygen in the blood is carried by the | red blood cells. |
|  |  | white blood cells. |

**(1)**

(ii)     Oxygen combines with a coloured pigment in the blood.

|  |  |
| --- | --- |
|  | alveoli. |
| This coloured pigment is called | haemoglobin. |
|  | lactic acid. |

**(1)**

**(Total 4 marks)**

**Q14.**

Complete the table to show which part of the blood carries out each function.

          Choose your answers from the list.

**plasma**                 **platelet**                **red blood cell**                **white blood cell**

          The first answer has been done for you.

|  |  |
| --- | --- |
| **Function** | **Part of the blood** |
| Transports most of the carbon dioxide | *plasma* |
| Transports most of the oxygen |  |
| Helps blood to clot at a wound |  |
| Defends the body against microorganisms |  |
| Transports the products of digestion |  |

**(Total 4 marks)**

**Q15.**

The following sentences are about the blood system. Choose words from the list in the box to complete these sentences. You may use a word once or not at all.

|  |
| --- |
| diffuse      lowered      narrow      one         raised      spread      two      wide |

Capillaries have thin walls which are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .cell thick. This allows

nutrients from digested food to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through and reach the cells

of organs. Capillaries are very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .and so blood flow through an

organ is slowed down and blood pressure is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

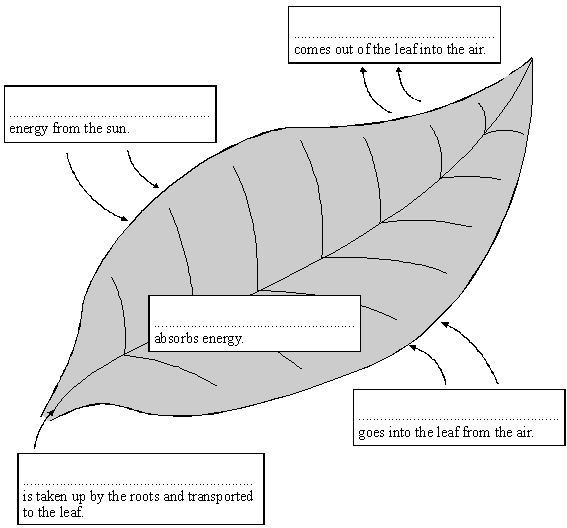
**(Total 4 marks)**

**Q16.**

The diagram shows how a leaf of a green plant makes glucose.

(a)     Use words from the box to complete the labels on the diagram.  You may use each word once or not at all.

|  |
| --- |
| carbon dioxide       chlorophyll       glucose       heat          light       oxygen       water |



**(5)**

(b)     (i)      Compete the following sentence.

Glucose in food is a type of \_\_\_\_\_\_\_\_\_ . When we eat it, it gives us energy.

**(1)**

(ii)     The plant turns some of the glucose into starch.  Why is starch useful to the plant?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(iii)     What does the plant do with the rest of the glucose?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(c)     (i)      What is the name of the process outlined in the diagram?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(ii)     Give **one** way that leaves are adapted to do this process.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

**(Total 10 marks)**

**Q17.**

(a)     (i)      Complete the word equation for the process of aerobic respiration.

Glucose      +      \_\_\_\_\_\_\_\_\_\_\_\_\_\_      →      carbon dioxide      +      water

**(1)**

(ii)     Which organ removes carbon dioxide from your body?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)     Use names from the box to complete the **two** spaces in the passage.

|  |
| --- |
| carbon dioxide      lactic acid       nitrogen        oxygen       water |

Anaerobic respiration can occur when an athlete does vigorous exercise.

This is because there is not enough \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the body.

The product of anaerobic respiration is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(2)**

**(Total 4 marks)**

**Q18.**

Antibiotics are used to kill some types of pathogen.

(a)     Which illness could be treated with an antibiotic?

Tick **one** box.

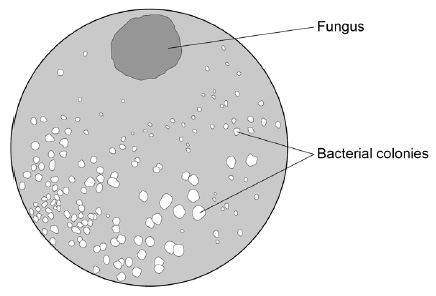
|  |  |
| --- | --- |
| AIDS |  |
| Measles |  |
| Salmonella |  |
| Type 2 diabetes |  |

**(1)**

Alexander Fleming discovered the antibiotic penicillin.

He noticed that one of his Petri dishes containing bacteria had become contaminated with a fungus.

The diagram shows the Petri dish.



(b)     Read the information about the discovery of penicillin.

Draw **one** line from each piece of information to its description.

|  |  |  |
| --- | --- | --- |
| **Information** |  | **Description** |
|  |  | Conclusion |
| Fleming noticed that there were only a few bacterial colonies growing near the fungus. |  |  |
|  |  | Hypothesis |
| Fleming thought the fungus must have produced a chemical (penicillin) that killed the bacteria around it. |  |  |
|  |  | Investigation |
| He injected 8 mice with bacteria and gave 4 of these mice an injection of penicillin. |  |  |
|  |  | Observation |
| The 4 mice injected with penicillin survived. The 4 mice **not** given penicillin died. |  |  |
|  |  | Result |

**(4)**

(c)     Look at the diagram of the petri dish.

The greater the distance from the fungus the more bacteria grew.

Suggest **one** reason for this.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(d)     Give **two** reasons why Fleming’s discovery was important.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 8 marks)**

**Q19.**

Pathogens are microorganisms that cause infectious disease.

(a)     Draw **one** line from each disease to the way the disease is spread.

|  |  |  |
| --- | --- | --- |
| **Disease** |  | **Way the disease is spread** |

|  |  |  |
| --- | --- | --- |
|  |  | Animals that draw blood |
|  |  |  |
| Cholera |  | Drinking contaminated water |
|  |  |  |
| Cold |  | Droplets in the air when people cough or sneeze |
|  |  |  |
| Malaria |  | Eating food that is contaminated |
|  |  |  |
|  |  | Breathing air polluted with carbon dioxide |

**(3)**

(b)     One way the human body protects itself against the entry of pathogens is by producing antimicrobial chemicals.

Antimicrobial chemicals kill pathogens.

Give **two** other ways the human body protects itself against the **entry** of pathogens.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

(c)     Measles is a childhood disease caused by a microorganism.

Measles is **not** treated by antibiotics.

Give the reason why.

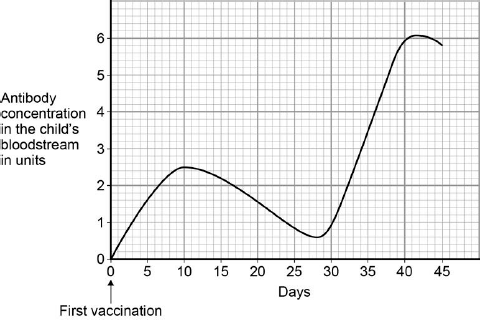
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**(1)**

(d)     Vaccinations help people become immune to infections.

In 2013, 92% of children in the UK had two vaccination injections against measles.

The figure below shows how the concentration of antibodies in the blood changes after each measles vaccination.



Suggest what day the second vaccination was given.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(e)     What is the highest concentration of antibodies produced by the first vaccination?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(f)     How will the number of children getting measles change as more children are vaccinated against measles?

Give a reason for your answer.

Change   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

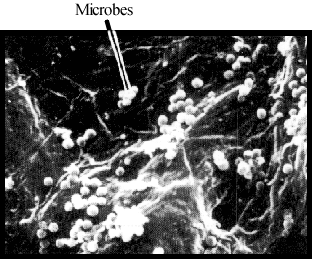
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**(2)**

**(Total 10 marks)**

**Q20.**

The photograph below shows human skin highly magnified. Groups of microbes can be seen on the skin.



Give **two** ways in which the body protects itself from these microbes.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 2 marks)**

**Q21.**

Bacteria and viruses can reproduce quickly inside the body and make people feel ill.

(a)     Use the correct answer from the box to complete the sentence.

|  |  |  |
| --- | --- | --- |
| **antibodies** | **antitoxins** | **toxins** |

Bacteria and viruses make us feel ill because they produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(1)**

(b)     (i)      Antibiotics can be used to treat some infections.

Use the correct answer from the box to complete the sentence.

|  |  |  |
| --- | --- | --- |
| **bacteria** | **bacteria and viruses** | **viruses** |

Antibiotics are medicines that kill \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(1)**

(ii)     New strains of pathogens have developed which are resistant to antibiotics.

Use the correct answer from the box to complete the sentence.

|  |  |  |
| --- | --- | --- |
| **are short of food** | **invade body cells** | **mutate** |

New strains are produced when pathogens \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**(1)**

(iii)    What will scientists have to develop to kill these new resistant strains?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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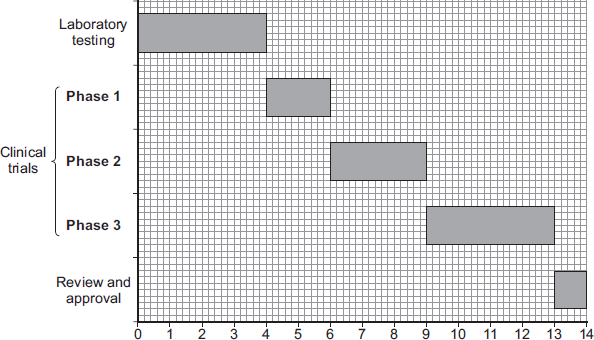
**(1)**

**(Total 4 marks)**

**Q22.**

New drugs have to be tested before they can be sold.

The graph shows how much time the different stages of testing took for a new drug.

  
                                    Time in years

(a)     (i)      How much time did the laboratory testing of the drug take?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years

**(1)**

(ii)     Suggest what the drug was tested on during laboratory testing.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)     Clinical trials are carried out on human volunteers and patients.

(i)      How much time did the clinical trials take for this drug?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years

**(2)**

(ii)     During **Phase 1** clinical trials, the drug is tested on healthy volunteers using low doses.

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

|  |  |
| --- | --- |
|  | find the best dose. |
| The reason for **Phase 1** testing is to | see if the drug works. |
|  | see if the drug has side effects. |

**(1)**

(iii)    During **Phase 2** and **Phase 3** clinical trials, half of the volunteers are given a fake drug called a placebo in a double blind trial.

In a double blind trial, who knows which volunteers are given the drug and which volunteers are given the placebo?

Tick ( ) **one** box.

|  |  |
| --- | --- |
|  | **Tick ( )** |
| The doctors but not the volunteers |  |
| The doctors and the volunteers |  |
| The volunteers but not the doctors |  |
| Neither the volunteers nor the doctors |  |

**(1)**

**(Total 6 marks)**

**Q23.**

Drugs affect our body chemistry.

(a)     **List A** gives the names of some drugs.  
**List B** gives the uses of some drugs.

Draw **one** line from each drug in **List A** to the use of the drug in **List B**.

|  |  |  |
| --- | --- | --- |
| **List A Drug** |  | **List B Use** |
|  |  |  |
|  |  | To increase fertility in women |
| Anabolic steroid |  |  |
|  |  | To treat leprosy |
| Statin |  |  |
|  |  | To stimulate muscle growth |
| Thalidomide |  |  |
|  |  | To reduce the risk of heart and circulatory diseases |

**(3)**

(b)     A new drug was trialled on 80 healthy volunteers.  
The volunteers were asked to report any side effects.

The results of the trial are shown in the table.

|  |  |
| --- | --- |
| **Reported effects** | **Number of volunteers** |
| No side effects | 20 |
| Severe sickness | 42 |
| Itchy skin | 18 |

Based on the results of this trial, what should the drug company do next?

Tick () **one** box.

|  |  |
| --- | --- |
| Test on a small group of patients to find the optimum dose |  |
| Test on a large group of patients to see if the drug works on ill people |  |
| Stop the trial |  |

Give a reason for your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 5 marks)**

**Q24.**

Plants make glucose by photosynthesis.

(a)     Complete the word equation for photosynthesis.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ → glucose + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)     What is the name of the chemical that makes a leaf look green?

Tick **one** box.

|  |  |
| --- | --- |
| Cellulose |  |
| Chlorophyll |  |
| Chloroplast |  |
| Chromosome |  |

**(1)**

(c)     A test for starch is used to show that a plant has photosynthesised.

How does the presence of starch show that photosynthesis has taken place?

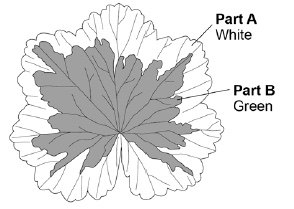
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**(1)**

A student investigated where starch was made in a leaf.

She used a leaf that was part green and part white as shown in the diagram.



This is the method used.

1.      Put the leaf in boiling water for 1 minute.

Reason: stops all chemical reactions in the leaf.

2.      Transfer the leaf to boiling ethanol for 5 minutes.

Reason: removes the green colour.

3.      Dip the leaf in hot water.

Reason: softens the leaf.

4.      Spread the leaf on a white tile and test with iodine solution.

Reason: stains any starch.

(d)     If the chemical reactions in the leaf were not stopped, the amount of starch in the leaf would decrease.

Give the reason why.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(e)     Suggest why it is important to remove the green colour from the leaf before adding iodine solution.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(f)      Ethanol is flammable.

The student wore safety goggles when testing the leaf for starch.

Give one other safety precaution the student should have taken.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(g)     Look at the leaf in the diagram.

What colour would part **A** and part **B** stain with iodine solution after the starch test?

**A** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**B** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

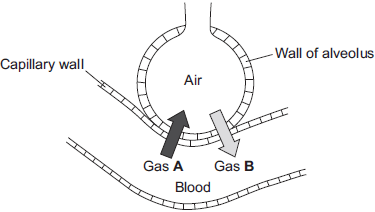
**(Total 8 marks)**

**Q25.**

Gas exchange takes place in the lungs.

The diagram shows an alveolus next to a blood capillary in a lung.

The arrows show the movement of two gases, **A** and **B**.



(a)     (i)      Draw a ring around the correct answer to complete the sentence.

|  |  |
| --- | --- |
| Gases **A** and **B** move by | diffusion.  osmosis.  respiration. |

**(1)**

(ii)     Gas **A** moves from the blood to the air in the lungs.

Gas **A** is then breathed out.

Name Gas **A**.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(iii)    Which cells in the blood carry Gas **B**?

Draw a ring around the correct answer.

**platelets**                **red blood cells**                **white blood cells**

**(1)**

(b)     The average number of alveoli in each human lung is 280 million.

The average surface area of 1 million alveoli is 0.25 m2.

Calculate the total surface area of a human lung.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m2

**(2)**

(c)     An athlete trains to run a marathon. The surface area of each of the athlete’s lungs has increased to 80 m2.

Give **one** way in which this increase will help the athlete.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

**(Total 6 marks)**

**Q26.**

One factor that may affect body mass is *metabolic rate*.

(a)     (i)      What is meant by *metabolic rate* ?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(ii)     Metabolic rate is affected by the amount of activity a person does.

Give **two** other factors that may affect a person’s metabolic rate.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

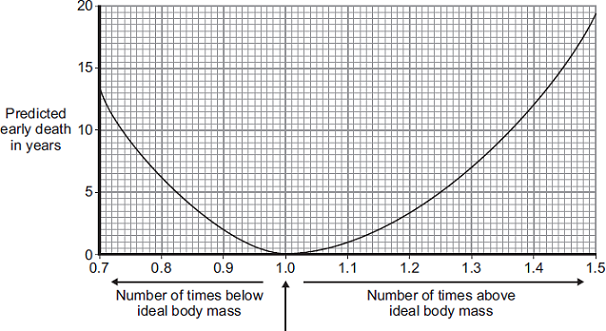
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**(2)**

(b)     Predicted early death is the number of years that a person will die before the mean age of death for the whole population. The predicted early death of a person is affected by their body mass.

Scientists have calculated the effect of body mass on predicted early death.

The graph shows the results of the scientists’ calculations.



**Ideal body mass**

The number of times above or below ideal body mass is given by the equation:



In the UK the mean age of death for women is 82.

A woman has a body mass of 70 kg. The woman’s ideal body mass is 56 kg.

(i)      Use the information from the graph to predict the age of this woman when she dies.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Age at death = \_\_\_\_\_\_\_\_\_\_\_ years

**(2)**

(ii)     The woman could live longer by changing her lifestyle.

Give **two** changes she should make.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 7 marks)**

**Q27.**

(a)     Respiration is a process which takes place in living cells. What is the purpose of *respiration*?

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**(1)**

(b)     (i)      Balance the equation for the process of respiration when oxygen is available.

C6H12O6  +              O2  →            CO2  +              H2O

**(1)**

(ii)     What is the name of the substance in the equation with the formula C6H12O6?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(c)     Oxygen is absorbed through the alveoli in the lungs.

(i)      How are the alveoli adapted for this function?

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**(2)**

(ii)     Name the gas which is excreted through the alveoli.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(d)     (i)      What is the name of the process of respiration when oxygen is **not** available?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(ii)     Describe the process of respiration which takes place in human beings when oxygen is **not** available and give an effect.

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**(3)**

**(Total 10 marks)**

**Section 2: Required Practicals**

**Q1.**

This question is about photosynthesis.

(a)  What are the **two** products of photosynthesis?

Tick **two** boxes.

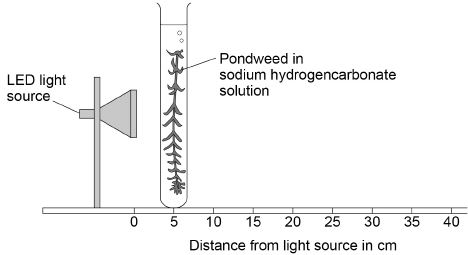
|  |  |
| --- | --- |
| Carbon dioxide |  |
| Chlorophyll |  |
| Glucose |  |
| Oxygen |  |
| Water |  |

**(2)**

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

**Figure 1** shows the apparatus.

**Figure 1**

****

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 30 seconds.

3.   Repeat the investigation with the pondweed at different distances from the light source.

(b)  How could the student measure the rate of photosynthesis more accurately?

Tick **two** boxes.

|  |  |
| --- | --- |
| Count the number of bubbles produced in 1 minute |  |
| Measure the change in mass of the pondweed in 30 seconds |  |
| Measure the volume of gas produced in 30 seconds |  |
| Place the pondweed further from the light source |  |
| Use water instead of sodium hydrogencarbonate solution |  |

**(2)**

(c)  The LED light source does **not** get hot.

Why is this important?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

The table below shows the student’s results.

|  |  |
| --- | --- |
| **Distance of light source from pondweed in cm** | **Number of bubbles produced in 30 seconds** |
| 5 | 40 |
| 10 | 13 |
| 15 | 5 |
| 20 | 2 |
| 25 | 1 |
| 30 | 0 |

(d)  Calculate the number of bubbles produced in 2 minutes when the light source was 10 cm from the pondweed.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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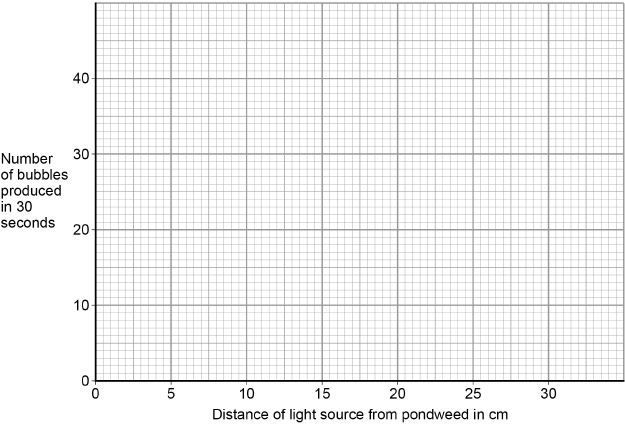
Number of bubbles produced in 2 minutes = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(e)  Plot the data from the table above on **Figure 2**

Draw a line of best fit.

**Figure 2**

****

**(3)**

(f)  Give **one** conclusion that can be made from these results.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

**(Total 10 marks)**

**Q2.**

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

This is the method used.

1.   Cut three pieces of potato to the same length.

2.   Dry each piece on a paper towel.

3.   Weigh each piece.

4.   Place each piece in a different concentration of sugar solution.

5.   Leave all three pieces for 2 hours.

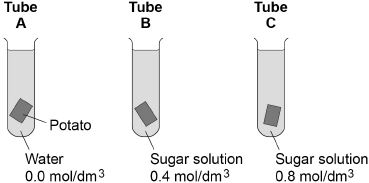
6.   Remove the three pieces of potato from the solutions.

7.   Dry each piece on a paper towel.

8.   Measure the length and mass of each piece of potato.

**Figure 1** shows how the investigation was set up.

**Figure 1**

****

(a)  Why did the student dry each piece of potato before weighing it?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(b)  What **two** changes would you expect in the potato in **tube A** after 2 hours?

Tick **two** boxes.

|  |  |
| --- | --- |
| Breaks into pieces |  |
| Decrease in hardness |  |
| Decrease in size |  |
| Increase in mass |  |
| Increase in length |  |

**(2)**

(c)  Complete the sentences.

Water moves into and out of cells by a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

Water would move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the potato cells in **tube A**.

The solution outside the potato in **tube A** is at a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

concentration than the solution inside the potato cells.

**(3)**

(d)  The potato in **tube B** did not change.

Give **one** conclusion that can be made from this observation.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(e)  **Figure 2** shows the root of a germinating seed.

**Figure 2**

****

Describe **two** ways the root is adapted to absorb water efficiently.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 9 marks)**

**Q3.**

Some students tested a red cabbage leaf for starch.

This is the method used.

1.   Boil the leaf in ethanol.

2.   Rinse the leaf in water.

3.   Add the reagent to test the leaf for starch.

(a)  Give **one** safety precaution the students should take in this test.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(b)  Which reagent is used to test the boiled leaf for starch?

Tick **one** box.

|  |  |
| --- | --- |
| Benedict’s solution |  |
| Biuret solution |  |
| Iodine solution |  |
| Sodium chloride solution |  |

**(1)**

(c)  What colour will be seen if the test for starch is positive?

Tick **one** box.

|  |  |
| --- | --- |
| Blue-black |  |
| Pale pink |  |
| Orange |  |
| Red |  |

**(1)**

The students then used paper chromatography to investigate the coloured pigments in a red cabbage leaf.

(d)  Complete the sentences.

Choose answers from the box.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **distil** | **evaporate** | **filter** | **mobile** | **separate** | **solid** |

Chromatography can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixtures.

In paper chromatography, the paper is part of the stationary phase.

The solvent is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phase.

**(2)**

**Table 1** shows the students’ results.

The distance each pigment moved was measured from the start line.

|  |  |  |
| --- | --- | --- |
|  | **Distance moved in mm** | **Rf value** |
| Yellow-green pigment | 17 | **X** |
| Yellow pigment | 46 | 0.42 |
| Orange pigment | 100 | 0.91 |

The Rf value is calculated using the equation:



(e)  The solvent moved 110 mm from the start line.

Calculate Rf value **X** in **Table 1**.

Give your answer to 2 significant figures.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Rf value **X** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(f)  The known ranges of Rf values of some pigments are shown in **Table 2**.

**Table 2**

|  |  |
| --- | --- |
| **Pigment** | **Rf value range** |
| Carotene | 0.89 to 0.98 |
| Chlorophyll a | 0.24 to 0.30 |
| Chlorophyll b | 0.20 to 0.26 |
| Xanthophyll | 0.04 to 0.28 |

The Rf value for the orange pigment in red cabbage leaves is 0.91

What is this orange pigment most likely to be?

Tick **one** box.

|  |  |
| --- | --- |
| Carotene |  |
| Chlorophyll a |  |
| Chlorophyll b |  |
| Xanthophyll |  |

**(1)**

**(Total 8 marks)**

**Q4.**

An athlete decides to try a new type of protein drink after he exercises.

(a)     The athlete tests the protein drink to check it contains protein.

Which solution is used to test for protein in the drink?

Tick **one** box.

|  |  |
| --- | --- |
| Benedict’s |  |
| Biuret |  |
| Iodine |  |
| Universal indicator |  |

**(1)**

(b)     What colour will the solution turn to if there is protein in the drink?

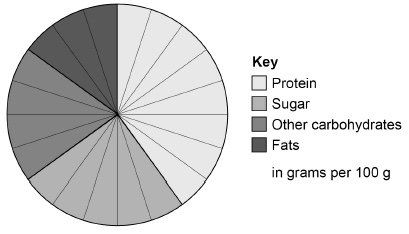
Tick **one** box.

|  |  |
| --- | --- |
| Blue-black |  |
| Purple |  |
| Red |  |
| Yellow |  |

**(1)**

**Figure 1** shows the proportion of different nutrients in the protein drink.

**Figure 1**

****

(c)     What is the ratio of sugar to protein in the protein drink?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1:1 |  | 1:0:6 |  | 1:2 |  | 1:1:6 |  |

**(1)**

(d)     Why is a high protein diet useful to an athlete?

Tick **one** box.

|  |  |
| --- | --- |
| Provides amino acids to make new muscle. |  |
| Provides fatty acids to produce urea. |  |
| Provides glucose for energy. |  |
| Provides lactic acid for anaerobic respiration. |  |

**(1)**

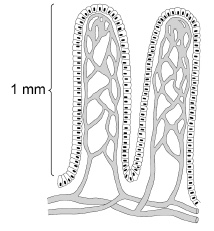
When the athlete drinks the protein drink the substances are digested.

The products of digestion are absorbed into the bloodstream.

Absorption happens in the small intestine.

**Figure 2** shows a section of the small intestine.

**Figure 2**

****

(e)     How is the small intestine in **Figure 2** adapted to absorb the products of digestion quickly?

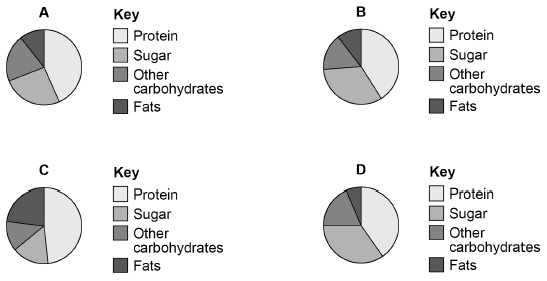
Tick **two** boxes.

|  |  |
| --- | --- |
| It has a large surface area. |  |
| It has a long diffusion pathway. |  |
| It has a thin surface. |  |
| The concentration inside the small intestine is low. |  |
| It has a poor blood supply. |  |

**(2)**

(f)      **Figure 3** shows the proportion of different nutrients in four protein drinks.

**Figure 3**

****

Which protein drink should an athlete with diabetes use?

Give a reason for your answer.

Drink \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 8 marks)**

**Q5.**

A scientist investigated how effective 5 different antibiotics were at killing two types of bacteria, *E.coli* and *S.aureus*.

•        The scientist grew the bacteria on agar in two different Petri dishes.

•        He placed paper discs soaked in the 5 different antibiotic solutions, **A**, **B**, **C**, **D** and **E**, onto the agar.

•        He used the same concentration of each antibiotic and the same sized paperdiscs.

•        The Petri dishes were incubated at 25°C for 3 days.

A clear area around the paper disc means that the antibiotic has killed the bacteria there.

The results are shown in the diagram.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Petri dish containing *E.coli* |  | Petri dish containing *S.aureus* |  |
|  | | | | |

(a)     Give **one** variable the scientist controlled.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)     Use the results shown in the diagram to help you to answer the following questions.

(i)      Which antibiotic, **A**, **B**, **C**, **D** or **E**, was the most effective at killing *E.coli*?

Write the correct answer in the box.        

**(1)**

(ii)     Which antibiotic, **A**, **B**, **C**, **D** or **E**, did not kill either *E.coli* or *S.aureus*?

Write the correct answer in the box.        

**(1)**

(iii)    Which antibiotic, **A**, **B**, **C**, **D** or **E**, would be the best to use to kill both *E.coli* **and** *S.aureus*?

Antibiotic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Give a reason for your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

(c)     MRSA is a strain of *S.aureus*. MRSA cannot be killed by most antibiotics.

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

|  |  |
| --- | --- |
|  | immune. |
| Bacteria that cannot be killed by antibiotics are | powerful. |
|  | resistant. |

**(1)**

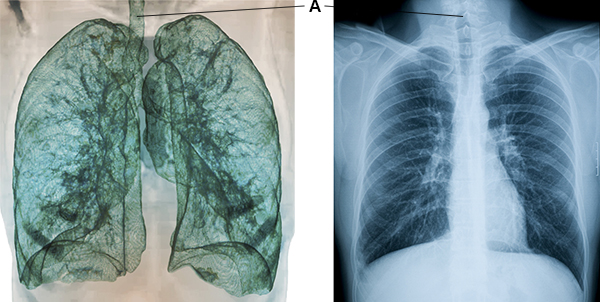
**(Total 6 marks)**

**Section 3: 6 mark questions**

**Q1.**

A man with breathing difficulties goes to hospital.

The photographs below show his lung scan and chest X-ray.



(a)  What is part **A**?

Tick **one** box.

|  |  |
| --- | --- |
| Bronchus |  |
| Capillary |  |
| Trachea |  |
| Vein |  |

**(1)**

(b)  Give **one** advantage of using the **lung scan**, rather than the chest X-ray, to diagnose problems with the man’s breathing system.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(c)  Give **one** advantage of using the **chest X-ray**, rather than the lung scan, to diagnose problems with the man’s breathing system.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(1)**

(d)  Aerobic respiration and anaerobic respiration are the two types of cell respiration.

Give **three** differences between aerobic and anaerobic respiration.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(3)**

(e)  A health website contains the following advice:

**Stop smoking and you will be healthier and live longer.**

Explain why stopping smoking will improve a person’s health.

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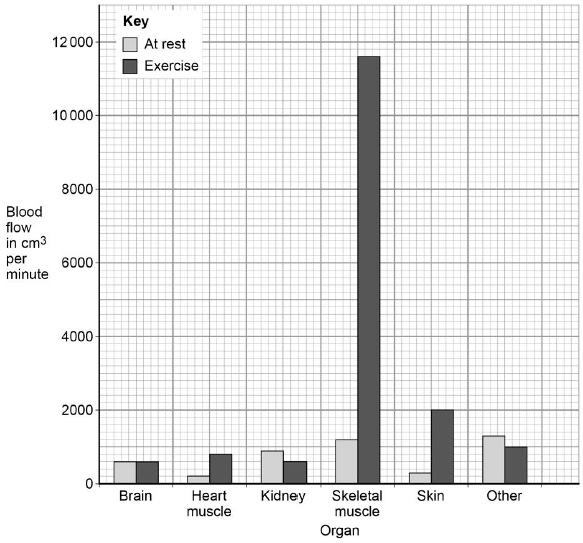
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**(6)**

**(Total 12 marks)**

**Q2.**

The graph shows the rate of blood flow through different organs at rest and during exercise.



(a)     Determine the total volume of blood that flows through the brain in 1 hour.

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Volume = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm3

**(1)**

(b)     Look at the blood flow through the skeletal muscle.

Calculate how many times the blood flow increases by during exercise compared to at rest.

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Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(c)     Explain why the blood flow to the skeletal muscles increases during exercise.

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**(3)**

(d)     Arteries and veins have different structures and different functions.

Explain how the different structure of arteries and veins relates to their different functions.

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**(6)**

**(Total 12 marks)**

**Q3.**

Plants absorb light to photosynthesise.

(a)     What is the correct word equation for photosynthesis?

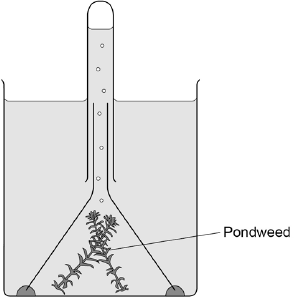
Tick **one** box.

|  |  |
| --- | --- |
| carbon dioxide  +  glucose     oxygen  +  water |  |
| glucose  +  oxygen     carbon dioxide  +  water |  |
| oxygen  +  water     carbon dioxide  +  glucose |  |
| water  +  carbon dioxide     oxygen  +  glucose |  |

**(1)**

(b)     **Figure 1** shows some of the apparatus that can be used to measure the rate of photosynthesis.

**Figure 1**

****

The rate of photosynthesis in the pondweed is affected by different colours of light.

Describe a method you could use to investigate this.

You should include:

•      what you would measure

•      variables you would control.

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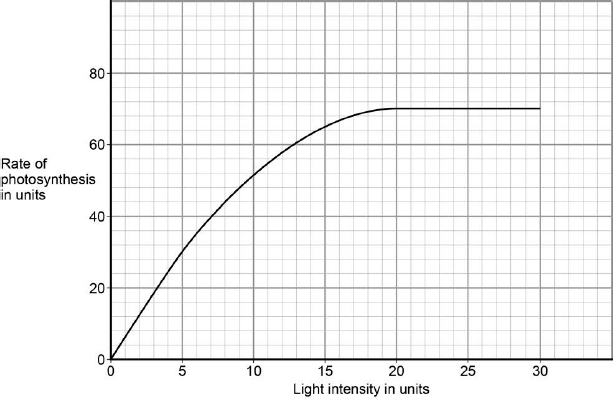
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**(6)**

(c)     A scientist carried out a similar investigation.

Her results are shown in **Figure 2**.

**Figure 2**

****

The scientist said:

**‘Light stops being a limiting factor at a light intensity of 20 units.’**

Give evidence from **Figure 2** to support this statement.

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**(1)**

(d)     What could be limiting the rate of photosynthesis at a light intensity of 25 units?

Give **one** factor.

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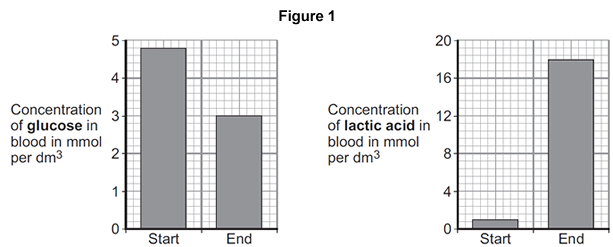
**(1)**

**(Total 9 marks)**

**Q4.**

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

(a)     **Figure 1** shows the concentrations of glucose and of lactic acid in the athlete’s blood at the start and at the end of the run.



(i)      Lactic acid is made during anaerobic respiration.

What does anaerobic mean?

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**(1)**

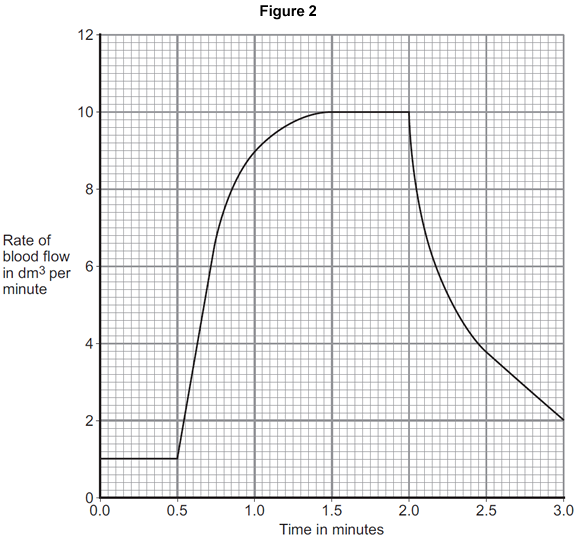
(ii)     Give evidence from **Figure 1** that the athlete respired anaerobically during the run.

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**(1)**

(b)     **Figure 2** shows the effect of running on the rate of blood flow through the athlete’s muscles.



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

Time = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes

**(1)**

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

Use data from **Figure 2** in your answer.

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**(2)**

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

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**(4)**

**(Total 9 marks)**

**Q5.**

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

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

(a)  Explain what a non-communicable disease is.

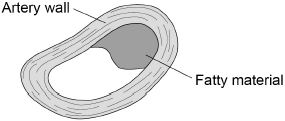
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**(2)**

The diagram below shows a coronary artery of someone with CHD.



(b)  Explain how CHD can cause a heart attack.

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**(3)**

(c)  Explain how lifestyle and medical risk factors increase the chance of developing CHD.

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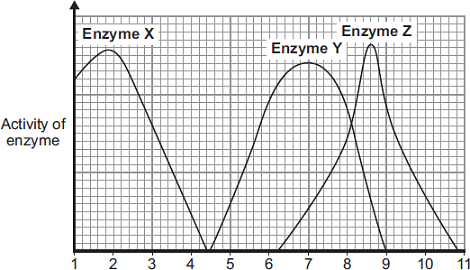
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**(6)**

**(Total 11 marks)**

**Q6.**

(a)     The graph shows the effect of pH on the activities of three enzymes, **X**, **Y** and **Z**.  
These enzymes help to digest food in the human digestive system.  
Each enzyme is produced by a different part of the digestive system.



pH

(i)      What is the optimum (best) pH for the action of enzyme **Z**?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(ii)     The stomach makes a substance that gives the correct pH for enzyme action in the human stomach.

Name this substance. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(iii)    Which enzyme, **X**, **Y** or **Z**, will work best in the human stomach?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

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

Different parts of the human digestive system help to break down molecules of fat so that they can be absorbed into the body.

Describe how.

To gain full marks you should refer to:

•         the enzyme and where the enzyme is produced

•         the products of digestion

•         any other chemicals involved.

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**(6)**

**(Total 9 marks)**

**Q7.**

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

Diffusion is an important process in animals and plants.

The movement of many substances into and out of cells occurs by diffusion.

Describe why diffusion is important to animals and plants.

In your answer you should refer to:

•        animals

•        plants

•        examples of the diffusion of named substances.

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**(Total 6 marks)**

**Section 1: Knowledge Mark Scheme**

**Q1.**

(a)  cell membrane

*extra ticks negates marks*

**1**

(b)  engulf pathogens

**1**

produce antibodies

**1**

produce antitoxins

**1**

*extra ticks negates marks*

(c)  2050 − 100

**1**

= 1950

*allow* ***1*** *mark for a correct subtraction of incorrect values*

**1**

*an answer of 1950 scores* ***2*** *marks*

(d)  any **one** from:

•   (more) people vaccinated

*ignore injections / treatments / medicines unqualified*

*allow vaccine produced*

*allow (more people given) MMR (vaccine)*

*do* ***not*** *allow antibiotics*

*ignore less people infected*

•   (more) people immune

•   no new measles strain

**1**

(e)  any **one** from:

•   measles is (caused by) a virus

*allow measles is not caused by a bacterium*

•   viruses cannot be killed / destroyed by antibiotics

*allow antibiotics* ***only*** *kill / destroy bacteria*

*ignore harmed / treated*

**1**

(f)  any **one** from:

•   use of a barrier method of contraception

*ignore use of diaphragm*

•   use of a condom

*ignore use protection / safe sex*

•   vaccination / immunisation

•   avoid sexual intercourse / contact

*do* ***not*** *accept less sexual intercourse / contact*

**1**

(g)  any **one** from:

•   size / shape/ type of paper disc

*ignore paper disc unqualified*

•   concentration of antibiotic

*allow strength / dosage of antibiotic*

•   volume / amount of antibiotic

•   (incubation) time

*allow 3 days*

•   (incubation) temperature

*ignore size of petri dish*

**1**

(h)  to check that the disc / water did not have an effect

**or**

to make sure it was the antibiotic that had an effect

*allow for comparison with the antibiotics*

*allow as a (experimental) control*

*do* ***not*** *accept as a control variable*

**1**

(i)   (antibiotic) **A**

*no marks if wrong antibiotic given*

**1**

any **one** from:

•   (antibiotic **A**) had the larg**est** clear area around it

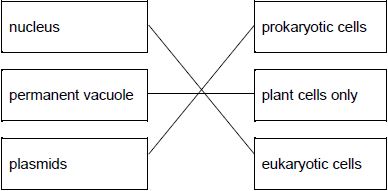
•   (antibiotic **A**) killed the **most** bacteria

**1**

**[13]**

**Q2.**

(a)



*allow* ***1*** *mark for one or two correct links*

**2**

(b)

|  |  |  |
| --- | --- | --- |
| vacuole | ribosome | cell wall |

*tick box takes precedence*

*if no tick is given, look at both the figure and the circling of words in the table*

*if writing is seen on the figure and in the table both must be correct*

**1**

(c)  turn the (fine focusing) knob until the cells are in focus

*allow focus it*

*do* ***not*** *accept increase magnification*

*ignore decrease magnification*

*ignore clear*

*ignore references to resolution / illumination*

*ignore zoom in / out*

**1**

(d)  (rotate the) nosepiece / objective lens

*allow change the (objective / eyepiece) lens*

**1**

to a higher power (lens)

*allow (to) increase the magnification*

*a comparator is required*

*ignore change / adjust the magnification*

*allow stronger or more powerful lens*

*ignore references to resolution / illumination unqualified*

*ignore zoom in / out*

*ignore references to an electron microscope*

**1**

(e)  conversion of units:

(112 mm ⟶) 112 000 (µm)

**or**

(280 µm ⟶) 0.28 (mm)

**1**

****

**or**

****

*allow* ***1*** *mark for no conversion of units 112 / 280*

***or***

*incorrect value from step 1 correctly substituted*

**1**

400 (×)

*do* ***not*** *accept if units are given*

*if no other mark scored allow* ***1*** *mark for:*

**

*a triangle with words or letters in is insufficient, as the correct rearrangement is needed*

**1**

*an answer of 400 (×) scores* ***3*** *marks*

**[9]**

**Q3.**

(a)     contract / shorten

*ignore relax*

*do* ***not*** *allow expand*

**1**

to churn / move / mix food

*accept peristalsis / mechanical digestion*

*ignore movement unqualified*

**1**

(b)     400

*acceptable range 390-410*

*allow 1 mark for answer in range of 39 to 41*

*allow 1 mark for answer in range of 3900 to 4100*

**2**

(c)     to transfer energy for use

*allow to release / give / supply / provide energy*

*do* ***not*** *allow to ‘make’ / ߢproduce’ / ‘create’ energy*

*allow to make ATP*

*ignore to store energy*

**1**

by (aerobic) respiration **or** from glucose

*do* ***not*** *allow anaerobic*

*energy released* ***for*** *respiration = max 1 mark*

**1**

(d)     (i)      to make protein / enzyme

*ignore ‘antibody’ or other named protein*

**1**

(ii)     too small / very small

*allow light microscope does not have sufficient magnification / resolution*

*allow ribosomes are smaller than mitochondria*

*ignore not sensitive enough*

*ignore ribosomes are transparent*

**1**

**[8]**

**Q4.**

(a)  mitochondria

**1**

ribosomes

**1**

(b)  to repair the muscles

**1**

(c)  



**1**

1.05 (hours)

*allow for* ***2*** *marks 1 hour 3 minutes* ***or*** *1:03 (hours)*

**1**

*an answer of 1.05 hours scores* ***2*** *marks*

(d)  

*allow 5 × 7*

**1**

35 (%)

**1**

*an answer of 53 (%) scores* ***2*** *marks*

(e)  78

**1**

(f)  fertilisation

**1**

**[9]**

**Q5.**

(a)     (i)      alveoli / alveolus

*allow air sacs*

*allow phonetic spelling*

**1**

(ii)     any **one** from:

•        protection (of lungs / heart)

•        help you breathe / inflate lungs.

**1**

(b)     (i)      diffusion

**1**

(ii)     capillaries

**1**

(iii)    any **two** from:

•        (have many) alveoli

*allow air sacs*

•        large surface / area

•        thin (exchange) surface **or** short diffusion pathway

*accept only one / two cell(s) thick*

•        good blood supply / many capillaries

*allow (kept) ventilated or maintained concentration gradient.*

**2**

**[6]**

**Q6.**

(a)     (i)      water / H2O

*accept oxygen*

*allow H2O*

*do* ***not*** *allow H2O or H2O*

**1**

(ii)     the mineral ions are absorbed by active transport

**1**

the absorption of mineral ions needs energy

**1**

(iii)    have (many root) hairs

**1**

(which) give a large surface area (for absorption)

**1**

(b)     carbon dioxide in

**or**

oxygen out

**or**

control water loss

*accept gas exchange*

*ignore gases in and out*

*ignore gain / lose water*

**1**

(c)     (i)      guard cells

**1**

(ii)     (stomata are) closed

*allow there is no gap / space*

**1**

(iii)    plant will wilt / droop

*ignore die*

**1**

**[9]**

**Q7.**

(a)     (i)      diffusion

*apply list principle*

**1**

(ii)     **A**

*apply list principle*

**1**

(b)    (i)      osmosis

*apply list principle*

**1**

(ii)     **R**

*apply list principle*

**1**

**[4]**

**Q8.**

(a)     **C**

**1**

(b)     **B**

**1**

(c)     **E**

**1**

(d)     any **one** from:

•        they are too big

•        they are insoluble

**1**

(e)     (pH) 7.5

*allow answers in range 7.4 to 7.6*

**1**

(f)      (enzyme **X**) stomach

(enzyme **Y**) small intestine

**1**

(g)     

**1**

(h)     lock and key

**1**

(i)      (some pH values):

change the shape of the active site

*allow some pH values denature enzymes*

**1**

(so) so substrate will no longer fit / bind to the active site

**1**

**[10]**

**Q9.**

(a)     biuret

**1**

(b)     purple

**1**

(c)     1:1.6

**1**

(d)     provides amino acids to make new muscle

**1**

(e)     it has a large surface area

**1**

it has a thin surface

**1**

(f)      **C**

**1**

lowest sugar (content)

**1**

**[8]**

**Q10.**

(a)     (i)     any **one** from:

•        glucose

•        oxygen

•        carbon dioxide

•        urea

•        water

*allow hormones*

*allow named example of a product of digestion*

**1**

(ii)     (cardiac) muscle

*allow muscular*

**1**

(b)     (i)      **B**

**1**

(ii)     **D** atrium / atria

*ignore references to left or right*

**1**

**E** ventricle(s)

*ignore references to left or right*

**1**

(c)     (i)      a vein

**1**

(ii)      an artery

**1**

(iii)     keeps artery open / wider

*allow ecf from part cii*

**1**

(so) blood / oxygen can pass through (to the heart muscle)

**1**

**[9]**

**Q11.**

(a)     (i)      root hairs

*if clear which word then allow*

**1**

(ii)     xylem

*if clear which word then allow*

**1**

(iii)    stomata

*if clear which word then allow*

**1**

(iv)    storage organs

*in this order*

**1**

phloem

**1**

(b)     (i)      23.2

**1**

(ii)     loss of water (from flask with plant) from leaves / plant

**1**

via transpiration / via evaporation

*if no other marks allow used in   
photosynthesis for one mark*

**1**

**[8]**

**Q12.**

(a)     any **two** from:

*ignore eating disorder*

*ignore cancer*

•        arthritis

*accept worn joints*

•        diabetes

*accept high blood sugar*

•        high blood pressure

*ignore cholesterol*

•        heart disease / heart condition / heart attack / blood vessel disease

*allow blood clots / strokes*

**2**

(b)      (i)     **or**  0.25   **or**  25%

*correct answer gains* ***2*** *marks*

*if answer incorrect, evidence of 1500 ÷ 6000 gains* ***1*** *mark*

*25 without % gains* ***1*** *mark*

**2**

(ii)     majority / most / high proportion of people in trial lost mass / weight

*ignore good results / it worked*

**1**

**[5]**

**Q13.**

(a)      (i)     18

**1**

(ii)     Z

**1**

(b)     (i)      red blood cells

**1**

(ii)     haemoglobin

**1**

**[4]**

**Q14.**

red (blood cell)

**1**

platelet

**1**

white (blood cell)

**1**

plasma

**1**

**[4]**

**Q15.**

one;

**1**

          diffuse;

**1**

          narrow;

**1**

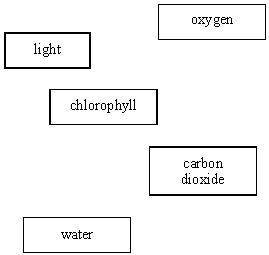
          lowered;

**1**

**[4]**

**Q16.**

(a)



**5**

(b)     (i)      sugar **or** carbohydrate

**1**

(ii)     it can be stored **or** it is insoluble

*accept it has no osmotic effect*

**1**

(iii)     any **one** from:  
respires it **or** releases **or** transfers  
energy  
turns it **or** stores it as fructose **or**sucrose **or** lipid **or** protein **or**cellulose

**1**

(c)     (i)      photosynthesis

**1**

(ii)     any **one** from:  
flat surface  
stomata  
thin  
chloroplasts  
veins  
large surface area  
air spaces

*do* ***not*** *accept chlorophyll*

**1**

**[10]**

**Q17.**

(a)     (i)      oxygen

*do not credit air*

**1**

(ii)     lung(s)

*do not credit blood* ***or*** *nose or windpipe alone but accept as a neutral answer if included with lungs*

**1**

(b)     oxygen

**1**

lactic acid

*both words required*

**1**

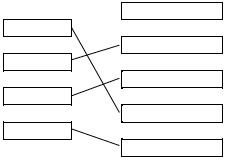
**[4]**

**Q18.**

(a)     salmonella

**1**

(b)



**1**

**1**

**1**

**1**

(c)     lower concentration of antibiotic / chemical further from the fungus

*allow less antibiotic / chemical further from the fungus*

**1**

(d)     lead to mass production of antibiotics

**or**

lead to development of other antibiotics

**1**

reduced infection by bacteria

**or**

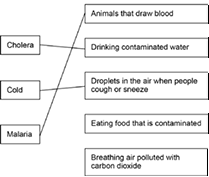
antibiotics have saved many lives

**1**

**[8]**

**Q19.**

(a)     **Disease**       **Way the disease is spread**

****

*extra lines from left cancel the mark*

**3**

(b)     any **two** from:

•        skin acts as a barrier

•        blood clots (over cuts)

•        nose (hairs) catch particles (breathed in)

•        mucus (in trachea / bronchi) traps microorganisms

•        acid in stomach kills microorganisms

**2**

(c)     because measles is a virus

**1**

(d)     28 / twenty eight

*± 0.5 small square tolerance*

**1**

(e)     2.5

**1**

(f)     number will decrease

**1**

less likely to come into contact with someone with measles / the disease

**1**

**[10]**

**Q20.**

blood clots to seal cuts;  
kills microbes which enter

*each for 1 mark  
(allow higher level answers)*

**[2]**

**Q21.**

(a)     toxins

**1**

(b)     (i)      bacteria

**1**

(ii)     mutate

**1**

(iii)    new / different antibiotic

*allow new / different drug*

*do* ***not*** *allow vaccine*

**1**

**[4]**

**Q22.**

(a)     (i)      4 / four (years)

**1**

(ii)     any **one** from:

•        animals

*allow suitable examples eg rats*

*do* ***not*** *allow humans / plants*

•        (living) cells

*allow human cells*

*do* ***not*** *allow plant cells*

•        (living) tissues

*allow human tissues*

*do* ***not*** *allow plant tissues*

**1**

(b)     (i)      9 (years)

*allow* ***1*** *mark for 13 – 4*

***or***

*2 + 3 + 4*

**2**

(ii)     see if the drug has side effects

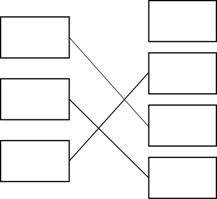
**1**

(iii)    neither the volunteers nor the doctors

**1**

**[6]**

**Q23.**

(a)  


*one mark for each correct line*

*extra line from drug negates mark*

**3**

(b)     stop the trial

**1**

*second mark scores only if first mark correct*

side effects too severe

*allow people might die / get ill / harmed*

**or**(too) many people had side effects

*allow use of numbers from table*

*ignore itchy skin*

**1**

**[5]**

**Q24.**

(a)     carbon dioxide + water → (glucose) + oxygen

*allow reactants in either order*

*allow correct formulae, balancing not required*

**1**

(b)     chlorophyll

**1**

(c)     glucose (produced in photosynthesis) is converted into starch

**1**

(d)     starch could be broken down (into sugar)

**1**

(e)     so the colour of the iodine solution / result can be seen

**1**

(f)      any **one** from:

•        turn off Bunsen / flame before collecting ethanol

•        use a water bath to heat the ethanol

*allow idea that there are no naked flames near the ethanol*

**1**

(g)     **A** orange / brown

**1**

**B** black / blue-black

**1**

**[8]**

**Q25.**

(a)     (i)      diffusion

**1**

(ii)     carbon dioxide

*accept CO2 / CO2*

*do* ***not*** *accept CO2*

**1**

(iii)    red blood cells

**1**

(b)     70

*if no / incorrect answer then*

*70 000 000*

***or***

*280 x 0.25 gains* ***1*** *mark*

*ignore doubling the answer*

**2**

(c)     allows more gas / oxygen / CO2(exchange)

*do* ***not*** *accept air*

**1**

**[6]**

**Q26.**

(a)     (i)      rate of chemical reactions (in the body)

**1**

(ii)     any **two** from:

•        heredity / inheritance / genetics

•        proportion of muscle to fat **or** (body) mass

*allow (body) weight / BMI*

•        age / growth rate

•        gender

*accept hormone balance or environmental temperature*

*ignore exercise / activity*

**2**

(b)    (i)      77

*correct answer with or without working gains* ***2*** *marks*

*allow* ***1*** *mark for 70 / 56* ***or*** *1.25* ***or*** *5*

**2**

(ii)     increase exercise

*accept a way of increasing exercise*

**1**

reduce food intake

*accept examples such as eat less fat / sugar*

*allow go on a diet* ***or*** *take in fewer calories*

*ignore lose weight*

*ignore medical treatments such as gastric band / liposuction*

**1**

**[7]**

**Q27.**

(a)     to transfer / provide / give release energy

***or*** *production of ATP / adenosine triphosphate (molecules)*

*accept to give heat*

**1**

(b)     (i)      C6H12O6 + 6O2 → 6CO2 + 6H2O

*accept any other*

*n  :  6n  :  6n  :  6n  ratio*

*do not credit if any other changes have been made*

**1**

(ii)     glucose

*do not credit sugar / sucrose*

**1**

(c)     (i)      any **two** from

large surface

thin (surface)

moist (surface)

(with a good) blood supply

**2**

(ii)     carbon dioxide

*accept water vapour*

*do not credit just water*

**1**

(d)     (i)      anaerobic (respiration)

**1**

(ii)     any **three** from

in mitochondria

glucose decomposes / breaks down / reacts

***or*** *glucose → lactic acid for (2) marks*

to give lactic acid

***or*** *breathing hard*

***or*** *lactic acid → CO2 + water*

causing pain

(leaving an) oxygen debt

(quick) source of energy

(but) less efficient than aerobic respiration

*accept less efficient than with oxygen*

**3**

**Secton 2: Required Practicals Mark Scheme**

**Q1.**

(a)  glucose

**1**

oxygen

**1**

*extra ticks negates marks*

(b)  count the number of bubbles produced in 1 minute

**1**

measure the volume of gas produced in 30 seconds

**1**

*extra ticks negates marks*

(c)  any **one** from:

•   to control the temperature

*allow so pondweed / solution did not warm up*

•   temperature affects the rate of photosynthesis

*allow correct description of effect of temperature on rate*

*allow high temperatures denature enzymes*

*ignore references to limiting factors*

**1**

*ignore reference to ‘it’*

(d)  52

**1**

(e)  all points plotted correctly

*allow ± ½ a square*

*allow* ***1*** *mark for three points correctly plotted*

**2**

smooth curve drawn through all points

*ignore extensions of line / curve unless inconsistent with line / curve drawn*

**1**

*(where a bar chart has been plotted)*

*allow* ***1*** *mark for all bars plotted correctly*

*if points are plotted as well as bars, ignore bars*

(f)  any **one** from:

•   the nearer the light source to the pondweed the faster the rate of photosynthesis

*allow the nearer the light source to the pondweed the faster the bubbles produced*

•   the greater the light intensity the faster the rate of photosynthesis

*allow the greater the light intensity the faster the bubbles produced*

*allow the closer the light source the more the plant photosynthesises*

*ignore more bubbles are produced with no reference to rate*

*allow oxygen for bubbles*

*do* ***not*** *accept carbon dioxide*

**1**

*allow converse statements for all marking points*

**[10]**

**Q2.**

(a)  any **one** from:

•   water on potato would increase mass

*allow so only the mass of the potato is measured*

•   to control amount of water on potato

*allow to remove water from outside of potato*

*allow liquid / solution / sugar solution for water*

*allow so you get the correct (starting) mass of the potato*

*do* ***not*** *accept so that all the pieces of potato weighed the same*

**1**

(b)  increase in mass

**1**

increase in length

**1**

*extra ticks negates marks*

(c)  osmosis

*allow diffusion*

**1**

into

*allow inside*

*do* ***not*** *accept through*

**1**

lower

*allow low / more dilute / dilute*

**1**

*in this order only*

(d)  any **one** from:

•   the concentration (of sugar solution) in the cells is 0.4 (mol/dm3)

•   the concentration (of sugar solution) in the cells is the same as the solution (in the tube)

**1**

*allow reference to potato instead of cells*

(e)  any **two** from:

•   has (root) hairs

*allow root hair cells*

•   large surface / area

*allow wide surface area*

•   (root) hairs extend into soil

*allow (root) hairs are long / widespread*

•   (root) hairs have thin walls

**2**

*ignore references to active transport and mineral uptake*

**[9]**

**Q3.**

(a)  (wear safety) goggles

*allow (wear) safety glasses*

*allow (wear) eye protection*

*allow keep ethanol away from flame or in a water bath*

*allow use tweezers or a glass rod to remove leaf from ethanol / water*

*ignore gloves*

**1**

(b)  iodine solution

**1**

(c)  blue-black

**1**

(d)  separate

**1**

mobile

**1**

*in this order only*

(e)  

*allow 0.154545 or correctly rounded answer*

**1**

= 0.15

*allow an answer from an incorrect calculation correctly given to 2 significant figures*

**1**

*an answer of 0.15 scores* ***2*** *marks*

(f)  carotene

**1**

**[8]**

**Q4.**

(a)     biuret

**1**

(b)     purple

**1**

(c)     1:1.6

**1**

(d)     provides amino acids to make new muscle

**1**

(e)     it has a large surface area

**1**

it has a thin surface

**1**

(f)      **C**

**1**

lowest sugar (content)

**1**

**[8]**

**Q5.**

(a)     any **one** from:

•        amount / concentration of antibiotic

*do* ***not*** *allow type of antibiotic ignore number of antibiotics allow type of paper*

•        size of discs

*ignore number / position of discs*

•        (incubation) temperature

•        incubated for same time / 3 days

*allow left / kept for same time*

•        type of agar

*ignore references to bacteria or petri dishes*

**1**

(b)     (i)      D

**1**

(ii)     C

**1**

(iii)    B

*no marks if wrong antibiotic*

**1**

both had a large clear area around the disc

*allow a description of this, eg B had the 2nd largest clear area with E.coli and the largest clear area on S.aureus*

**or**

killed a lot of both bacteria

**1**

(c)     resistant

**1**

**[6]**

**Section 3: 6 mark questions Mark Scheme**

(a)  trachea

**1**

(b)  any **one** from:

•   can see more detail in lungs

*ignore gives clearer image*

•   you can see the bronchus / bronchioles / soft tissues

*ignore bones*

*allow it doesn’t use ionising radiation*

*allow X-rays can cause cancer / mutation*

**1**

(c)  you can see the ribs / bones

*allow cheaper*

*allow takes less time*

**1**

(d)  any **three** from:

(aerobic)

•   uses / needs / requires oxygen (and anaerobic does not)

•   transfers more energy (than anaerobic)

*allow releases more energy (than anaerobic)*

*do* ***not*** *accept energy is created / produced / made*

•   produces carbon dioxide / water (anaerobic does not)

•   does not produce lactic acid (anaerobic does)

•   does not cause an oxygen debt (anaerobic does)

*allow aerobic takes place in mitochondria* ***and*** *anaerobic takes place in cytoplasm*

*allow converse in terms of anaerobic*

**3**

(e)  **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

**5−6**

**Level 2:** Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

**3−4**

**Level 1:** Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

**1−2**

**No relevant content**

**0**

**Indicative content**

(stopping smoking will improve health because):

•   smoking is a risk factor for cardiovascular disease

•   raises blood pressure

•   increases cholesterol and / or lowers HDL

•   increases atherosclerosis **or** thickened artery walls

•   increases the risk of blood clots forming

•   increases risk of stroke

•   smoking is a risk factor for lung cancer

•   as it can cause mutations

•   caused by carcinogenic chemicals in smoke (tar)

•   leading to uncontrolled growth of cells

•   smoking damages alveoli

•   causing the surface area of the alveoli to decrease

•   causes emphysema / COPD

•   causes shortness of breath **or** reduces gas exchange

•   chemicals / tar / nicotine in the smoke irritate / inflame the bronchi / lung / bronchioles

•   which damage the cilia

•   causes goblet cells to secrete more mucus

•   causes shortness of breath **or** reduces gas exchange

•   causing chronic bronchitis **or** increases risk of infections

•   carbon monoxide is produced

•   which is toxic / poisonous

•   binds / attaches to haemoglobin / Hb

•   so oxygen carrying capacity of blood is decreased

**[12]**

**Q2.**

(a)     36 000 (cm3)

**1**

(b)     11600 / 1200

**1**

9.66666r

*allow any number of decimals*

**1**

(c)     muscles need more energy (for contraction)

**1**

(so) more oxygen / glucose needed

*need at least one reference to ‘more’ for full marks*

*allow so more carbon dioxide / thermal energy needs to be removed*

**1**

(for) increased respiration

**1**

(d)

|  |  |
| --- | --- |
| **Level 3:** Relevant points (differences / functions) are identified, given in detail and linked logically to form a clear account. | 5-6 |
| **Level 2:** Relevant points (differences / functions) are identified and there are attempts at logical linking. The resulting account is not fully clear. | 3-4 |
| **Level 1:** Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking. | 1-2 |
| No relevant content | 0 |
| **Indicative content**  •   artery has a thicker wall  •   (because) artery has to withstand higher pressure  •   artery has thicker layer of elastic tissue / fibres  •   (so) it can stretch  •   (so) artery returns to original size / shape  •   artery has thicker layer of muscle  •   to maintain a force on the blood  •   vein has valves  •   (valves) prevent backflow of blood  •   artery carries blood away from the heart  •   vein carries blood towards the heart  ignore references to oxygenated / deoxygenated blood |  |

**6**

**[12]**

**Q3.**

(a)     water + carbon dioxide     oxygen + glucose

*extra box ticked negates mark*

**1**

(b)     **Level 3 (5–6 marks):**

A coherent method is described with relevant detail, which demonstrates a broad understanding of the relevant techniques and procedures. The steps in the method are logically ordered. The method would lead to the production of valid results.

**Level 2 (3–4 marks):**

The bulk of the method is described with mostly relevant detail, which demonstrates a reasonable understanding of the relevant scientific techniques and procedures. The  
method may not be in a completely logical order and may be missing some detail.

**Level 1 (1–2 marks):**

Simple statements are made which demonstrate some understanding of some of the relevant scientific techniques and procedures. The response may lack a logical structure and would not lead to the production of valid results.

**0 marks:**

No relevant content

**Indicative content**

•        description of how the apparatus would be used

•        reference to control intensity of light / brightness

•        use of ruler to measure distance of light from beaker / pondweed

•        reference to varying colour of light or use of different filters

•        plant releases gas / oxygen

•        measure number of bubbles / volume of gas produced

•        same length of time

•        reference to control of temperature

•        reference to control / supply of carbon dioxide in water

•        do repeats and calculate a mean

**6**

(c)     rate does not increase further if light intensity increased beyond 20

*allow graph levels off after 20*

**1**

(d)     any **one** from:

•        temperature

•        carbon dioxide (concentration)

•        amount of chlorophyll

*allow number of chloroplasts*

**1**

**[9]**

**Q4.**

(a)     (i)    without oxygen

*allow not enough oxygen*

*ignore air*

*ignore production of CO2*

*ignore energy*

**1**

(ii)     more / high / increased lactic acid (at end)

*allow approximate figures (to show increase)*

*ignore reference to glucose*

**1**

(b)     (i)      1.5

*allow only 1.5 / 1½ / one and a half*

**1**

(ii)     increases at first **and** levels off

*ignore subsequent decrease*

**1**

suitable use of numbers eg

rises to 10 / by 9 (dm3 per min)

**or**

increases up to 1.5 (min) / levels off after 1.5 (min) (of x axis timescale)

*allow answer in range 1.4 to 1.5*

**or**

after the first minute (of the run)

**1**

(iii)     supplies (more) oxygen

**1**

supplies (more) glucose

**1**

*need ‘more/faster’ once only for full marks*

*allow removes (more) CO2 / lactic acid / heat as an alternative for either marking point one* ***or*** *two,* ***once*** *only*

for (more) respiration

**1**

releases (more) energy (for muscle contraction)

*do* ***not*** *allow energy production or for respiration*

**1**

**[9]**

**Q5.**

(a)  is not caused by a pathogen / infective organism

*allow not caused by a microorganism / microbe*

*ignore not caused by infection*

*ignore named pathogen unless bacteria, virus and fungus all mentioned*

**1**

(so) is not passed / spread (from person to person)

*allow cannot be spread / caught*

*allow is not infectious / contagious*

**1**

(b)  reduced / restricted / stopped blood flow

*it does not matter where blood flow is restricted to − heart / body*

**1**

(so) less oxygen reaches heart (muscle / cells)

*must reference heart / it*

*allow no oxygen reaches the heart (muscle / cells)*

**1**

(so heart muscle / cells) cannot respire (enough)

**or**

(so heart muscle / cells) do not release (enough) energy

*do* ***not*** *accept do not make / produce / create energy*

*ignore references to breathing / suffocation*

*ignore blood clots / blockages*

**1**

*allow ‘it’ for heart*

(c)  **Level 3:** Relevant points (factors / effects) are identified, given in detail and logically linked to form a clear account.

**5−6**

**Level 2:** Relevant points (factors / effects) are identified and there are attempts at logical linking. The resulting account is not fully clear.

**3−4**

**Level 1:** Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

**1−2**

**No relevant content**

**0**

**Indicative content**

**medical risk factors:**

•   high blood pressure

•   high cholesterol

•   diabetes

•   genetic factors

•   medications

**lifestyle risk factors:**

•   smoking

•   obesity

•   lack of exercise

•   high fat / energy diet

•   eating insufficient fruit / vegetables

•   alcohol

•   high salt intake

•   exposure to air pollution

•   certain drugs / correct named drug

**examples of links:**

•   smoking − high bp / cholesterol / fatty deposition

•   obesity − lack of exercise / high bp / cholesterol / fatty deposition / diabetes

•   exercise − obesity / bp /diabetes

•   diet − obesity / cholesterol / diabetes

•   alcohol − bp / cholesterol

•   high salt intake − high blood pressure

•   genetic factors − bp / cholesterol / diabetes / obesity

•   medication − can affect blood / blood vessels / metabolism

the main discriminator is the quality of linking

both lifestyle and medical factors are required for **level 3**

**[11]**

**Q6.**

(a)     (i)      8.6

*accept value in range 8.5 to 8.7*

**1**

(ii)     hydrochloric acid / HCl

*accept HCL*

*accept hydrogen chloride*

*ignore hcl / etc.*

**1**

(iii)    X

**1**

(b)     Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the [Marking guidance](../resources/AG_BL/menus/Markingguidance.pdf).

**0 marks**No relevant content.

**Level 1 (1-2 marks)**There is a simple description of part of a process or a reference to at least one of: mechanical digestion, lipase, product of enzyme action, bile, site of production or site of digestion

**Level 2 (3-4 marks)**There is a description of at least one process linking ideas

**Level 3 (5-6 marks)**There is a clear description of the process including reference to the majority of: mechanical digestion, lipase, bile, where they are produced, products, function of bile and site of digestion / absorption

**Examples of biological points made in the response:**

•        mechanical breakdown in mouth / stomach

•        fats →fatty acids and / or glycerol

•        by lipase

•        (produced by) pancreas

•        and small intestine

•        fat digestion occurs in small intestine

•        bile

•        produced by liver

•        neutralises acid from stomach

•        produces alkaline conditions in intestine

•        refs. to increased surface area related to emulsification or chewing

•        products are small molecules / water-soluble

•        products absorbed by small intestine

**6**

**[9]**

**Q7.**

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a ‘best-fit’ approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1 – 2 marks)**

An example is given of a named substance  
**or**a process  
**or**there is an idea of why diffusion is important eg definition.

**Level 2 (3 – 4 marks)**

At least one example of a substance is given  
**and**correctly linked to a process in either animals or plants.

**Level 3 (5 – 6 marks)**

There is a description of a process occurring in either animals or plants that is correctly linked to a substance  
**and**a process occurring in the other type of organism that is correctly linked to a substance.

**examples of points made in the response**

**Importance of diffusion:**

•        to take in substances for use in cell processes

•        products from cell processes removed

**Examples of processes and substances:**

•        for gas exchange / respiration: O2 in / CO2 out

•        for gas exchange / photosynthesis: CO2 in / O2 out

•        food molecules absorbed: glucose, amino acids, etc

•        water absorption in the large intestine

•        water lost from leaves / transpiration

•        water absorption by roots

•        mineral ions absorbed by roots

***extra information***

***Description of processes might include:***

*•        movement of particles / molecules / ions*

*•        through a partially permeable membrane*

*•        (movement of substance) down a concentration gradient*

*•        osmosis: turgor / support / stomatal movements*

**[6]**