

Index Number	Class	Name
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## CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 2



**BIOLOGY (SPA)**

Secondary 3 Express

**5158  
Part A**

Tuesday, 11 October 2016  
2 hours (for parts A and B)

Additional Materials: Optical Answer Sheet

**READ THESE INSTRUCTIONS FIRST**

Write your index number, class and name on all the work you hand in.  
Do not use staples, paper clips highlighters, glue or correction fluid.

**Section A**

There are 40 questions in this section. Answer all questions. For each question there are four possible answers A, B, C and D. Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

This document consists of **16** printed pages.

Setter(s) : Mrs Cherry Lim and Mrs Lee-Tan Yu Jun

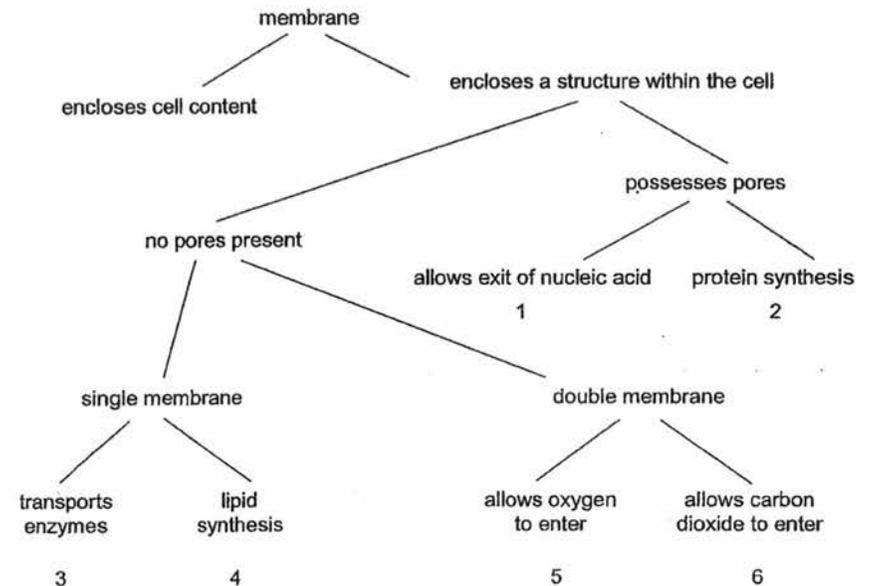
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2

**Section A [30 Marks]**

Answer all questions.

- 1 Membranes within and at the surface of cells have different roles. The diagram allows the identification of the various organelles within the cell, by describing the membrane structure and function.



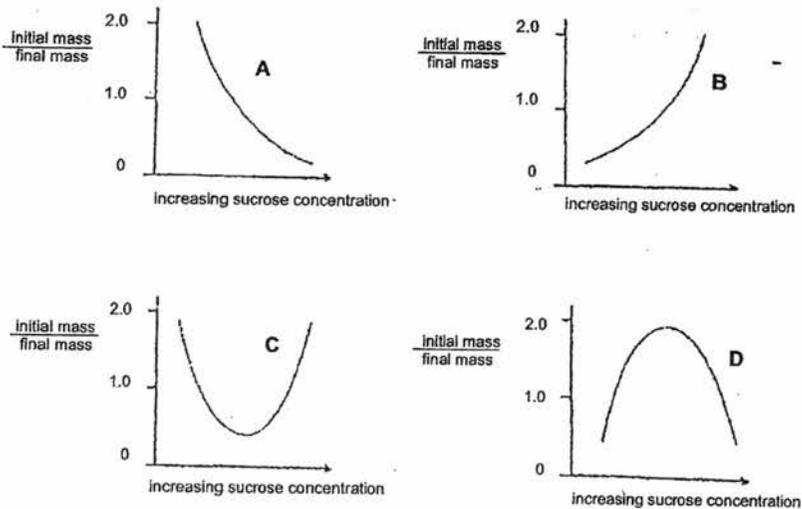
Which of the following correctly identifies the organelles that possess the membrane and the function?

	1	2	3	4	5	6
A	chloroplast	vesicle	smooth ER	rough ER	mitochondrion	nucleus
B	chloroplast	smooth ER	vesicle	rough ER	nucleus	mitochondrion
C	nucleus	rough ER	vesicle	smooth ER	mitochondrion	chloroplast
D	nucleus	smooth ER	mitochondrion	rough ER	vesicle	chloroplast

3

- 2 Pieces of potato of equal size were weighed and placed in different concentrations of sucrose solutions. After 24 hours, the potato pieces were removed and reweighed. For each potato piece, the initial mass divided by final mass was calculated.

Which graph correctly represents the change in initial mass divided by final mass of the potato pieces in sucrose solutions of different concentrations?



- 3 Which process involves active transport?

- A movement of ions up the xylem
- B uptake of glucose by cells in the villi
- C movement of water into root hairs
- D uptake of oxygen in red blood cells

4

- 4 Solutions containing nutrients are tested. The table shows results of the tests.

solution	heated with Benedict's solution	mixed with sucrose, then heated with Benedict's solution
P	blue	orange
Q	green	green
R	yellow	red

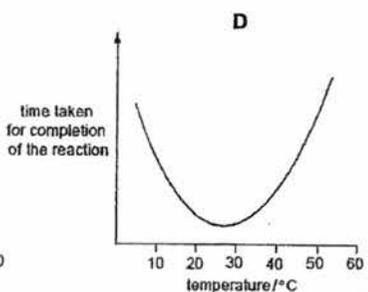
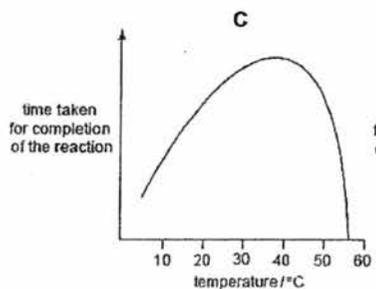
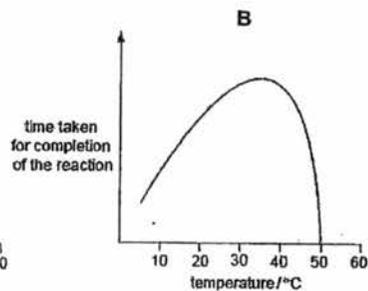
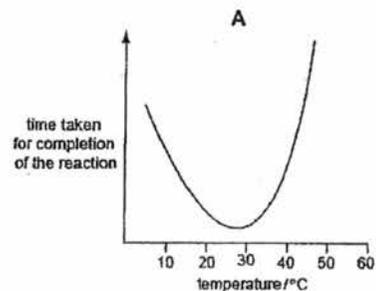
Which solution/s contain/s both reducing and non-reducing sugars?

- A P, Q and R
  - B P and R only
  - C P only
  - D R only
- 5 Which statement/s is/are true about the optimum temperature of all enzymes?
- 1 It is the temperature at which the enzymes work best.
  - 2 It is the highest temperature at which the enzymes will work.
  - 3 It is between 35°C and 40°C.
- A 1, 2 and 3
  - B 2 and 3 only
  - C 1 only
  - D 3 only

5

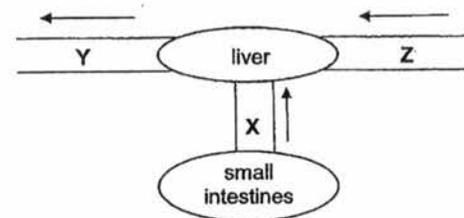
- 6 An enzyme is completely denatured at 50°C. A fixed concentration of this enzyme is added to a fixed concentration of its substrate. The time taken for completion of the reaction is measured at different temperatures.

Which graph shows the results?



6

- 7 The diagram shows blood vessels surrounding the liver of a person who ate a full lunch. The arrows indicate the direction of blood flow.



Which of the following correctly arrange the relative amount of glucose in the three blood vessels?

- A  $X > Z > Y$
- B  $Y > Z > X$
- C  $X > Y > Z$
- D  $Y > X > Z$

- 8 Which of the following statements is not an effect of excessive alcohol consumption?

- A It stimulates over-secretion of stomach acid.
- B It decreases the amount of glycogen stored in the liver.
- C It decreases the ability of neurones to transmit nerve impulses.
- D It increases the production of acetaldehyde in the liver.

- 9 One gram of glucose yields 17.0 kJ of energy. One tablespoon of glucose weighs 25 grams.

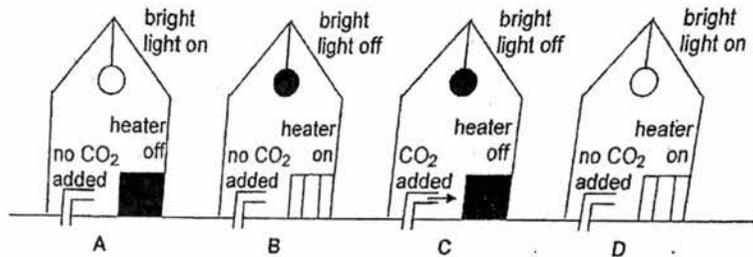
Which of the following activities, when carried out for 20 minutes, uses the same amount of energy as is contained in 2 tablespoons of glucose?

	activity	energy used (kJ/min)
A	playing football	37.5
B	walking upstairs	38.5
C	rowing boat	40.5
D	running	42.5

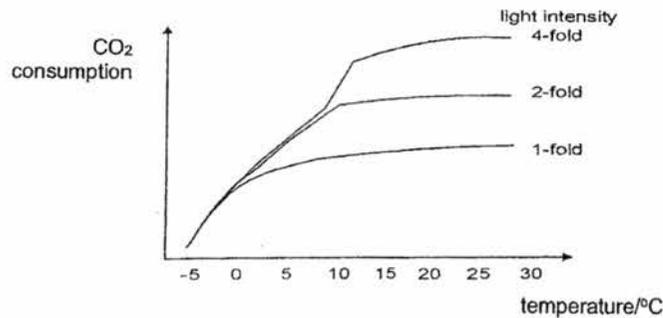
7

- 10 The diagram shows four greenhouses set up to grow chilli plants in Tibet.

In which greenhouse is carbon dioxide concentration the factor limiting the rate of photosynthesis?



- 11 Photosynthesis in plants is dependent on temperature (T) and light intensity (L). The graph below shows the results of carbon dioxide consumption for three plants of the same species under different light intensities.



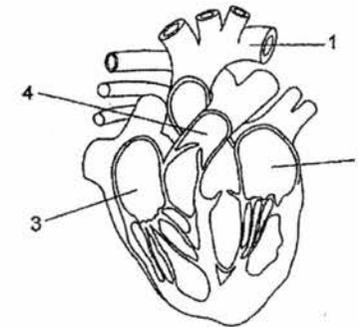
Which of the following correctly identifies the limiting factor/s in temperature ranges (I) -5 °C to 0 °C and (II) +20 °C to +30 °C?

	temperature range	
	(I) -5 °C to 0 °C	(II) +20 °C to +30 °C
A	T and L limiting factors	T and L not limiting factors
B	T limiting, L not limiting factors	T not limiting, L limiting factors
C	T limiting, L not limiting factors	T limiting, L not limiting factors
D	T not limiting, L limiting factors	T limiting, L not limiting factors

11

8

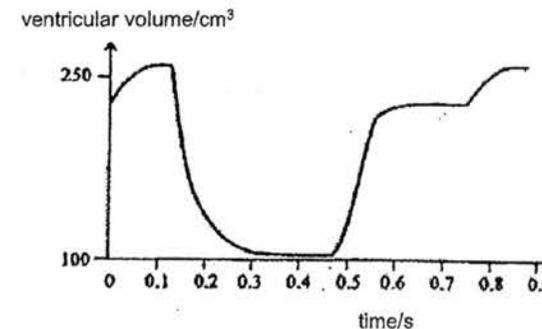
- 12 The diagram shows a section through the heart and the associated blood vessels.



Which is the flow of blood through the heart?

- A 1 → 2 → 3 → 4
- B 2 → 1 → 3 → 4
- C 3 → 4 → 1 → 2
- D 4 → 3 → 2 → 1

- 13 The graph shows the change in the ventricular volume of a person's heart within a short period of time.



Which of the following correctly identify the event that occurs at 0.2 second?

- A atrial muscle contract
- B semi lunar valve open
- C tricuspid valve open
- D ventricular muscle relax

14 Which gases share the same binding site on haemoglobin?

- A carbon dioxide and carbon monoxide
- B carbon dioxide and oxygen
- C oxygen and carbon monoxide
- D oxygen, carbon dioxide and carbon monoxide

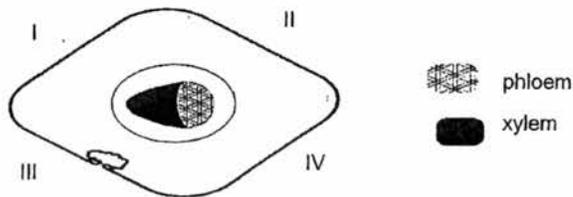
15 Two blood samples from persons, P and Q, are exposed to antibodies a and b. Results are shown in the table.

blood samples from person	exposed to antibody-a	exposed to antibody-b	control	key
P	●	●	○	no agglutination
Q	○	●	○	agglutination

Which of the following blood transfusion is not possible?

- A Person P can receive a blood transfusion from blood group AB.
- B Person P can receive a blood transfusion from blood group O.
- C Person Q can receive blood transfusion from blood group B.
- D Person Q can receive a blood transfusion from blood group A.

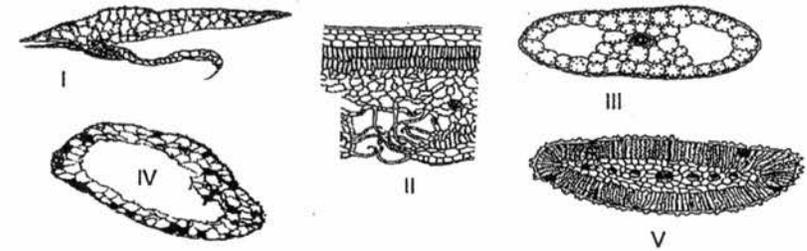
16 A transverse microscopic section of a needle shaped leaf is shown in the diagram below. Which regions show the upper surface of the leaf?



- A I and II
- B II and IV
- C I and III
- D II and III

20

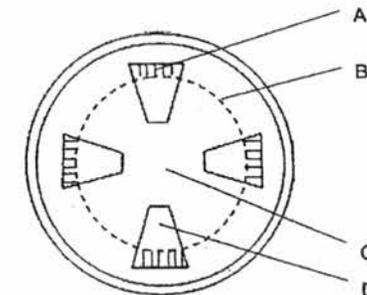
17 The following figures show the cross sections of five leaves from different species of plant.



Which ones grow in aquatic habitat?

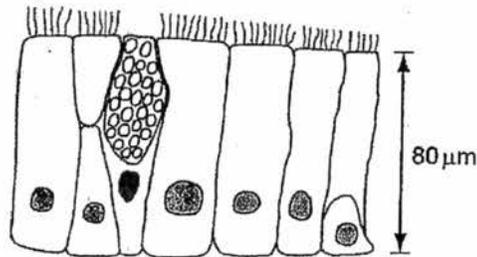
- A I, III and IV
- B I, II and V
- C I, II and III
- D I, III, IV and V

18 The diagram shows a transverse section through a dicotyledenous stem. If the stem was treated with the poisonous cyanide that prevents respiration, which region will show slower movement of substances?



11

- 19 The diagram shows a section through a type of epithelium. Where is this type of epithelium found in the respiratory system?



	trachea	bronchus	all bronchioles	alveolus
A	✓	✓	✓	x
B	✓	✓	x	x
C	x	x	✓	✓
D	x	x	x	✓

key  
 ✓ = present  
 x = absent

- 20 Fresh milk not consumed and kept for long period turns sour after some time.

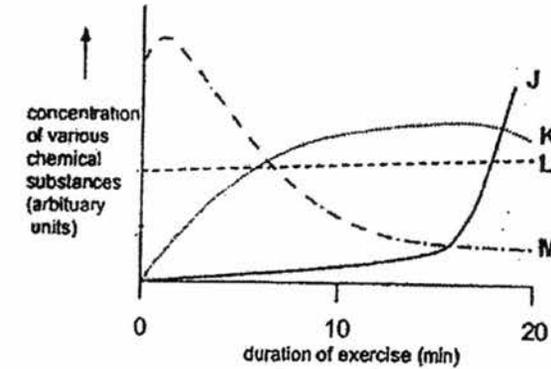
Which of the following below correctly list the process involved and products formed.

	process	products
A	aerobic respiration	carbon dioxide and water
B	anaerobic respiration	lactic acid
C	aerobic respiration	ethanol and water
D	anaerobic respiration	ethanol and carbon dioxide

21

12

- 21 The graph shows changes in the concentration of various chemical substances in the thigh muscles of a person exercising vigorously on a bicycle.



Which of the following statements is correct?

- A Line J represents glycogen.  
 B Line K represents carbon dioxide.  
 C Line L represents oxygen.  
 D Line M represents lactic acid.
- 22 Which of the following is not a common feature of air sacs of the lungs and the convoluted tubules of the nephrons?  
 A Both have one cell thick wall.  
 B Both have rich blood capillary network.  
 C Both have film of moisture on the walls.  
 D Both are permeable to dissolved substances.
- 23 Which of the following is not an example of excretion?  
 A Removal of uric acid in the skin.  
 B Removal of glycogen in the liver.  
 C Removal of bile pigments in the liver.  
 D Removal of water in expired air.

24 Teleost fish have body fluids which are maintained at a higher water potential than sea water.

What is likely to happen when a teleost fish is transferred from sea water to pure water?

- A it produces higher volume of urine
- B it produces more concentrated urine
- C its urine concentration remains unchanged
- D its urine volume remains unchanged

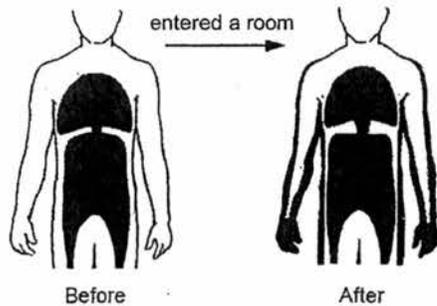
25 Four statements about negative feedback are given below.

- 1 Effectors bring about corrective responses.
- 2 A receptor detects a change in the internal environment.
- 3 Variation from the norm is counteracted.
- 4 A nerve or hormone message is generated.

The order in which these events occur is

- A 2, 1, 4, 3
- B 2, 4, 1, 3
- C 4, 1, 3, 2
- D 4, 2, 1, 3

26 The diagram illustrates blood distribution in a man before and after he entered a room.



Which of the following is correct?

	room temperature	effect
A	increase	vasodilation
B	decrease	vasodilation
C	increase	vasoconstriction
D	decrease	vasoconstriction

Questions 27 and 28 refer to the diagram of a specialised cell below.



27 What is the cell shown in the diagram?

- A relay neurone
- B motor neurone
- C sensory neurone
- D receptor neurone

28 Sarin is colourless and odourless gas which is used as chemical weapon. Sarin interferes with the function of neurotransmitter in nervous tissue.

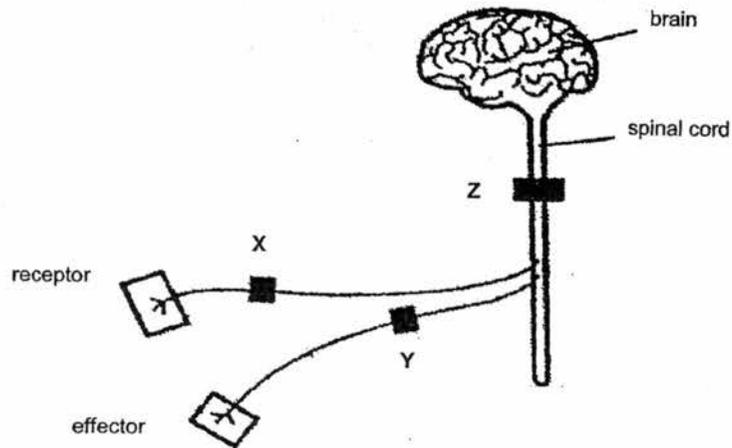
Which part of the cell will be inhibited by sarin gas?

- A W
- B X
- C Y
- D Z

15

- 29 A local anaesthetic is a drug used to block nerve impulses in a specific part of the body. Figure below shows parts of the nervous system X, Y and Z which are possible sites where the anaesthetic can be injected. A person can feel a pin prick in his leg but he cannot move his leg.

Where was the anaesthetic injected in this person?

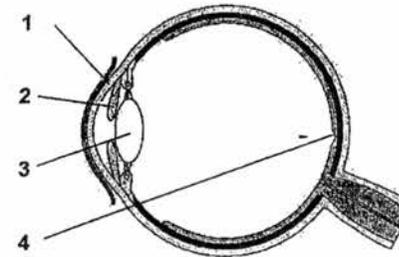


- A at X
- B at Y
- C at Z
- D at X and Y

23

16

- 30 The diagram shows a section through an eye.



In the pupil reflex, which are the sites of the effector and the receptor?

	effector	receptor
A	2	1
B	3	1
C	3	4
D	2	4

End of Part A

Index Number	Class	Name
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## CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 2



**BIOLOGY (SPA)**

Secondary 3 Express



**5158  
Part B**

Tuesday, 11 October 2016  
2 hours (for Parts A & B)

Additional Materials: nil

### READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
Working in pencil will not be marked.  
You may use an HB pencil for any diagrams or graphs  
Do not use staples, paper clips highlighters, glue or correction fluid.

### Section B & C

Answer **all** questions.  
Write your answers on the question paper.  
The number of marks is given in brackets [ ] at the end of each question or part question.  
Show all your working on the same page as the rest of the answer.  
Omission of essential working will result in loss of marks.  
Electronic calculators may be used in this paper.

FOR EXAMINER'S USE	
Part A	30
Part B	70
Total	100

This document consists of 15 printed pages.

Setter(s): *Mrs Cherry Lim and Mrs Lee-Tan Yu Jun*

24

**Section B [50 marks]**

**Answer all questions in this section.**

For  
Examiner's  
Use

- 1 A study was performed on osmoregulation in marine (seawater) and freshwater fish. The salt concentration in the circulatory fluid of fish is generally higher than that of fresh water fish and lower than that of sea water. Both water and salts can move freely through the plasma membranes of fish cells.

Use the information in Table 1.1 to answer the following questions.

**Table.1.1**

	marine fish	freshwater fish
rate of water uptake (ml/h)	-3.5	4.0
rate of salt uptake (mg/h)	1.2	-2.3
rate of urine production (ml/h)	3.2	12.2
concentration of salt in circulatory fluid (mg/l)	2.0	2.0
concentration of salts in urine (mg/l)	5.0	2.0

- (a) With reference to Table 1.1, explain the difference in water uptake between the marine fish and the freshwater fish.

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 .....  
 .....  
 .....[2]

- (b) With reference to the function of the kidney nephron, explain how marine fish maintains the water potential of its circulatory fluid.

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 .....  
 .....  
 .....[2]

3

For  
Examiner's  
Use

- (c) Freshwater fish actively absorb salts from their surrounding through their gills to maintain a constant water potential in their circulatory fluid.

With reference to osmoregulation, explain why maintaining a constant water potential is important to the health and survival of this fish.

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.....

.....

.....

.....[2]

- 2 Carbohydrates and lipids are both used as respiratory substrates. Table 2.1 shows the energy values of carbohydrates and lipids.

respiratory substrate	energy value/ kJ g <sup>-1</sup>
carbohydrate	15.8
lipid	39.4

Table 2.1.

- (a) Explain what is meant by the term "respiratory substrate".

.....

.....

.....

.....[3]

- (b) Describe the differences in digestion of lipids and carbohydrates in humans.

.....

.....

.....[2]

- (c) Discuss how frequent intake of meals rich in lipids can affect the cardiac muscles.

.....

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.....[3]

4

3 A spirometer is an instrument used to measure the air capacity of the lungs. Fig. 3.1 compares the spirometer trace amongst a normal person, a trained athlete and a bronchitis sufferer.

For  
Examiner's  
Use

Each curve shows the volume of air exchanged during one normal breath, followed by a second breath where maximum volume is inhaled and exhaled.

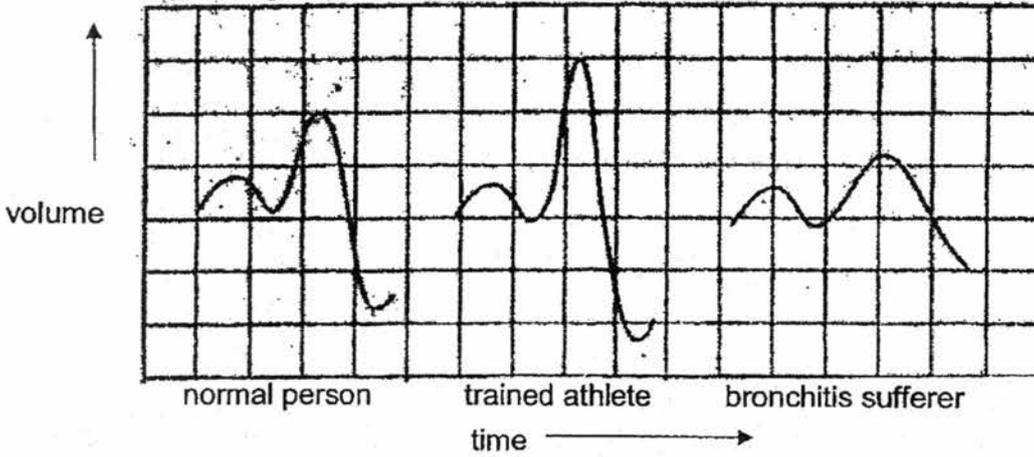


Fig. 3.1

(a) With reference to Fig. 3.1, describe and explain how the spirometer trace in a bronchitis sufferer differ from the normal person.

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.....[3]

(b) Compare the spirometer trace between the athlete and normal person. How is this difference beneficial to the athlete?

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.....[4]

For  
Examiner's  
Use

5

4 Fig. 4.1 is a diagram of a kidney tubule and its blood supply.

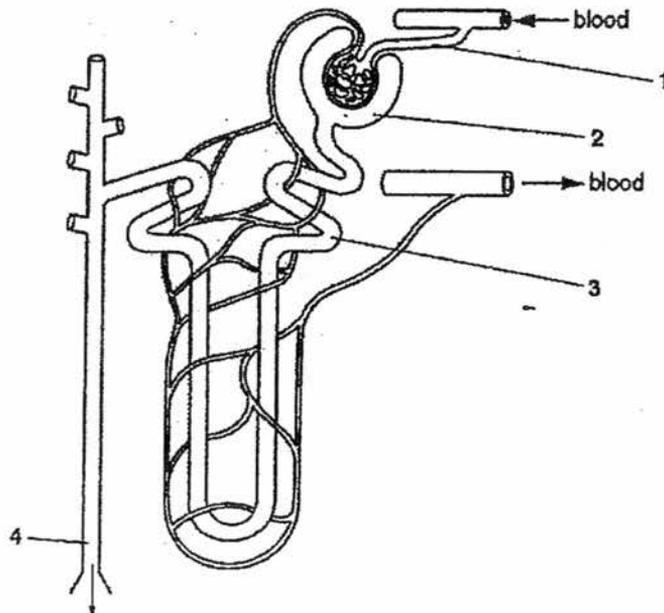


Fig. 4.1

(a) The concentrations of four substances, P to S, in the fluids at regions 1, 2, 3 and 4 were determined. The results are shown in Table 4.1.

substance	concentration/g dm <sup>-3</sup>			
	region 1	region 2	region 3	region 4
P	0.9	0.9	0.2	0.0
Q	82.0	0.0	0.0	0.0
R	8.0	8.0	9.6	16.5
S	0.2	0.2	0.2	20.0

Table 4.1

Identify the substances, P to S, which

(i) are too large to be filtered,

.....[1]

(ii) are small enough to be filtered but will be completely reabsorbed from the fluid in the kidney tubule, and

.....[1]

(iii) Increase in concentration as fluid move along the kidney tubule?

.....[1]

6

(b) Explain why there is a larger volume of fluid flowing through region 4 on a cold day.

For  
Examiner's  
Use

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.....

.....[3]

5 *Helicobacter pylori* bacteria can cause damage to the stomach lining of humans. The 'urea breath test' is used to detect the presence of this bacteria in the stomach. *Helicobacter pylori* produce an enzyme urease, which breaks down urea to carbon dioxide.

To test for the presence of the bacteria, a patient drinks a solution of urea containing  $^{13}\text{C}$ , which is an isotope of carbon. The breath of the patient is then sampled at intervals for 110 minutes and analysed for the presence of  $^{13}\text{CO}_2$  (carbon dioxide containing  $^{13}\text{C}$ ).

The results are shown in Fig 5.1.

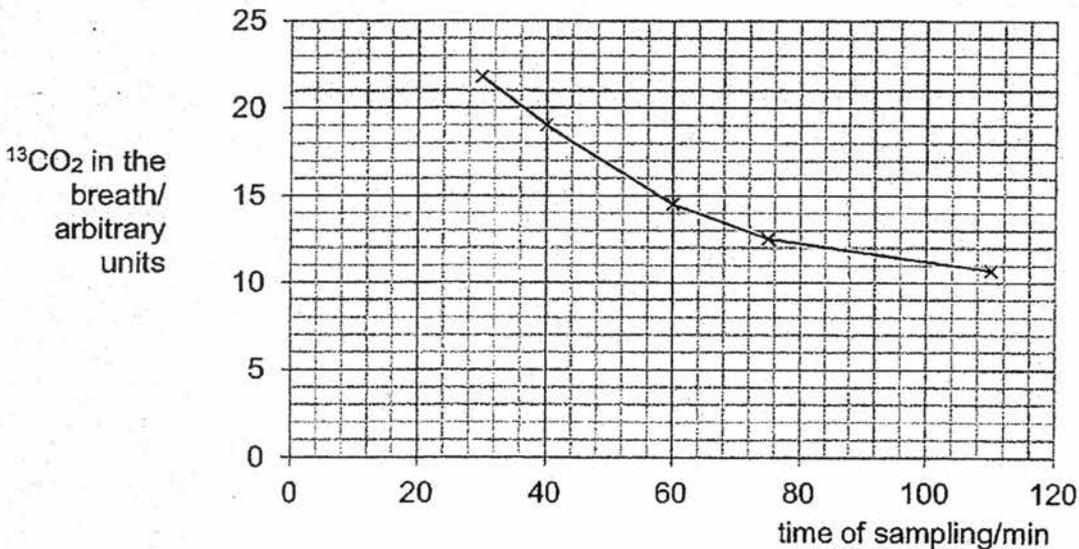


Fig. 5.1

(a) (i) With reference to the data in Fig. 5.1, is the patient infected with *Helicobacter pylori* bacteria? Explain your answer.

.....

.....[1]



8

6 Fig.6.1 shows the eye of Patient A having an eye examination, and after a few drops of atropine had been applied to his eye.

For  
Examiner's  
Use

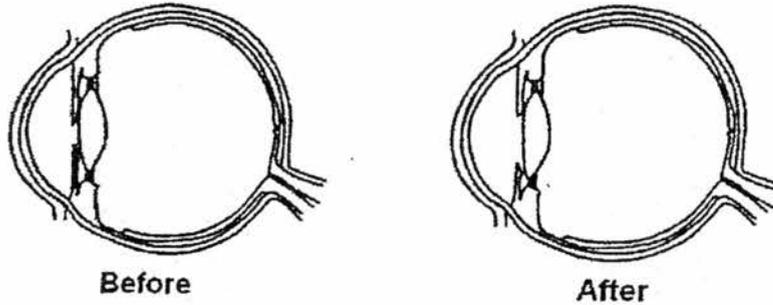


Fig.6.1

(a) Describe the effect of atropine and how it would aid the doctor in examining the internal structures of the patient's eye.

.....

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.....[2]

(b) Explain why Patient A was advised to put on a pair of sunglasses until the effects of atropine wears off?

.....

.....

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.....[2]

(c) Patient A was at a bus stop and he observed a bus approaching him from a distance. Describe how his eyes respond to this change.

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.....[2]



10

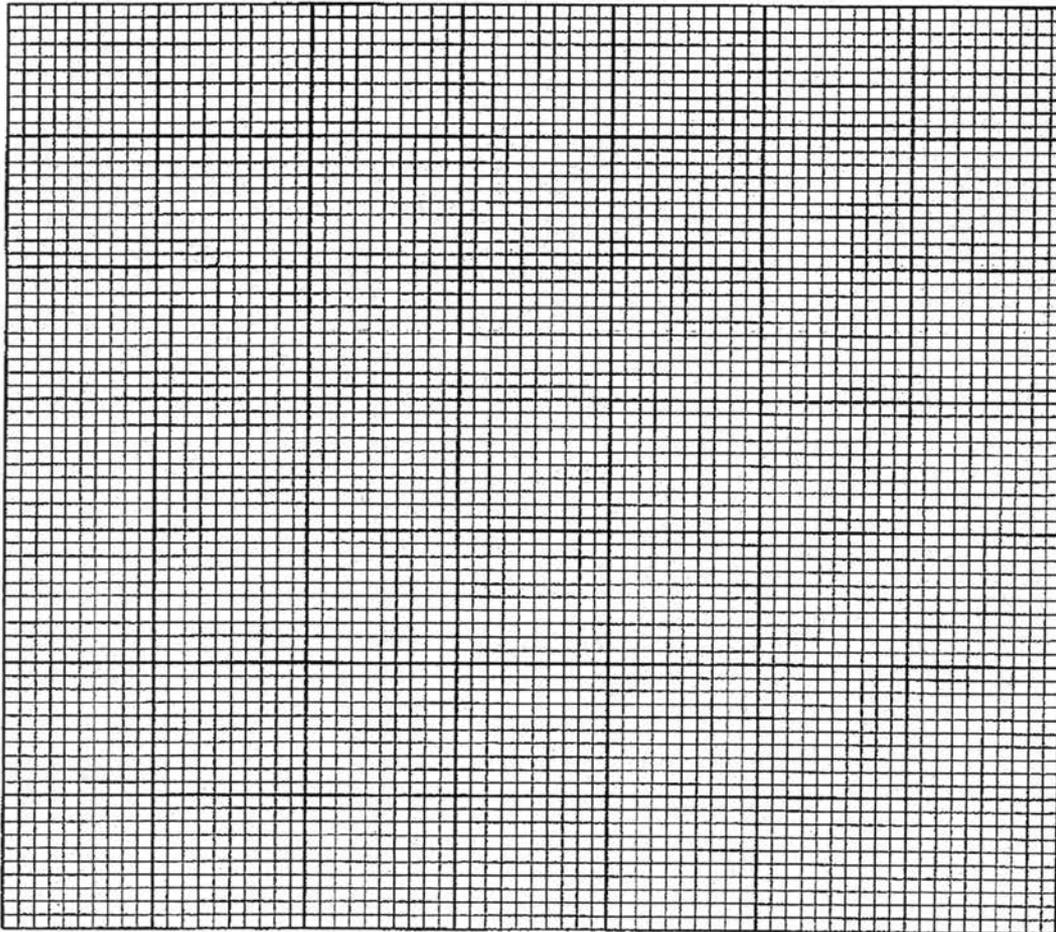
- 7 An investigation on the relationship between surface area to volume ratio and rate of diffusion of a colour solution in agar cubes was carried out in the laboratory. The results of investigation are shown in Table 7.1.

For  
Examiner's  
Use

Table 7.1

surface area / volume ratio of agar	Time taken to change colour of agar / s
1.5	120
2	105
3	84
4	60
6	30

- (a) Draw a graph to show the relationship of surface area to volume ratio and time taken for agar cubes to change colour.



[4]

11

- (b) From the graph, describe the relationship between surface area to volume ratio and the diffusion rate of the agar cubes.

.....  
.....[1]

- (c) Suggest two possible sources of error which may have affected the results of the investigation.

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.....[2]

For  
Examiner's  
Use

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12  
Section C [20 marks]

For  
Examiner's  
Use

Answer all questions in this section.

- 8 The experimental set-up shown in Fig.8.1 is used to determine the rate of transpiration of a leafy shoot.

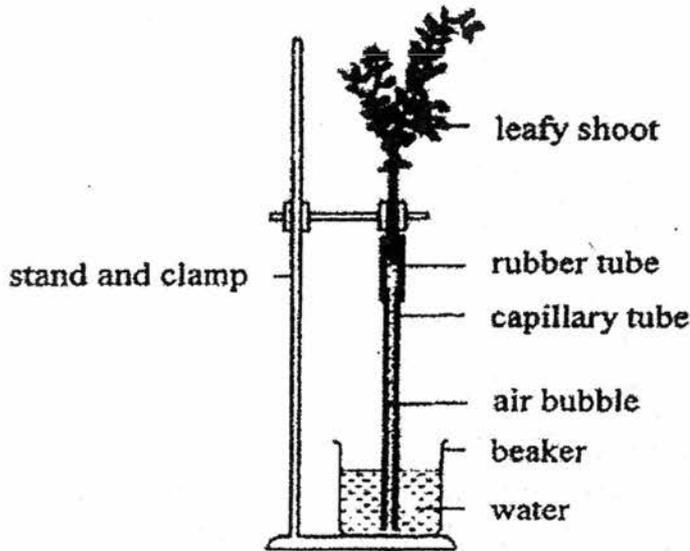


Fig.8.1

- (a) In setting up this experiment, the lower end of the leafy shoot should be cut under water. Give a possible reason for this step.

.....  
.....[1]

- (b) Give one assumption made for using this set-up to measure transpiration rate.

.....  
.....[1]

- (c) Deduce the direction and the rate the air bubble will move if the set-up is placed in front of an electric fan which is switched on.

.....  
.....[1]



14

- 9 Three flasks were set up as shown in Fig 9.1. Each flask represents a hot mammal cooling down. Flask A represents a hairless mammal, flask B represents a mammal with dry fur and flask C represents a mammal with wet fur.

For  
Examiner's  
Use

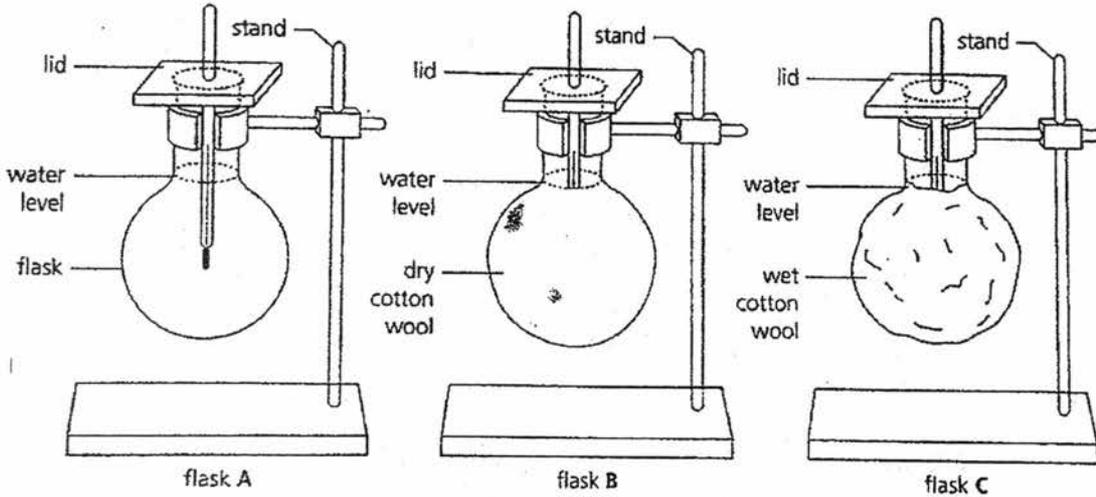


Fig. 9.1

Each flask was filled with an equal volume of hot water. The temperature of the water in each flask was measured as it cooled. Fig. 9.2 shows the readings.

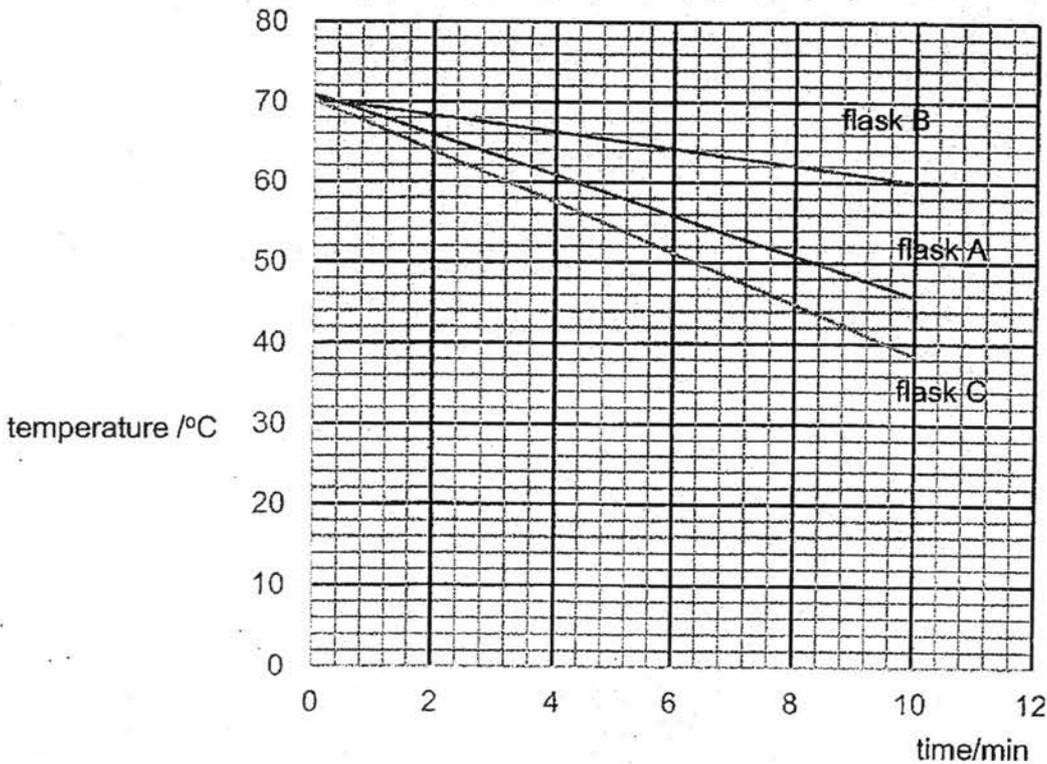


Fig. 9.2

15

(ai) Compare the cooling of the three flask.

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.....[3]

For  
Examiner's  
Use

(aii) Explain what has happened to produce the results of the three flasks.

.....  
.....  
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.....  
.....  
.....  
.....[4]

(b) Explain how the mechanism for controlling temperature in human body are coordinated.

.....  
.....  
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.....  
.....[3]

End of Part B

Answers to 2016 SA2 Sec 3 Exp Bio (SPA)

**Section A (30M)**

1	2	3	4	5	6	7	8	9	10
C	B	B	D	C	A	C	B	D	D
11	12	13	14	15	16	17	18	19	20
B	B	B	C	D	C	A	A	B	B
21	22	23	24	25	26	27	28	29	30
B	D	B	A	B	A	B	D	B	D

**Section B (50m)**

1a	FW fish cells have lower water potential than surrounding/FW/solution, M fish cells have higher water potential than surrounding surrounding/SW/solution; water molecules diffuse/move into FW fish cells by osmosis, water molecules diffuse/move out of M fish cells by osmosis; must quote some supporting data from table to qualify for MP2	1 1
1b	In Marine fish, there is more water reabsorbed from the nephron [correct part of nephron/ collecting duct] into the blood capillaries; M fish, less reabsorption of salt (from the nephron (correct part of nephron) into the blood capillaries)/ greater removal of excess salts in urine;	1 1
1c	If water potential in circulatory fluid (of FW fish) becomes too high / higher, water enters cells by osmosis, causing lysis/ bursting of cells; If water potential of circulatory fluid becomes too low / lower, water leaves the cells by osmosis, causing crenation / dehydration / shrinkage of cells;	1 1
2a	Substance that is <u>broken down to release energy</u> ; <u>Enzymes</u> are involved in the process; Aerobically or anaerobically;	1 1 1
b	Lipase is used for digestion of lipids, while carbohydrase/amylase/maltase/correct examples are used for digestion of carbohydrates Emulsification of fats occur/ Bile is involved in the digestion (physical) of lipids but not for carbohydrates Carbohydrate digestion begins in the mouth, but lipids digestion begin in the small intestine Any other well elaborated correct comparison	1 1 1 Any 2
c	More fats/lipids absorbed into the blood; More deposition of fats on the inner wall of coronary arteries; Heart muscles receive less oxygen/glucose/blood + reduced respiration rate in the heart muscle;	1 1 1

3a	Maximum/highest volume of air inhaled/exhaled by the bronchitis sufferer is almost half/lower than that of the normal person; (WTTE)  <b>Other 2 marks from explanation</b> Epithelium lining inflamed; Excessive mucus is secreted by epithelium; Air passage become blocked (by mucus); (Ignore: cilia paralysed)	1 2
b	Volume of air that can be inhaled/exhaled by the athlete is higher/larger/almost two times of than the normal person; WTTE  Athlete has ability to breathe deeper/ take in greater volume of air (oxygen) during exercise (ignore breathe faster);  This increase the rate of diffusion of oxygen in the lungs/ increase intake of oxygen into the body/ muscles can receive more oxygen;  Allowing higher rate of <u>aerobic</u> respiration <u>muscles</u> ;  Hence releasing more <u>energy</u> for exercise/movement;	1 1 1 1 1 Any 4
4	a (i) <b>Q</b> (ii) <b>P</b> (iii) <b>R and S</b> (both must be right)  (b) On a cold day, <u>sweat gland is less active</u> hence <u>water potential in blood plasma will be higher</u> ;  hence <u>Less ADH</u> is released into blood stream;  <u>Walls/cells of the collecting duct become less permeable to water</u> and thus <u>Less water reabsorbed</u> from the collecting duct into the blood capillaries;  Larger volume of urine produced (no mark)	1 1 1 1 1 1
5ai	Yes (no marks) Detection of 22 arbitrary units of <sup>13</sup> CO <sub>2</sub> in the breath at 30 minutes/ correct use of data to support answer	1
aii	Urease/enzyme is produced by the H.pylori/bacteria + Urease has an <u>active site</u> ; Urea has a <u>complementary shape</u> to the active site of urease  Urea and urease can bind to form <u>E-S complex</u> ;  Urease will be broken down to form <u>carbon dioxide/products</u> , which will be released from the enzyme;  Urease will remain chemically unchanged at the end of the reaction	1 1 1

bi	The longer the time of sampling, the <sup>13</sup> CO <sub>2</sub> in the breath decreases.	1
bii	As time increases, less urea / substrate (lower concentration of urea) remain the stomach; urea has already been broken down; fewer enzyme-substrate complex will be formed thus slower rate of reaction;	1 1 1 Any2
6a	Atropine acts on the <u>muscles</u> of the iris or circular muscles of iris to relax and radial muscle to contract) to cause the pupil to dilate;  this allows <u>more light</u> to enter the eye for examination;	1  1
b	If the pupil is dilated, too much light may enter and hence the <u>retina may be damaged</u> ; thus the sunglasses serve to <u>limit/decrease the amount of light</u> entering the eye;	1 1
c	As the bus approaches him, <u>ciliary muscles contract</u> and <u>suspensory ligaments slacken</u> ; lens becomes <u>thicker and more convex</u> ;	1 1
d	Structure S has an <u>irregular shape/uneven surface/ not smooth</u> WTTE;  causing the light entering the eye to be <u>bend irregularly</u> / light entering the eye are <u>refracted in many directions</u> ; WTTE  and <u>not be focused</u> on the <u>retina</u> , causing blurry vision;	1 1 1
7a	Correct scale; Correct axes labels; All points plotted correctly; Best fit line;  Inverted axis (0marks)	1 1 1 1
7b	The bigger the SA/V ratio, the shorter time / faster diffusion (rate)	1
7c	Determination of end point / point of <u>colour change</u> ; <u>Variations</u> in temperature; <u>Evaporation of solution</u> , changing the concentration of the colour solution; Not all <u>surface area</u> of agar exposed to the solution due to clumping/ WTTE;	Any 2
SECTION C		
8a	To prevent <u>air bubble</u> from forming in the <u>xylem vessels</u> when cut is made/ WTTE;	1
8b	<u>Rate of transpiration</u> is same as rate of <u>water absorption</u> ; OR <u>total volume</u> of the water absorbed is lost entirely through transpiration;	1
8ci	Air bubble will <u>move upwards</u> at a <u>faster rate</u> (than without fan);	1
8cii	Wind / moving air blows away <u>water vapour</u> surrounding the <u>stomata/surface of the leaves</u> ; <u>Water vapour concentration gradient / diffusion gradient is steeper</u> ; [link transpiration rate to higher rate of water absorption] As more water vapour is lost from the stomata, mesophyll cells have lower water potential. This will draws water from the xylem by osmosis. The rate of movement of water up the xylem will increase.	1 1 1
8d	Stomata <u>closed</u> ; More water loss than water absorbed/ rate of water loss (Transpiration) is greater than water uptake; Guard / leaf <u>cells lose water</u> ;	1 1

Guard cells become flaccid/collapse/plasmolysed/lost turgor pressure;	1
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9	ai	<table border="1"> <thead> <tr> <th>flask</th> <th>Comparison</th> <th>End points °C</th> </tr> </thead> <tbody> <tr> <td>A v B</td> <td>A loses more heat/cooling quicker or converse for B</td> <td>45 and 60</td> </tr> <tr> <td>B v C</td> <td>C loses more heat/cooling quicker or converse for B</td> <td>40 and 60</td> </tr> <tr> <td>C v A</td> <td>C loses more heat/cooling quicker or converse for A</td> <td>40 and 45</td> </tr> </tbody> </table> <p><b>1 mark only for all 3 trends given correctly.</b> 2 marks for quoting data for ABC. (2 correct data-1m; 3 correct data- 2m)</p>	flask	Comparison	End points °C	A v B	A loses more heat/cooling quicker or converse for B	45 and 60	B v C	C loses more heat/cooling quicker or converse for B	40 and 60	C v A	C loses more heat/cooling quicker or converse for A	40 and 45	Ma x 3
flask	Comparison	End points °C													
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C v A	C loses more heat/cooling quicker or converse for A	40 and 45													
	aii	<ul style="list-style-type: none"> <li>• (dry) cotton wool/flask B - traps (warm) air or heat/does not let heat escape/keeps heat in;</li> <li>• wet cotton wool/flask C – link to evaporation;</li> <li>• latent heat/evaporation takes heat;</li> <li>• (no cover on A) – loss of heat by radiation;</li> </ul>	Ma x 4												
	b	Thermoreceptors detects changes in the body temperature + <u>Nerve impulses</u> are sent to coordinator ( <u>hypothalamus/brain</u> )  Brain which will send nerve impulse to <u>effectors</u> ;  <u>Correct mechanisms/actions</u> leads to several responses which serve to bring the body temperature back to normal; OR When the body temperature returns to normal, a feedback is sent to the control centre/brain.	1  1  1												