# Organisation part 13

headstartscience.co.uk

Name: _____

Class: _____

Date: _____

Time: **72 minutes**

Marks: **72 marks**

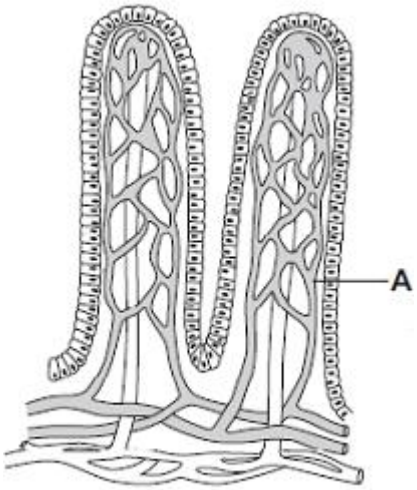
Comments:

## Q1.

Villi are found in some parts of the digestive system.

**Diagram 1** shows two villi.

**Diagram 1**




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

(i) Structure **A** is a

muscle.

nerve.

capillary.

**(1)**

(ii) The villi absorb the products of digestion by

dialysis.

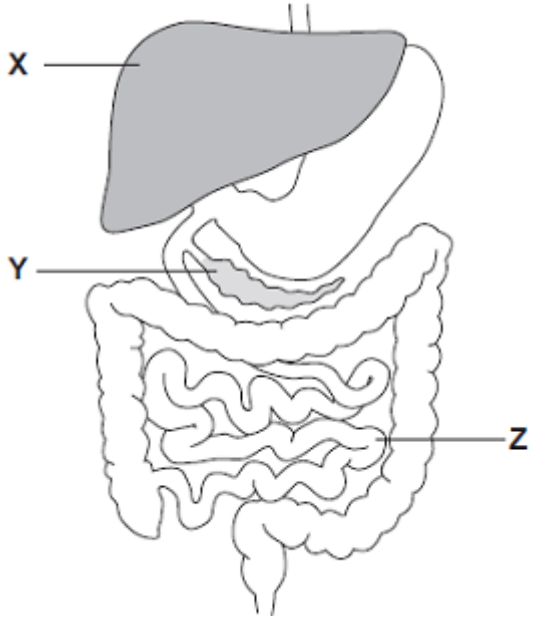
diffusion.

osmosis.

**(1)**

(b) **Diagram 2** shows the digestive system.

**Diagram 2**




(i) In which part of the digestive system, **X**, **Y** or **Z**, are most villi found? ☐

**(1)**

(ii) There are about 2000 villi in each $cm^2$ of this part of the digestive system.

Why is it helpful to have lots of villi?

_____

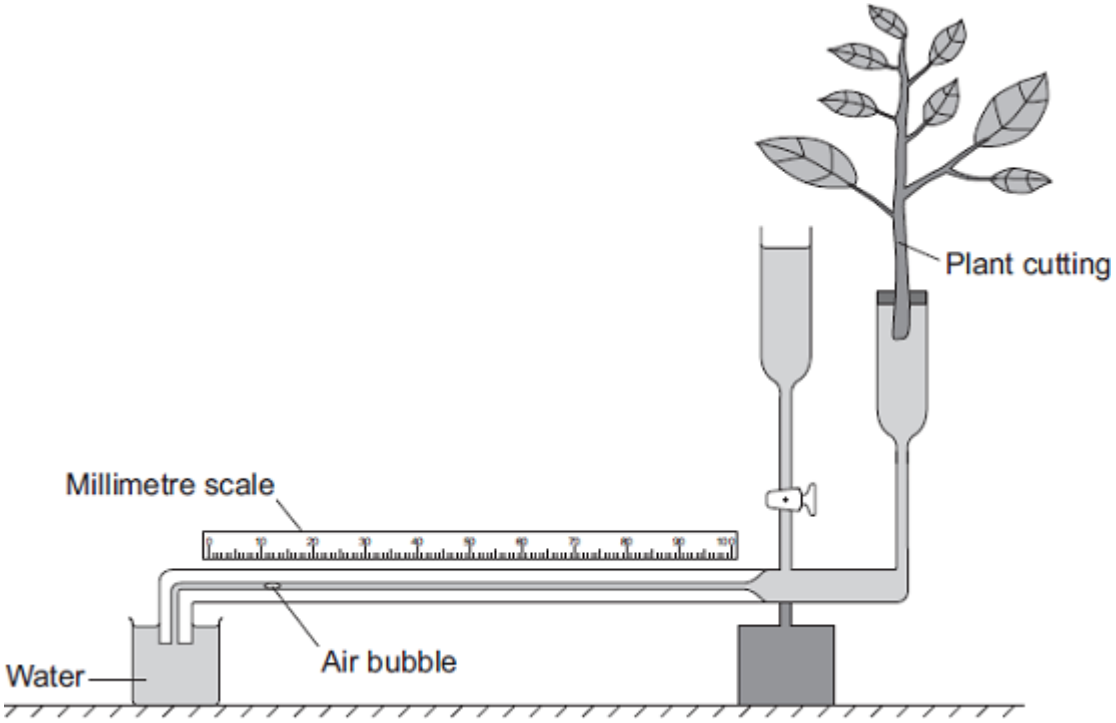
_____

**(1)**

**(Total 4 marks)**

## Q2.

Some students used the apparatus shown in the diagram to measure the rate of water uptake by a plant cutting.




The students set up the apparatus in three different conditions:

- no wind at 15°C
- no wind at 25°C
- wind at 25°C

For each experiment, the students recorded the movement of the air bubble along the scale.

(a) (i) Name the **two** variables the students chose to change in these experiments.

1. _____

2. _____

**(2)**

(ii) It was important to use the same plant cutting each time to make these experiments fair.

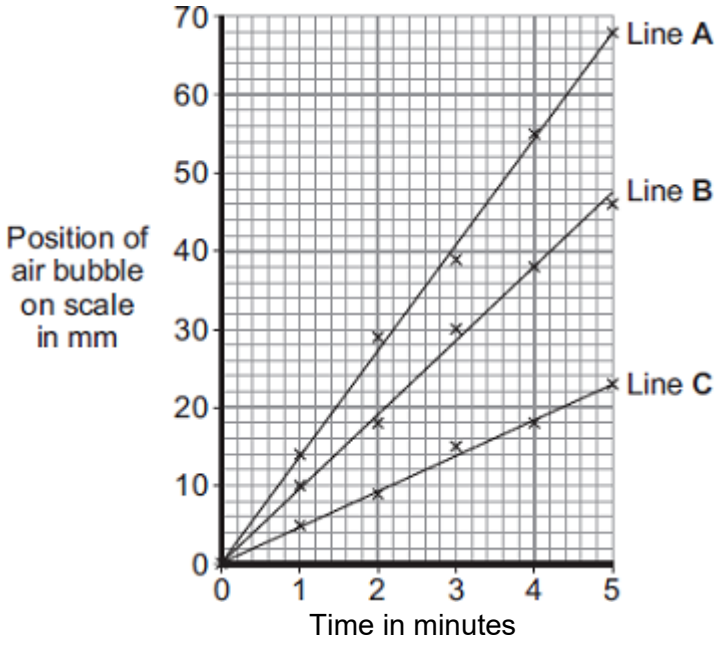
Explain why.

_____

_____

**(1)**

(b) The graph shows the students' results.




Which line on the graph, **A**, **B** or **C**, shows the results for each of the three different experiments?

Write each of the letters, **A**, **B** and **C**, in the correct boxes in the table.

| Conditions | Letter |
|---|---|
| No wind at 15°C | |
| No wind at 25°C | |
| Wind at 25°C | |

**(2)**

(c) Water is lost from the leaves of the plant cutting.

Name this process.

Draw a ring around **one** answer.

**distillation** **respiration** **transpiration**

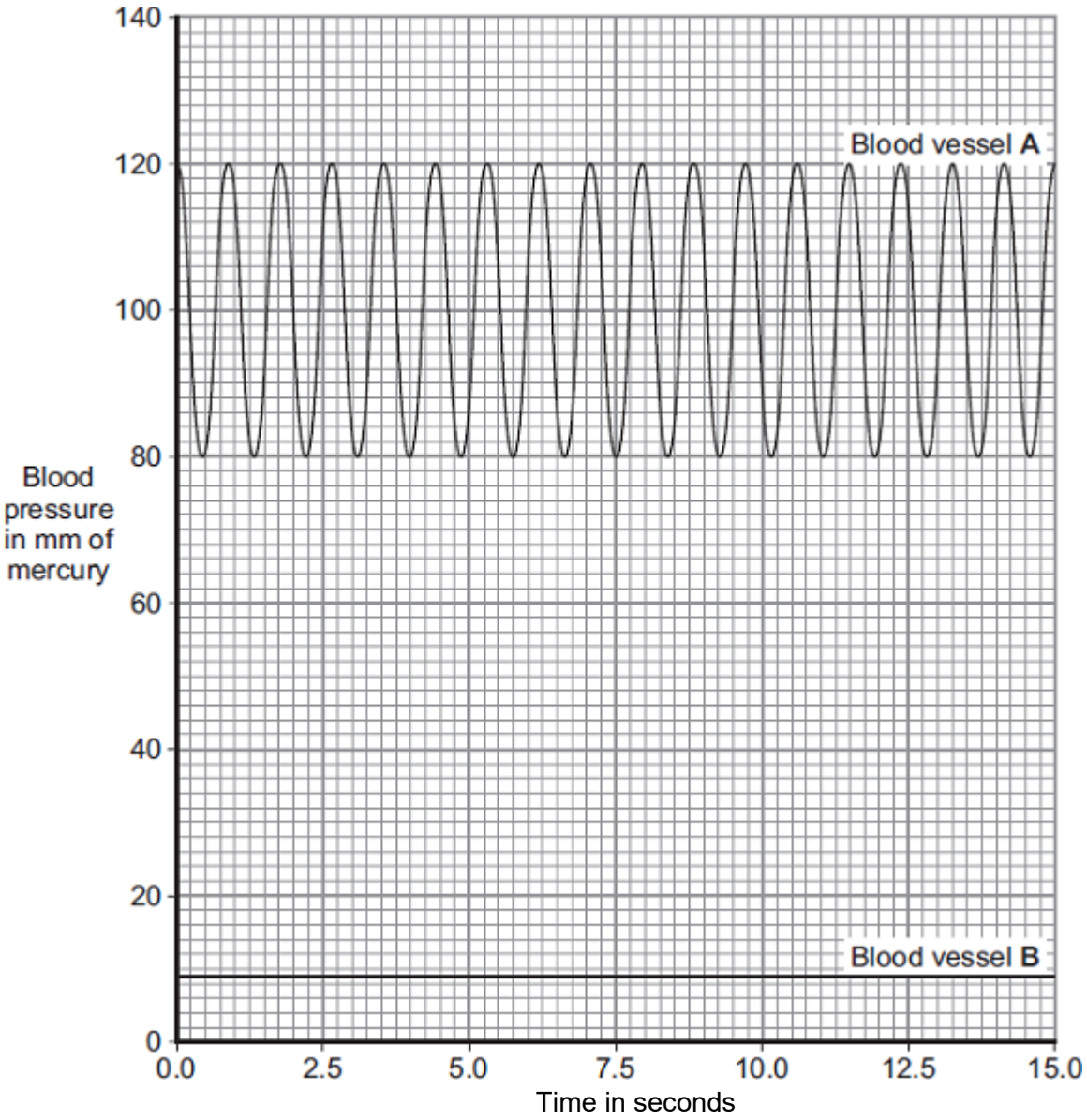
**(1)**

**(Total 6 marks)**

## Q3.

The heart pumps the blood around the body. This causes blood to leave the heart at high pressure.

The graph shows blood pressure measurements for a person at rest.
The blood pressure was measured in an artery and in a vein.




(a) Which blood vessel, **A** or **B**, is the artery?

Blood vessel _____

Give **two** reasons for your answer.

Reason 1 _____

_____

Reason 2 _____

_____

**(2)**

(b) Use information from the graph to answer these questions.

(i) How many times did the heart beat in 15 seconds? _____

**(1)**

(ii) Use your answer from part (b)(i) to calculate the person's heart rate per minute.

_____

_____

Heart rate = _____ beats per minute

**(1)**

(c) During exercise, the heart rate increases.

The increased heart rate supplies useful substances to the muscles at a faster rate.

Name **two** useful substances that must be supplied to the muscles at a faster rate during exercise.

1. _____

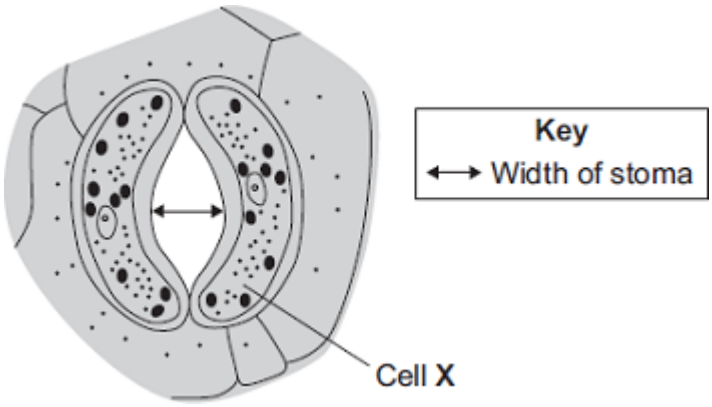
2. _____

**(2)**

**(Total 6 marks)**

## Q4.

Plant leaves have many stomata.
The diagram shows a stoma.




(a) Name cell **X** _____

**(1)**

(b) The table shows the mean widths of the stomata at different times of the day for two
different species of plant.
Species **A** grows in hot, dry deserts.
Species **B** grows in the UK.

| | Time of day in hours | Mean width of stomata as a percentage of their maximum width | |
|---|---|---|---|
| | | Species A | Species B |
| Dark | 0 | 95 | 5 |
| | 2 | 86 | 5 |
| | 4 | 52 | 6 |
| Light | 6 | 6 | 40 |
| | 8 | 4 | 92 |
| | 10 | 2 | 98 |
| | 12 | 1 | 100 |
| | 14 | 0 | 100 |
| | 16 | 1 | 96 |
| | 18 | 5 | 54 |
| Dark | 20 | 86 | 6 |
| | 22 | 93 | 5 |
| | 24 | 95 | 5 |

The data in the table show that species **A** is better adapted than species **B** to living in hot, dry deserts.

Explain how.

_____

_____

_____

_____

_____

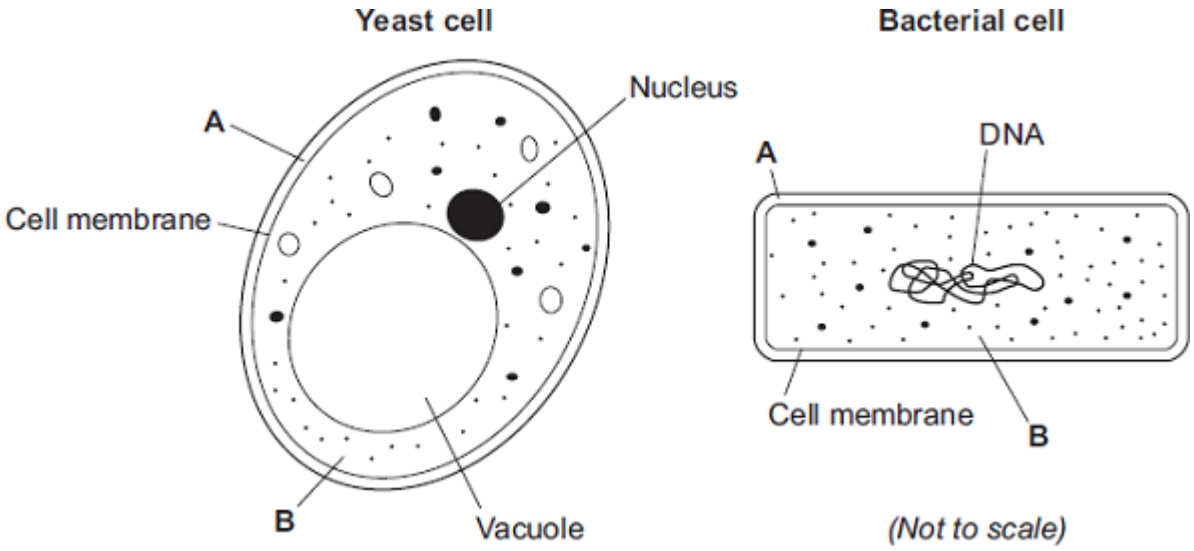
_____

**(4)**

**(Total 5 marks)**

**Q5.**

(a) The diagrams show the structures of a yeast cell and a bacterial cell.




(i) Both the yeast cell and the bacterial cell have structures **A** and **B**.

Name structures **A** and **B**.

**A** _____

**B** _____

**(2)**

(ii) The yeast cell and the bacterial cell have different shapes and sizes.

Give **one** other way in which the structure of the bacterial cell is different from the structure of the yeast cell.

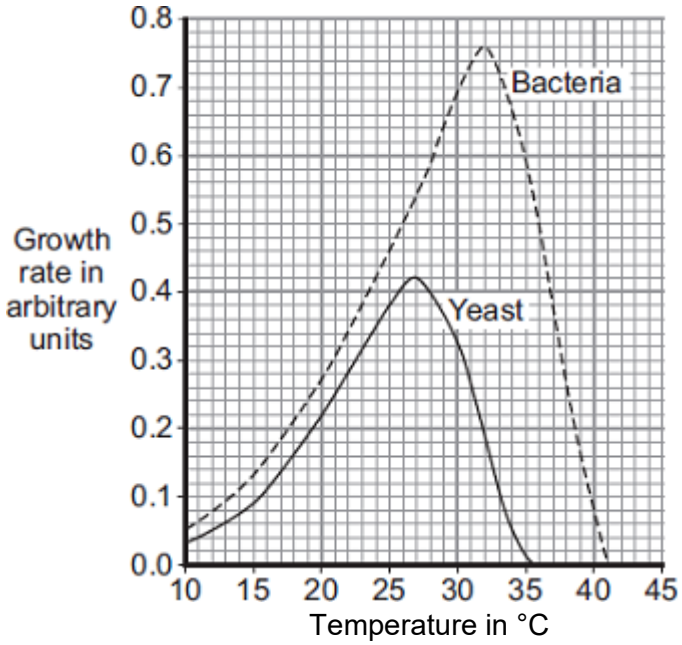
_____

_____

**(1)**

(b) Sourdough bread is light in texture and tastes slightly sour. The bread is made using two types of microorganism, a yeast and a bacterium. The bacterium can make acids such as lactic acid. The acid makes the bread taste sour.

The graph shows how the growth rates of the yeast and the bacteria change with temperature.




(i) Sourdough bread rises fastest at 27°C.

Use information from the graph to explain why.

_____

_____

_____

_____

**(2)**

(ii) The bread tastes most sour if it rises at 32°C.

Use information from the graph to explain why.

_____

_____

_____

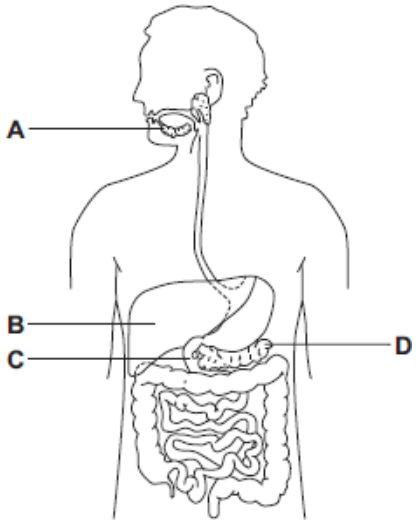
_____

**(2)**

**(Total 7 marks)**

## Q6.

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)**

(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 $cm^3$ of a food substance in each of 6 test tubes
- added 1 $cm^3$ 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)**

## Q7.

The number of people in the UK with tumours is increasing.

(a) (i) Describe how tumours form.

_____

_____

**(1)**

(ii) Tumours can be malignant or benign.

What is the difference between a malignant tumour and a benign tumour?

_____

_____

**(1)**

(b) Describe how some tumours may spread to other parts of the body.

_____

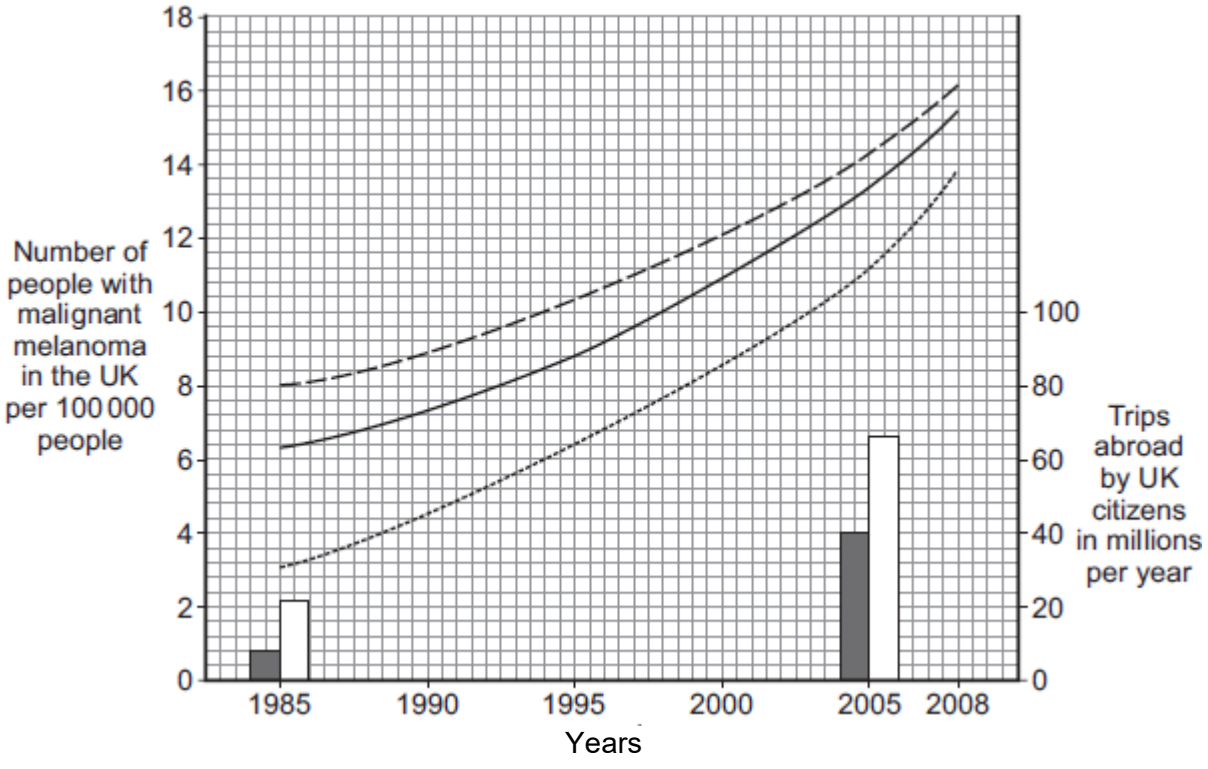
_____

**(1)**

(c) People from Northern Europe have fair skin and many people have malignant melanoma skin cancer.

The graph shows how the number of people in the UK with malignant melanoma changed between 1985 and 2008.

The bars on the graph show the number of people in the UK who travelled abroad and the number who took cheap holidays in the sun in 1985 and 2005.



**Key**

——— Mean for all areas
– – – Mean for people from rich areas
—·— Mean for people from poor areas

□ Total number of trips abroad
■ Number of cheap holidays in the sun

(i) Describe the trends in the number of people with malignant melanoma skin cancer between 1985 and 2008.

_____

_____

_____

_____

_____

_____

**(3)**

(ii) Use the data about the number of trips abroad to suggest an explanation for the trends you have described in part **(c)(i)**.

_____

_____

_____

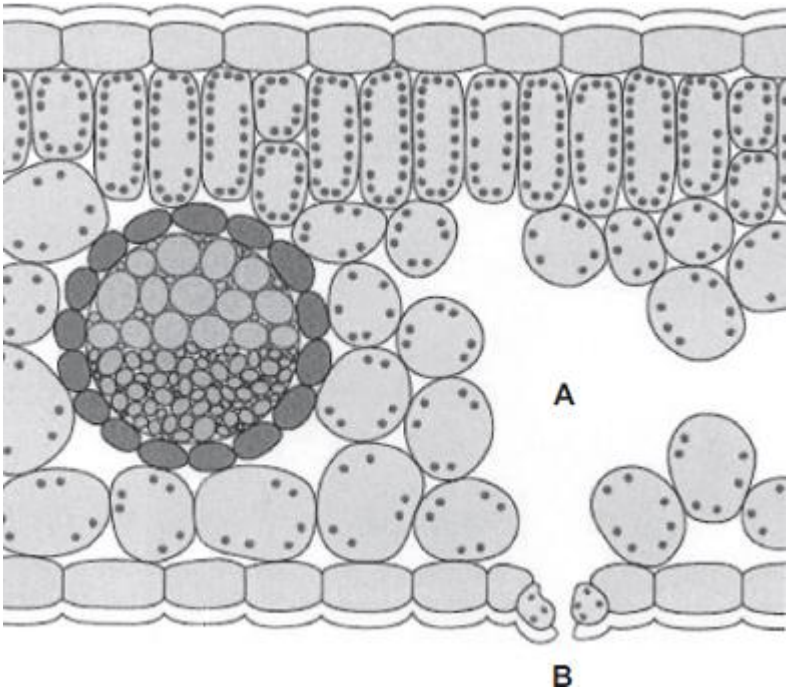
_____

**(2)**

**(Total 8 marks)**

## Q8.

The diagram shows a section through a plant leaf.




(a) Use words from the box to name **two** tissues in the leaf that transport substances around the plant.

| | | | |
|---|---|---|---|
| **epidermis** | **mesophyll** | **phloem** | **xylem** |

_____ and _____

**(1)**

(b) Gases *diffuse* between the leaf and the surrounding air.

(i) What is *diffusion*?

_____

_____

_____

_____

**(2)**

(ii) Name **one** gas that will diffuse from point **A** to point **B** on the diagram on a sunny day.

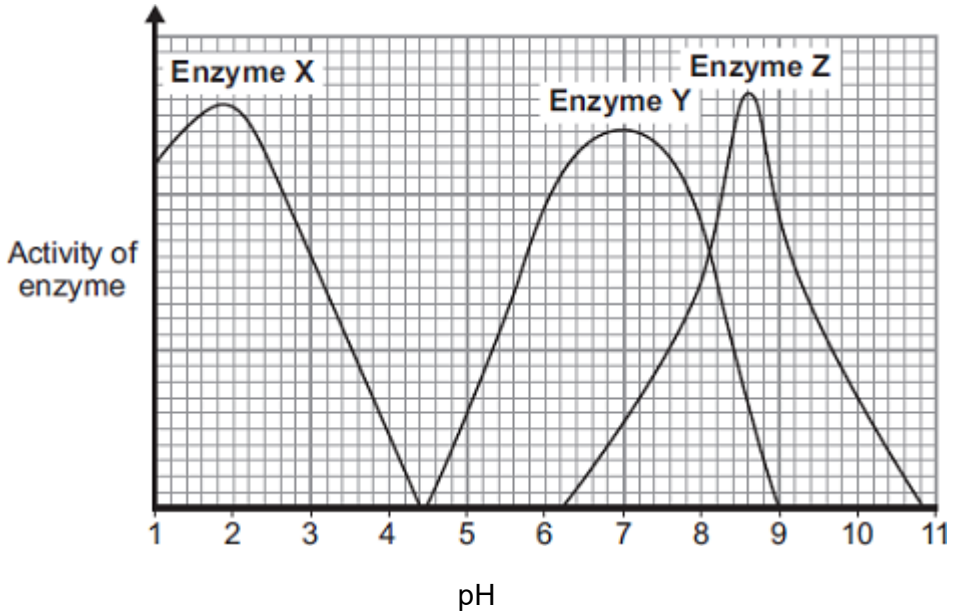
_____

**(1)**

**(Total 4 marks)**

**Q9.**

(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.




(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.

**(6)**
**(Total 9 marks)**

## Q10.

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)**

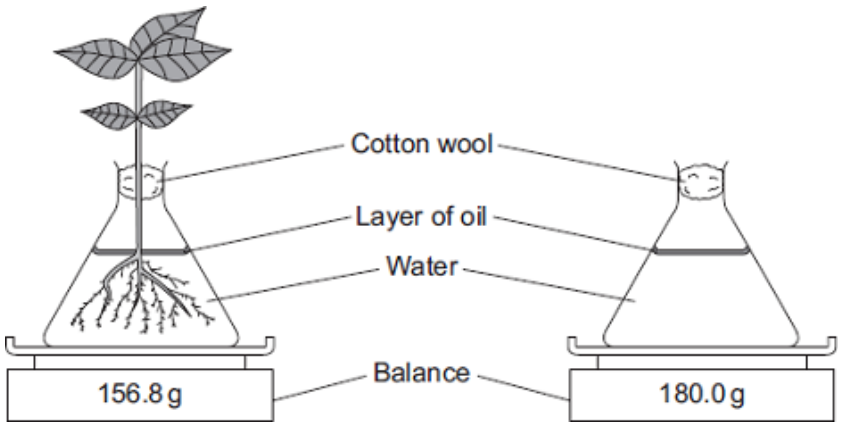
(iv) A leaf uses the carbon dioxide to produce sugars.

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.

_____

_____

_____

_____

**(2)**

**(Total 8 marks)**

## Q1.

(a) (i) capillary

**1**

(ii) diffusion

**1**

(b) (i) Z

*ignore any names*

**1**

(ii) large / increased surface / area

*allow all food absorbed*

**or** to absorb more food
**or** improved diffusion

**1**

**[4]**

## Q2.

(a) (i) wind

*answers in either order*

**1**

temperature

*ignore weather*

**1**

(ii) different plants have different sizes

*ignore reference to validity*

/ different numbers of leaves
/ different sizes of leaves
/ different plants take up different amounts of water
/ different number of stomata
/ different surface area

*allow different plants need different amounts of water*

**1**

(b) in table, in sequence:

C
B
A

*all 3 correct = **2** marks*
*2 correct = **1** mark*
*0 or 1 correct = **0** marks*

**max 2**

(c) transpiration

**1**

**[6]**

## Q3.

(a) A

*no mark - can be specified in reason part*
*if B given - no marks throughout*
*if unspecified + 2 good reasons = 1 mark*

high(er) pressure in A

*allow opposite for B*
*do **not** accept 'zero pressure' for B*

pulse / described in A

*accept fluctuates / 'changes'*
*allow reference to beats / beating*
*ignore reference to artery pumping*

**2**

(b) (i) 17

**1**

(ii) 68

*accept correct answer from student's (b)(i) × 4*

**1**

(c) oxygen / oxygenated blood

*allow adrenaline*
*ignore air*

glucose / sugar

*extra wrong answer cancels - eg sucrose / starch / glycogen / glucagon / water*
*allow fructose*
*ignore energy*
*ignore food*

**2**

**[6]**

## Q4.

(a) guard cell

*ignore stoma / stomata*

**1**

(b) <u>Species A :</u>

*allow converse points for species B*

stomata open in dark / at night **or** close in light / in day

**1**

stomata closed during warm(est) period **or** open when cool(er)

**1**

heat (energy) /warmth increases evaporation / transpiration
*must give explicit link between heat and transpiration*

1

reduces water loss / evaporation / transpiration
*ignore photosynthesis*

1

**[5]**

## Q5.

(a) (i) A = (cell) wall
*ignore cellulose*

1

B = cytoplasm

1

(ii) any **one** from:
*accept has DNA instead of a nucleus, but not just has DNA*

- bacterial cell / it has no nucleus
*allow no mitochondria*
- DNA free in cytoplasm
*ignore size*
- has no vacuole / no vesicles
*ignore strands of DNA*

1

(b) (i) yeast grows best / better / well **or** optimum temperature for yeast / more yeast present
*allow yeast works best / better / well*

1

(yeast) makes $CO_2$ **or** respires / respiration
*allow fermentation*

1

(ii) bacterium grows best / better / well / more bacteria present **or** optimum temperature for bacterium
*ignore microorganisms / microbes*
*allow works / respires best / better / well*

1

(bacterium) makes (lactic) acid
*do **not** allow wrong acid*

1

**[7]**

## Q6.

(a) **A** − saliva(ry) gland

1

**B** − liver

1

**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

**[15]**

## Q7.

(a) (i) (as a result of) uncontrolled / abnormal growth / division of cells

*ignore mutation*

*allow cells dividing with no contact inhibition*

1

(ii) benign tumours do not invade / spread to other tissues / do not form

secondary tumours

*accept converse for malignant*

*accept benign tumours do not metastasise*

**1**

(b) via the blood / circulatory system

*accept via lymphatic system*

**1**

(c) (i) incidence is increasing

**1**

more rapidly (over the years)

*ignore figures*

**1**

difference between rich and poor areas is getting less

**or**

the incidence is rising fastest in people from poor areas

*accept converse for people from rich areas*

**1**

(ii) risk factor is UV from sunlight

*ignore ionising radiation*

**1**

more UK citizens going abroad or taking holidays in the Sun

**or**

poorer people can afford holidays in the Sun

**or**

more poorer people are taking holidays in the Sun

**1**

**[8]**

## Q8.

(a) xylem **and** phloem

*either order*

*allow words ringed in box*

*allow mis-spelling if unambiguous*

**1**

(b) (i) movement / spreading out of particles / molecules / ions / atoms

*ignore names of substances / 'gases'*

**1**

from high to low concentration

*accept down concentration gradient*

*ignore 'along' / 'across' gradient*

*ignore 'with' gradient*

1

(ii) oxygen / water (vapour)

*allow $O_2$ / O2*

*ignore $O^2$/ O*

*allow $H_2O$ / H2O*

*ignore $H^2O$*

1

**[4]**

## Q9.

(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.

**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]**

## Q10.

(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]**