

Revision Pack Topic 2- Organisation

| | R/A/G |
|--|-------|
| Animal tissues, organs and organ systems | |
| The human digestive system | |
| Carry out rate calculations for chemical reactions. | |
| Enzymes catalyse specific reactions in living organisms due to the shape of their active site. | |
| Use the 'lock and key theory' as a simplified model to explain enzyme action. Digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream. Carbohydrases break down carbohydrates to simple sugars. Amylase is a carbohydrase which breaks down starch. Proteases break down proteins to amino acids. Lipases break down lipids (fats) to glycerol and fatty acids. The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration. Bile is made in the liver and stored in the gall bladder. It is alkaline to neutralise hydrochloric acid from the stomach. It also emulsifies fat to form small droplets which increases the surface area. The alkaline conditions and large surface area increase the rate of fat breakdown by lipase. | |
| Recall the sites of production and the action of amylase, proteases and lipases. | |
| Required practical activity 4: use qualitative reagents to test for a range of carbohydrates, lipids and proteins. | |
| Required practical activity 5: investigate the effect of pH on the rate of reaction of amylase enzyme. | |
| The heart and blood vessels | |
| Recall the blood vessels associated with the heart (aorta, vena cava, pulmonary artery, pulmonary vein and coronary arteries) | |
| Recall the structure of the lungs (trachea, bronchi, alveoli and the capillary network surrounding the alveoli) | |
| The heart is an organ that pumps blood around the body in a double circulatory system. The right ventricle pumps blood to the lungs where gas exchange takes place. The left ventricle pumps blood around the rest of the body. The natural resting heart rate is controlled by a group of cells located in the right atrium that act as a pacemaker. Artificial pacemakers are electrical devices used to correct irregularities in the heart rate. | |
| The body contains three different types of blood vessel: <ul style="list-style-type: none"> • arteries • veins • capillaries. Explain how the structure of these vessels relates to their functions. | |
| Use simple compound measures such as rate and carry out rate calculations for blood flow. | |
| Blood | |
| Blood is a tissue consisting of plasma, in which the red blood cells, white blood cells and platelets are suspended. | |

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| | |
|--|--|
| Recognise different types of blood cells in a photograph or diagram, and explain how they are adapted to their functions. | |
| <i>Coronary heart disease: a non-communicable disease</i> | |
| Evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant. | |
| In coronary heart disease layers of fatty material build up inside the coronary arteries, narrowing them. This reduces the flow of blood through the coronary arteries, resulting in a lack of oxygen for the heart muscle. Stents are used to keep the coronary arteries open. Statins are widely used to reduce blood cholesterol levels which slows down the rate of fatty material deposit. In some people heart valves may become faulty, preventing the valve from opening fully, or the heart valve might develop a leak. Faulty heart valves can be replaced using biological or mechanical valves. In the case of heart failure a donor heart, or heart and lungs can be transplanted. Artificial hearts are occasionally used to keep patients alive whilst waiting for a heart transplant, or to allow the heart to rest as an aid to recovery. | |
| <i>Health issues</i> | |
| Describe the relationship between health and disease and the interactions between different types of disease. Health is the state of physical and mental well-being. Diseases, both communicable and non-communicable, are major causes of ill health. Other factors including diet, stress and life situations may have a profound effect on both physical and mental health. | |
| Different types of disease may interact: <ul style="list-style-type: none"> • Defects in the immune system mean that an individual is more likely to suffer from infectious diseases. • Viruses living in cells can be the trigger for cancers. • Immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma. • Severe physical ill health can lead to depression and other mental illness. | |
| Understand the principles of sampling as applied to scientific data, including epidemiological data. | |
| <i>The effect of lifestyle on some non-communicable diseases</i> | |
| <ul style="list-style-type: none"> • discuss the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally • explain the effect of lifestyle factors including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels. | |
| Risk factors are linked to an increased rate of a disease. They can be: <ul style="list-style-type: none"> • aspects of a person's lifestyle • substances in the person's body or environment. A causal mechanism has been proven for some risk factors, but not in others. • The effects of diet, smoking and exercise on cardiovascular disease. • Obesity as a risk factor for Type 2 diabetes. • The effect of alcohol on the liver and brain function. • The effect of smoking on lung disease and lung cancer. | |

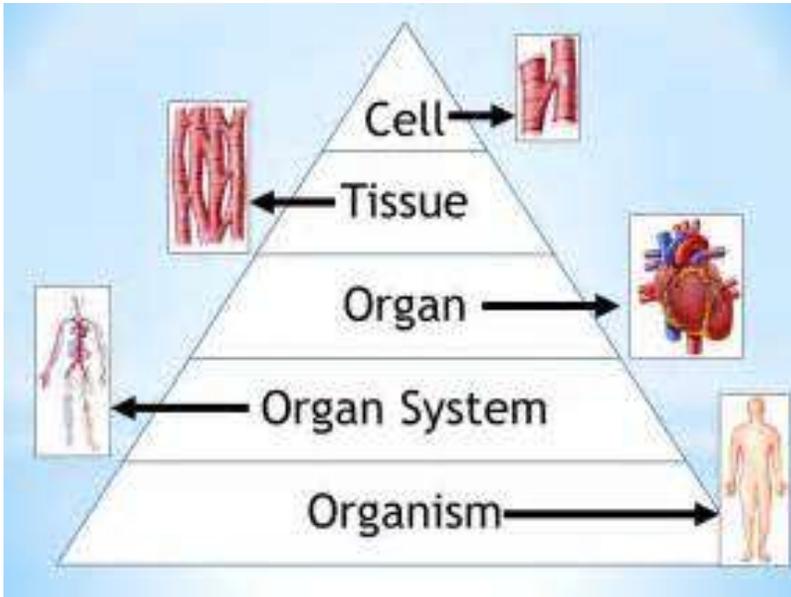
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| | |
|---|--|
| <ul style="list-style-type: none"> • The effects of smoking and alcohol on unborn babies. • Carcinogens, including ionising radiation, as risk factors in cancer. <p>Many diseases are caused by the interaction of a number of factors.</p> | |
| <p>Cancer</p> | |
| <p>Describe cancer as the result of changes in cells that lead to uncontrolled growth and division. Benign tumours are growths of abnormal cells which are contained in one area, usually within a membrane. They do not invade other parts of the body. Malignant tumour cells are cancers. They invade neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours. Scientists have identified lifestyle risk factors for various types of cancer. There are also genetic risk factors for some cancers.</p> | |
| <p>Plant tissues, organs and systems</p> | |
| <p>Plant tissues</p> | |
| <p>Explain how the structures of plant tissues are related to their functions. Plant tissues include:</p> <ul style="list-style-type: none"> • epidermal tissues • palisade mesophyll • spongy mesophyll • xylem and phloem • meristem tissue found at the growing tips of shoots and roots. <p>The leaf is a plant organ.</p> | |
| <p>Plant organ system</p> | |
| <p>Explain how the structure of root hair cells, xylem and phloem are adapted to their functions.</p> | |
| <p>Explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration.</p> | |
| <p>Understand and use simple compound measures such as the rate of transpiration.</p> | |
| <p>The roots, stem and leaves form a plant organ system for transport of substances around the plant.</p> <p>Describe the process of transpiration and translocation, including the structure and function of the stomata. Root hair cells are adapted for the efficient uptake of water by osmosis, and mineral ions by active transport. Xylem tissue transports water and mineral ions from the roots to the stems and leaves. It is composed of hollow tubes strengthened by lignin adapted for the transport of water in the transpiration stream. The role of stomata and guard cells are to control gas exchange and water loss. Phloem tissue transports dissolved sugars from the leaves to the rest of the plant for immediate use or storage. The movement of food molecules through phloem tissue is called translocation. Phloem is composed of tubes of elongated cells. Cell sap can move from one phloem cell to the next through pores in the end walls.</p> | |

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Cell organisation

Give examples of each below: cells, tissues, organs, organ systems, organisms.



Example Question

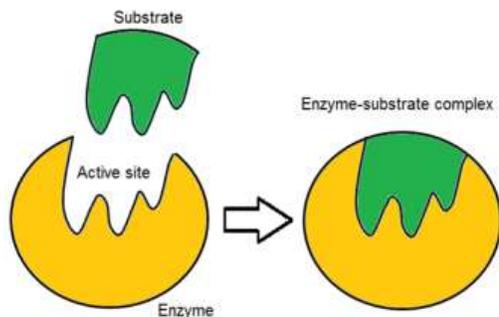
Euglena is a single celled organism. Why can Euglena not be said to have organs?



Enzymes

Define an enzyme:

Use the below diagram to summarise the lock and key mechanism:

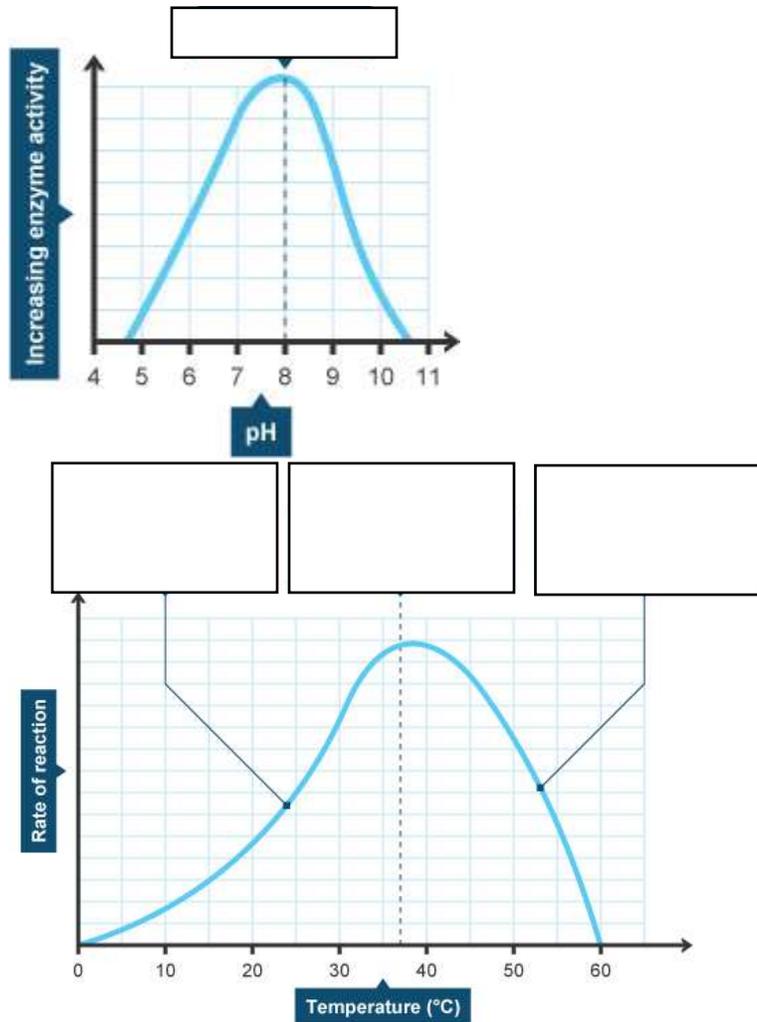


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Three factors that can effect enzyme action are:

- 1.
- 2.
- 3.

Describe the below graphs summarising the optimum conditions for enzyme action:



Common enzymes:

| Enzyme | Breaks down.... | Into... | Found in... |
|------------------------------|-----------------|---------|-------------|
| Protease | | | |
| Lipase | | | |
| Carbohydrase | | | |
| Amylase (a type of _____) | | | |

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What is the role of bile in the digestive system?

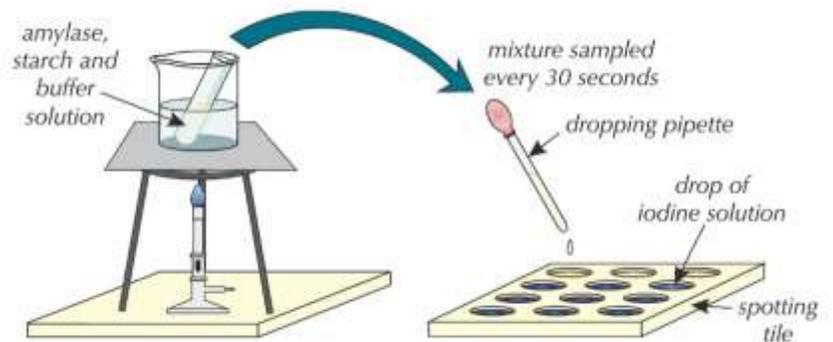
Required Practical: Investigating the effect of pH on enzyme activity

Independent variable: _____

Dependent variable: _____

Controlled variables: _____

Prediction: _____

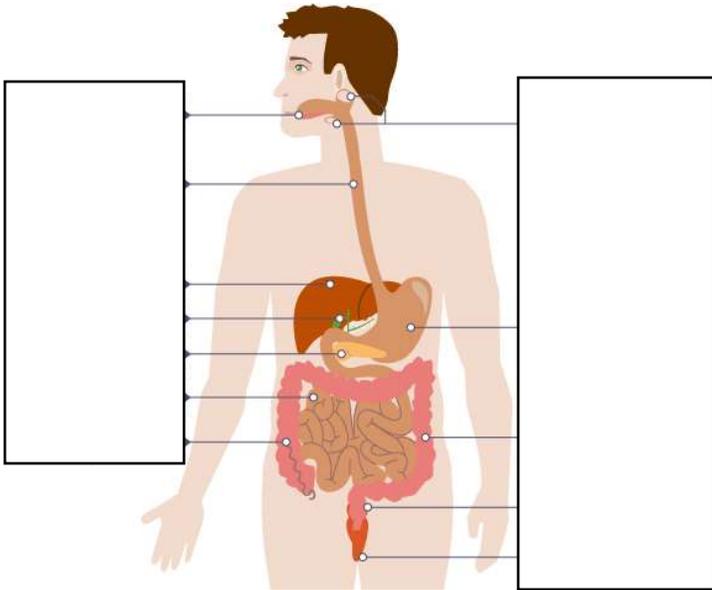


Method:

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The digestive System

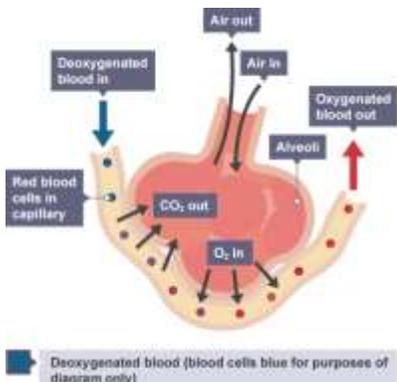
Annotate the below diagram to identify and describe the digestive organs:



Food tests

| Food tested for: | Method: | Result: |
|------------------|---------|---------|
| Sugars | | |
| Starch | | |
| Proteins | | |
| Lipids | | |

The lungs and gas exchange



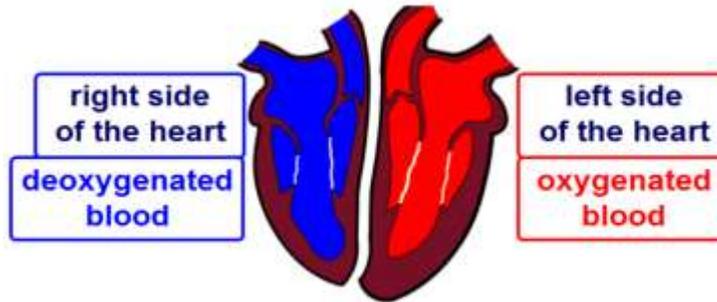
How are the alveoli adapted for efficient gas exchange?

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The Heart

Label the diagram of the heart

Keywords: *Left Ventricle, Right Ventricle, Left Atrium, Right Atrium, Valves,*



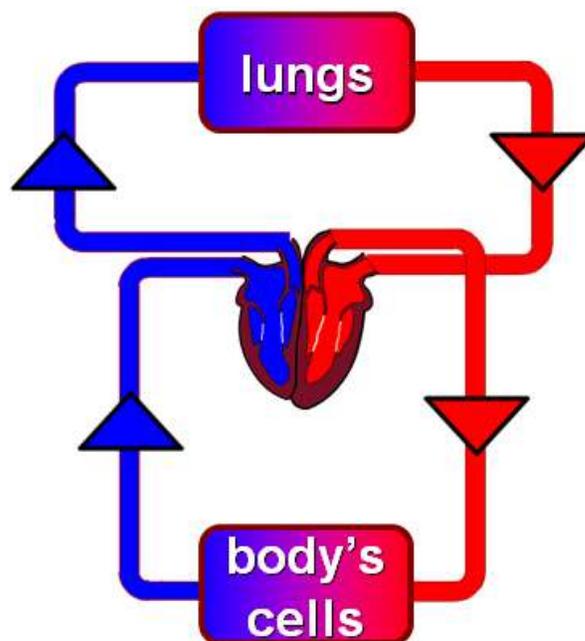
The heart's pacemaker _____

Artificial pacemakers _____

The Circulatory System

Label the diagram below to show how blood goes round the body

Keywords: *Vena Cava, Aorta, Left Ventricle, Right Ventricle, Left Atrium, Right Atrium, Pulmonary Vein, Pulmonary Artery, Capillaries in body, Capillaries in the lungs*

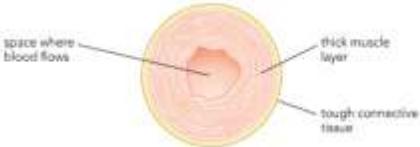
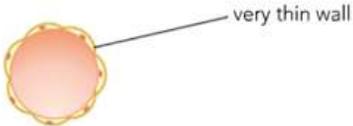
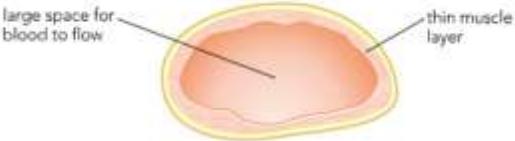


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Blood Cells

| Cell | Description / Adaptation |
|---|--------------------------|
|  | |
|  | |
|  | |
|  | |

Blood Vessels

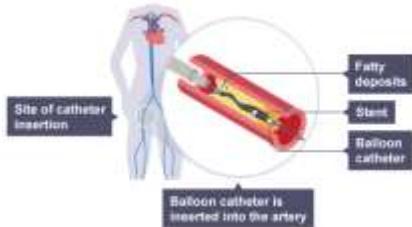
| Blood Vessel | Description/Adaptation |
|---|------------------------|
|  | |
|  | |
|  | |

To calculate the rate of blood flow:

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What is cardiovascular disease?

Treatments for CVD:



Stents: _____

Statins:

Advantages _____

Disadvantages _____

Artificial hearts: _____

Faulty heart valves: _____

Artificial blood: _____

Communicable and non-communicable diseases

Communicable _____

Non-communicable _____

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Risk factors for disease:

- 1.
- 2.
- 3.
- 4.
- 5.

What is the difference between a benign and malignant tumour?

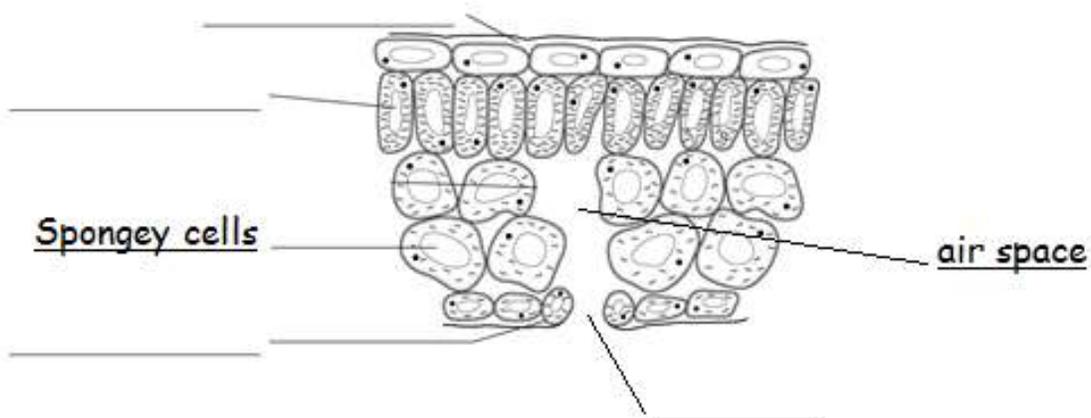
How do the cells from malignant tumours spread around the body?

Risk factors for cancer:

- 1.
- 2.
- 3.
- 4.

Plant cell organisation

Annotate the below diagram of a leaf:



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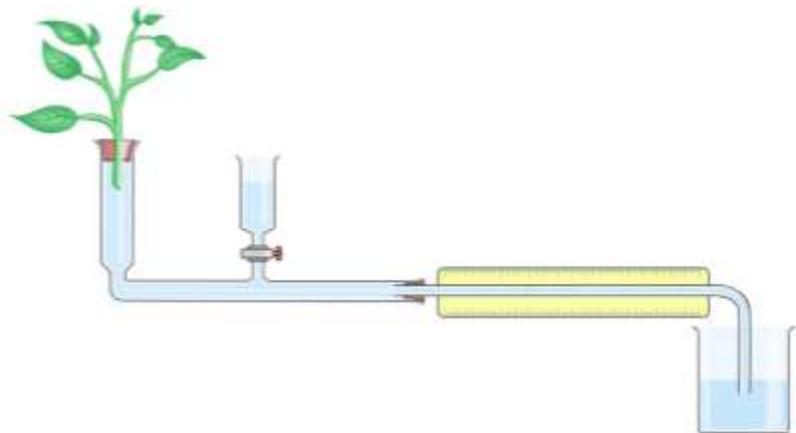
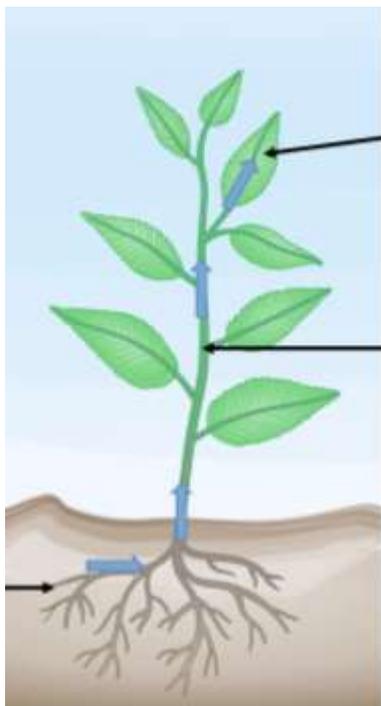
How are leaves adapted for efficient gas exchange?

How are leaves adapted for efficient photosynthesis?

Transpiration and Translocation

| Process | Type of Cell | Description |
|---------------|--------------|-------------|
| Transpiration | | |
| Translocation | | |

Annotate the below diagrams to help you explain transpiration:



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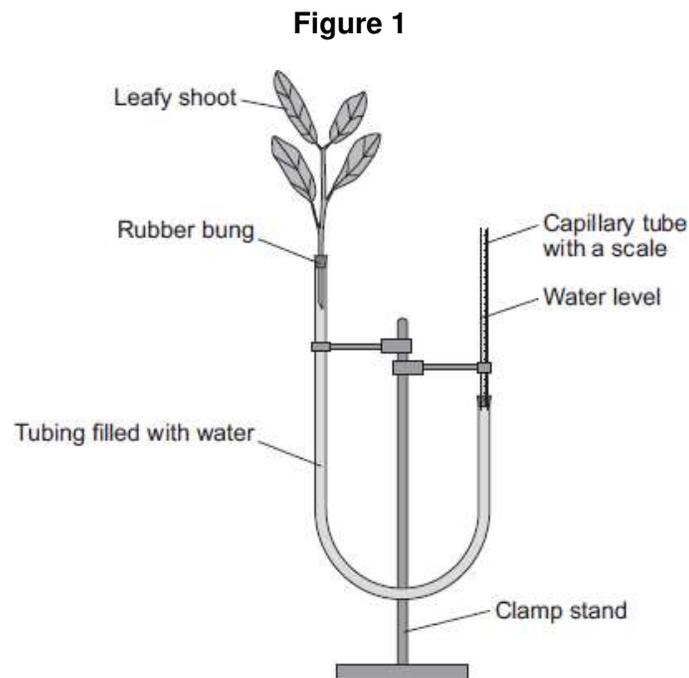
Rate of transpiration is affected by 4 factors:

- 1.
- 2.
- 3.
- 4.

Practice Exam Questions

Q1. A potometer is a piece of apparatus that can be used to measure water uptake by a leafy shoot.

Figure 1 shows a potometer.



Some students used a potometer like the one shown in **Figure 1**.

- They measured the water taken up by a shoot in normal conditions in a classroom.
- As the water was taken up by the shoot, the level of water in the capillary tube went down.
- The students recorded the level of the water in the capillary tube at 2-minute intervals for 10 minutes.

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Table 1 shows the students' results.

| | | | | | | |
|---|-----|-----|-----|-----|-----|-----|
| Time in minutes | 0 | 2 | 4 | 6 | 8 | 10 |
| Level of water (on scale) in capillary tube in mm | 2.5 | 3.6 | 4.4 | 5.4 | 6.5 | 7.5 |

The area of the cross section of the capillary tube was 0.8 mm^2 .

- (a) (i) Complete the following calculation to find the volume of water taken up by the shoot in mm^3 per minute.

Distance water moved along the scale in 10 minutes =mm

Volume of water taken up by the shoot in 10 minutes = mm^3

Therefore, volume of water taken up by the shoot in 1 minute = mm^3

(3)

- (ii) The students repeated the investigation but this time placed the potometer next to a fan blowing air over the leafy shoot.

Suggest how the results would be different. Give a reason for your answer.

.....

(2)

- (b) The students repeated the investigation at different temperatures.

The results are shown in **Table 2**.

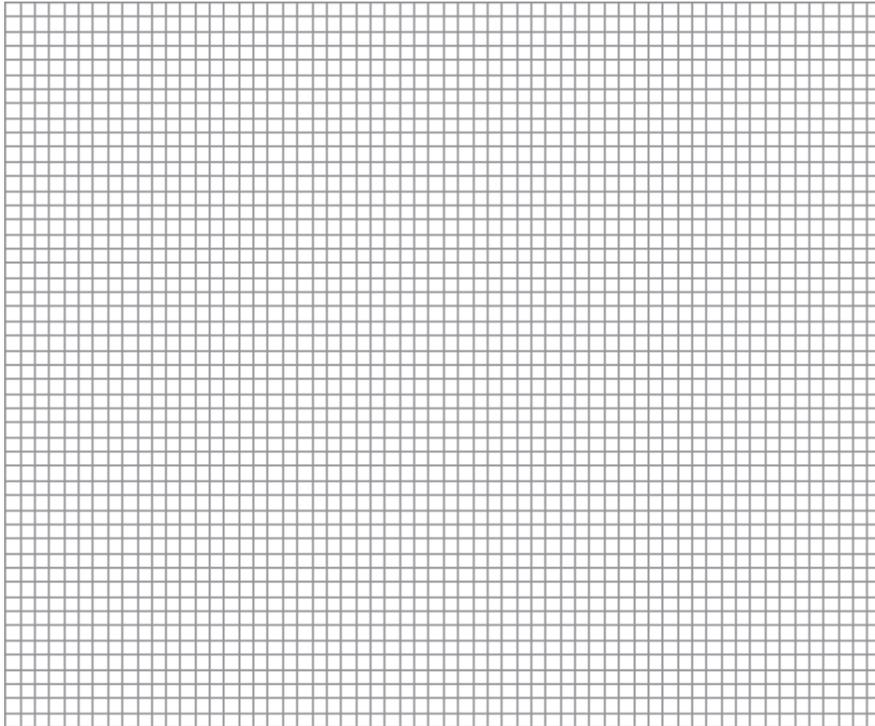
| Temperature in $^{\circ}\text{C}$ | Rate of water uptake in mm^3 per minute |
|-----------------------------------|--|
| 10 | 0 |
| 15 | 0.4 |
| 20 | 1.0 |
| 25 | 2.1 |
| 30 | 3.2 |
| 35 | 4.0 |
| 40 | 4.4 |

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Plot the data from **Table 2** on the graph paper in **Figure 2**.

Choose suitable scales, label both axes and draw a line of best fit.

Figure 2



(5)

(c) What would happen to the leaves if the potometer was left for a longer time at 40 °C?

Explain your answer.

.....

.....

.....

.....

.....

.....

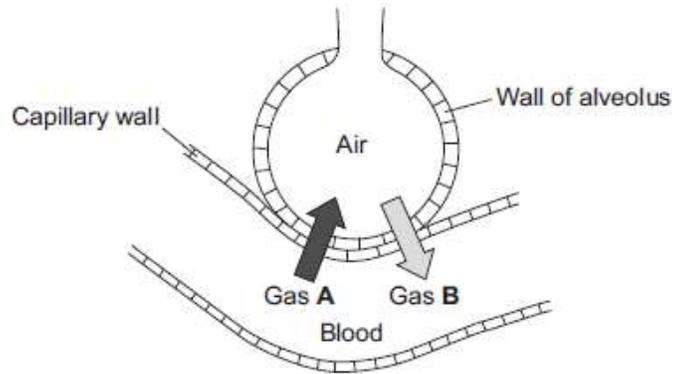
(3)
(Total 13 marks)

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2. 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)

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

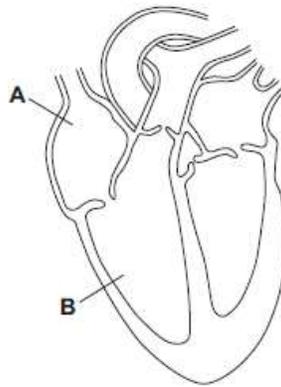
Give **one** way in which this increase will help the athlete.

.....
.....

(1)
(Total 6 marks)

3. **Diagram 1** shows a section through the heart.

Diagram 1



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

| | | | |
|-------|--------|------------------|-----------|
| arota | atrium | pulmonary artery | ventricle |
|-------|--------|------------------|-----------|

A

B

(2)

- b) The tissue in the wall of the heart contracts.

- (i) What type of tissue is this?

Tick (✓) **one** box.

muscular

glandular

epithelial

(1)

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(ii) What does the heart do when this tissue contracts?

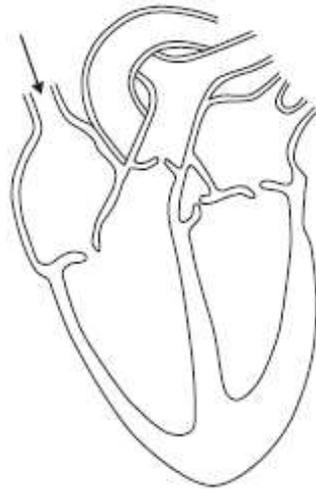
.....

.....

(1)

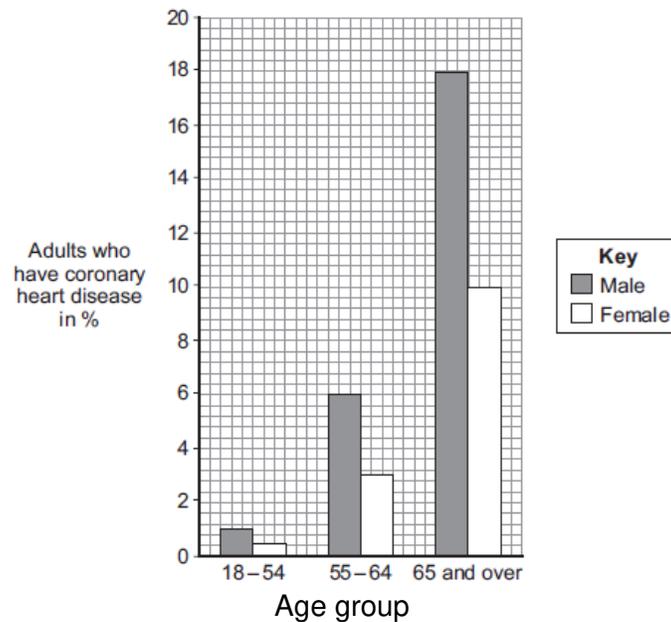
(c) Draw arrows on **Diagram 2** to complete the route taken by deoxygenated blood through the heart.

Diagram 2



(2)

(d) The graph shows the percentage (%) of adults in the UK who have coronary heart disease.



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(i) Look at the graph.

Which group of people is **most** at risk of having coronary heart disease in the UK?

.....

(2)

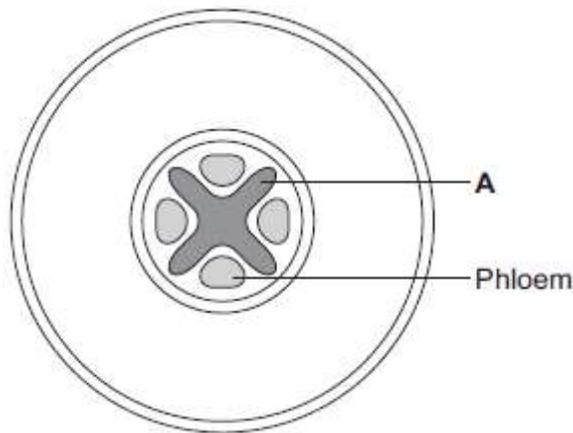
(ii) Explain what happens to the heart in coronary heart disease.

.....

(3)

(Total 11 marks)

Q4. The diagram below shows a cross-section of a plant root. The transport tissues are labelled.



(a) (i) What is tissue **A**?

Draw a ring around the correct answer.

cuticle epidermis xylem

(1)

(ii) Name **two** substances transported by tissue **A**.

1

2

(2)

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(b) Phloem is involved in a process called translocation.

(i) What is translocation?

.....
.....
.....

(1)

(ii) Explain why translocation is important to plants.

.....
.....
.....
.....

(2)

(c) Plants must use active transport to move some substances from the soil into root hair cells.

(i) Active transport needs energy.

Which part of the cell releases most of this energy?

Tick (✓) **one** box.

mitochondria

nucleus

ribosome

(1)

(ii) Explain why active transport is necessary in root hair cells.

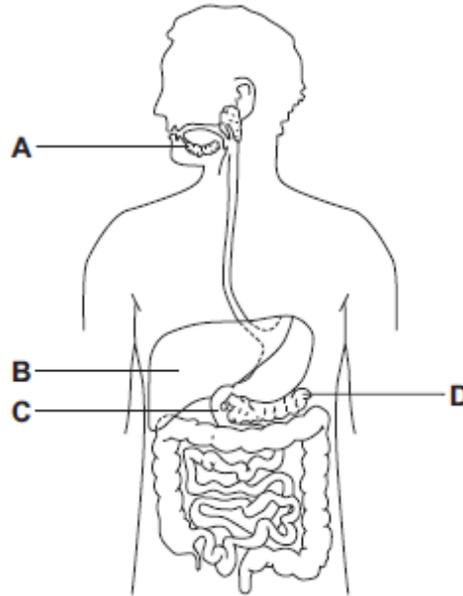
.....
.....
.....
.....

(2)

(Total 9 marks)

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Q5. The diagram shows part of the human digestive system.



(a) Name the parts of the digestive system labelled **A**, **B**, **C** and **D**.

- A
- B
- C
- D

(4)

(b) A student has eaten a steak for dinner. The steak contains protein and fat.

(i) Describe how the **protein** is digested.

.....

.....

.....

.....

.....

.....

(3)

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(ii) Explain **two** ways in which bile helps the body to digest **fat**.

.....
.....
.....
.....
.....
.....

(4)

c) A group of students investigated the action of salivary amylase.
The students:

- collected a sample of salivary amylase
- put a different pH solution and 5 cm³ of a food substance in each of 6 test tubes
- added 1 cm³ of salivary amylase to each of the 6 test tubes
- recorded the amylase activity after 10 minutes.

The results are shown in the table.

| | | | | | | |
|-------------------------------------|----|----|---|---|---|---|
| pH | 7 | 6 | 5 | 4 | 3 | 2 |
| Amylase activity in arbitrary units | 12 | 10 | 3 | 0 | 0 | 0 |

(i) Name the food substance that amylase breaks down.

.....

(1)

(ii) Suggest what happens to the breakdown of this substance when food reaches the stomach.

Use information from the table to help you to answer this question.

.....
.....
.....
.....
.....

(3)

(Total 15 marks)

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MARKSCHEME.

(a) (i) 5.0

1

(5 × 0.8) **or** 4

allow ecf from distance

1

0.4

allow ecf from 10-min volume

1

(ii) increased (rate of uptake)

1

more transpiration / evaporation

1

(b) correct scales

allow reversed axes

1

correctly labelled axes with units

1

correct points

one plot error = max 1 mark

2

curved line of best fit

allow correct straight line

1

(c) leaves wilt

1

because plants lose too much water (by evaporation)

1

through the stomata

or

because cells become plasmolysed

or

stomata close

controlled by guard cells

to prevent wilting

1

[13]

M2.(a) (i) diffusion

1

(ii) carbon dioxide

accept CO₂ / CO₂

*do **not** accept CO²*

1

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(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]

M3.(a) A - atrium

ignore references to right / left

1

B - ventricle

1

(b) (i) muscular

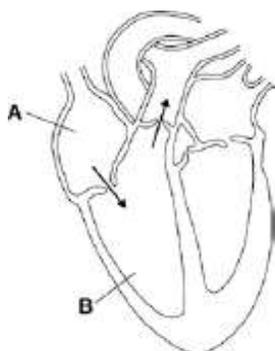
1

(ii) push blood

accept pump / force

1

(c)



arrows approx as indicated

1

arrow(s) showing flow from A to B
from B out / up / to artery

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| | | | |
|---------------|----------|---|------|
| | | 1 | |
| (d) | (i) | male | 1 |
| | | 65 and over | 1 |
| ii) | | fatty deposits / material in (coronary) arteries | 1 |
| | | <i>allow correct points made about heart attacks</i> | 1 |
| | | narrows / blocks / reduces flow | 1 |
| | | decreases oxygen supply (to heart muscle) | 1 |
| | | | [11] |
| M4.(a) | (i) | xylem | 1 |
| | (ii) | water | 1 |
| | | minerals / ions / named example(s) | |
| | | <i>ignore nutrients</i> | 1 |
| (b) | (i) | movement of (dissolved) sugar | |
| | | <i>allow additional substances, eg amino acids / correct named sugar</i> | |
| | | <i>(allow sucrose / glucose)</i> | |
| | | <i>allow nutrients / substances / food molecules if sufficiently qualified</i> | |
| | | <i>ignore food alone</i> | 1 |
| | (ii) | sugars are made in the leaves | 1 |
| | | so they need to be moved to other parts of the plant for respiration / growth / storage | 1 |
| (c) | (i) | mitochondria | 1 |
| | (ii) | for movement of minerals / ions | |
| | | <i>Do not accept 'water'</i> | 1 |
| | | against their concentration gradient | 1 |
| | | | [9] |
| Q5.(a) | A | – saliva(ry) gland | 1 |
| | B | – liver | 1 |

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- C – duodenum
ignore small intestine 1
- D – pancreas
accept phonetic spellings 1
- (b) (i) any **three** from:
• chewing / muscle contraction / mechanical digestion
allow churning
• protease enzymes
allow pepsin / trypsin
• in stomach / small intestine / duodenum / from pancreas
• (break down protein) into amino acids
allow (poly)peptides 3
- (ii) neutralises acid pH / makes conditions alkaline 1
- so lipase can work 1
- emulsifies fat 1
- to give large(r) surface area for lipase / enzyme action 1
- (c) (i) starch
ignore carbohydrate 1
- (ii) breakdown stops
allow slows down 1
- because stomach produces / contains acid / has low pH 1
- and amylase cannot work in acid / low pH
accept amylase is denatured / changes shape 1