Organisation part 2

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Name: _____

Class: _____

Date: _____

Time: **76 minutes**

Marks: **69 marks**

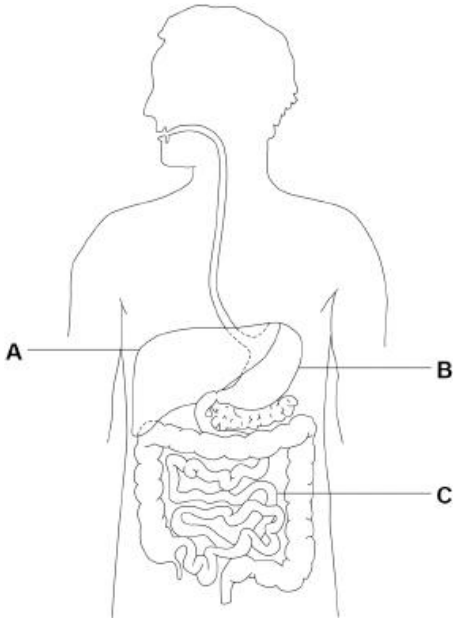
Comments:

Q1.

Enzymes break down food in the digestive system.

Figure 1 shows the human digestive system.

Figure 1



The enzyme amylase digests starch.

(a) Which part of the digestive system produces amylase?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐

(1)

(b) What molecules are produced when starch is digested?

Tick (✓) **one** box.

Amino acids ☐

Fatty acids ☐

Sugars ☐

(1)

(c) Where is digested food absorbed into the blood?

Tick (✓) **one** box.

Liver ☐

Pancreas ☐

Small intestine ☐

(1)

A student investigated the effect of pH on the digestion of starch by amylase.

This is the method used.

1. Put 1 drop of iodine solution into each well of a spotting tile.
2. Prepare amylase solution at pH 5
3. Mix the amylase solution with starch solution in a test tube.
4. Every 30 seconds remove a drop of the amylase–starch mixture. Add each drop to iodine solution in a different well of the spotting tile.
5. Record the colour of the iodine solution after the amylase–starch mixture has been added.
6. Repeat steps 2 to 5 using amylase solutions at different pH values.

(d) What is the independent variable in this investigation?

Tick (✓) **one** box.

pH of the amylase solution ☐

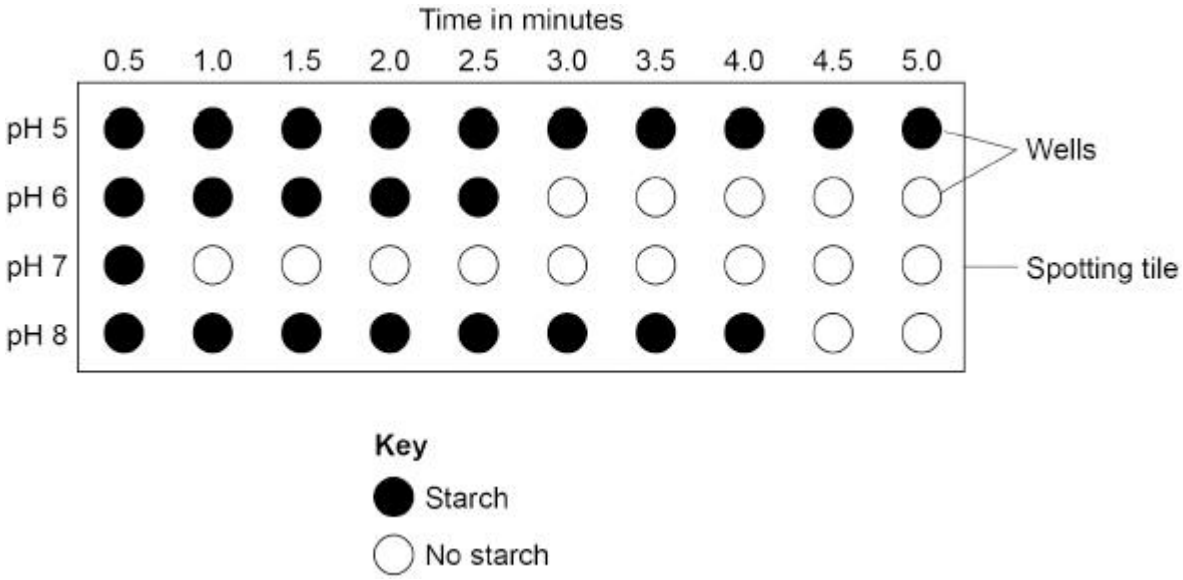
Time when the samples were taken ☐

Volume of iodine solution ☐

(1)

Figure 2 shows the results on the spotting tile.

Figure 2



(e) What colours do the symbols in the key represent?

Choose answers from the box.

black	**green**	**lilac**	**orange**	**white**

● _____

○ _____

(2)

(f) Look at the results for pH 6 in **Figure 2**.

How many minutes did it take for all the starch to be digested at pH 6?

_____ minutes

(1)

(g) What was the optimum pH for the amylase to work?

Use **Figure 2**.

Tick (✓) **one** box.

pH 5 ☐ pH 6 ☐ pH 7 ☐ pH 8 ☐

(1)

(Total 8 marks)

Q2.

Plants need water for photosynthesis.

(a) Where do plants obtain water for photosynthesis from?

_____

(1)

Plants lose water from their leaves through small pores called stomata.

(b) What is the evaporation of water from leaves called?

Tick (✓) **one** box.

Active transport ☐

Respiration ☐

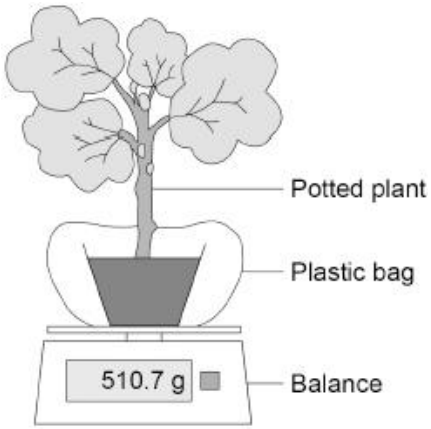
Transpiration ☐

(1)

A student investigated the mass of water lost from a plant.

Figure 1 shows the apparatus.

Figure 1



This is the method used.

1. Seal a plastic bag around the pot of a potted plant.

2. Place the plant on a balance in a room at 20 °C.

3. Record the mass.

4. Record the mass every hour for 5 hours.

5. Calculate the total mass of water lost from the plant after each hour.

The table below shows the results.

Time in hours	Mass in grams	Total mass of water lost in grams
0	510.7	0.0
1	508.9	1.8
2	507.1	3.6
3	505.3	5.4
4	503.5	7.2
5	**X**	9.0

(c) Calculate mass **X** in the table above.

_____

_____

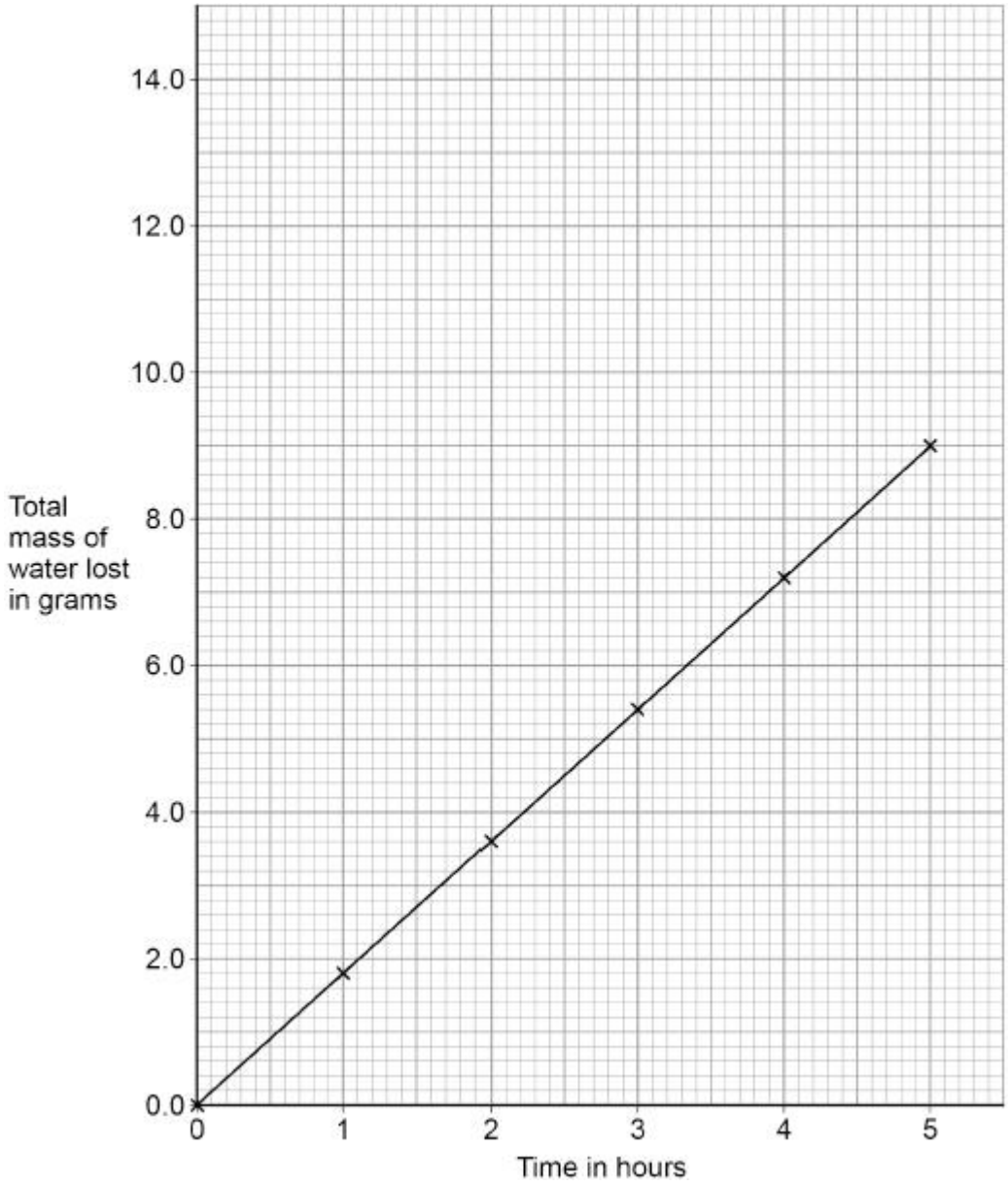
_____

Mass **X** = _____ grams

(2)

Figure 2 shows the results.

Figure 2



(d) What was the rate of water loss from the plant?

Tick (✓) **one** box.

0.9 grams/hour ☐

1.8 grams/hour ☐

9.0 grams/hour ☐

(1)

(e) The investigation was repeated at a **lower** temperature.

Draw **one** line on **Figure 2** to show how the results would be different at a **lower** temperature.

(2)

(f) Suggest **one** change to the investigation that would **increase** the rate of water loss from the plant.

Do **not** refer to temperature in your answer.

_____

_____

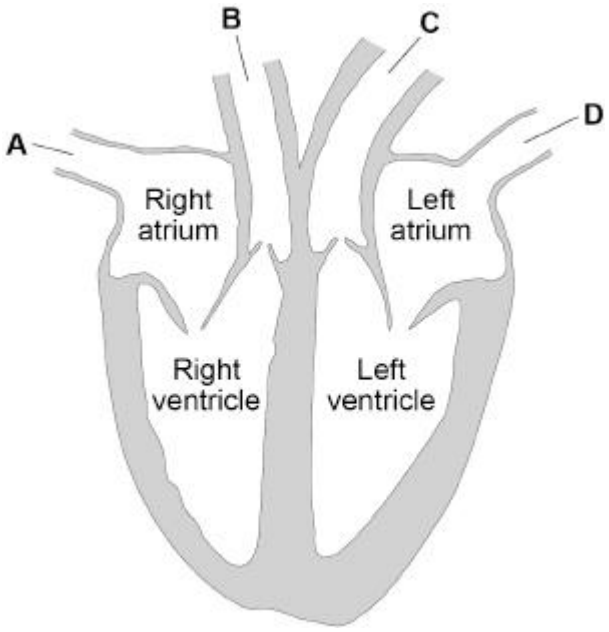
(1)

(Total 8 marks)

Q3.

Figure 1 shows a human heart.

Figure 1



(a) The vena cava carries blood into the heart from the body.

Which blood vessel in **Figure 1** is the vena cava?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(b) Which chamber of the heart pumps blood to the body?

Tick (✓) **one** box.

- Left atrium ☐
- Left ventricle ☐
- Right atrium ☐
- Right ventricle ☐

(1)

(c) What is the name of the blood vessel that carries blood to the heart muscle?

Tick (✓) **one** box.

- Aorta ☐
- Coronary artery ☐
- Pulmonary artery ☐

(1)

The heart and some blood vessels contain valves.

(d) Which type of blood vessel has valves?

Tick (✓) **one** box.

- Artery ☐
- Capillary ☐
- Vein ☐

(1)

(e) What is the function of valves?

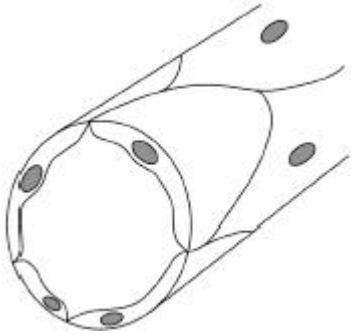
_____

_____

(1)

Figure 2 shows a blood capillary.

Figure 2



(f) Explain **one** way the capillary is adapted for its function.

_____

_____

_____

_____

(2)

The table below shows information about the blood of four people.

Person	Concentration of blood component in number/mm^3		
	Red blood cells	**White blood cells**	**Platelets**
W	5 000 000	15 000	200 000
X	4 700 000	5 500	20 000
Y	8 000 000	7 200	250 000
Z	4 900 000	6 400	225 000

(g) Person **W** has 5 000 000 red blood cells in 1 mm^3 of blood.

What is 5 000 000 written in standard form?

Tick (✓) **one** box.

5 × 1 000 000 ☐

5 × 10^6 ☐

5 × 10^7 ☐

50 × 10^5 ☐

(1)

(h) Draw **one** line from each description to the person in the table above it describes.

Description	**Person in Table**
Person most likely to have an infection	Person **W**
	Person **X**
Person whose blood will **not** clot properly	Person **Y**
	Person **Z**

(2)

(i) The greater the height above sea level, the less oxygen there is in the air.

People who live high above sea level have more red blood cells than people who live at sea level.

Some athletes train in mountains high above sea level.

Explain why having more red blood cells will improve an athlete's performance.

_____

_____

_____

_____

_____

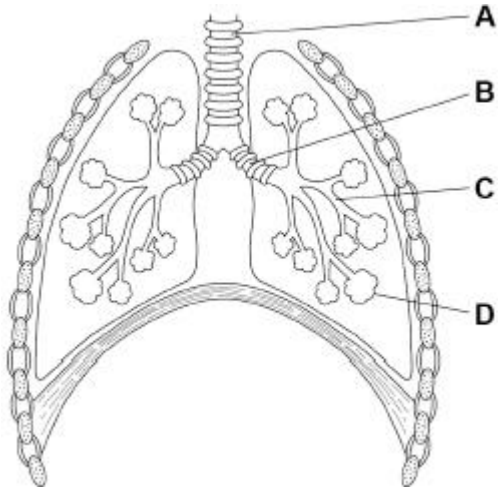
_____

(3)

(Total 13 marks)

Q4.

The figure below shows the human breathing system.



(a) Name parts **A** and **B**.

Choose answers from the box.

alveolus	**bronchus**	**capillary**	**trachea**

A _____

B _____

(2)

(b) Where does gas exchange happen in the breathing system?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(c) Give **two** ways that the lungs are adapted for efficient gas exchange.

1 _____

_____

2 _____

_____

(2)

The table below shows the percentage of gases in air breathed into the lungs and air breathed out of the lungs**.**

Gas	**Percentage (%) in air breathed in**	**Percentage (%) in air breathed out**
Oxygen	21	16
Carbon dioxide	0.04	4
Nitrogen	78	78

(d) Explain the **differences** in the air breathed into the lungs and the air breathed out of the lungs.

(4)

(e) The percentages given in each column of the table above do **not** add up to 100%.

Suggest **one** reason why.

(1)

(Total 10 marks)

Q5.

Communicable and non-communicable diseases are major causes of ill health.

(a) Which disease is a **non-communicable** disease?

Tick (✓) **one** box.

AIDS ☐

Cancer ☐

Gonorrhoea ☐

Malaria ☐

(1)

Obesity is a risk factor for many non-communicable diseases.

(b) Give **one** non-communicable disease that obesity is a risk factor for.

Do **not** refer to the diseases given in part (a) in your answer.

_____

(1)

(c) National policies are used to help people who are obese to lose weight.

One national policy is to reduce the amount of sugar added to food and drinks.

Suggest **one other** national policy that could help people to lose weight.

_____

_____

(1)

(d) Body mass index (BMI) is one measure of obesity.

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$$

The table below shows how BMI is used to describe an adult's BMI category.

BMI	**BMI category**
<18.5	Underweight
18.5 to 24.9	Healthy weight
25.0 to 29.9	Overweight
>29.9	Obese

A person is 1.64 m tall and has a mass of 69 kg.

Determine the **BMI category** for this person.

Use the BMI equation and the table above.

_____

_____

_____

_____

_____

The person's BMI category is _____

(3)

Scientists investigated the effect of smoking and of BMI on the birth mass of babies.

Women's BMI categories were determined before the women became pregnant.

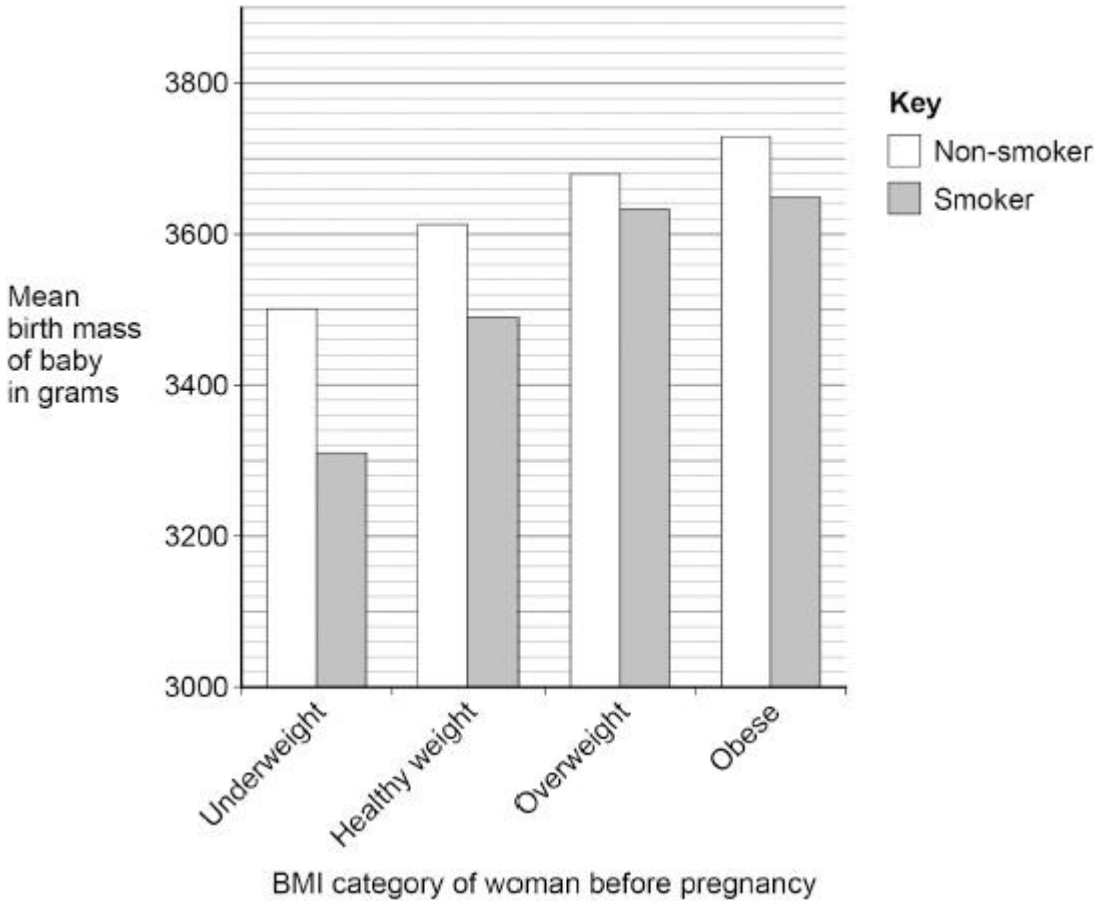
(e) Suggest why BMI categories were determined **before** the women became pregnant.

_____

_____

(1)

The figure below shows the results.



(f) Give **two** conclusions that can be made from the figure above.

1 _____

_____

2 _____

_____

(2)

(g) Measles is a communicable disease.

A virus causes measles.

Describe how the measles virus is transferred from person to person.

_____

_____

_____

_____

(2)

Athlete's foot is a communicable disease.

A fungus causes athlete's foot.

The athlete's foot fungus infects the skin on feet.

(h) Scientists estimate that 17% of the UK population have athlete's foot.

The estimated UK population is 67 961 900

Calculate how many people are estimated to have athlete's foot.

_____

_____

_____

Estimated number of people with athlete's foot = _____

(2)

(i) Athlete's foot fungus grows in moist conditions.

Suggest **one** way a person could reduce their chance of catching athlete's foot.

_____

_____

(1)

(Total 14 marks)

Q6.

The circulatory system includes the heart, blood vessels and blood.

(a) The heart pumps the blood in a double circulatory system.

Describe what is meant by a 'double circulatory system'.

_____

_____

_____

_____

(2)

(b) Heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart is the pacemaker found?

_____

(1)

(c) Which blood vessel carries deoxygenated blood?

Tick (✓) **one** box.

Aorta	☐
Coronary artery	☐
Pulmonary artery	☐
Pulmonary vein	☐

(1)

The structure of a vein is different from the structure of an artery.

One difference is that veins have valves but arteries do **not** have valves.

(d) Explain why veins have valves, but arteries do not.

_____

_____

_____

_____

(2)

(e) Describe **two** structural differences between a vein and an artery.

Do **not** refer to valves in your answer.

1 _____

_____

_____

2 _____

_____

_____

(2)

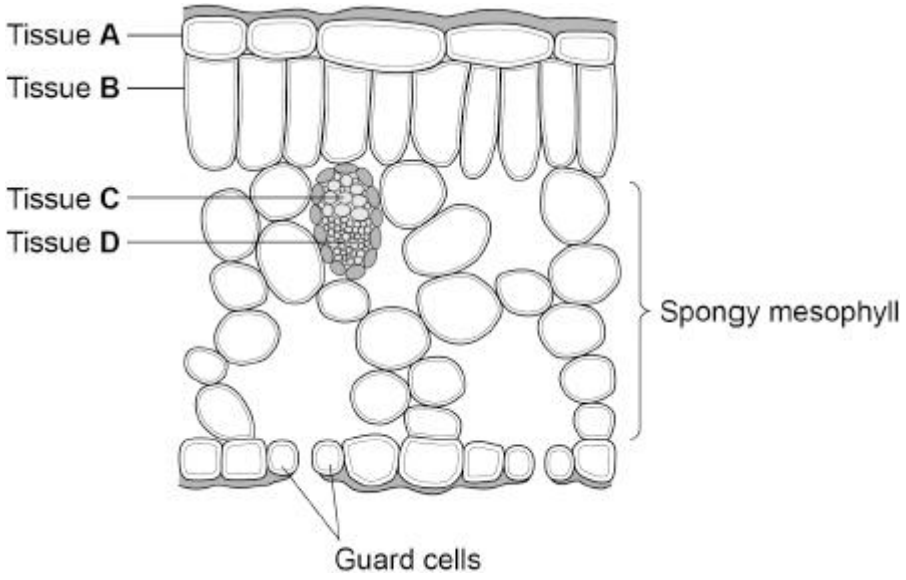
(Total 8 marks)

Q7.

A leaf is a plant organ.

Figure 1 shows tissues in a leaf.

Figure 1



(a) Which tissue is the epidermis?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(b) Explain how the spongy mesophyll is adapted for its function.

Use **Figure 1**.

_____

_____

_____

_____

_____

_____

(3)

(c) The xylem is adapted to transport water through a plant.

Explain **one** way that xylem is adapted for its function.

_____

_____

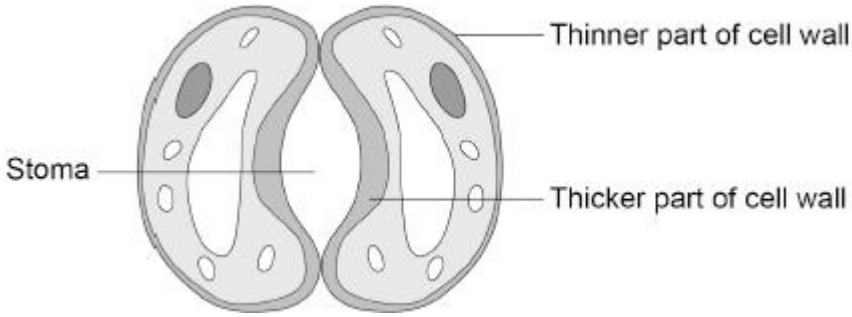
_____

_____

(2)

(d) **Figure 2** shows a pair of guard cells around a stoma.

Figure 2



During the day, glucose is made in the guard cells.

Describe how an increase in glucose concentration in the guard cells causes the stoma to open.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q1.

(a) C

1

(b) sugars

1

(c) small intestine

1

(d) pH of the amylase solution

1

(e) ● black

1

○ orange

1

(f) 3(.0 minutes)

allow any value in the range 2.51 to 3.0 (minutes)
*do **not** accept 2.5 (minutes)*

1

(g) pH 7

1

[8]

Q2.

(a) soil

allow ground
ignore air
ignore rain
ignore roots

1

(b) transpiration

1

(c) 510.7 - 9(.0)
or
503.5 - 1.8

1

501.7 (grams)

1

(d) 1.8 grams/hour

1

(e) straight line drawn from 0,0 to 5 hours

ignore any extrapolations

1

at a less steep gradient below the line on **Figure 2**

1

(f) any **one** from:

- increase air movement
- increase light intensity
- decrease humidity

ignore references to temperature

ignore references to the bag

allow descriptions of how changes could be achieved experimentally eg use a fan

1

[8]

Q3.

(a) A

1

(b) left ventricle

1

(c) coronary artery

1

(d) vein

1

(e) to stop blood flowing in the wrong direction

allow to stop blood flowing backwards

allow to stop backflow (of blood)

allow to keep blood flowing in the correct direction

1

(f) walls that are one cell thick

allow thin walls

ignore thin unqualified

*do **not** accept references to cell walls*

1

(so) there is a short diffusion distance

allow (so) substances can move (quickly) between blood and cells / tissues

allow (so) diffusion / movement can happen faster

allow (so) there is a short distance for substances to move

OR

large surface area (to volume ratio) (1)

for exchange of substances (1)

allow (so) more substances can diffuse / move at the same time (1)

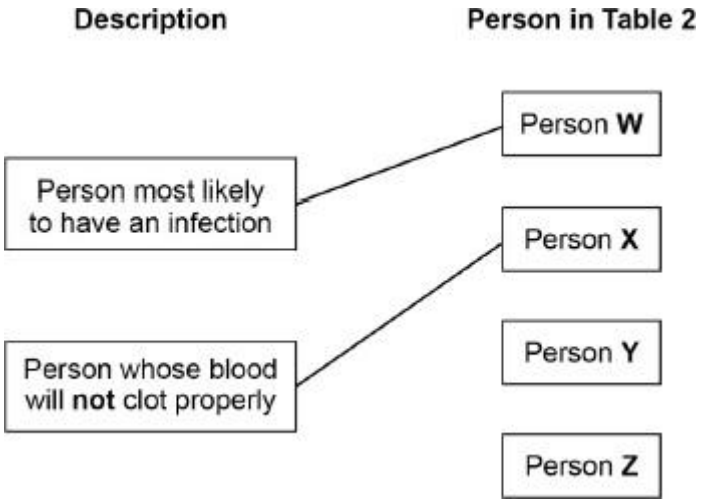
allow (very) narrow (1)
(so) are close to cells (1)

1

(g) 5×10^6

1

(h)



*do **not** accept more than one line from a box on the left*

2

(i) more oxygen (can be transported / carried)
allow red blood cells carry oxygen

1

(oxygen) is needed for (aerobic) respiration
allow (so) less anaerobic respiration

1

(so) more energy can be transferred / released
*do **not** accept energy is made / produced / created*

1

[13]

Q4.

(a) (A) trachea

1

(B) bronchus
must be in this order

1

(b) D

1

(c) any **two** from:
- many alveoli
- large surface area

- short diffusion distance

  allow short distance for gas to travel across
- wall of alveolus only one cell thick

  allow (wall of) alveolus is thin

  *do **not** accept cell wall*
- wall of blood capillaries only one cell thick

  allow thin (wall of) blood capillary

  *do **not** accept cell wall*
- good blood supply
- well ventilated

  ignore moist

2

(d) **Level 2:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

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

- less oxygen in exhaled air (than inhaled air)
  - (because) the body has used some oxygen
  - for respiration

- more carbon dioxide in exhaled air (than inhaled air)
  - (because) carbon dioxide is produced in respiration
  - carbon dioxide can cause poisoning (in high concentration)
  - (so) needs to be removed from the body

- no difference in the percentage of nitrogen in inhaled and exhaled air
  - (because) nitrogen is not used by the body

- more water vapour / moisture in air breathed out
  - (because) water is produced in respiration

- exhaled air is warmer (than inhaled air)
  - (because) energy is transferred during respiration
  - thermal energy of body warms the exhaled air

For **Level 2**, explanation(s) and difference(s) must be given

(e) any **one** from:
- there are other gases present

  allow named gas eg argon
- water (vapour) is present
- the numbers are rounded

1

[10]

Q5.

(a) cancer

1

(b) any **one** from:

ignore cancer

- (coronary) heart disease / CHD / cardiovascular disease

  allow atherosclerosis

  ignore heart attack

- diabetes

  allow high blood pressure

  allow stroke / asthma / depression / gallstones / (osteo)arthritis

  allow sleep apnoea

1

(c) any **one** from:

- taxes on high energy / fat / sugar foods

  allow increase the price on high energy / fat / sugar foods

- education (about diet and health)
- (government) advertising
- restrict media advertising of high energy / fat / sugar foods
- information on food labels
- help / advice / groups for obese people via the NHS
- calorie information on restaurant / takeaway menus
- regulation of supermarket offers on high sugar / fat / energy foods
- regulation of type of foods for sale near checkouts
- exercise campaigns

1

(d) $\text{BMI} = \frac{69}{1.64^2}$

allow $\text{BMI} = \frac{69}{1.64 \times 1.64}$

allow $\text{BMI} = \frac{69}{2.6896}$

1

BMI = 25.6(5437....)

allow 26 or 25.7

1

(the person's BMI category is) overweight

must be consistent with their calculated BMI value

1

(e) any **one** from:

- women will gain mass / weight (during pregnancy)

  allow BMI (of woman) will increase (during pregnancy)

- (developing) baby will increase mass / weight of woman

1

(f) any **two** from:

- smokers had babies with lower birth mass
- women / smokers / non-smokers with higher BMI had heavier babies

  allow obese women have the heaviest / heavier babies

  allow underweight women have the lightest / lighter babies
- smoking had the greatest effect on birth mass in underweight women
- smoking had the least effect on birth mass in overweight women
- smoking had less effect on birth mass in overweight and obese women (than in underweight and healthy weight women)

  allow there is only a 365 g difference between the smallest and largest babies

2

statements must be comparative

allow converse statements

allow weight for mass

(g) coughs / sneezes (spread virus in droplets)

allow breathing out (spreads virus in droplets)

1

droplets / virus are inhaled

allow droplets / virus are breathed in

ignore contact with infected person unqualified

1

assume 'it' refers to the virus

*allow touch a contaminated surface **and** then touch your mouth / nose / eyes for **1** mark*

*if no other marks awarded allow kissing for **1** mark only*

(h) $\frac{17}{100} \times 67\,961\,900$

allow 0.17 x 67 961 900

1

= 11 553 523

allow 11 553 500

1

(i) any **one** from:

- dry feet thoroughly (after washing)

  allow use foot powder

  ignore keep feet dry

  ignore wash feet regularly
- do not share socks / tights / shoes / towels
- use a fungicide

  allow named fungicide

  allow wear silver(-impregnated) socks
- do not walk around barefoot in public / contaminated areas

  allow wear flip flops in public / contaminated areas

ignore avoid moist conditions

1

[14]

Q6.

(a) right ventricle pumps blood to the lungs

allow right side of heart pumps blood to the lungs

1

left ventricle pumps blood around / to the body

allow left side of heart pumps blood to the body

1

*if no other marks awarded allow **1** mark for:*

*(two circuits / pumps) one from heart to lungs **and** one from heart to body*

or

blood passes twice through heart on each circuit

(b) right atrium

1

(c) pulmonary artery

1

(d) valves prevent backflow of blood

allow valves prevent blood from flowing in the wrong direction

1

(because) blood (in veins) is at lower pressure / force (than in arteries)

allow (because) blood travels more slowly (through veins than arteries)

allow converse statements eg blood in arteries is at higher pressure (1)

(so) do not need valves to prevent backflow (1)

1

(e) any **two** from:

- lumen in vein is wider (than in an artery)
- (wall of vein) has a thinner layer of muscle (tissue)
- (wall of vein) has a thinner layer of elastic tissue

*if neither mark awarded allow **1** mark for:*

veins have thinner walls (than arteries)

*do **not** accept reference to cell wall*

2

answers must be comparative allow converse statements

ignore reference to valves

[8]

Q7.

(a) A

1

(b) has (large) air spaces (between cells)

allow has (large) gaps (between cells)

1

(so) gases can diffuse / move through the leaf

*allow carbon dioxide **or** oxygen **or** water vapour for gases*

1

to / from the photosynthetic / palisade / B layer

allow to / from the upper mesophyll

if named gas given for mp 2 direction of movement must be correct

1

*if no other marks awarded allow **1** mark for cells have chloroplasts for photosynthesis*

(c) composed of hollow tubes / cells

allow cells are empty

allow no cytoplasm / nucleus / sub-cellular structures

1

(so) no obstruction to water flow

allow (so) water flows easily if linked to hollow tubes

allow to maintain the transpiration stream

OR

has lignin (1)

ignore has thick walls

(to) hold tubes open (1)
or
(to) strengthen the tubes

allow (to) keep water inside xylem

allow (to) make tubes rigid

OR

no end walls (1)

(so) water flows easily (1)
or
(so) water flows continuously

must be linked to an adaptation

allow (so) maintains a constant water flow

allow to maintain the transpiration stream

1

reason must correctly match the structure

(d) <u>water</u> enters (guard) cells by osmosis

allow <u>water</u> enters (guard) cells because the concentration of water is higher outside the cell than inside the cell

1

cells swell and curve (to open the stoma)

allow cells become turgid and curve (to open the stoma)

*allow inner wall of (guard) cell is thicker / stronger **or** less flexible than outer wall so cells curve (to open stoma)*

1

[8]