Geylang Methodist School (Secondary)
End-of-Year Examination 2019

SCIENCE (CHEMISTRY/ BIOLOGY) **5078/01**
Paper 1 **3 Express**

Additional materials: Optical Answer Sheet **45 minutes**

10 October 2019

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid on the Optical Answer Sheet.

Write your name, class and index number on the Optical Answer Sheet provided.

There are **thirty** questions in this paper. Answer **all** the 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.

Read the instructions on the answer sheet very carefully.

Each correct answer will score one mark. No mark will be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page ___.

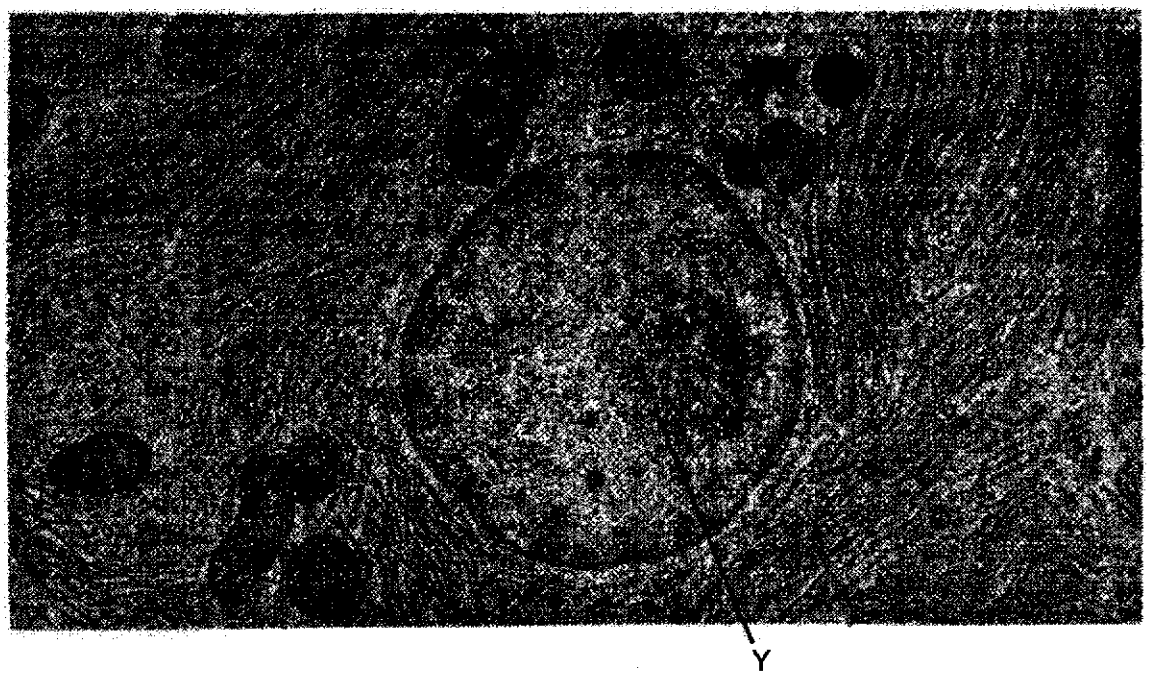
This document consists of 9 printed pages and 1 blank page.

[Turn over]

partnerInLearning
More papers at www.testpapersfree.com

Downloaded from SingaKids.com

16 The diagram shows an electron micrograph of parts of a cell.



Which statement does **not** describe the function of Y?

A regulating cell division
B regulating cell growth
C storage of cell's genetic material
D synthesizing proteins

17 Which line in the table correctly identifies the following components?

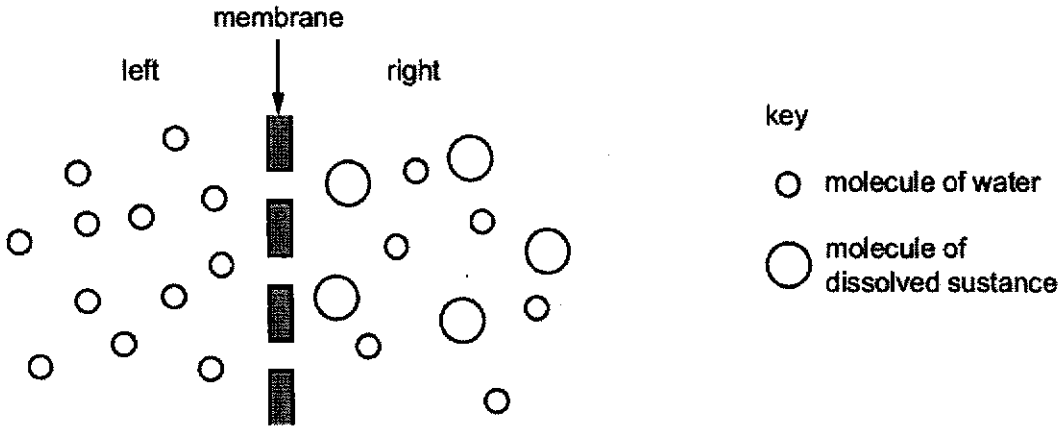
1. heart, blood and blood vessels
2. cardiac muscles
3. liver
4. lymphocyte

	cell	tissue	organ	organ system
A	2	3	4	1
B	2	4	1	3
C	4	2	1	3
D	4	2	3	1

partnerInLearning
More papers at www.testpapersfree.com

Downloaded from SingaKids.com

18 The diagram represents two liquids, separated by a membrane through which osmosis can occur.

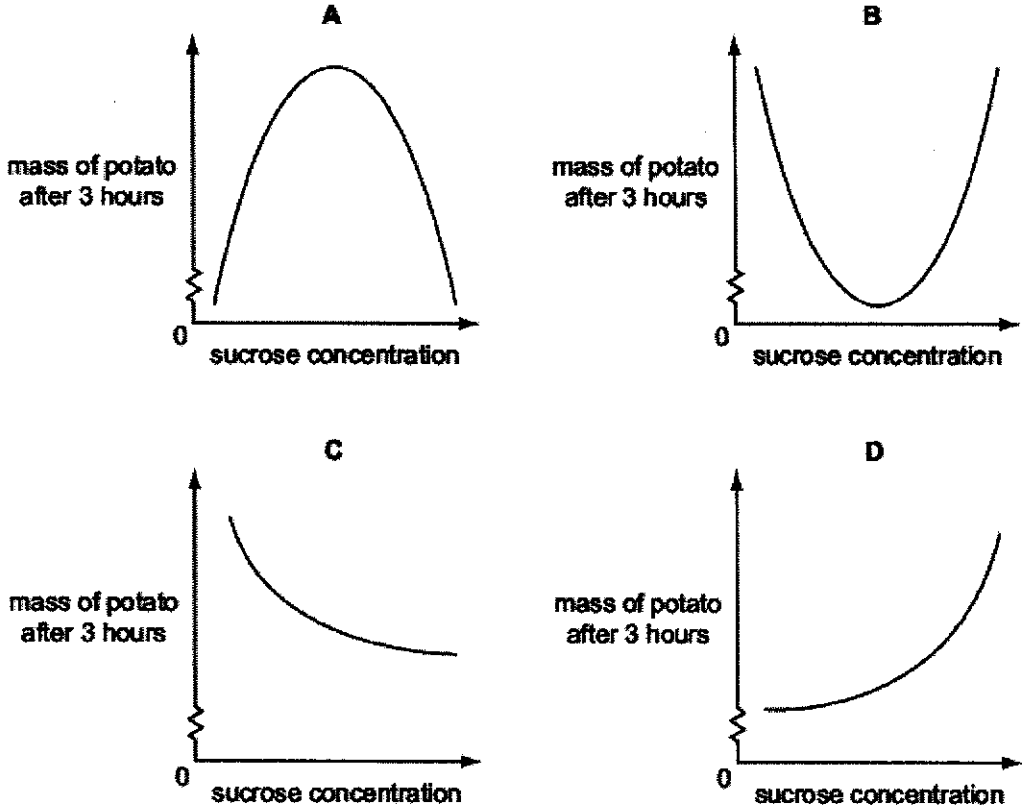


Which statement describes how the molecules will move?

A Molecules of dissolved substance move from left to right.
B Molecules of dissolved substance move from right to left.
C Overall, water molecules move from left to right.
D Overall, water molecules move from right to left.

19 Identical pieces of potato are placed in sucrose solutions of different concentrations. After three hours, the mass of each potato piece is measured.

Which graph shows the results of this experiment?



More papers at www.testpapersfree.com
Downloaded from SingaKids.com

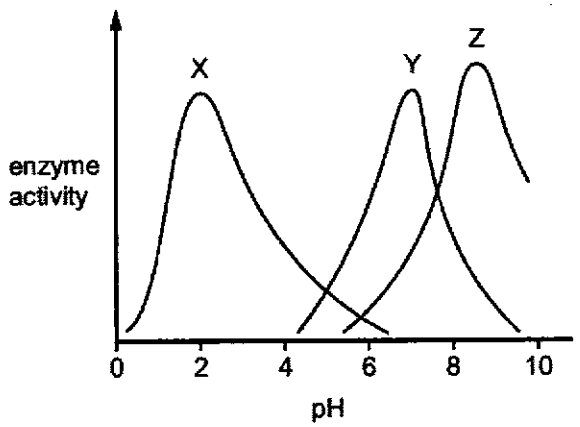
20 Two samples of a human enzyme were used in an experiment. Before they were used

- sample X was heated to 80 °C and then cooled to 37 °C,
- sample Y was cooled to 0 °C and then heated to 37 °C.

How will this affect their activity?

A Sample X and sample Y are no longer active.
B Sample X and sample Y will be equally active.
C Sample X will be more active than sample Y.
D Sample Y will be more active than sample X.

21 The graph shows the effect of pH on the activity of three different enzymes.



The table shows the pH of different parts of the alimentary canal.

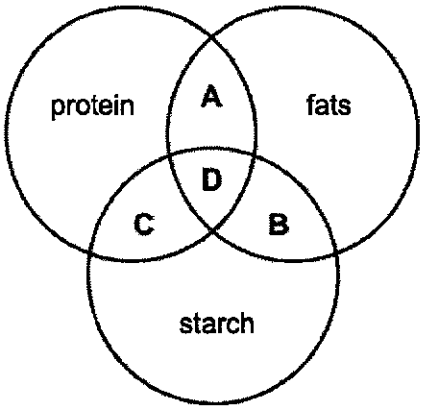
part of the alimentary canal	pH
mouth	7.0
stomach	2.0
small intestine	8.5

Which enzymes in the graph are likely to be protease enzymes?

A X, Y and Z **B** X and Z only **C** Y and Z only **D** Z only

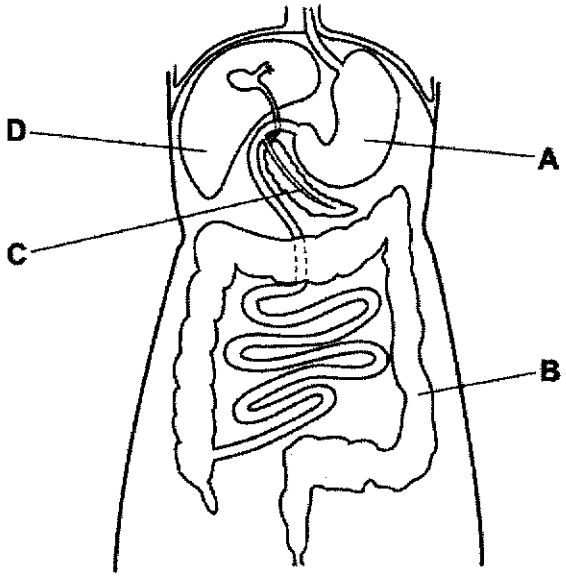
Downloaded from SingaKids.com

22 The diagram refers to the different types of food required by the human body.



Which area would consist of only carbon, hydrogen and oxygen?

23 The diagram shows some organs in the human body.



In which part are amino acids broken down to form urea?

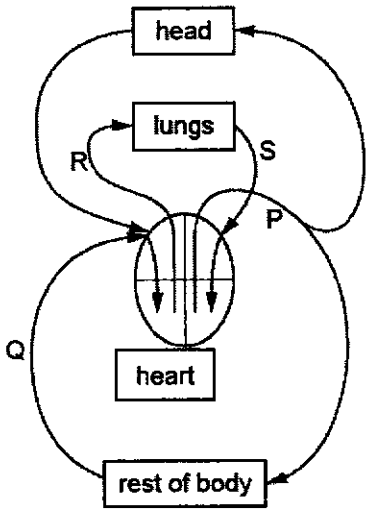
24 A person has a blockage in his bile duct.

What will be a result of this?

A increased concentration of glucose in the blood
B increased concentration of urea in the blood
C slower digestion of fats
D slower digestion of starch

More papers at www.testpapersfree.com
Downloaded from SingaKids.com

25 The diagram represents the heart and some major blood vessels.

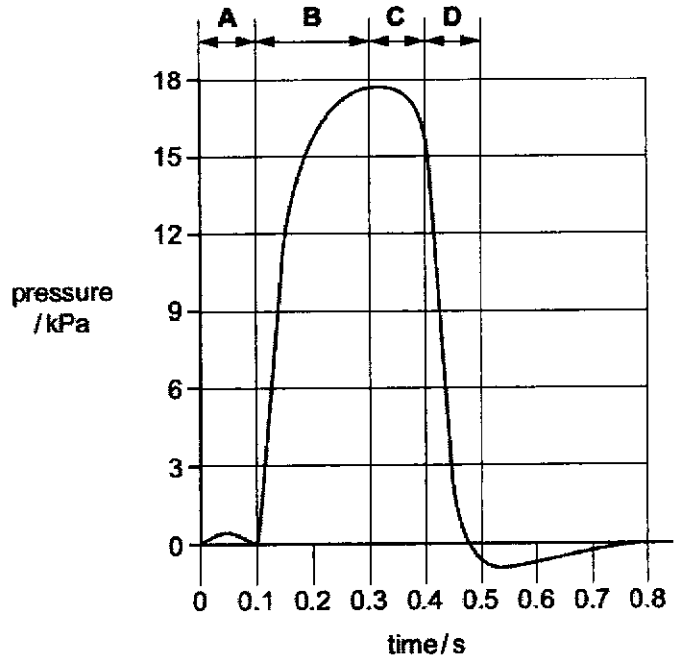


What are possible blood pressures (in kPa) for the vessels shown on the diagram?

	P	Q	R	S
A	1	4	2	16
B	4	16	2	1
C	16	2	4	1
D	16	4	1	2

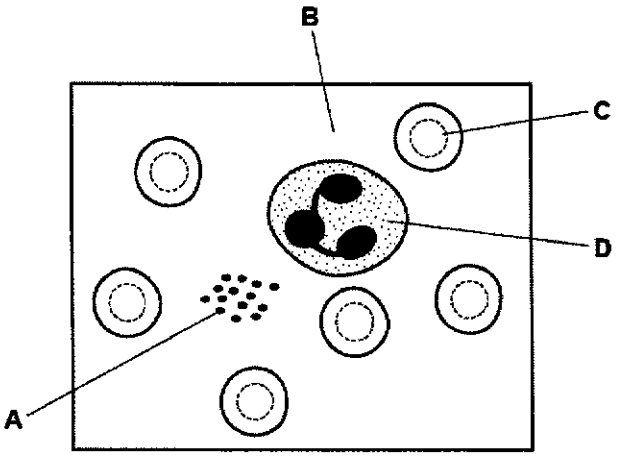
26 The graph shows changes in the blood pressure in the left ventricle of the heart.

During which period is the left **atrium** contracting?



Downloaded from SingaKids.com

27 The diagram shows human blood as seen through a light microscope.

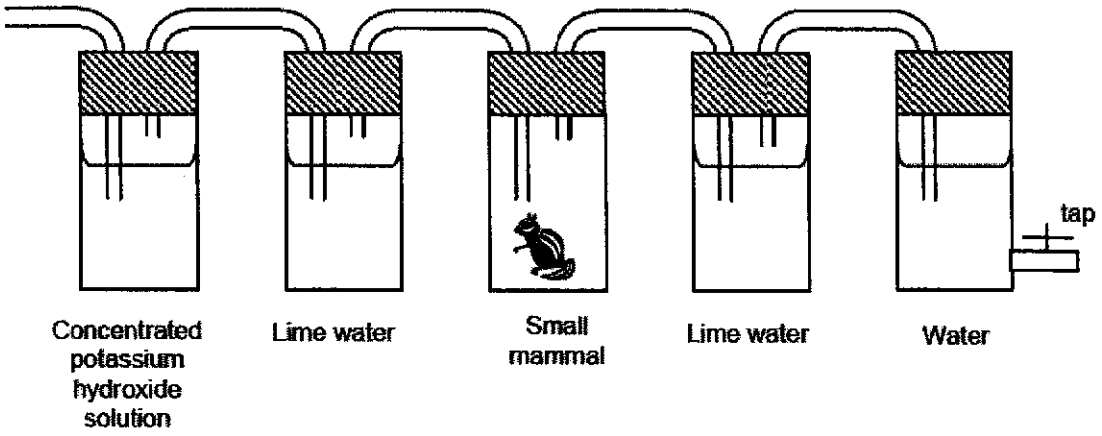


Which component of the blood will **not** function properly if a person's diet lacks iron?

28 What is the role of cilia in the respiratory system?

A They increase the surface area for gaseous exchange.
B They move air down the trachea.
C They move mucus up the trachea.
D They trap dust and bacteria.

29 The diagram shows an experiment in progress.



What conclusion can be drawn from this experiment?

A Carbon dioxide is present in the atmosphere.
B The small mammal releases carbon dioxide.
C The small mammal releases energy in the form of heat.
D Oxygen is absorbed to support the metabolic activities of the small mammal.

Downloaded from SingaKids.com

30 What path does oxygen take as it enters the human body?

A bronchiole → bronchus → larynx → trachea → alveoli
B bronchus → bronchiole → trachea → larynx → alveoli
C trachea → bronchiole → bronchus → alveoli → blood capillary
D trachea → bronchus → bronchiole → alveoli → blood capillary

END OF PAPER

partnerInLearning
More papers at www.bestpapersfree.com

Downloaded from SingaKids.com

Geylang Methodist School (Secondary)
End-of-Year Examination 2019

Candidate Name

Class | Index Number

SCIENCE **5078/04**

PAPER 4 BIOLOGY

Sec 3 Express

Additional materials : Writing paper **1 hour**

8 Oct 2019

READ THESE INSTRUCTIONS FIRST

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

Section A (35 marks)
Answer **all** the questions.
Write your answers in the spaces provided on the question paper.

Section B (20 marks)
Answer **all** the questions.
Write your answers on in the spaces provided on the question paper.

At the end of the examination, hand in your question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

For Markers' Use	
Section A	/35
Section B	/20
TOTAL	/55

This question paper consists of **11** printed pages and **1** blank page.

[Turn over]

partnerInLearning
More papers at www.testpapersfree.com

Downloaded from SingaKids.com

Section A

Answer **all** the questions in the spaces provided.

1 *Androstenol,* is a sex pheromone secreted by male insects to attract the female for mating purposes.

The rate of diffusion of this chemical may affect the insect's ability to attract the female. Fig. 1.1 shows an apparatus that was used to investigate the effect of concentration of androstenol on the rate of diffusion.

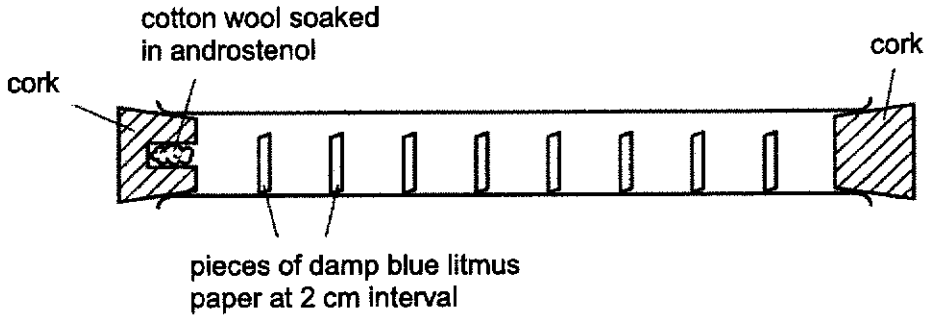


Fig. 1.1

As androstenol diffused along the tube, the pieces of blue litmus paper turned red. Two different samples of androstenol, **A** and **B**, were used in this apparatus. The two samples had different concentrations. The results are shown in Fig. 1.2.

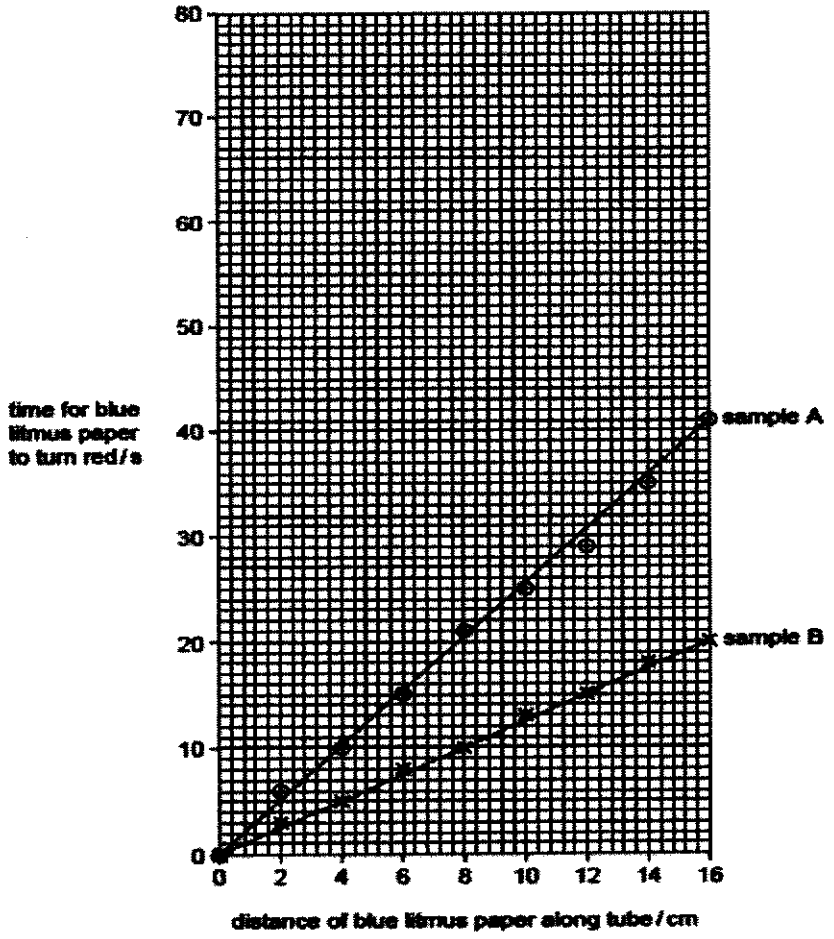


Fig. 1.2

partnerInLearning
More papers at www.bestpapersfree.com

Downloaded from SingaKids.com

Table 1.1 shows the results for a third sample, **C**, of androstenol.

Table 1.1

distance of blue litmus paper along tube / cm	time for blue litmus paper to turn red / s
2	9
4	18
6	28
8	36
10	45
12	54
14	63
16	72

(a) Plot the results shown in Table 1.1 on the grid, Fig. 1.2, on page 2. Draw a best fit line. [2]

(b) State which sample of androstenol, **A**, **B** or **C**, took the longest time to travel 8 cm along the tube.

_____ [1]

(c) State and explain which sample of androstenol was the most concentrated.

_____

_____

_____

_____ [2]

partnerInLearning

More papers at www.testpapersfree.com

Downloaded from SingaKids.com

2 Fig. 2.1 shows a specialised white blood cell of the immune system, used for ingesting foreign substances found in the epidermis of the skin.

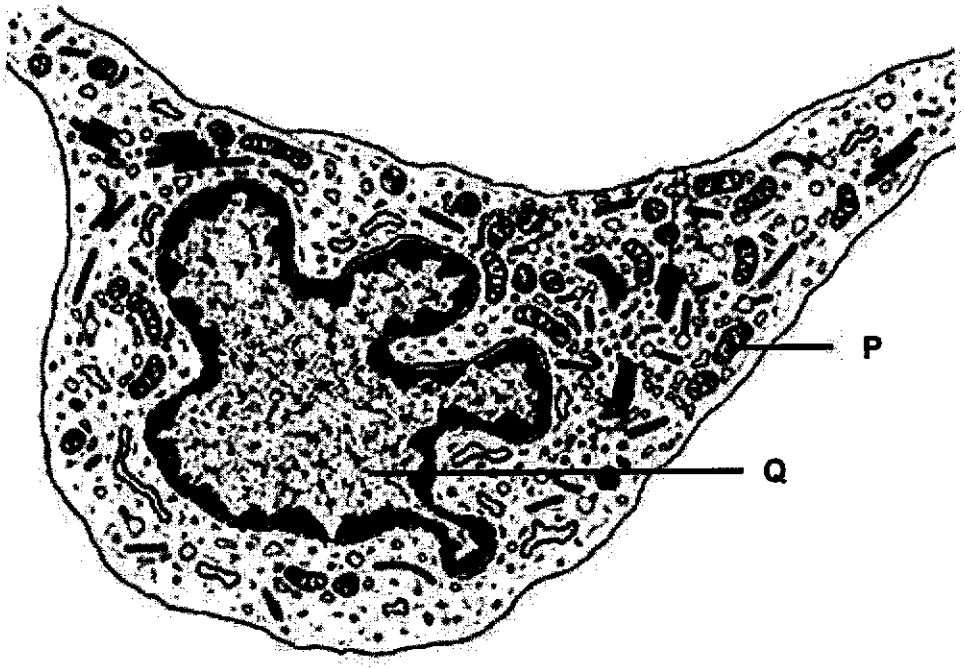


Fig. 2.1

(a) Identify structures **P** and **Q**.

P _____ **Q** _____ [2]

(b) State the function of structure **P**.

_____

_____ [1]

(c) Explain why structure **P** is found in large quantities in this cell.

_____

_____ [1]

(d) Suggest why this cell produces plenty of enzymes throughout its lifespan.

_____

_____ [1]

Downloaded from SingaKids.com

3 A student investigates the enzyme amylase.

She adds amylase to starch solution and keeps the mixture in a tube at 37 °C for ten minutes. She then adds iodine solution. Starch forms a blue / black colour with iodine.

She repeats the experiment using different temperatures.

Her results are shown in Table 3.1.

Table 3.1

temperature/ °C	colour when iodine added
5	blue black
20	blue black
37	brown
60	blue black

(a) Define enzyme.

_____

_____

_____

_____ [2]

(b) Describe the action of the enzyme amylase.

_____

_____ [1]

(c) Explain why is the result at 37 °C different from the results at 5 °C and 20 °C.

_____

_____

_____

_____

_____ [2]

More papers at www.testpapersfree.com

Downloaded from SingaKids.com

(d) Explain why starch is still present in the tube kept at 60 °C.

_____

_____

_____

_____ [2]

4 Fig. 4.1 shows the human alimentary canal and the associated organs.

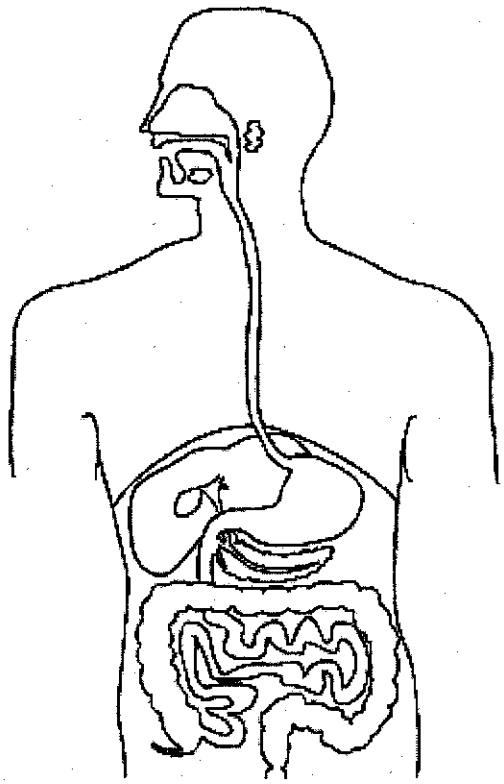


Fig. 4.1

(a) On Fig. 4.1, identify the organ responsible for each of the following processes:

(i) absorption of mineral ions (label it as **M**, and state its name beside the label); [1]

(ii) glycogen storage (label it as **N**, and state its name beside the label). [1]

(b) Describe the role of the liver when alcohol is present in the blood.

_____

_____ [1]

Downloaded from SingaKids.com

(c) After absorption, the body assimilates the nutrients absorbed.

Explain what is meant by the term assimilate, and why assimilation is necessary.

_____

_____

_____

_____

_____ [2]

5 Fig. 5.1 shows a section through the human heart.

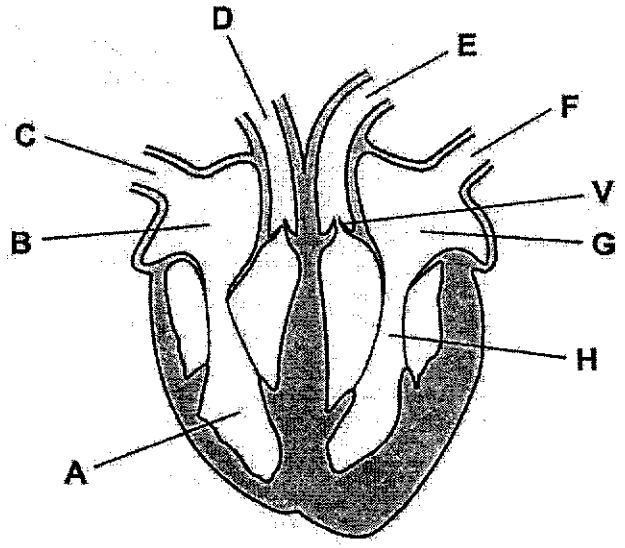


Fig. 5.1

(a) Table 5.1 lists the functions of parts of the heart and associated blood vessels. Complete Table 5.1 by identifying which structure, **A** to **H** labelled on Fig. 5.1, carries out each of the following functions.

Table 5.1

function	letter
vessel which returns blood from the body	
chamber which pumps blood to the body	
vessel which carries blood to the lungs	
vessel which carries blood at the highest pressure	

[2]

More papers at www.testpapersfree.com

Downloaded from SingaKids.com

(b) Describe the function of structure **V**.

_____

_____ [1]

(c) Ventricular Septal Defect (VSD) is a condition in which there is a hole in the wall separating structures **A** and **H**.

Predict and explain the consequences of this condition.

_____

_____

_____

_____ [2]

6 Fig. 6.1 shows the human respiratory system.

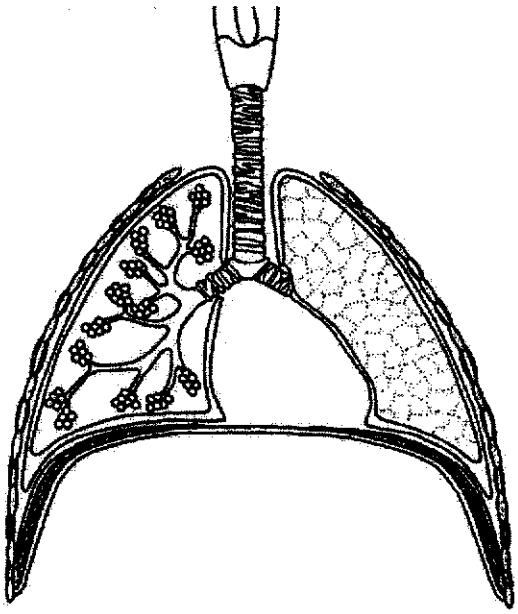


Fig. 6.1

(a) Label on Fig. 6.1 to show the trachea, bronchiole and alveoli. [3]

Downloaded from SingaKids.com

(b) An athlete runs a race in six minutes.

Fig. 6.2 shows the lactic acid concentration in his muscles during and after the race.

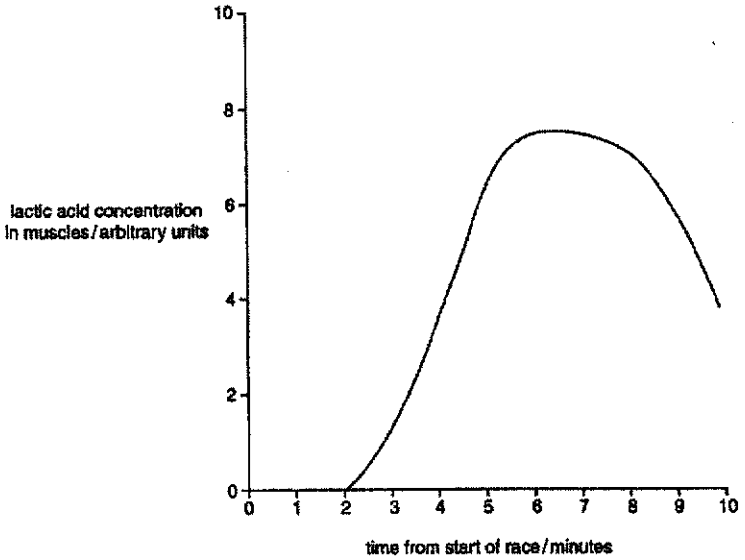


Fig. 6.2

(i) Describe and explain how the lactic acid concentration in the athlete's muscles changed in the way shown in Fig. 6.2.

[4]

(ii) Predict the effect of lactic acid on his muscles.

[1]

End of Section A

More papers at www.testpapersfree.com

Downloaded from SingaKids.com

Section B

Answer **all** questions.

7 **(a)** Describe coronary heart disease.

Suggest measures that a person could take to reduce the chances of developing coronary heart disease.

[4]

(b) A student fell down while running and suffered a cut on his arm.

Explain how the different components of blood come together to protect him against the injury and infection.

[6]

Downloaded from SingaKids.com

8 **(a)** At the exchange surface of the alveoli, oxygen travels from air to the blood.

Describe and explain how the structure of the alveoli aids the rapid transfer of oxygen at this surface.

[4]

(b) Oxygen supplied by blood is used for aerobic respiration in body cells.

With the use of word equations, explain the differences between the aerobic and anaerobic respiration in humans.

[6]

End of Paper

partnerInLearning

More papers at www.bestpapersfree.com

Downloaded from SingaKids.com

BLANK PAGE

partnerInLearning
More papers at www.bestpapersfree.com

Downloaded from SingaKids.com

More papers at www.testpapersfree.com

Downloaded from SingaKids.com

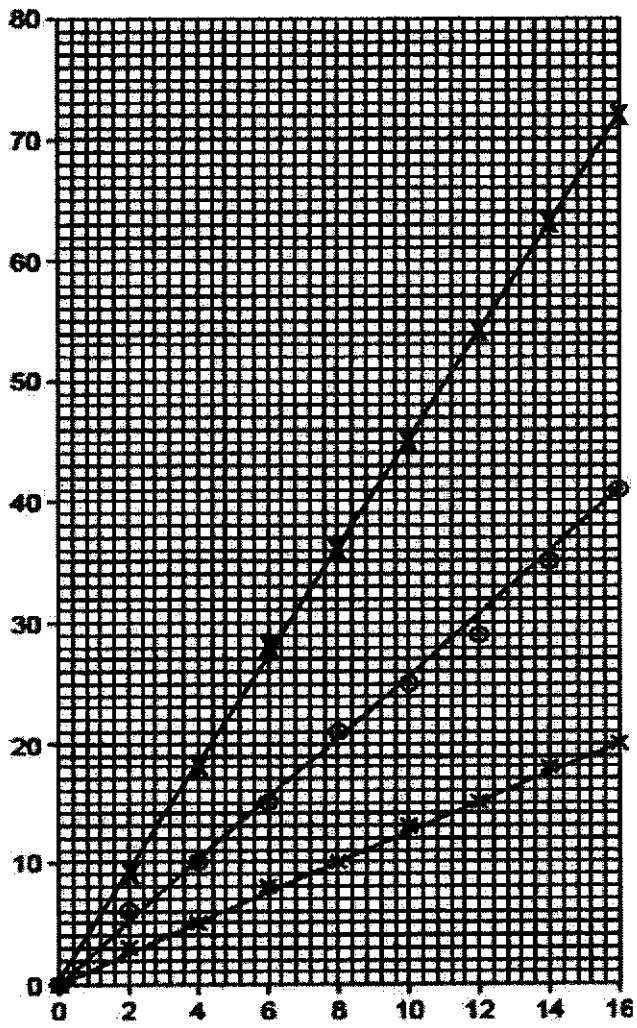
GMS(S) EYE 2019
SEC 3 EXP SCIENCE (BIO) - MARKING SCHEME

PAPER 1

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
D	D	C	C	D	B	D	D	C	A	C	C	C	B	D

PAPER 2
Section A

1 (a)



plot 1m
line 1m

[2]

(b) State which sample of androstenol, **A**, **B** or **C**, took the longest time to travel 8 cm along the tube.

Sample C [1]

(c) State and explain which sample of androstenol was the most concentrated.

Sample B was the most concentrated [1]
as the rate of diffusion was fastest. [1] [2]

Downloaded from SingaKids.com

2 (a) Identify structures **P** and **Q**.

P mitochondrion [1] **Q nucleus [1]** [2]
Reject: mitochondria

(b) State the function of structure **P**.

Mitochondrion carries out aerobic respiration by oxidising glucose to release energy. [1]

(c) Explain why structure **P** is found in large quantities in this cell.

To provide energy for movement of the cell/digestive activities/ phagocytosis/ make enzymes/change shape to engulf the bacteria. [1]

(d) Suggest why this cell produces plenty of enzymes throughout its lifespan.

To digest/ break down the foreign substances/ bacteria that it ingests. [1]

3 (a) Define enzyme.

Enzymes are biological catalyst, made of proteins, [1] that can speed up the rate of reaction without being chemically changed at the end of reaction. [1] [2]

(b) Describe the action of the enzyme amylase. (what does this enzyme do?)

Amylase digests starch into maltose. [1]

(c) Explain why is the result at 37 °C different from the results at 5 °C and 20 °C.

The optimum temperature at which amylase works best is 37 °C, thus it is able to digest all the starch to maltose. [1] [2]

At low temperatures such as 5 °C and 20 °C, amylase becomes inactive, thus some of the starch remains undigested at these temperatures. [1]

(d) Explain why starch is still present in the tube kept at 60 °C.

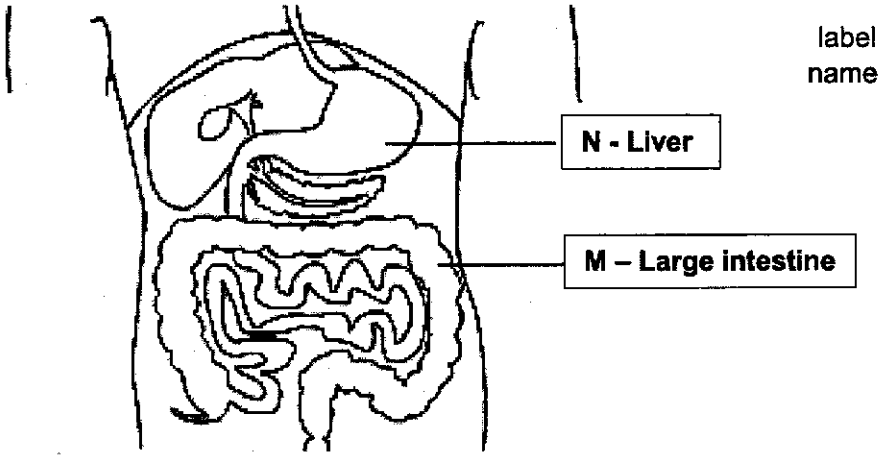
At 60 °C, the high temperature causes amylase to be denatured. [1] [2]
Amylase lose its active site thus not able to digest the starch. [1]

More papers at www.testpapersfree.com
Downloaded from SingaKids.com

4 **(a)** On Fig. 4.1, identify the organ responsible for each of the following processes:

(i) absorption of mineral ions (label it as **M**, and state its name beside the label); [1]

(ii) glycogen storage (label it as **N**, and state its name beside the label). [1]



label - [½],
name - [½]

(b) Describe the role of the liver when alcohol is present in the blood.

Liver will release alcohol dehydrogenase to break down alcohol into acetaldehyde/ harmless substances/ carbohydrate compound. [1]

(c) After absorption, the body assimilates the nutrients absorbed. Explain what is meant by the term assimilate, and why assimilation is necessary.

To assimilate means to use the absorbed nutrients in the body, and transform it into new tissues/ protoplasm or tissue fluids and to obtain energy. [1].
It is necessary to provide energy for cellular activities and for growth/ cellular division or tissue repair [1]. [2]

5 **(a)** Table 5.1 lists the functions of parts of the heart and associated blood vessels. Complete Table 5.1 by identifying which structure, **A** to **H** labelled on Fig. 5.1, carries out each of the following functions.

Table 5.1

function	letter
vessel returning blood from the body	**C [½]**
chamber which pumps blood to the body	**H [½]**
vessel which carries blood to the lungs	**D [½]**
vessel which carries blood at the highest pressure	**E [½]**

[2]

(b) Describe the function of structure **V**.

To prevent backflow of blood from aorta to left ventricle. [1]

Downloaded from SingaKids.com

(c) Ventricular Septal Defect (VSD) is a condition in which there is a hole in the wall separating structures **A** and **H**. Predict and explain the consequences of this condition.

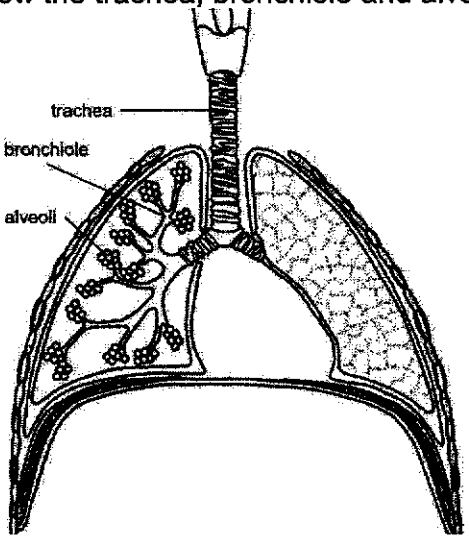
- **Blood passes from left to right ventricle (due to higher pressure in the left) causing mixing of oxygenated and deoxygenated blood.** [2]
- **There will be more than normal amount of blood to the lungs/ less than normal amount of blood to the rest of the body.**
- **Higher blood pressure in the lungs**
- **Enlargement of right ventricle**
- **Less O_2 to body cells**
- **Shortness of breath**
- **Tiredness / fatigue**
- **Heart will beat faster / harder**

Any two points from above. Bonus max 1m

---

6 (a) Label on Fig 6.1 to show the trachea, bronchiole and alveoli. [3]

Trachea – 1m,
Bronchiole – 1m,
Alveoli – 1m



Data based question

(b) (i) Describe and explain how the lactic acid concentration in the athlete's muscles changed in the way shown in Fig. 6.2.

From 0 – 2 min, the lactic acid concentration in the athlete's muscles is zero unit. This is because the athlete receive sufficient oxygen to carry out aerobic respiration to provide energy for the race.

At 2 min to 6 min, the lactic acid concentration in the athlete's muscles increases to about 8 arbitrary units. [1]

This is because during the race, the athlete needs more energy and the muscles incur oxygen debt. [½]

Hence anaerobic respiration was carried out to release additional energy required. At the same time, lactic acid is produced. [½]

At 6 min to 10 min, the lactic acid concentration in the athlete's muscles decreases from 8 arbitrary units to 4 arbitrary units. [1]

[4]

More papers at www.testpapersfree.com
Downloaded from SingaKids.com

The athlete stops running, the muscle cells do not need to respire anaerobically hence lactic acid production ceases. [½]

The lactic acid accumulated in the muscles are slowly removed to the liver by the blood to be broken down. [½]

(ii) Predict the effect of lactic acid has on his muscles.

Lactic acid may cause muscle fatigue/ pain/ soreness/ cramp. [1]

partnerInLearningm
More papers at www.bestpapersfree.com

Downloaded from SingaKids.com

Section B

7 (a) Describe coronary heart disease.

Suggest measures that a person could take to reduce the chances of developing coronary heart disease.

- **Coronary heart disease occurs due to the fatty deposits found on the inner wall of coronary arteries** [4]
- **leading to atherosclerosis/ narrowing and hardening/ blockage of coronary arteries.**
- **This reduces the blood supply to heart/ cardiac muscles.**
- **The lack of glucose and oxygen results in heart muscle damage where it becomes unable to contract to pump blood to the body.**

Description: max 3m

Reduce consumption of foods high in saturated fat / regular exercise / avoid smoking / stress management
Measures: max 2m

(b) A student fell down while running and suffered a cut on his arm.

Explain how the different components of blood come together to protect him against the injury and infection.

- **When there is a cut, platelets and damaged tissues at the damaged blood vessel will release enzymes thrombokinase;** [6]
- **activating prothrombin into thrombin in the presence of calcium ions.**
- **Thrombin then converts soluble fibrinogen into insoluble fibrin threads.**
- **The meshwork of fibrin traps blood cells to form a clot that seals the wound, preventing excessive/further blood loss;**

- **Lymphocytes will produce antibodies against bacteria that have entered the wound.**
- **Phagocytes will engulf and digest bacteria/foreign particles preventing illness due to infection.**

partnerInLearningm

More papers at www.testpapersfree.com

Downloaded from SingaKids.com

8 **(a)** At the exchange surface of the alveoli, oxygen travels from air to the blood.

Describe and explain how the structure of the alveoli aids the rapid transfer of oxygen at this surface.

[4]

Structure [1]	Explanation [1]
One-cell thick wall/ epithelium	To have shorter diffusion distance to facilitate faster rate of diffusion of oxygen
Thin film of moisture on internal surfaces	Allow oxygen to dissolve before diffusion can occur
Numerous alveoli and folded surface	Large surface area to volume ratio To facilitate faster rate of diffusion of gases
Well supplied with blood capillaries	To maintain steep concentration gradient of oxygen between the blood and the alveoli

Any two correct pairing of structure and explanation.
Bonus max 1m for extra one correct pairing.

(b) Oxygen supplied by blood is used for aerobic respiration in body cells.

With the use of word equations, explain the differences between the aerobic and anaerobic respiration in humans.

[6]

Aerobic Respiration:
Glucose + oxygen → carbon dioxide + water + energy. [1]

Anaerobic Respiration:
Glucose → lactic acid + small amount of energy [1]

Aerobic respiration involves the use of oxygen whereas anaerobic respiration occurs in the absence of oxygen. [1]

Aerobic respiration is more efficient as it results in the release of large amount of energy as compared to anaerobic respiration. [1]

Carbon dioxide and water are the by-products of aerobic respiration whereas in anaerobic respiration lactic acid is the only by-product. [1]

Aerobic respiration occurs in the mitochondria while anaerobic respiration occurs in the cytoplasm of a cell. [1]

Downloaded from SingaKids.com