3EXP

KRANJI SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2019
BIOLOGY (6093)

Booklet A

Level : Secondary Three

Date : 8 October 2019

Stream : Express

Duration : 2 hours 15 minutes

Name : _____ ( )

Marks

Class : Sec 3K_____

/ 100

INSTRUCTIONS TO CANDIDATES

1. Booklet **A** consists of **Sections A** and **B**.
2. For **Section A**, there are four possible answers, A, B, C and D for each question. Choose the most suitable answer and shade your answers in the **OMR sheet** provided.
3. For **Section B**, write your answers in the spaces provided.
4. Use of scientific calculator is allowed.

This question paper consists of 24 printed pages including this cover page.

[Turn over]

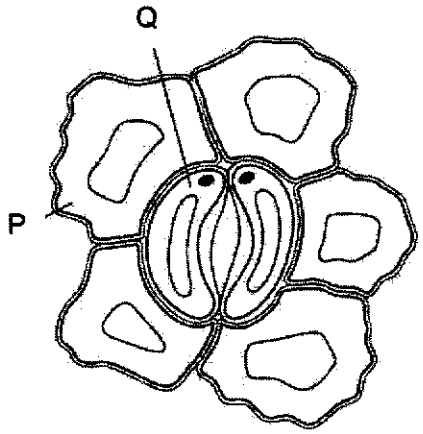
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Section A: Multiple Choice Questions (30 marks)

For each question, there are four possible answers, A, B, C and D.
Choose the most suitable answer and shade your answers in the OMR sheet provided.

1 The diagram shows cells in the epidermis of a leaf.



To complete the diagram, which structural features should be added to the cells P and Q?

	P		Q	
	chloroplasts	nucleus	chloroplasts	nucleus
A	✓	✓	✗	✗
B	✓	✗	✓	✓
C	✗	✓	✓	✗
D	✗	✗	✓	✓

key
✓ =yes
✗ = no

2 A student cuts out four cylinders of potato. The cylinders are all of the same length and the same diameter. The mass of each cylinder is measured before they are placed in sugar solutions of different concentrations.
After one hour, the mass of the cylinders are measured again.

The results are shown in the table.

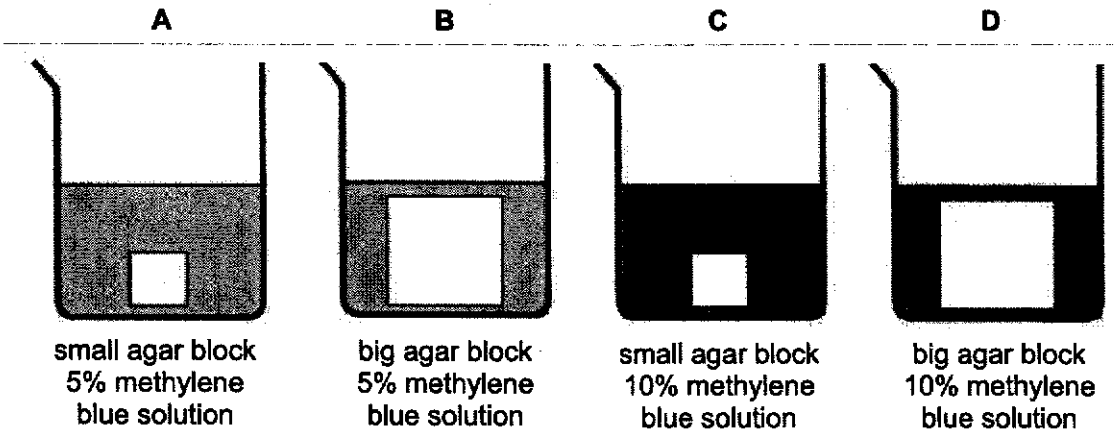
Which sugar solution has a water potential **closest** to that of the potato cells?

	concentration of sugar/ mol per dm^3	starting mass/ g	mass after 1 hour/ g
A	0.1	3.26	3.52
B	0.3	3.22	3.25
C	0.4	3.05	3.15
D	0.6	3.18	2.94

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3 Four clear agar blocks (**A** to **D**) were placed into solutions of methylene blue of different concentrations as shown below.

Which of the following will be the **last** to be stained completely?



4 The table below shows the results from an investigation of the absorption of digested food in the presence and the absence of oxygen.

type of digested food	absorption in the presence of oxygen/ arbitrary units	absorption in the absence of oxygen/ arbitrary units
fatty acids	1.8	1.7
glucose	7.0	2.3
amino acids	6.2	2.4
glycerol	4.5	4.6

Which of the following describes the results obtained from the investigation?

A All the digested food is absorbed by active transport and diffusion.

B Amino acids are absorbed by active transport and diffusion.

C Fatty acids and glycerol are mainly absorbed by active transport.

D Glucose are absorbed by active transport only.

5 What are the chemical elements found in lipase?

A carbon, hydrogen and oxygen only

B carbon, hydrogen, oxygen and nitrogen only

C carbon, hydrogen, oxygen and sulfur only

D carbon, hydrogen, nitrogen and sulfur only

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6 Various food tests were conducted on a food sample.

The following are the results:

- blue coloured mixture formed with Biuret test;
- orange precipitate formed with Benedict's test;
- white emulsion formed when mixed with ethanol and water.

Which of the following may be present in the food sample?

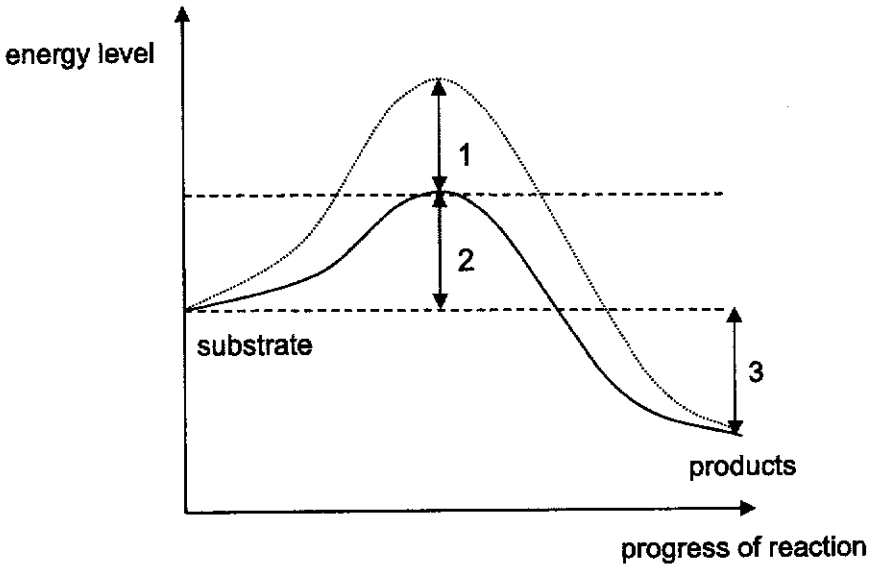
A glucose and protein

B lipids and protein

C lipids and maltose

D protein and maltose

7 The graph below shows the changes in energy levels during the breakdown of a substrate into the products, in the presence and absence of an enzyme.



Which of the following option(s) represent(s) the activation energy of the reaction when the enzyme is present?

A 1 only

B 2 only

C 1 + 2

D 2 + 3

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8 Which are properties of enzymes?

	reusable many times	specific in their action	unaffected by temperature
A	✓	✓	×
B	×	×	×
C	✓	×	✓
D	✓	✓	✓

key
✓ =yes
× = no

9 Which column contains statements that correctly describe sucrose?

property	column **A**	column **B**	column **C**	column **D**
It is not a reducing sugar.	✓	✓	×	×
It is a disaccharide.	×	✓	✓	×
It contains nitrogen.	×	×	✓	✓
The ratio of hydrogen to oxygen is 2:1.	✓	✓	×	✓

key
✓ =yes
× = no

10 Four tubes containing 2 cm^3 of 1% starch solution were treated in different ways and then mixed with pancreatic amylase. After 30 minutes, the contents were tested with iodine solution.

tube	incubated at 35°C	incubated at 80°C	pH at 2.5	pH at 8.0
I	✓		✓	
II	✓			✓
III		✓	✓	
IV		✓		✓

Which tube(s) will turn blue black?

A I only
B II only
C II, III and IV only
D I, III and IV only

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11 In order to compare the amounts of fat in four different food samples of equal volume, a student added an equal amount of lipase to each food sample. After an hour, the pH of the mixture was measured and recorded in a table shown below.

If the food samples had similar pH at the start of the experiment, which food samples contained the highest amount of fat?

food sample	pH
A	5.8
B	6.3
C	7.0
D	8.5

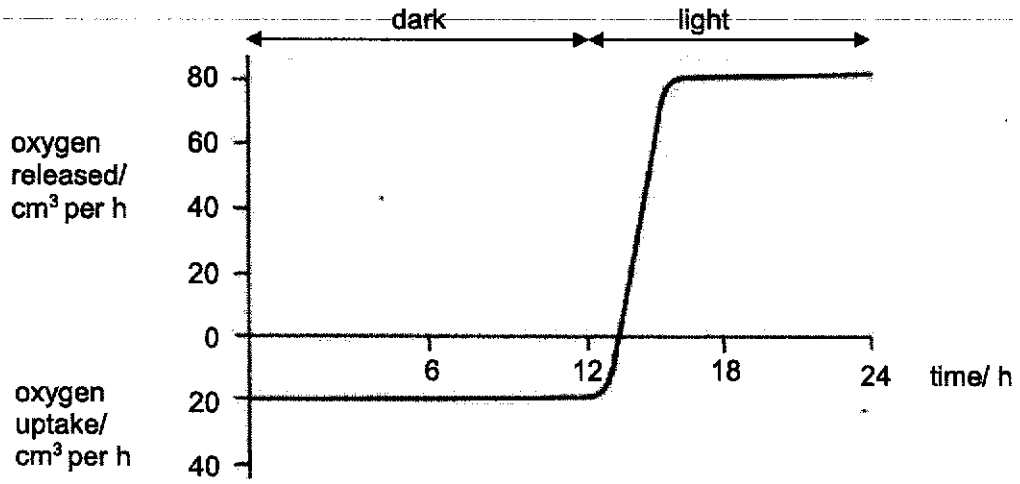
12 In which of the following organ(s) do(es) peristalsis occur?

I duodenum
II ileum
III large intestines
IV oesophagus
V stomach

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

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For questions **13** and **14**, refer to the graph below.
Plants were kept in a dark room for 12 hours followed by 12 hours of exposure to sunlight.
The rates of oxygen release and uptake were recorded and the results are shown in the graph below.



13 Which of the following correctly describes the duration of photosynthesis and respiration?

	duration / hours	
	photosynthesis	respiration
A	6	6
B	6	12
C	12	12
D	12	24

14 Which of the following is the closest estimate of total volume of oxygen used for respiration by the plant during the 24 hour period?

A 240 cm^3

B 480 cm^3

C 720 cm^3

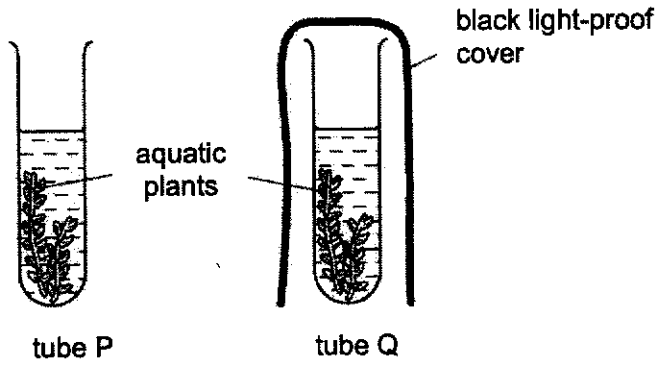
D 1 440 cm^3

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15 Two test-tubes, P and Q, were set up, each containing a solution of red hydrogencarbonate indicator. Hydrogencarbonate indicator turns yellow when the carbon dioxide concentration increases and turns purple when the carbon dioxide concentration decreases.

Similar pieces of the same aquatic plant were placed into tubes P and Q. Tube P was uncovered, tube Q had a black light-proof cover. The tubes were left in a warm room in sunlight for four hours.

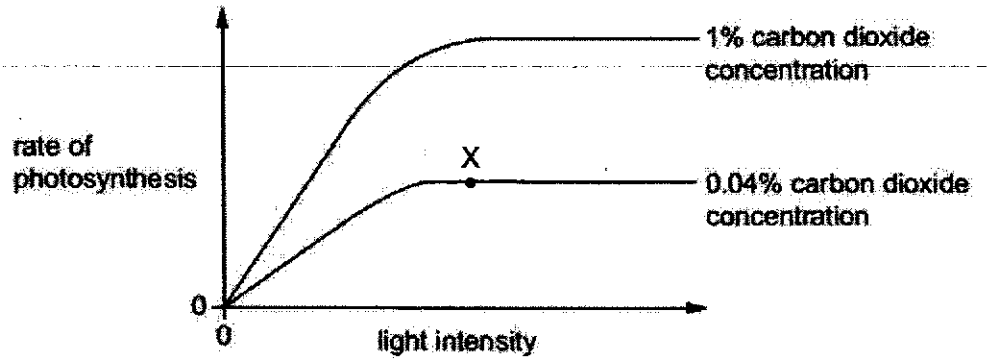


What would be the colour of the hydrogencarbonate indicator in the two tubes after four hours?

	tube P	tube Q
A	purple	red
B	purple	yellow
C	red	yellow
D	yellow	red

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16 The graph shows how the rate of photosynthesis of a plant varies with light intensity at two different carbon dioxide concentrations. The temperature is kept constant at 20 °C.



Which factor is limiting the rate of photosynthesis at point X?

A availability of chlorophyll

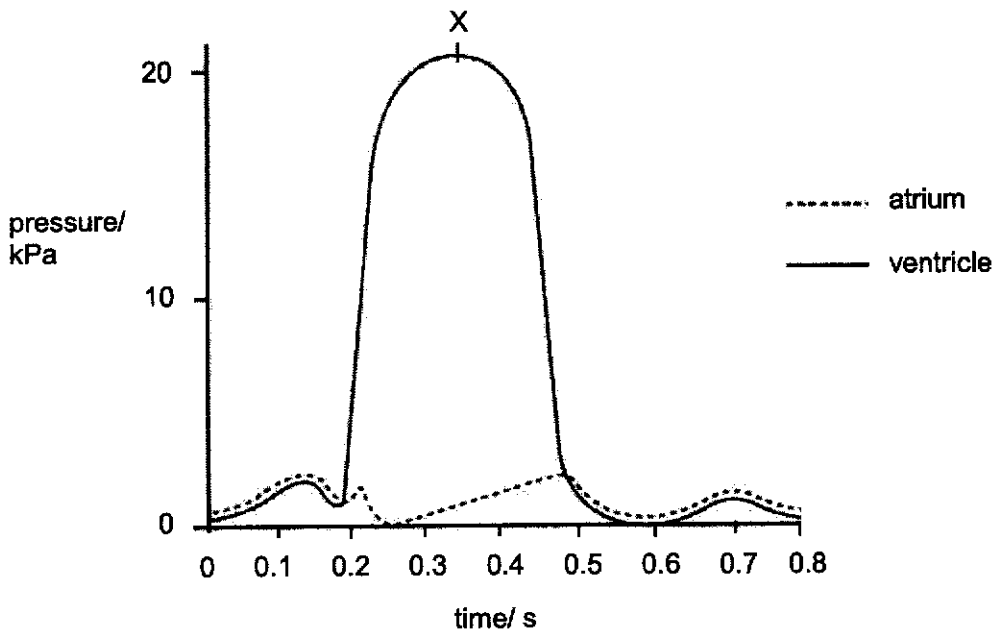
B availability of water

C concentration of carbon dioxide

D intensity of light

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For questions **17** and **18**, refer to the graph which shows pressure changes in the left atrium and in the left ventricle during one heartbeat measured in a man.



17 What is the state of the valves in the heart at X?

	left atrio-ventricular valve (bicuspid)	semi-lunar valve (in aorta)
A	closed	closed
B	closed	open
C	open	closed
D	open	open

18 What is the heart rate of the man?

A 75 beats per minute

B 80 beats per minute

C 100 beats per minute

D 120 beats per minute

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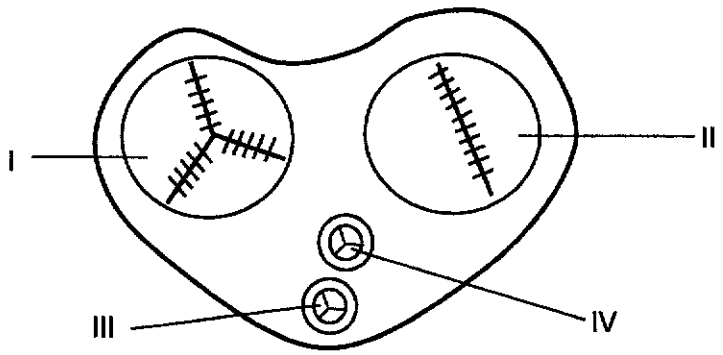
19 The table below shows the contents of the blood samples taken from three different veins found in a human body.

	vein 1	vein 2	vein 3
oxygen/ arbitrary units	95	78	85
carbon dioxide/ arbitrary units	30	50	45
urea/ %	2.5	1.3	5.5

Which of the following shows the correct identities of these veins?

	vein 1	vein 2	vein 3
A	hepatic vein	pulmonary vein	vena cava
B	vena cava	pulmonary vein	hepatic vein
C	pulmonary vein	hepatic vein	vena cava
D	pulmonary vein	vena cava	hepatic vein

20 The diagram below shows the transverse section of a mammalian heart.



Which valve(s) produces a 'dub' sound during ventricular diastole?

A I only

B I and II only

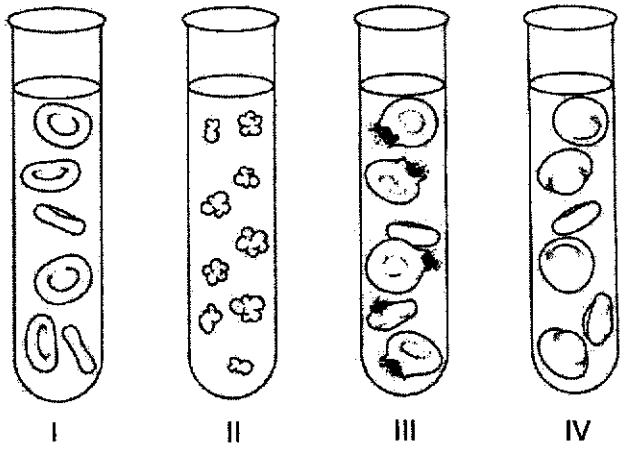
C II and IV only

D III and IV only

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21 The diagram shows red blood cells in four different liquids I, II, III and IV.



Which of the following shows the liquids in order of **decreasing** water potential?

A II, IV, I, III

B II, I, IV, III

C III, II, IV, I

D III, IV, I, II

22 A patient, with blood type B, just lost a lot of blood in an accident and a blood transfusion is needed.

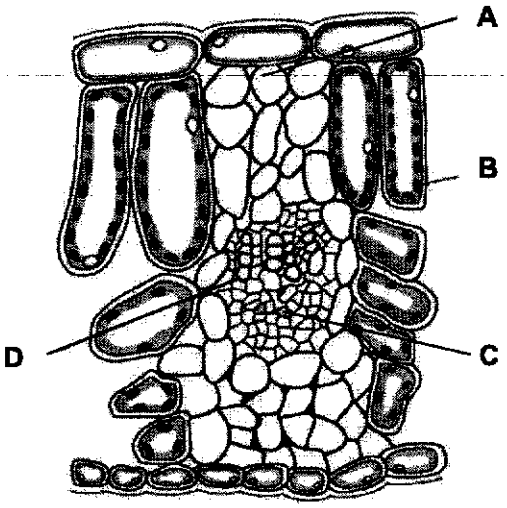
Which of the following is correct?

	patient's blood antibody	possible blood groups patient can receive
A	a	O only
B	b	O only
C	a	B or O
D	b	B or O

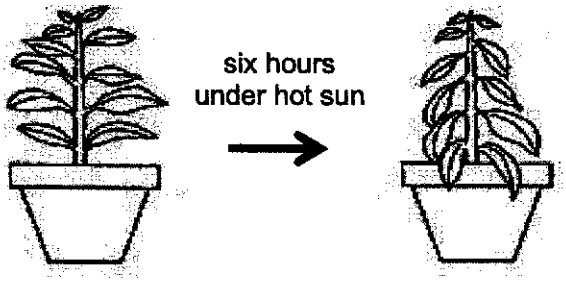
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23 The diagram shows cells from a plant leaf.

Which structure contains a high concentration of nitrates?



24 A plant is left in the hot sun for six hours.



Which of the following conditions would **not** occur in the plant as a result of the above phenomenon?

A The amount of water lost in transpiration decreases.

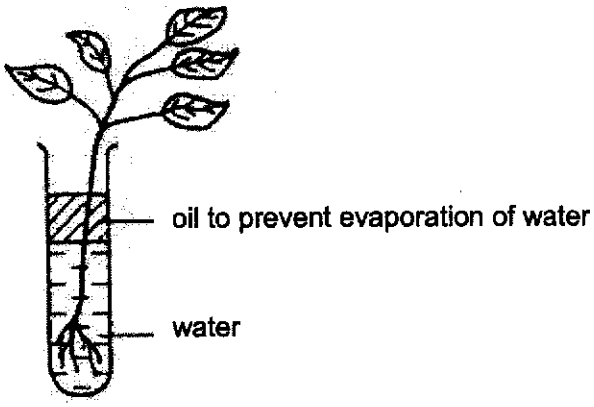
B The cell sap of the plant cells become less concentrated.

C The guard cells become flaccid and the stomata close.

D The rate of photosynthesis decreases.

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25 Four similar plants were placed in test-tubes as shown in the diagram below.



The leaves of each plant were treated with Vaseline as follows:
both leaf surfaces coated with Vaseline;
lower leaf surfaces coated;
upper leaf surfaces coated;
all leaves not coated.

Each plant was weighed in its test-tube at the start of the experiment and again two days later. The results are shown in the table below.

	mass/ g			
	plant 1	plant 2	plant 3	plant 4
at the start of experiment	109	110	107	113
after two days	105	98	85	107

Which of the plants had their lower leaf surfaces coated with vaseline?

A plant 1

B plant 2

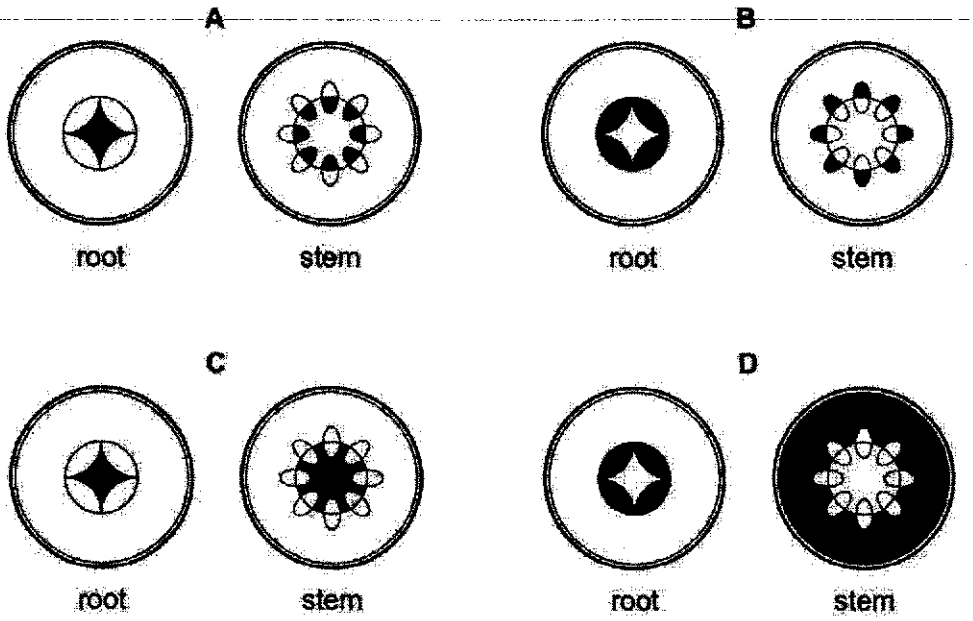
C plant 3

D plant 4

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26 A plant was placed in water containing black dye. After 24 hours the plant was removed and sections were taken from the root and the stem.

Which diagram shows the results?



27 Which process does **not** utilise energy?

A active uptake of potassium ions
B cellular division and growth
C cellular respiration
D contraction of arm muscles

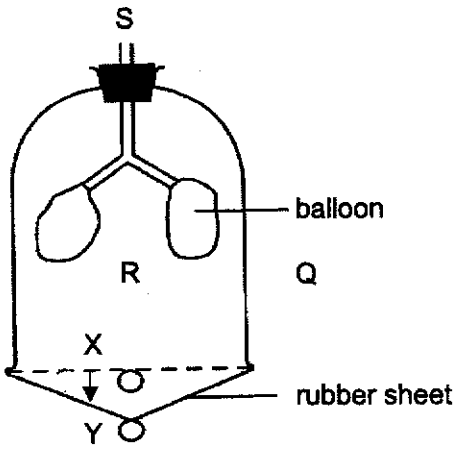
28 Which of the following represents the reaction for carbonic anhydrase at the lungs?

A $H^+ + HCO_3^- \rightarrow H_2CO_3$
B $H_2CO_3 \rightarrow H^+ + HCO_3^-$
C $H_2O + CO_2 \rightarrow H_2CO_3$
D $H_2CO_3 \rightarrow H_2O + CO_2$

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29 The diagram represents the apparatus used to demonstrate the action of the diaphragm in the human respiratory system.



Which of the following will occur if the rubber sheet moves from X to Y?

A The pressure at Q becomes higher than R.

B The pressure at R becomes higher than Q.

C Air will leave the bell jar through S.

D The volume inside the balloons will decrease

30 How does tar in cigarette smoke increase health risk?

A by increasing build-up of fatty deposits on inner arterial wall

B by increasing the risk of blood clotting

C by paralysing cilia lining of the air passages

D by stimulating the release of adrenaline

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KRANJI SECONDARY SCHOOL

END-OF-YEAR EXAMINATION 2019
BIOLOGY (6093)

Booklet B

Level : Secondary Three

Date : 8 October 2019

Stream : Express

Duration : 2 hours 15 mins

Name : _____ ( )

Marks Obtained: _____ / 100

Class : _____

INSTRUCTIONS TO CANDIDATES

1. Booklet **B** consists of two section **B** and **C**. Answer **all** questions.
2. For Section **B**, write your answers in the spaces provided.
3. For Section **C**, write your answers on the writing paper and graph paper provided. Tie the writing paper and graph paper together.

   Use of scientific calculator is allowed. Omission of essential working may result in loss of marks.
4. Leave all calculated answers to 2 decimal places (if any).

Booklet B	Marks
Section B	
Section C	
Total	/ 70

Set by: _____

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Section B: Structured Questions (40 marks)
Answer the following questions in the spaces provided.

1 Fig. 1.1 shows a mucus-secreting cell **X** found in the lining of a stomach.

Cell **X** produces and secrete mucin, a protein component of mucus.

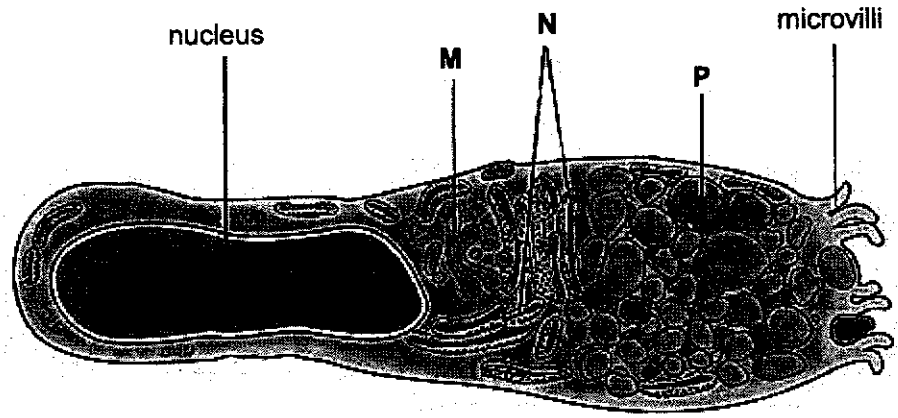


Fig. 1.1

(a) Identify organelles **M**, **N** and **P**.

M: .....

N: .....

P: ..... [3]

(b) With reference to organelles **M**, **N** and **P**, describe how mucin is produced and secreted out of cell **X**.

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.....[3]

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(c) Similar structures found in different regions of the body may have different functions.

Microvilli can also be found in the small intestine.

Suggest one functional similarity and difference between the microvilli found in the small intestine and cell **X**.

similarity:.....

.....[1]

difference:.....

.....[1]

2 The enzyme tyrosine kinase is found in human cells. Tyrosine kinase can exist in an inactive and active form as shown in Fig 2.1.

Inactive tyrosine kinase is active with the addition of a phosphate to enable it to perform its function.

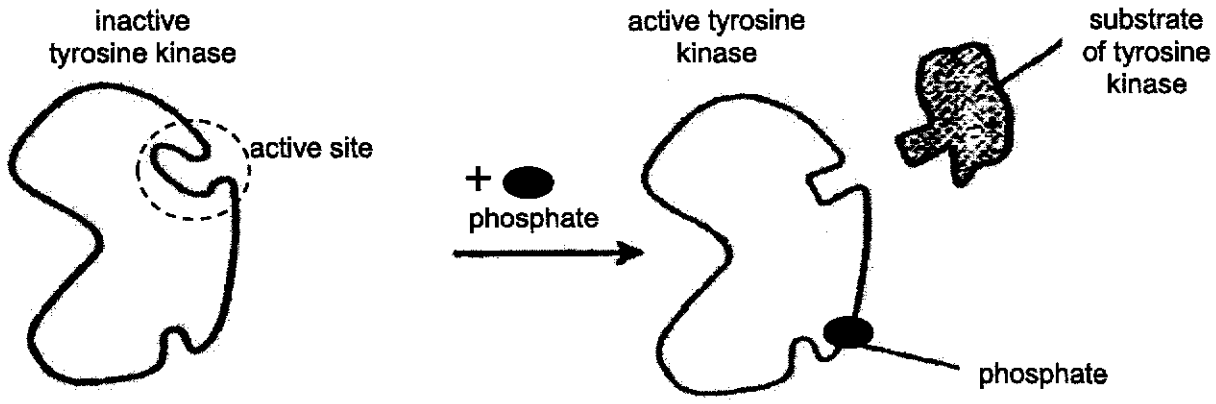


Fig. 2.1

Based on Fig 2.1, use a lock-and-key hypothesis to explain how the addition of a phosphate group enables tyrosine kinase to function.

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3 Fig. 3.1 shows a plant which grows in well-watered soil in the shade.

Plants are usually dug up and transplanted with its roots and the surrounding soil.

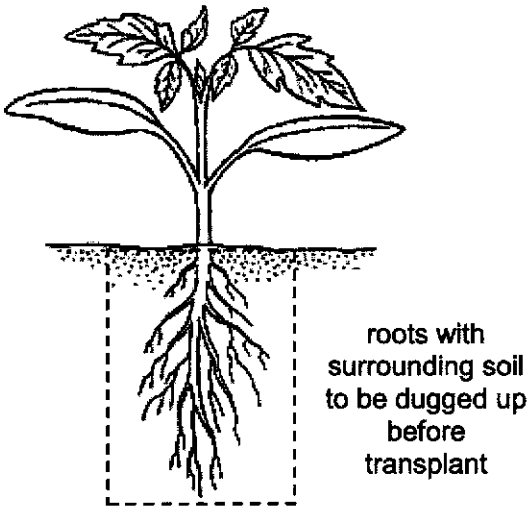


Fig 3.1

An unskilled farmer pulled the plant by its stem directly from the ground before being transplanted in another area of well-watered soil in the shade.

(a) Suggest and explain why the plant wilted for the first several days after being transplanted by the unskilled farmer.

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(b) **(i)** Potassium ions are mineral salts important for protein synthesis.

Describe the processes involved in the uptake of potassium ions from the soil and the pathway it takes to reach the leaves of the plant.

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.....[3]

(ii) The roots of the plant can take in oxygen from the air spaces between the soil particles. In a waterlogged soil condition, excessive amount of water expels air from the spaces between the soil particles.

Explain how the rate of potassium ion uptake by the roots will be affected in a waterlogged soil condition.

.....

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.....[2]

(c) Fig. 3.2 shows the outline of a root hair cell.

Complete the root hair cell of a plant which has not been watered for several days in the space below.
Label only the cell wall, cell membrane and the cytoplasm. [2]

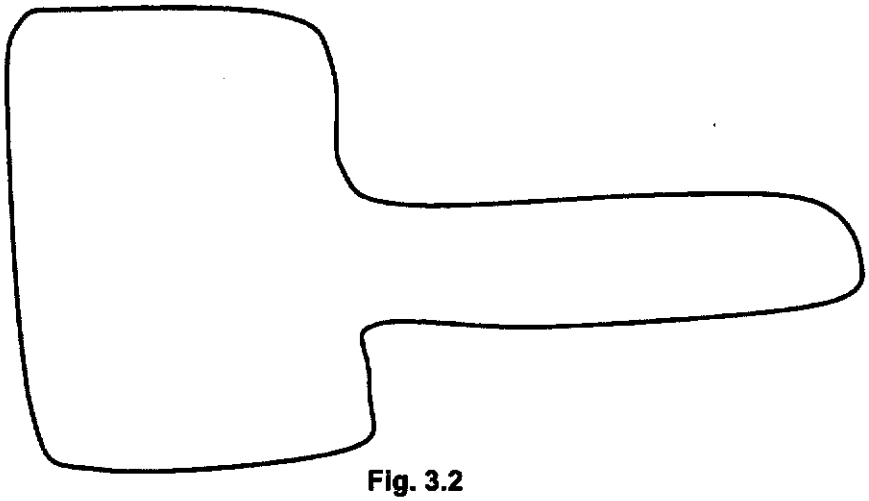


Fig. 3.2

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4 Table. 4.1 shows changes in concentration of oxygen in the air around a plant between 0800 hrs to 1600 hrs.

time/ hrs	0800	1000	1200	1400	1600
oxygen concentration/ percentage by volume	0.16	0.21	0.26	0.32	0.28

Table 4.1

(a) Describe and explain the change in oxygen concentration in the air around the plant as the day progresses from 0800 to 1400 hrs. Include a word equation in your answer.

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.....[4]

(b) State and describe a food test that can be used to show the presence of the nutrient produced during photosynthesis.

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.....[3]

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5 Fig 5.1 shows the rates of transpiration from leaves of two species of green plant kept under identical environmental conditions from 0800 hrs to 1400 hrs.

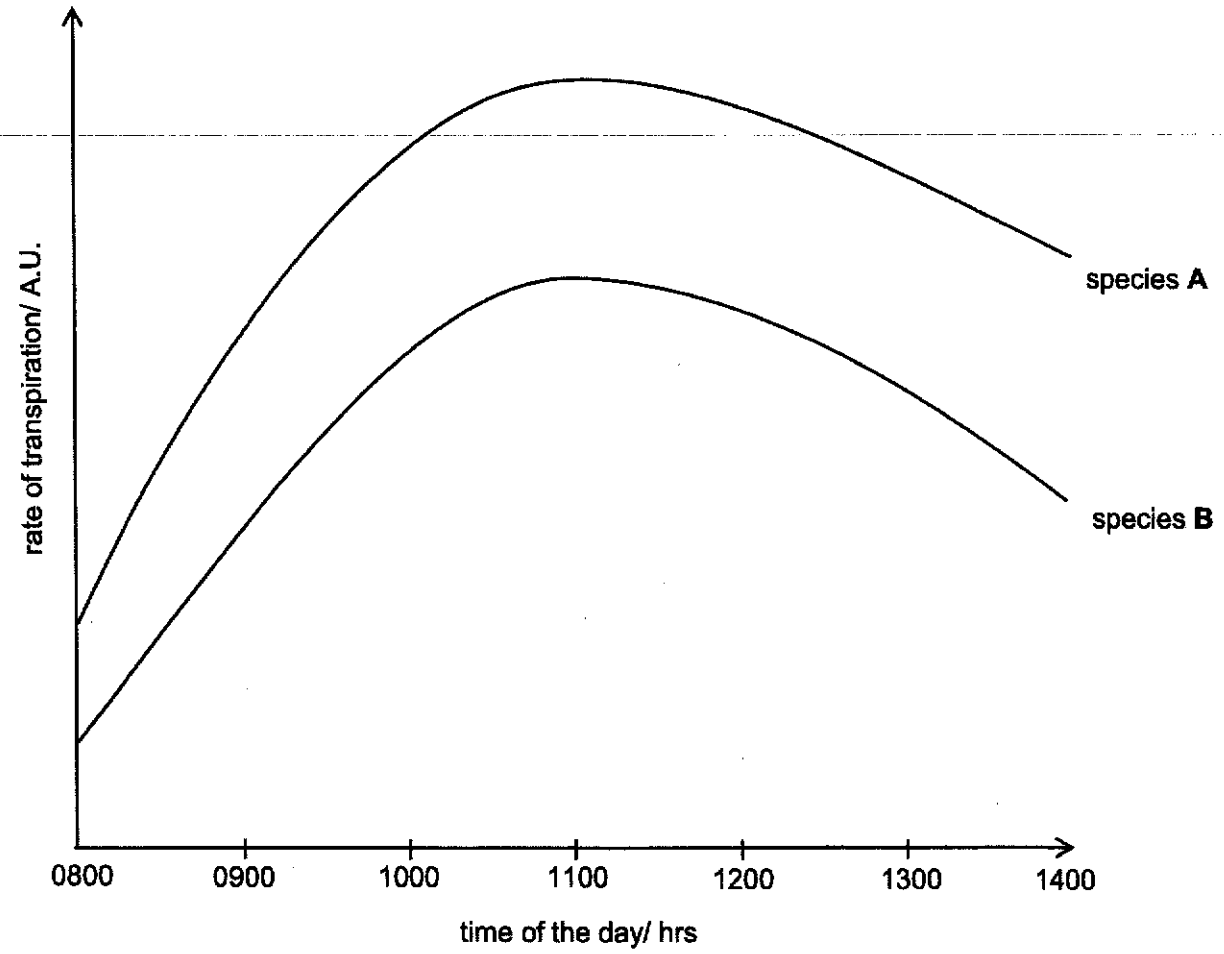


Fig. 5.1

(a) Define the term 'transpiration'.

.....

.....[1]

(b) Suggest an explanation for the difference in transpiration rate between species **A** and species **B**.

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.....[1]

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(c) Suggest and explain an environmental condition which may have caused a drop in the rate of transpiration from 1100 hrs to 1400hrs.

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(d) Fig. 5.2 shows the cross-section of a leaf taken from plant species **A**.

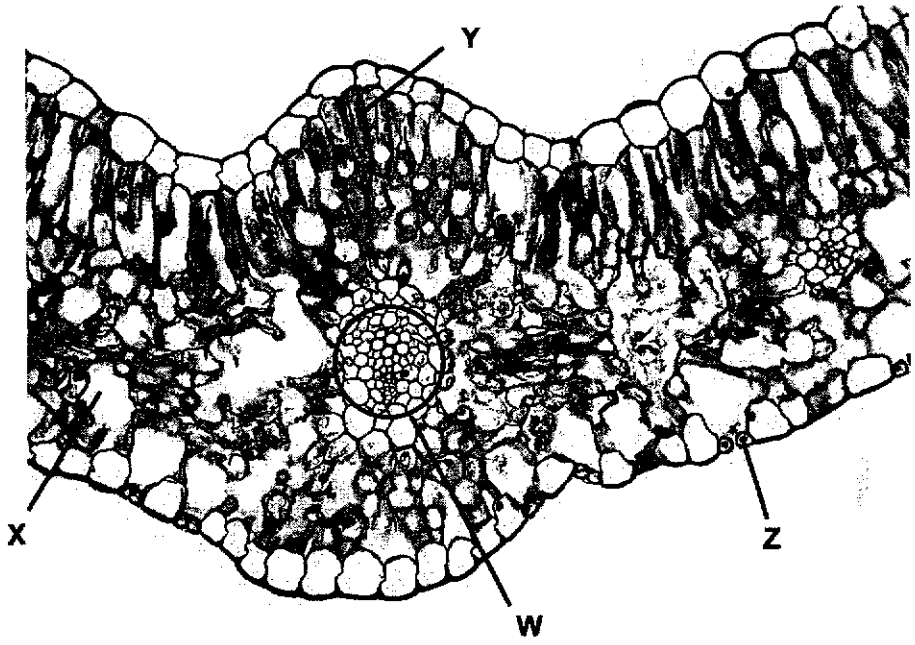


Fig. 5.2

Label the parts **W**, **X**, **Y** and **Z**.

W: ..... **X** : .....

Y: ..... **Z** : .....

[2]

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6 Fig. 6.1 shows changes in the volume of air in a person's lungs during breathing.

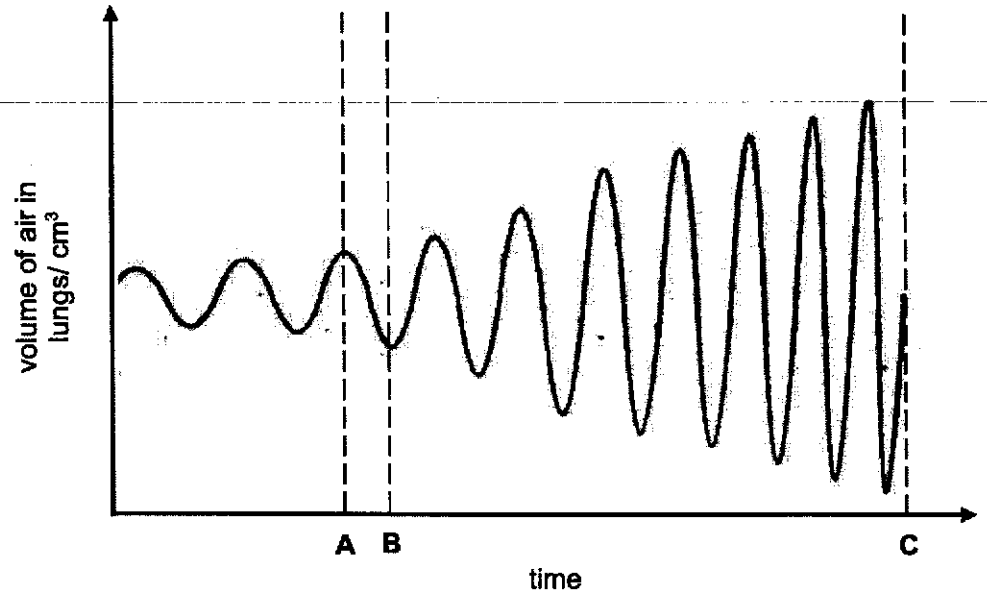


Fig. 6.1

(a) Explain the role of the diaphragm and the intercostal muscles to effect a change in volume of air in the lungs from times **A** to **B**.

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.....[4]

(b) Suggest one cause of the change in the person's breathing from times **B** to **C**.

.....[1]

(c) Name one adaptation of the alveolus to allow rapid exchange of gases between air in the alveoli and the blood capillaries surrounding them.

.....

.....[1]

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Section C: Free Response Questions (30 marks)
Answer all the questions in the writing paper and graph paper provided.

7 Pancreatitis is an inflammation of the pancreas which affects its function. Individuals with pancreatitis frequently lose weight, even when their appetite and eating habits are normal.

Table 7 shows the weight of an individual with pancreatitis over 8 months, from the time of diagnosis.

Table 7

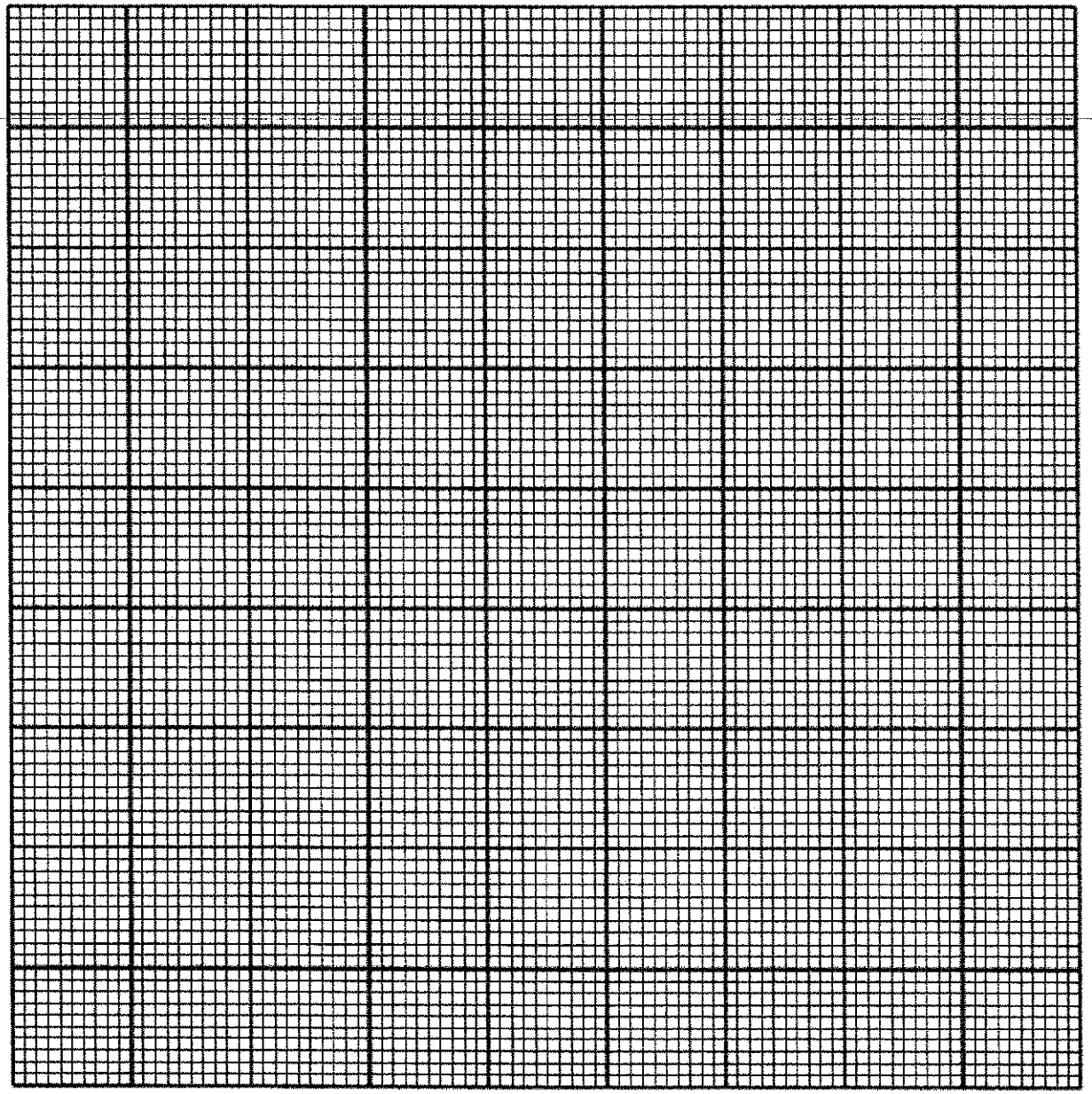
time from diagnosis/ month	weight/ kg
1	79.8
2	71.0
4	66.5
6	64.0
7	63.6
8	63.2

(a) Calculate the percentage weight loss of the individual over 8 months.

percentage weight loss: .....[1]

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(b) On the grids below, plot a graph to show the weight of the individual against time from the point of diagnosis. [4]



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(c) With reference to specific enzymes, substrates and products, suggest how pancreatitis may result in weight loss in an individual.

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.....[4]

(d) Describe one possible effect of pancreatitis on blood sugar regulation.

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.....[1]

8 (a) Warfarin is anticoagulant drug which is commonly used to prevent the formation of blood clots, reducing the risk of a heart attack or deep vein thrombosis.

(i) Describe how a blood clot is formed at the site of an open wound.

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.....[4]

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(ii) Explain why blood clots may increase the risk of a heart attack.

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.....[2]

(b) Warfarin is anticoagulant drug which is commonly used to prevent the formation of blood clots, reducing the risk of a heart attack or deep vein thrombosis.

Fig. 8.1 shows the relationship between the use of warfarin and amount of vitamin K in the body. Fig. 8.2 shows how vitamin K affects the synthesis of prothrombin in the body.

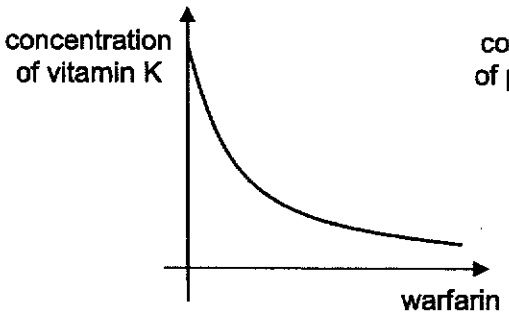


Fig 8.1

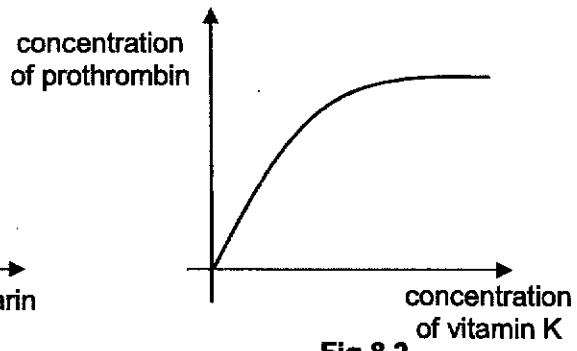


Fig 8.2

(i) Using Fig 8.1, state the effect of the use of warfarin on the concentration of vitamin K in the body.

.....

.....[1]

(ii) Hence, use Fig 8.2 and your answer in **(iii)** to suggest how warfarin may affect blood clotting.

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.....[1]

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(c) Explain how blood entering the vena cava is pumped to the lungs.

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.....[4]

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9 Blood samples were taken from an athlete's finger before, during and after vigorous exercise and was tested for lactic acid.

The results of the test of lactic acid are shown in Fig. 9.1.

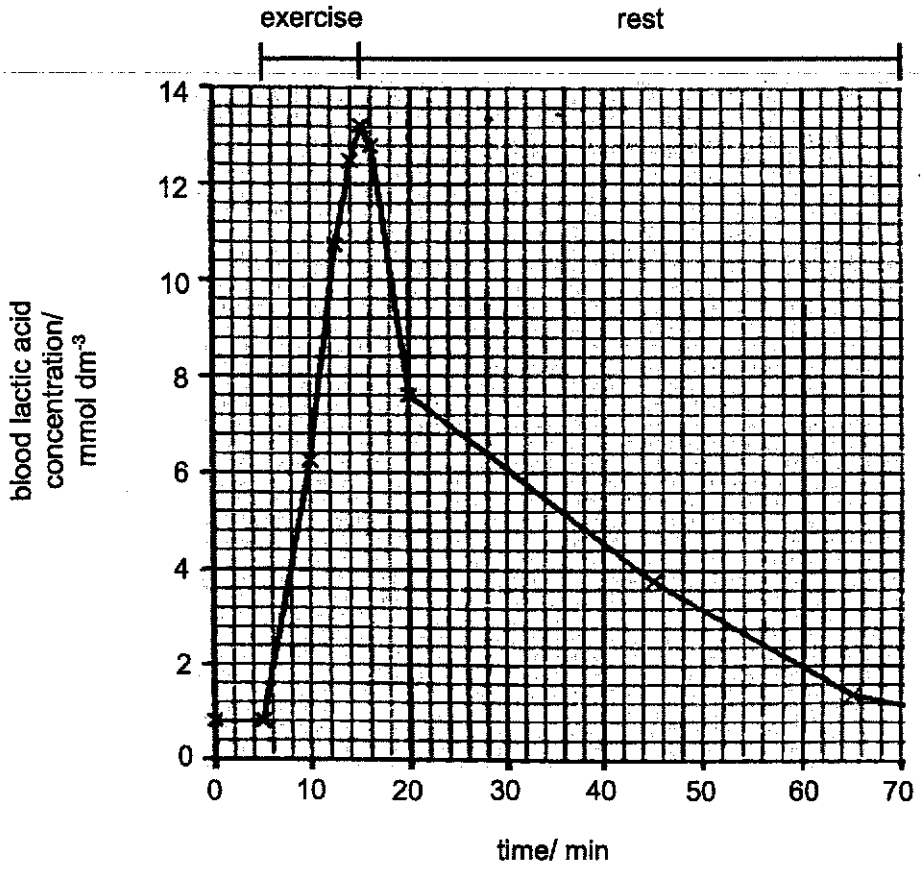


Fig. 9.1

(a) With reference to Fig. 9.1, describe how blood lactic acid concentration changes from the start of vigorous exercise until the 60-minute mark.

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.....[3]

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(b) Explain the changes in blood lactic acid concentration during and after exercise.

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.....[3]

END OF BOOKLET

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Kranji Secondary School
End-of-Year 2019
3 Exp Biology_**Answer Key**

Section A (30 marks)

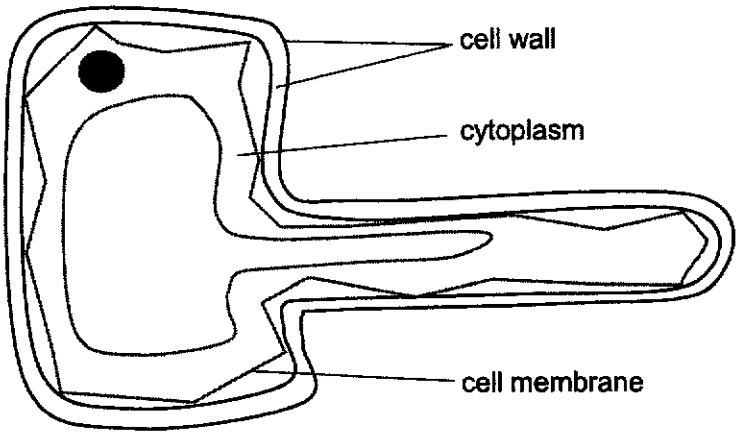
1	**C**	21	**D**
2	**B**	22	**C**
3	**B**	23	**D**
4	**B**	24	**B**
5	**B**	25	**D**
6	**C**	26	**A**
7	**B**	27	**C**
8	**A**	28	**D**
9	**B**	29	**A**
10	**D**	30	**C**
11	**A**		
12	**D**		
13	**D**		
14	**B**		
15	**B**		
16	**C**		
17	**B**		
18	**A**		
19	**D**		
20	**D**		

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Sec 3 Biology
EOY 2019 Section B and C
Suggested Answer Scheme

Qns	Suggested answer	Marks allocated
1(a)	Golgi apparatus / body Rough endoplasmic reticulum (Secretory) vesicle	1 1 1
1(b)	Ribosomes attached on N synthesises protein mucin; Vesicles pinch off N and fuses with M/ Golgi Body, which (chemically) modifies and packages mucin; Secretory vesicles P then pinch off M and **fuses** with cell membrane to release mucin;	1 1 1
1(c)	Microvilli increases surface area to volume ratio for the cell; The microvilli in cell X helps in secretion of mucin while the microvilli in the small intestine helps in the absorption of nutrients.	1 1
	Total	**8**
2	Enzyme **tyrosine kinase** is the **lock** while the **substrate** is the **key**; With addition of a phosphate group, the active site of the tyrosine kinase is **complementary to the 3D shape** of the substrate/ substrate is able to **fit into the active site**; **Enzyme-substrate complex** can be formed	1 1 1
	Total	**3**
3(a)	The roots were damaged/ xylem vessels are broken/ roots break off; hence rate of water loss is greater than water uptake/ cells become flaccid/ lose turgor pressure and wilt;	1 1
3(b)(i)	Uptake by **diffusion/ active transport** from soil into the **root hair cell;** **Diffuse** into the **inner cortical cells** and reaches the xylem; Transported by the **xylem** and into the leaf cells via diffusion; or Via **transpiration pull** up to the leaves (max 3 marks)	1 1 1
3(b)(ii)	Rate decreases/ Reduce the rate of potassium ion uptake; Less oxygen for respiration/ release energy for active transport.	1 1

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3(c)	**Label** all three parts correctly and clearly (**Reject:** non-plasmolysed version.) **Diagram:** Plasmolysis- shows cell membrane tear away from cell wall.  	1 1
	Total	**9**
4(a)	From 0800 to 1400, net concentration of oxygen in leaves increases by **0.16 A.U or some manipulation of data (Do not just quote!)**; As light intensity increases, rate of photosynthesis increases; hence more oxygen is given out/ released than taken in; **WORD equation** of photosynthesis: Carbon dioxide + water → glucose + oxygen (chlorophyll, light energy on arrows) (**Reject:** Chemical equation)	1 1 1 1
4(b)	**Benedict's test;** Add equal amounts of **benedict's solution** to the food sample containing glucose and **heat** for (5 minutes); If glucose is present, blue solution turns into a **brick-red precipitate**.	1 1 1
	Total	**7**
5(a)	**Transpiration is the loss of water through the stomata as a consequence of gaseous exchange**	1
5(b)	Plant species A has more stomata/ larger leaf surface area/ many leaves/ thicker cuticle than B.	1

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5(c)	A rain could have happened to **increase humidity** in the atmosphere; Concentration gradient **of water vapour in** the atmospheric air and inside the leaf decreases/ **water vapour conc gradient** become less steep/ gentle; **Rate of diffusion of water vapour out of the leaf decreases**, hence less water is loss and rate of transpiration decreases. *Other factors affecting transpiration accepted: Reduced wind speed/ lower temp/ reduce light intentsity (eg. Dark clouds)	1 1 1
5(d)	W: Vascular bundle X: Intercellular air space Y: Palisade mesophyll cell Z: Guard cell	2 (1m for 2 correct)
	Total	**7**
6(a)	External intercostal muscles relaxes, internal intercostal muscles contracts. (**Reject**: Intercoastal) Ribs move downwards and inwards. Diaphragm relaxes and arch upwards/ dome Volume of chest cavity decreases and air pressure increases, air forced out of the lungs.	1 1 1 1
6(b)	Exercise / running / jogging/ jumping rope etc (**Reject:** vigorous activity/ intentionally breathe faster)	1
6(c)	The one cell thick alveolus wall ensures a faster rate of diffusion of gases through it OR A thin film of moisture covers the surface of the alveolus, allowing oxygen to dissolve in it. (Accepted relevant answers: numerous alveoli to increase s.a. to vol. ratio/ short distance between capillary and alveolar wall.)	1
	Total	**6**
7(a)	(79.8 - 63.2/ 79.8) x 100% = 20.8 %	1
7(b)	LU A S – avoid inappropriate scale, eg. 10 squares to 3 units BF	1 1 1 1

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7(c)	A patient with pancreatitis will produce lesser trypsin, pancreatic amylase and pancreatic lipase. To produce maltose, polypeptide and and fatty acids and glycerol Rate of digestion of starch/ protein/ fats in the small intestine will decrease/ Lesser digestion Lesser end-products of digestion/ small digested nutrients will be absorbed/ lesser respiration releasing energy/ large complex molecules cannot be absorbed, resulting in malnutrition. Note: • Trypsin digests protein to polypeptide [1]/ Pancreatic amylase digests starch to maltose [1]/ Pancreatic lipase digests fats to fatty acids and glycerol [1] BUT cap at 2 marks	1 1 1 1
7(d)	Blood glucose concentration remains high/ no change in blood glucose concentration/ production of insulin and glucagon is affected.	1
	Total	**10**
8(a)(i)	Damaged tissue and platelets release thrombokinase; Thrombokinase converts inactive prothrombin to active thrombin; in presence of Ca2+ ions; Thrombin converts soluble fibrinogen into insoluble fibrin threads which form a mesh blood clot	1 1 1 1
8(a)(ii)	Block the flow of blood and oxygen (and glucose) from coronary arteries; to cardiac tissues in causing tissue death/ as respiration cannot take place to release energy for heart to pump blood/ heart cannot pump blood.	1 1
8(a)(iii)	As warfarin increases, vitamin K decreases	1
8(a)(iv)	Less prothrombin can be produced, hence reducing rate of blood clotting	1
8(b)	As right atrium contracts, tricuspid valves forced open as blood flows into right ventricle; As right ventricle contracts, tricuspid valves forced shut; and semi-lunar valves in pulmonary artery are forced open; Semi-lunar valves forced shut to prevent backflow of blood **Note:** • Must mention ventricle/ atrium contract	1 1 1 1

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	• Deduct 1 mark overall for no mention of 'forced' open/shut at least once • Note: vena cava/vessels DO NOT pump blood	
	Total	**12**
9(a)	During exercise, blood lactic acid concentration increases by 12.4 mmol dm^{-3} During rest, blood lactic acid concentration decreases steeply by 5.6 mmol dm^{-3} Then decreases gradually by 5.6 mmol dm^{-3} **Note:** • Quotation of data – "0.8 to 13.2 mmol dm^{-3}"/ 13.2 to 7.6 mmol dm^{-3}/ 7.6 to 2 mmol dm^{-3}), but deduct 1 mark overall for no manipulation of data	1 1 1
9(b)	During vigorous exercise, muscles carry out anaerobic respiration to release more energy; Equation of anaerobic respiration/ release small amounts of energy and lactic acid from glucose Oxygen debt occurs; During rest, lactic acid is transported to the liver; Some lactic acid is oxidised to release energy; Energy is used to convert lactic acid to glucose; **Note:** • Lactic acid is converted to glucose – [1]	1 1 1 1 1 1
	Total	**8**

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