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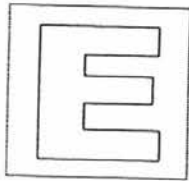
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GAN ENG SENG SCHOOL
Mid-Year Examination 2016



**CANDIDATE
NAME**

CLASS

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**INDEX
NUMBER**

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SCIENCE

Paper 1 Multiple Choice

9 May 2016

Papers 1 & 2: 2 hours

Sec 2 Express

Additional Materials: OTAS

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and index number on the OTAS.

There are **thirty** questions in Section A. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the answer you consider correct and record your choice in soft pencil on the separate OTAS.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Read the instructions on the OTAS very carefully.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

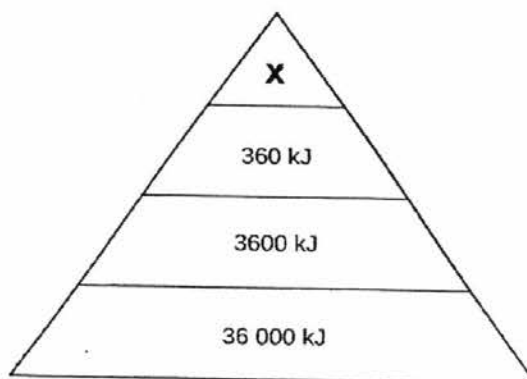
Any rough working should be done in this booklet.

A copy of the Periodic Table is inserted on page 13.

Total marks
30

Answer all the questions with the most suitable option A, B, C or D.

- 1 The diagram shows a pyramid of energy.



Which of the following statements about this pyramid of energy is not correct?

- A An organism at X receives only 36 kJ of energy from food.
- B The efficiency of this food chain is about 10%.
- C The secondary consumer receives only 3600 kJ of energy from the producer.
- D The trophic level containing 36 000 kJ of energy represents the producer.

- 2 The boiling points of some elements are given in the table.

Element	Melting point / °C	Boiling point / °C
Nitrogen	-210	-196
Xenon	-112	-108
Oxygen	-219	-183

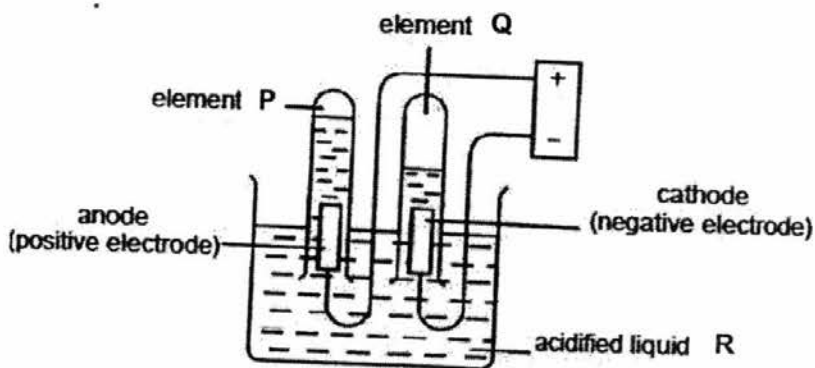
Which of the substances will be in a liquid state at -194 °C?

- A Nitrogen and Oxygen only
- B Nitrogen and Xenon only
- C Oxygen only
- D Xenon only

- 3 Carbon dioxide, methane and sulfur dioxide are gases which affect the atmosphere and the environment. In what ways do these gases affect the environment?

	carbon dioxide	methane	sulfur dioxide
A	acid rain	global warming	photochemical smog
B	depletion of ozone layer	photochemical smog	global warming
C	global warming	depletion of ozone layer	acid rain
D	global warming	global warming	acid rain

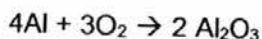
- 4 The diagram below shows an electric current being passed through a beaker of acidified liquid R.



Elements P and Q are collected as shown.

Which of the following statements about this experiment is correct?

- A Liquid R is a compound.
 - B This experiment set-up shows the physical change caused by electricity.
 - C When the electric current is switched off, liquid R will return to its original volume before the start of the experiment.
 - D Elements P and Q have similar physical and chemical properties as liquid R.
- 5 When heated, solid X gives off a gas which forms white precipitate with limewater. When solid X reacts with an alkali, there is no visible reaction.
- What is X?
- | | |
|---------------------|------------------|
| A Copper metal | B Zinc carbonate |
| C Magnesium sulfate | D Zinc oxide |
- 6 When pure aluminium, Al, is exposed to air, it combines with oxygen, O₂, to form aluminium oxide, Al₂O₃. The chemical reaction is shown below.



Which statement is correct?

- A The total number of atoms of the reactants and products is conserved.
- B Al and O₂ undergo thermal decomposition to form Al₂O₃.
- C There is no oxidation reaction taking place.
- D Aluminium oxide is not able to be broken down into aluminium and oxygen by electrolysis.

- 7 Which of the following correctly describes water containing small amounts of dissolved gases like nitrogen and oxygen molecules?

Substance	Gas molecules	Water molecules
A	close together, moving at random	close together, moving at random
B	widely separated, moving at random	close together, not moving
C	close together, moving at random	widely separated, moving at random
D	widely separated, moving at random	close together, moving at random

- 8 There are four balloons, each containing 200 cm³ of one of the following gases:
- carbon dioxide
 - neon
 - nitrogen
 - oxygen

The boiling points of four gases are given in the table below.

gas	carbon dioxide	neon	nitrogen	oxygen
boiling point / °C	-57	-246	-196	-183

Which of the balloons will **not** show a significant decrease in size when it is cooled to -200 °C?

- A The balloon containing carbon dioxide.
 B The balloon containing neon.
 C The balloon containing nitrogen.
 D The balloon containing oxygen.

- 9 Elements **M**, **N** and **O** are in the same period of the Periodic Table.
M is a metal, **N** is a non-metal and **O** shows properties of both metal and non-metals.

What is the order of increasing proton number?

	lowest	→	highest
A	M	N	O
B	M	O	N
C	N	O	M
D	O	N	M

- 10 Substance **X** melts at 135 °C.
Which statement about **X** is **definitely** true?

A The forces of attraction between the particles of **X** at 136 °C are very strong.
 B There is a mixture of solid and liquid **X** at 135 °C.
 C The distance between the particles of **X** at 50 °C are very widely spaced.
 D The particles of **X** move and slide past one another at -20 °C.

- 11 Which of the following does not have the same electronic configuration as argon?

A Cl^- B K^+ C Na^+ D S^{2-}

- 12 The symbol of an element is ${}^{45}_{21}\text{Sc}$.

Which of the following shows the number of protons, electrons and neutrons in an atom of the element?

	Protons	Neutrons	Electrons
A	21	21	21
B	21	24	21
C	21	45	21
D	21	45	45

- 13 A metal **X** and non-metal **Y** react together to form an ionic compound XY_2 .

Which of the following statements about the formation of the ions of **X** and **Y** is correct?

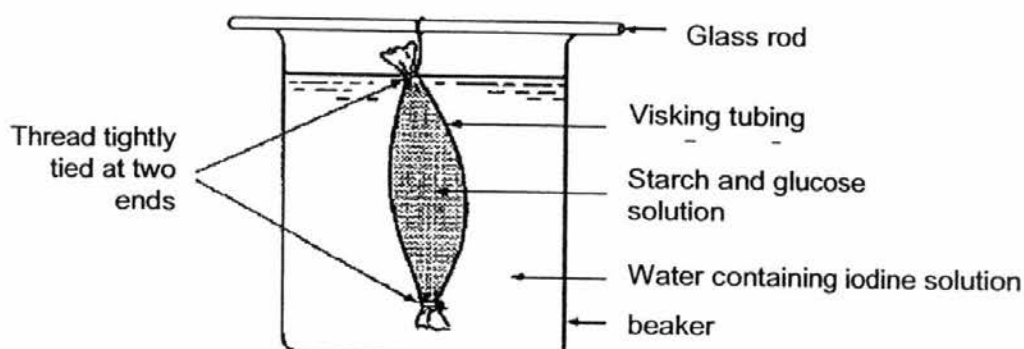
A Each atom of **X** gives away one electron.
 B Each atom of **X** receives one electron.
 C Each atom of **Y** gives away one electron.
 D Each atom of **Y** receives one electron.

- 14 The elements **W**, **X**, **Y** and **Z** have consecutive increasing proton numbers.

If **Y** is an inert element, which one of the following shows the correct formula of a compound formed between these elements?

A XW B XW_2 C ZX D W_2Z

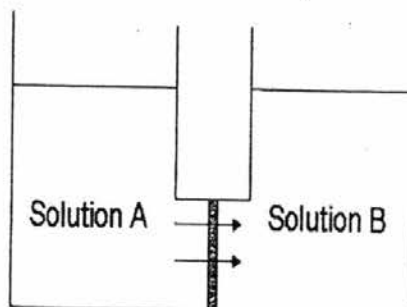
- 15 The following is a model of a cell made of a partially permeable membrane. No enzyme is added into the cell model.



The iodine solution will turn from brown to blue black in the presence of starch. After two hours, the water in the beaker has no change in colour.

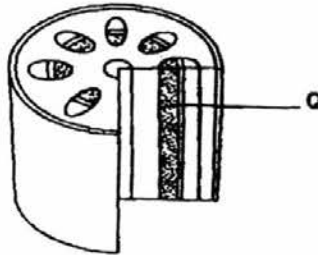
Which of the following could be the reason?

- A The starch does not diffuse out the cell model.
 - B The glucose moves from the cell model into the beaker.
 - C The glucose molecules have combined to produce starch.
 - D The starch in the cell model has broken down into glucose.
- 16 The diagram below shows 2 sucrose solutions. The arrows indicate the net movement of water molecules through a partially permeable membrane. What could possibly be the concentrations of solution A and B?



	Concentration of sucrose in solution A (mg/ml)	Concentration of sucrose in solution B (mg/ml)
A	1.00	0.500
B	0.500	1.00
C	0.500	0.500
D	0.500	0.250

- 17 The diagram shows a section through a stem.



What is the main transport function of tissue 'Q'?

	<i>Substance transported</i>	<i>Carried from</i>	<i>Carried to</i>
A	sugar	roots	leaves
B	sugar	leaves	roots
C	water	leaves	roots
D	water	roots	leaves

- 18 Which of the following have modified their structures to improve the diffusion of substances?

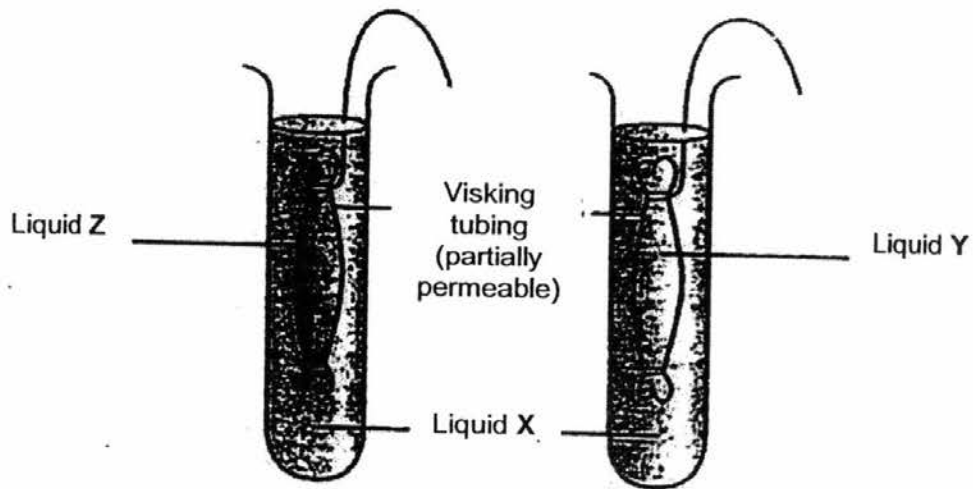
- I. Red blood cells
- II. Stomata
- III. Root hair cells

- | | | | |
|---|-----------------|---|----------------|
| A | I and II only | B | I and III only |
| C | II and III only | D | I, II and III |

- 19 Which of the following statements is not correct?

- A Unicellular organisms do not require an efficient transport system for survival.
- B Oxygen in the circulatory system enters and leaves the cells by simple diffusion.
- C Amoeba is able to survive without a proper transport system because it obtains nutrients and removes unwanted substances through simple diffusion.
- D Oxygen and water diffuse into the root hair cells and are transported upwardly to the rest of the plants by xylem vessels.

- 20 An apparatus was set up as shown.

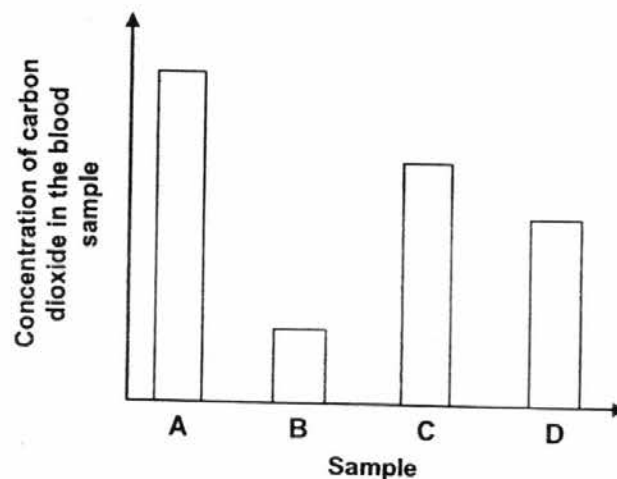


After some time had elapsed, the visking tubing containing liquid Y collapsed while the tubing containing liquid Z was firm and hard.

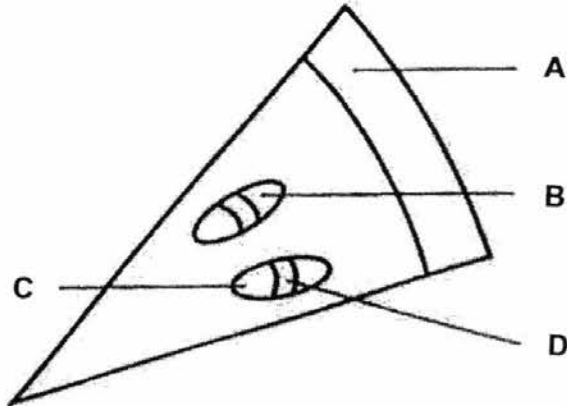
Which one of the following could be a correct description of the liquids at the start of the experiment?

	Liquid Z	Liquid X	Liquid Y
A	25% sucrose solution	10% sucrose solution	Water
B	Water	25% sucrose solution	10% sucrose solution
C	10% sucrose solution	Water	25% sucrose solution
D	water	10% sucrose solution	25% sucrose solution

- 21 The bar chart below shows the concentration of carbon dioxide in blood samples taken from four different places in the human circulatory system. Which blood sample was taken from the pulmonary vein?



- 22 The diagram shows part of a transverse section of the stem of the plant. Which part is responsible for transporting sucrose?



- 23 A scientist extracted protease from the human pancreas. The enzyme is subjected to different pH levels and different food molecules. In which set-up will digestion take place?

	food molecule	hydrochloric acid	sodium hydroxide
A	carbohydrate	present	absence
B	carbohydrate	absence	present
C	protein	absence	present
D	protein	present	absence

- 24 What is the final product when proteins are digested?

A Glucose
 C Amino acids
 B Glycerol
 D Fatty acids

- 25 Jia Jun likes to buy high fibre bread for his family.

At which part of the digestive system will the fibre be digested?

A Stomach
 C Large intestine
 B Small intestine
 D None of the above

- 26 The table shows the compositions of four types of food **P**, **Q**, **R** and **S**.

Food	Carbohydrate	Fat	Protein
P	✓	✗	✓
Q	✗	✓	✓
R	✗	✓	✗
S	✓	✓	✗

key:

✓ = present

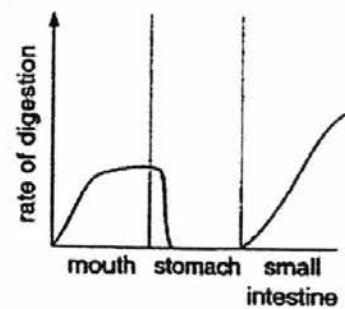
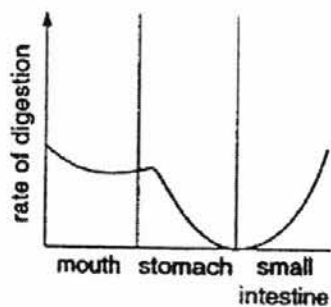
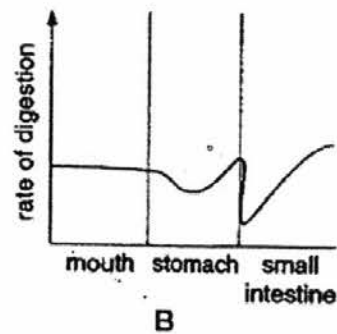
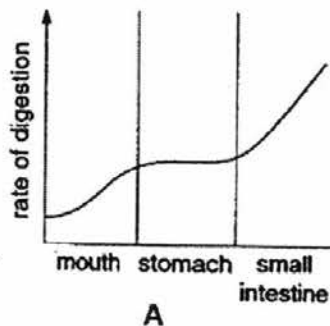
✗ = absent

Partial digestion of food takes place in the mouth.

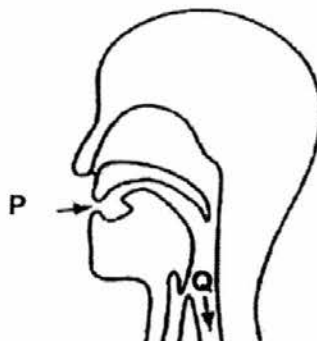
- A** **P** and **Q**
C **R** and **Q**

- B** **P** and **S**
D **R** and **S**

- 27 Which bar chart shows the rate of starch digestion in the mouth, stomach and small intestine?

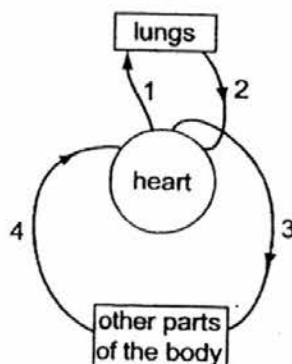


- 28 Solid food enters the mouth at **P** and enters the oesophagus at **Q**.



How does the food at **Q** differ from the food at **P**?

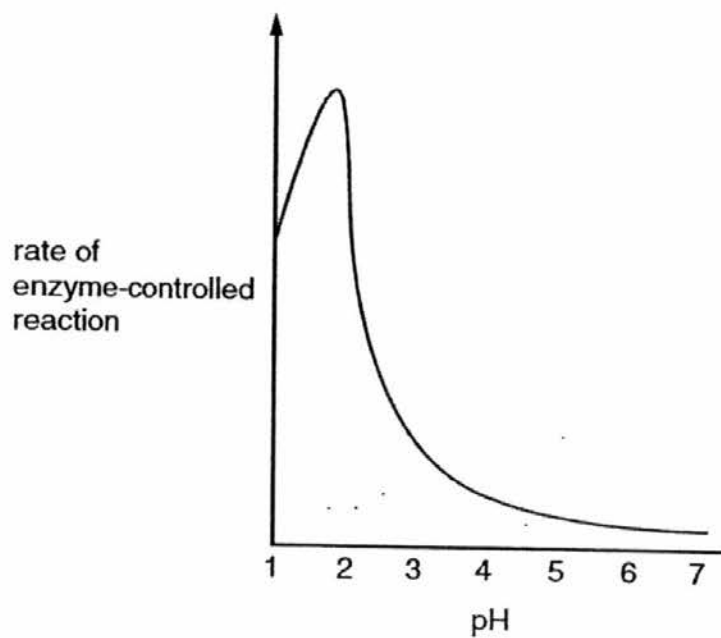
- A** Contains lesser protein
B Contains more starch
C Has larger surface area
D Has larger particles
- 29 The diagram shows the double circulation of blood.



Which row in the table below best describes the oxygen levels of the blood in the sites labelled 1 to 4?

	1	2	3	4
A	High	Low	Low	High
B	High	Low	Low	Low
C	Low	High	High	High
D	Low	High	High	Low

- 30 The diagram below shows the rate of enzyme reaction with time.



Which of the following enzymes do you think is represented by this graph?

- A Pepsin
- B Amylase
- C Lipase
- D Erepsin

END OF PAPER

The Periodic Table of the Elements

The Periodic Table of the Elements																																							
I		II		Group														III	IV	V	VI	VII	0																
																		1 H Hydrogen 1																4 He Helium 2					
7 Li Lithium 3		9 Be Beryllium 4																11 B Boron 5		12 C Carbon 6		14 N Nitrogen 7		16 O Oxygen 8		19 F Fluorine 9		20 Ne Neon 10											
23 Na Sodium 11		24 Mg Magnesium 12																27 Al Aluminium 13		28 Si Silicon 14		31 P Phosphorus 15		32 S Sulfur 16		35.5 Cl Chlorine 17		40 Ar Argon 18											
39 K Potassium 19		40 Ca Calcium 20		45 Sc Scandium 21		48 Ti Titanium 22		51 V Vanadium 23		52 Cr Chromium 24		55 Mn Manganese 25		56 Fe Iron 26		59 Co Cobalt 27		59 Ni Nickel 28		64 Cu Copper 29		65 Zn Zinc 30		70 Ga Gallium 31		73 Ge Germanium 32		75 As Arsenic 33		79 Se Selenium 34		80 Br Bromine 35		84 Kr Krypton 36					
85 Rb Rubidium 37		88 Sr Strontium 38		89 Y Yttrium 39		91 Zr Zirconium 40		93 Nb Niobium 41		96 Mo Molybdenum 42		Tc Technetium 43		101 Ru Ruthenium 44		103 Rh Rhodium 45		106 Pd Palladium 46		108 Ag Silver 47		112 Cd Cadmium 48		115 In Indium 49		119 Sn Tin 50		122 Sb Antimony 51		128 Te Tellurium 52		127 I Iodine 53		131 Xe Xenon 54					
133 Cs Caesium 55		137 Ba Barium 56		139 La Lanthanum 57		178 Hf Hafnium 72		181 Ta Tantalum 73		184 W Tungsten 74		186 Re Rhenium 75		190 Os Osmium 76		192 Ir Iridium 77		195 Pt Platinum 78		197 Au Gold 79		201 Hg Mercury 80		204 Tl Thallium 81		207 Pb Lead 82		209 Bi Bismuth 83		Po Polonium 84		At Astatine 85		Rn Radon 86					
Fr Francium 87		226 Ra Radium 88		227 Ac actinium 89																																			

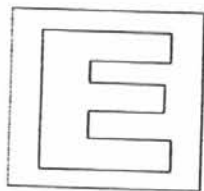
*58-71 Lanthanoid series

†90-103 Actinoid series

Key	a X b	a = relative atomic mass X = atomic symbol b = proton (atomic) number
-----	---	---

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



GAN ENG SENG SCHOOL
Mid-Year Examination 2016



CANDIDATE
NAME

CLASS

INDEX
NUMBER

SCIENCE

Paper 2

9 May 2016

Papers 1 & 2: 2 hours

Sec 2 Express

Candidates answer on the Question Paper.

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

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

Section A

Answer **all** questions.

Section B

Answer question 7 and **three other** questions.
In calculations, you should show all the steps in your working, giving your answer at each stage.
Enter the numbers of the Section B questions you have answered on the dotted lines in the grid below.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

At the end of the examination, hand in your answers to Paper 1 and Paper 2 separately.

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

A copy of the Periodic table is inserted on page 16.

For Examiner's Use	
Section A	30
Section B	40
Q7	
.....	
.....	
.....	
Total	70

SECTION A (30 marks)

Answer **all** the questions in this section.

- 1 Study the brief write up of a savanna found in one part of Africa.

'A savanna is a tropical grassland filled with shrubs and isolated trees. Its characteristics lie between a tropical rainforest and a desert biome.'

It has warm temperature throughout the year. There are two very distinct seasons in this savanna; a dry season and a very wet season. During dry season, there is only an average of about 10 cm of rainfalls. However, it rains very frequently during wet season.

Plants are highly specialized to survive for long periods of drought during dry season. Some develop long tap roots that can reach the deep water underground. Others contain thick bark to resist forest fires.

There are up to 16 different species of herbivores such as zebra and giraffe living in a savanna. They provide the source of food for carnivores such as lions and leopards.'

- (a) Is savanna an ecosystem? Explain your answer. [1]

.....

- (b) State two abiotic factors that affect the lives in this savanna. [1]

.....

- (c) 'Plants are highly specialized to survive for long periods of drought during dry season.' [1]

Which term best explains the above sentence?

.....

- (d) Construct one food chain from the passage above. [1]

.....

- 2 A salt, calcium sulfate is formed when an unknown substance **P** is added to dilute sulfuric acid. White precipitate and effervescence are formed in the limewater.

(a) Identify **P**.

Write a chemical equation to show the above reaction.

[2]

.....

(b) Explain why neutralization is a chemical reaction.

[1]

.....

.....

- 3 The following table gives the melting and boiling points of two substances **P** and **Q**.

Substance	Melting point / °C	Boiling point / °C
P	10	87
Q	120	312

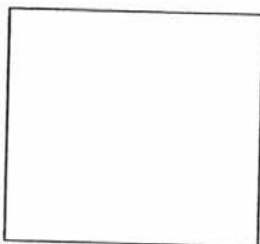
(a) State the physical state(s) of substance **P** and **Q** for the temperatures below; [2]

At 11°C, state(s) of substance **P**:

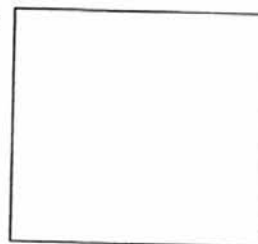
At 312°C, state(s) of substance **Q**:

(b) Draw the arrangement of the particles of substance **P** and **Q** at 80 °C. [2]

Substance **P**:



Substance **Q**:



(c) Describe the changes in movement and arrangement of the particles of substance **Q** as it is heated from 300 °C to 350 °C. [3]

.....

.....

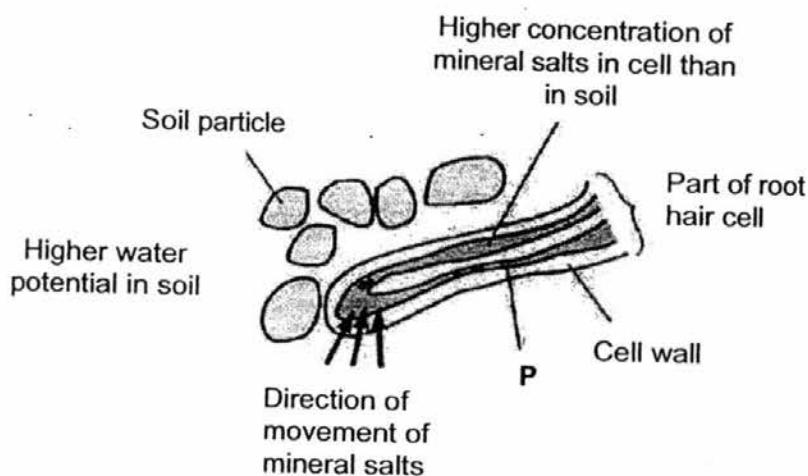
.....

.....

- (d) Complete the following table by writing the chemical formulae of the [2]
compounds given:

Name of compound	Chemical formula
Iron (III) nitrate	
Ammonium sulfate	

- 4 The following diagram shows a part of root hair cells.



It is found that in the soil, the water potential is high but low in minerals salts, in comparison to their respective concentrations found in the root hair cell.

- (a) (i) Suggest the direction of water movement. [1]

.....

- (ii) Explain why water moves in the direction stated in (i). [2]

.....

.....

- (b) The cell contains high concentration of other substances such as proteins but they are unable to move out from the cell into the soil. This is because their movement is restricted by structure P.

(i) What is P?

[1]

.....

(ii) Explain if protein can pass through P.

[1]

.....

.....

- 5 (a) In the alimentary canal, digestion is aided by three types of enzymes.

[4]

Complete the table below to show the names, substrates and end products of these digestive enzymes.

Name of enzymes	Name of substrate	End products
Maltase		Glucose
Protease	Protein	
	Fat	

- (b) Describe the digestion of protein in the body.

[2]

.....

.....

.....

.....

- 6 In normal birth the left and right sides of the heart are separated by a thick wall of muscle. In a few rare cases this sheet of muscle is incomplete and leaking.

Describe and explain how this defect may affect a person's activity.

[3]

.....

.....

.....

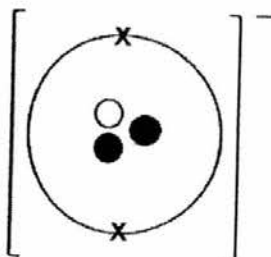
.....

END OF SECTION A

SECTION B (40 marks)

Answer Q7 and any 3 other questions in this section.

- 7 Tritium is an isotope of hydrogen. An ion of tritium has the following structure.



- (a) Complete the following table to show the names and charges of the particles in the ion of tritium. [3]

Symbol	Name	Charge
●		0
○	proton	
X		-1

- (b) Using the symbol, T, to represent tritium, state the formula of [2]

- (i) the ion of tritium,

.....

- (ii) The compound formed between tritium and calcium.

.....

- (c) (i) Explain what is meant by the term *isotope*. [1]

.....

.....

- (ii) Explain why isotopes have similar chemical properties but slightly different physical properties. [2]

.....

.....

.....

- (d) Nitrogen combines with sodium to form sodium nitride. Draw a dot and cross diagram to show the electronic structure of sodium nitride. You only need to show outer electrons. [2]

- 8 Table 8.1 shows an experiment to investigate the effect of pH on the activity of substance X which catalyzes the breakdown of proteins. A few drops of acid solution with different pH values are added into the solution in each set of the investigation.

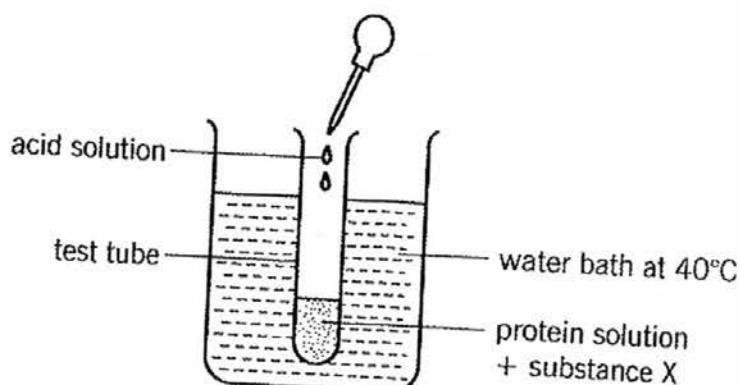


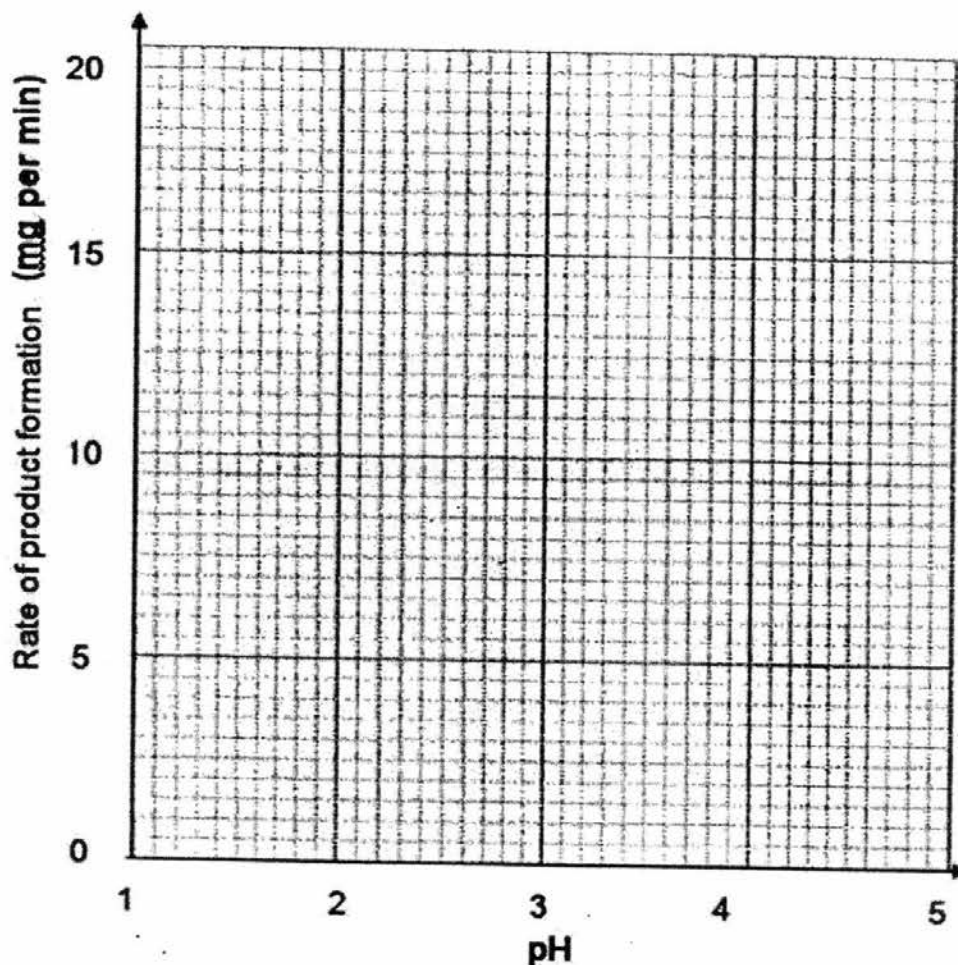
Figure 8.1

Table 8.1 shows the results of the experiment.

pH	1.0	2.0	3.0	4.0	5.0
Rate of product formation (mg per minute)	17.5	16	11.5	4.5	0

- (a) Suggest the name of substance X. [1]
-
- (b) What is the product formed when proteins are broken down by substance X? [1]
-

- (c) Draw a graph to show the rate of product formation against pH on the grid [2]
provided below.



- (d) What conclusion can you draw from the graph? [1]
.....
- (e) In which part of the alimentary canal might the substance X be found? [1]
.....
- (f) Why is it necessary to break down proteins in the human alimentary canal? [2]
.....
.....

- (g) The surface of the small intestine has many finger-like parts called villi.

[2]

How do the finger like structures relate to the function of the small intestine?

.....

.....

- 9 (a) In order to make computer processing easier, a code system is used to process various chemical substances. The system makes use of a certain number of elements.

Name	Formula	Code
Sodium chloride	NaCl	11,17
Iron(II) bromide	FeBr ₂	26,35(2)
Aluminium oxide	Al ₂ O ₃	13(2), 8(3)

- (i) A student records the code for potassium nitride, K₃N as 39(3),14. [2]
The substance fails to register in the computer system.
Explain why the student is wrong and give the correct input for this substance.

.....
.....

- (ii) Write down the chemical formula of these substances. [1]

12,16,8(4):

- (iii) Translate the following chemical substances into appropriate codes. [1]

Sugar, C₆H₁₂O₆:

- (b) Iron Powder is a grey solid. Chlorine is a yellow-green gas. When red-hot iron comes into contact with chlorine, it glows white-hot, sparks are seen flying and a brown solid is formed in the flask. The brown solid is compound Iron(III) chloride.

- (i) Give one reason to explain why the above is an example of a chemical change. [2]

.....

- (ii) Write a chemical equation for the above reaction. [2]

.....

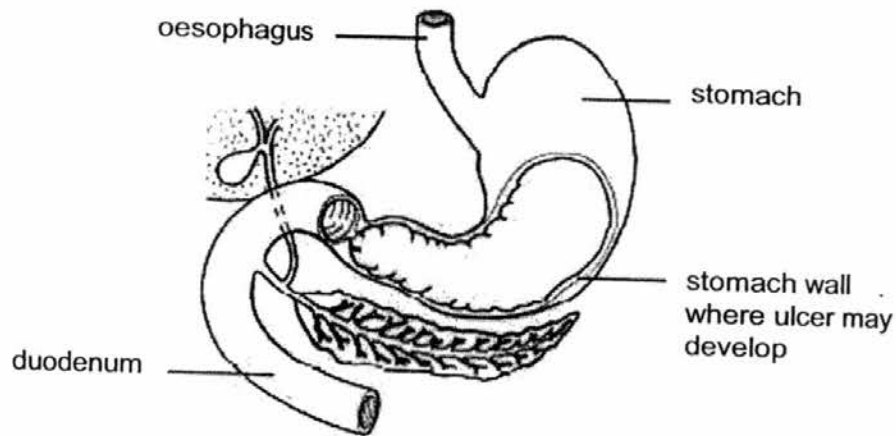
- (iii) Some decomposition processes occur naturally. [2]
Explain why decomposition has beneficial uses as well as harmful effects.

.....

.....

.....

- 10 (a) The figure below shows some parts of the human alimentary canal and associated organs.



- (i) Name and describe the process that moves food down the oesophagus to the stomach. [4]

Name of process:

Description of process:

.....

.....

.....

.....

- (iii) A sore can develop on the wall of the stomach. This sore is called an ulcer, which can cause pain. The pain may be relieved by taking a drug that neutralise the amount of acid produced by the cells in the stomach wall. [4]

Suggest and explain how the processes taking place in the stomach may be affected in a person taking this drug.

.....

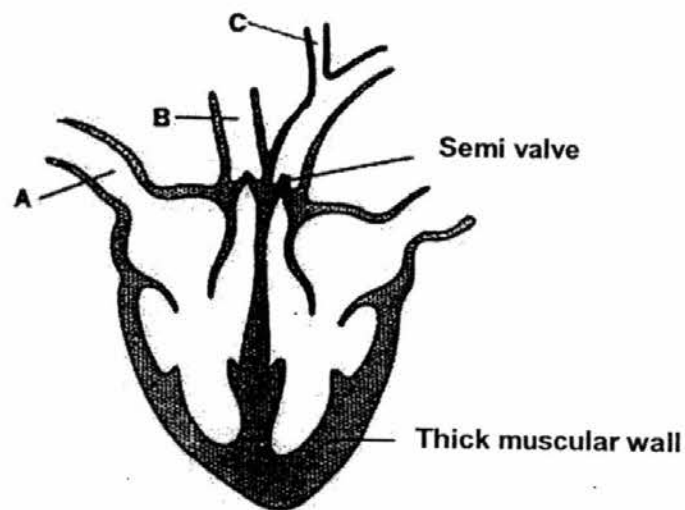
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- (b) The diagram below shows the human heart and some associated blood vessels. The arrows on the diagram show the direction of blood flow.



Name blood vessels A, B and C.

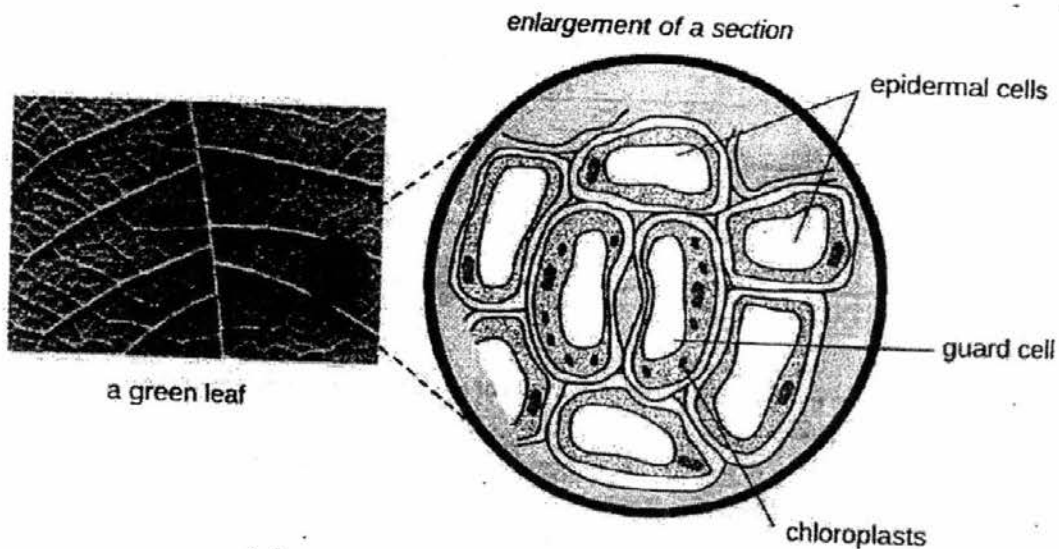
[2]

A:

B:

C:

- 11 The diagrams below show the cells found underside of a green leaf during a warm sunny day.



- (a) (i) Name two chemical reactions that take place in the guard cells during a warm sunny day. [1]

.....

- (ii) Hence, write the word equation that represent each chemical reactions. [2]

.....

.....

- (b) When tested with iodine solution, only the guard cells give blue-black colour. The epidermal cells give brown colour. [2]

Explain why the epidermal cells do not show blue-black colour as seen in the guard cells during a warm sunny day.

.....

.....

.....

- (c) (i) Explain if capillaries have thin walls surrounding the body cells. [1]

.....

.....

- (ii) Describe and explain what happens to the guard cells when it is placed in a high concentrated sucrose solution. [4]

.....

.....

.....

.....

.....

.....

END OF PAPER

The Periodic Table of the Elements

The Periodic Table of the Elements																				
I		II		Group																
				1 H Hydrogen 1											III	IV	V	VI	VII	0
7 Li Lithium 3	9 Be Beryllium 4												11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10		
23 Na Sodium 11	24 Mg Magnesium 12												27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18		
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36			
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54			
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86			
Fr Francium 87	226 Ra Radium 88	227 Ac actinium 89																		

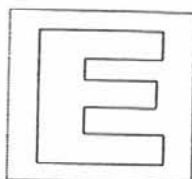
*58-71 Lanthanoid series

†90-103 Actinoid series

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

a	X	a = relative atomic mass
		X = atomic symbol
b		b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



GAN ENG SENG SCHOOL
Mid-Year Examination 2016



**CANDIDATE
NAME**

CLASS

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**INDEX
NUMBER**

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SCIENCE

Paper 1 Multiple Choice

9 May 2016

Papers 1 & 2: 2 hours

Sec 2 Express

Additional Materials: OTAS

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and index number on the OTAS.

There are **thirty** questions in Section A. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the answer you consider correct and record your choice in soft pencil on the separate OTAS.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Read the instructions on the OTAS very carefully.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

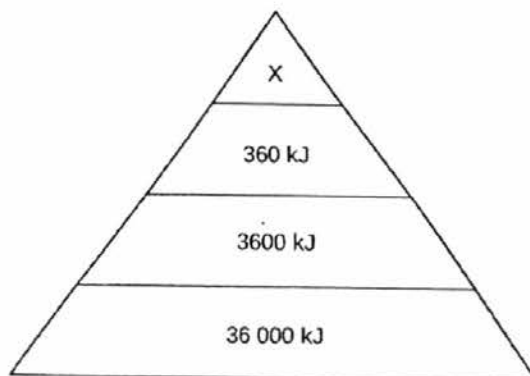
Any rough working should be done in this booklet.

A copy of the Periodic Table is inserted on page 13.

Total marks
30

Answer **all** the questions with the most suitable option **A, B, C or D**.

- 1 The diagram shows a pyramid of energy.



Which of the following statements about this pyramid of energy is not correct?

- A** An organism at **X** receives only 36 kJ of energy from food.
B The efficiency of this food chain is about 10%.
C The secondary consumer receives only 3600 kJ of energy from the producer.
D The trophic level containing 36 000 kJ of energy represents the producer.

- 2 The boiling points of some elements are given in the table.

Element	Melting point / °C	Boiling point / °C
Nitrogen	-210	-196
Xenon	-112	-108
Oxygen	-219	-183

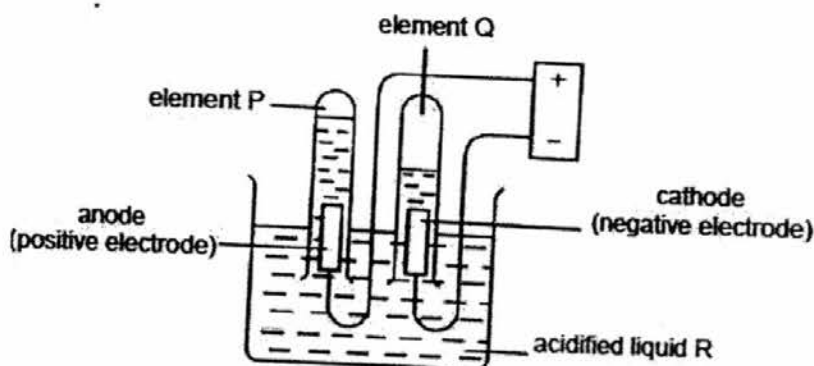
Which of the substances will be in a liquid state at -194 °C?

- A** Nitrogen and Oxygen only
B Nitrogen and Xenon only
C Oxygen only
D Xenon only

- 3 Carbon dioxide, methane and sulfur dioxide are gases which affect the atmosphere and the environment. In what ways do these gases affect the environment?

	carbon dioxide	methane	sulfur dioxide
A	acid rain	global warming	photochemical smog
B	depletion of ozone layer	photochemical smog	global warming
C	global warming	depletion of ozone layer	acid rain
D	global warming	global warming	acid rain

- 4 The diagram below shows an electric current being passed through a beaker of acidified liquid R.



Elements P and Q are collected as shown.

Which of the following statements about this experiment is correct?

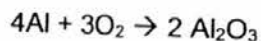
- ☒ A Liquid R is a compound.
- ☐ B This experiment set-up shows the physical change caused by electricity.
- ☐ C When the electric current is switched off, liquid R will return to its original volume before the start of the experiment.
- ☐ D Elements P and Q have similar physical and chemical properties as liquid R.

- 5 When heated, solid X gives off a gas which forms white precipitate with limewater. When solid X reacts with an alkali, there is no visible reaction.

What is X?

- ☐ A Copper metal
- ☐ B Zinc carbonate
- ☐ C Magnesium sulfate
- ☒ D Zinc oxide

- 6 When pure aluminium, Al, is exposed to air, it combines with oxygen, O₂, to form aluminium oxide, Al₂O₃. The chemical reaction is shown below.



Which statement is correct?

- ☒ A The total number of atoms of the reactants and products is conserved.
- ☐ B Al and O₂ undergo thermal decomposition to form Al₂O₃.
- ☐ C There is no oxidation reaction taking place.
- ☐ D Aluminium oxide is not able to be broken down into aluminium and oxygen by electrolysis.

- 7 Which of the following correctly describes water containing small amounts of dissolved gases like nitrogen and oxygen molecules?

Substance	Gas molecules	Water molecules
A	close together, moving at random	close together, moving at random
B	widely separated, moving at random	close together, not moving
C	close together, moving at random	widely separated, moving at random
D	widely separated, moving at random	close together, moving at random

- 8 There are four balloons, each containing 200 cm³ of one of the following gases:
- carbon dioxide
 - neon
 - nitrogen
 - oxygen

The boiling points of four gases are given in the table below.

gas	carbon dioxide	neon	nitrogen	oxygen
boiling point / °C	-57	-246	-196	-183

Which of the balloons will **not** show a significant decrease in size when it is cooled to -200 °C?

- A The balloon containing carbon dioxide.
 B The balloon containing neon.
 C The balloon containing nitrogen.
 D The balloon containing oxygen.

- 9 Elements **M**, **N** and **O** are in the same period of the Periodic Table.
M is a metal, **N** is a non-metal and **O** shows properties of both metal and non-metals.

What is the order of increasing proton number?

	lowest	→	highest
A	M	N	O
B	M	O	N
C	N	O	M
D	O	N	M

- 10 Substance **X** melts at 135 °C.
Which statement about **X** is definitely true?

☐ A The forces of attraction between the particles of **X** at 136 °C are very strong.
☒ B There is a mixture of solid and liquid **X** at 135 °C.
☐ C The distance between the particles of **X** at 50 °C are very widely spaced.
☐ D The particles of **X** move and slide past one another at -20 °C.

- 11 Which of the following does not have the same electronic configuration as argon?

A Cl⁻ B K⁺ ☒ C Na⁺ D S²⁻

- 12 The symbol of an element is ${}^{45}_{21}\text{Sc}$.

Which of the following shows the number of protons, electrons and neutrons in an atom of the element?

	Protons	Neutrons	Electrons
☐ A	21	21	21
☒ B	21	24	21
☐ C	21	45	21
☐ D	21	45	45

- 13 A metal **X** and non-metal **Y** react together to form an ionic compound **XY₂**.

Which of the following statements about the formation of the ions of **X** and **Y** is correct?

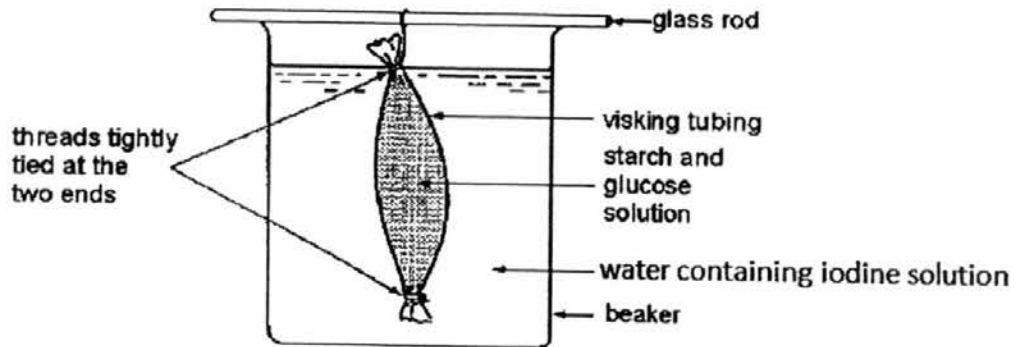
☐ A Each atom of **X** gives away one electron.
☐ B Each atom of **X** receives one electron.
☐ C Each atom of **Y** gives away one electron.
☒ D Each atom of **Y** receives one electron.

- 14 The elements **W**, **X**, **Y** and **Z** have consecutive increasing proton numbers.

If **Y** is an inert element, which one of the following shows the correct formula of a compound formed between these elements?

A XW B XW₂ ☒ C ZX D W₂Z

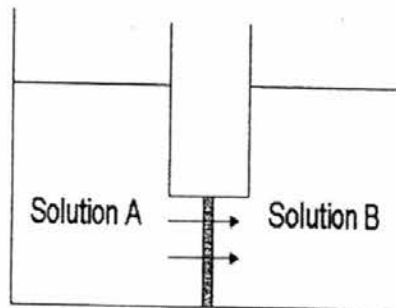
- 15 The following is a model of a cell made of a partially permeable membrane. No enzyme is added into the cell model.



The iodine solution will turn from brown to blue black in the presence of starch. After two hours, the water in the beaker has no change in colour.

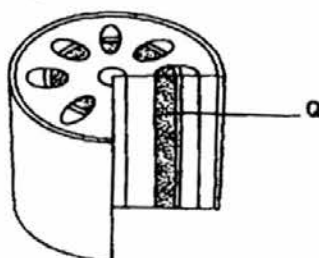
Which of the following could be the reason?

- ☒ A The starch does not diffuse out the cell model.
 - ☐ B The glucose moves from the cell model into the beaker.
 - ☐ C The glucose molecules have combined to produce starch.
 - ☐ D The starch in the cell model has broken down into glucose.
- 16 The diagram below shows 2 sucrose solutions. The arrows indicate the net movement of water molecules through a partially permeable membrane. What could possibly be the concentrations of solution A and B?



	Concentration of sucrose in solution A (mg/ml)	Concentration of sucrose in solution B (mg/ml)
A	1.00	0.500
☒ B	0.500	1.00
C	0.500	0.500
D	0.500	0.250

- 17 The diagram shows a section through a stem.



What is the main transport function of tissue Q?

	<i>Substance transported</i>	<i>Carried from</i>	<i>Carried to</i>
A	sugar	roots	leaves
B	sugar	leaves	roots
C	water	leaves	roots
☒ D	water	roots	leaves

- 18 Which of the following have modified their structures to improve the diffusion of substances?

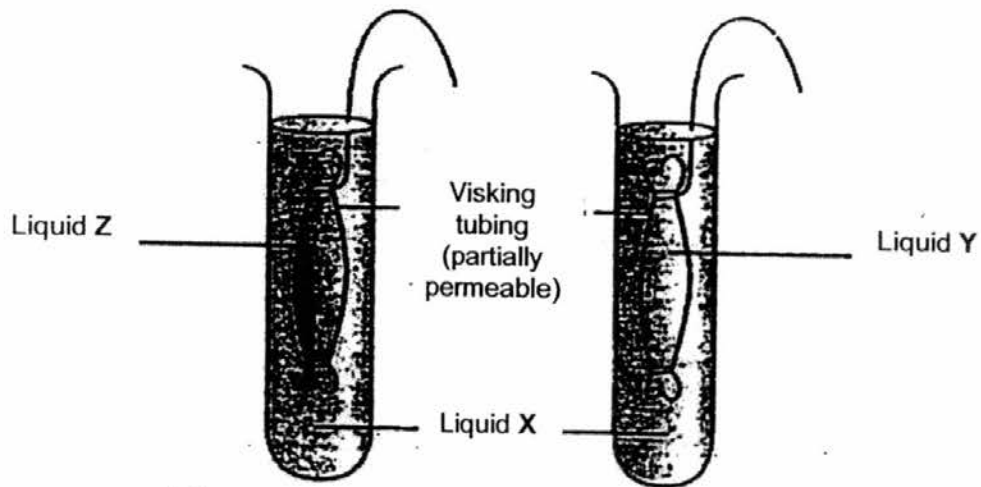
- I. Red blood cells
- II. Stomata (opening underneath leaves, do not modify structures to increase SA)
- III. Root hair cells

- | | | | |
|---|-----------------|------------------------------------|----------------|
| A | I and II only | ☒ B | I and III only |
| C | II and III only | D | I, II and III |

- 19 Which of the following statements is not correct?

- A Unicellular organisms do not require an efficient transport system for survival.
- B Oxygen in the circulatory system enters and leaves the cells by simple diffusion.
- C Amoeba is able to survive without a proper transport system because it obtains nutrients and removes unwanted substances through simple diffusion.
- ☒ D Oxygen and water diffuse into the root hair cells and are transported upwardly to the rest of the plants by xylem vessels. (oxygen not absorbed by root hair, its through stomata of the leaves)

- 20 An apparatus was set up as shown.

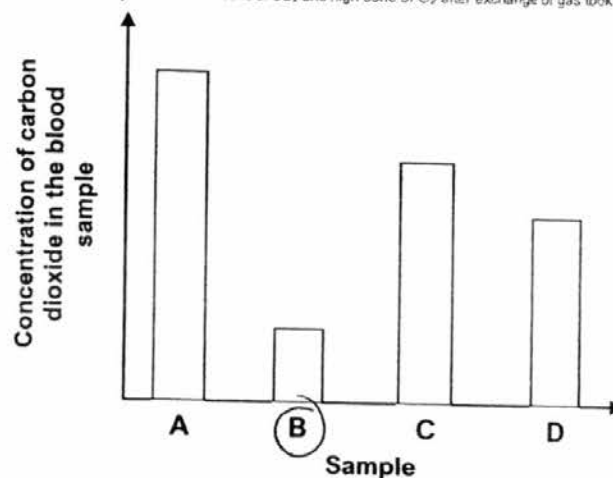


After some time had elapsed, the visking tubing containing liquid Y collapsed while the tubing containing liquid Z was firm and hard.

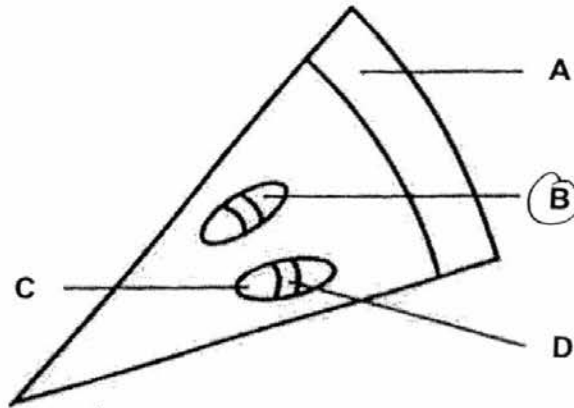
Which one of the following could be a correct description of the liquids at the start of the experiment?

	Liquid Z	Liquid X	Liquid Y
A	25% sucrose solution	10% sucrose solution	Water
B	Water	25% sucrose solution	10% sucrose solution
C	10% sucrose solution	Water	25% sucrose solution
D	water	10% sucrose solution	25% sucrose solution

- 21 The bar chart below shows the concentration of carbon dioxide in blood samples taken from four different places in the human circulatory system. Which blood sample was taken from the pulmonary vein? Blood in pulmonary contains low conc of CO₂ and high conc of O₂ after exchange of gas took place



- 22 The diagram shows part of a transverse section of the stem of the plant. Which part is responsible for transporting sucrose?



- 23 A scientist extracted protease from the human pancreas. The enzyme is subjected to different pH levels and different food molecules. In which set-up will digestion take place?

	food molecule	hydrochloric acid	sodium hydroxide
A	carbohydrate	present	absence
B	carbohydrate	absence	present
☒ C	protein	absence	present
D	protein	present	absence

- 24 What is the final product when proteins are digested?

☒ A Glucose
☐ B Glycerol
☐ C Amino acids
☐ D Fatty acids

- 25 Jia Jun likes to buy high fibre bread for his family.

At which part of the digestive system will the fibre be digested?

☐ A Stomach
☒ B Small intestine
☐ C Large intestine
☐ D None of the above

- 26 The table shows the compositions of four types of food P, Q, R and S.

Food	Carbohydrate	Fat	Protein
P	✓	X	✓
Q	X	✓	✓
R	X	✓	X
S	✓	✓	X

key:

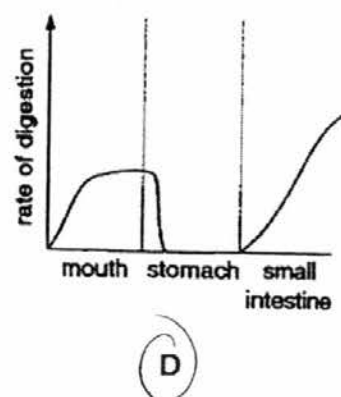
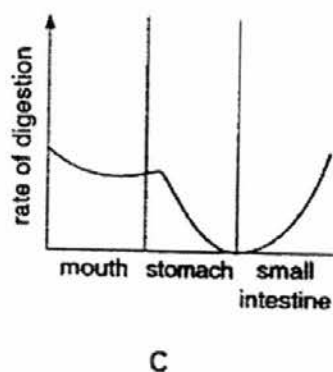
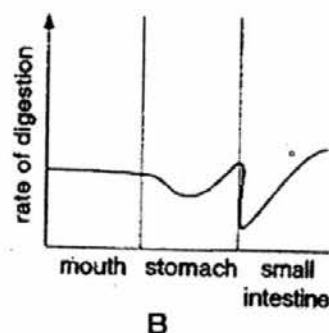
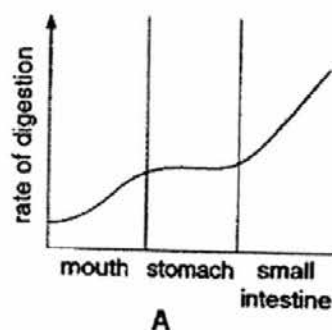
✓ = present
X = absent

Partial digestion of food takes place in the mouth.

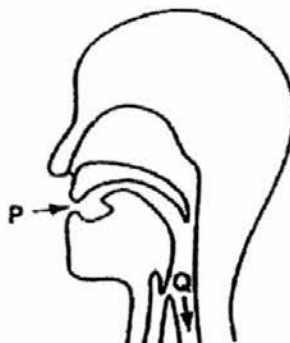
- A P and Q
C R and Q

- B** P and S
D R and S

- 27 Which bar chart shows the rate of starch digestion in the mouth, stomach and small intestine? [D]



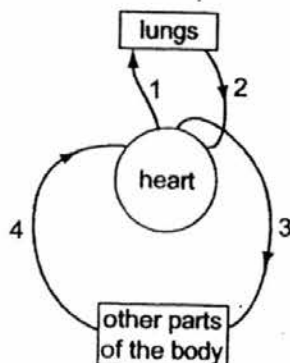
- 28 Solid food enters the mouth at **P** and enters the oesophagus at **Q**.



How does the food at **Q** differ from the food at **P**?

- ☒ **A** Contains lesser protein
☐ **C** Has larger surface area
- ☐ **B** Contains more starch
☐ **D** Has larger particles

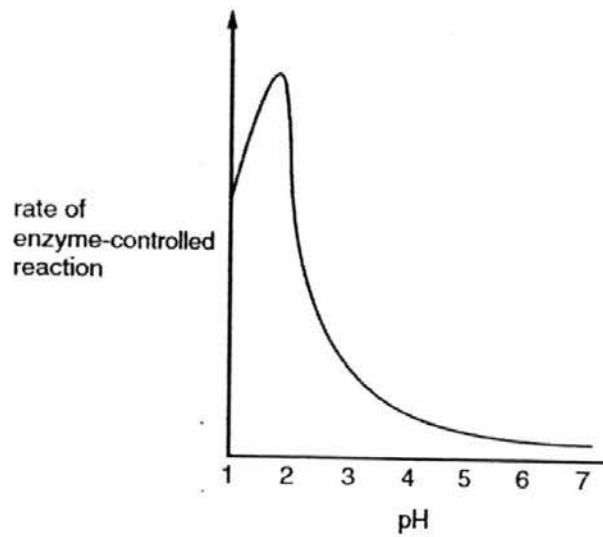
- 29 The diagram shows the double circulation of blood.



Which row in the table below best describes the oxygen levels of the blood in the sites labelled 1 to 4?

	1	2	3	4
A	High	Low	Low	High
B	High	Low	Low	Low
☒ C	Low	High	High	High
☐ D	Low	High	High	Low

- 30 The diagram below shows the rate of enzyme reaction with time.



Which of the following enzymes do you think is represented by this graph?

- ☒ A Pepsin
- ☐ B Amylase
- ☐ C Lipase
- ☐ D Erepsin

END OF PAPER

The Periodic Table of the Elements

The Periodic Table of the Elements																																						
I		II		Group															III	IV	V	VI	VII	0														
													1 H Hydrogen 1															2 He Helium 2										
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Fr Francium 87		226 Ra Radium 88		227 Ac actinium 89																																		

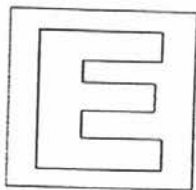
*58-71 Lanthanoid series

†90-103 Actinoid series

Key	a X b	a = relative atomic mass X = atomic symbol b = proton (atomic) number
-----	---	---

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



GAN ENG SENG SCHOOL
Mid-Year Examination 2016



**CANDIDATE
NAME**

CLASS

**INDEX
NUMBER**

SCIENCE

Paper 2

9 May 2016

Papers 1 & 2: 2 hours

Sec 2 Express

Candidates answer on the Question Paper.

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

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

Section A

Answer all questions.

Section B

Answer question 7 and **three other** questions.
In calculations, you should show all the steps in your working, giving your answer at each stage.
Enter the numbers of the Section B questions you have answered on the dotted lines in the grid below.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

At the end of the examination, hand in your answers to Paper 1 and Paper 2 separately.

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

A copy of the Periodic table is inserted on page **16**.

For Examiner's Use	
Section A	30
Section B	40
Q7	
.....	
.....	
.....	
Total	70

SECTION A (30 marks)

Answer **all** the questions in this section.

- 1 Study the brief write up of a savanna found in one part of Africa.

'A savanna is a tropical grassland filled with shrubs and isolated trees. Its characteristics lie between a tropical rainforest and a desert biome.

It has warm temperature throughout the year. There are two very distinct seasons in this savanna; a dry season and a very wet season. During dry season, there is only an average of about 10 cm of rainfalls. However, it rains very frequently during wet season.

Plants are highly specialized to survive for long periods of drought during dry season. Some develop long tap roots that can reach the deep water underground. Others contain thick bark to resist forest fires.

There are up to 16 different species of herbivores such as zebra and giraffe living in a savanna. They provide the source of food for carnivores such as lions and leopards.'

- (a) Is savanna an ecosystem? Explain your answer.

[1]

Yes. It is a habitat to a community which have different populations of plants and animals.

- (b) State two abiotic factors that affect the lives in this savanna.

[1]

Temperature and water

- (c) 'Plants are highly specialized to survive for long periods of drought during dry season.'

[1]

Which term best explains the above sentence?

Adaptation

- (d) Construct one food chain from the passage above.

[1]

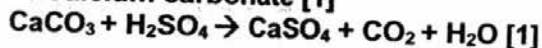
**Plant → Zebra → Lion
Or
Plant → giraffe →
Lion/leopard**

- 2 A salt, calcium sulfate is formed when an unknown substance **P** is added to dilute sulfuric acid. White precipitate and effervescence are formed in the limewater.

(a) Identify **P**.

Write a chemical equation to show the above reaction. [2]

P: Calcium carbonate [1]



(b) Explain why neutralization is a chemical reaction. [1]

The reaction is irreversible and new products are formed.

- 3 The following table gives the melting and boiling points of two substances **P** and **Q**.

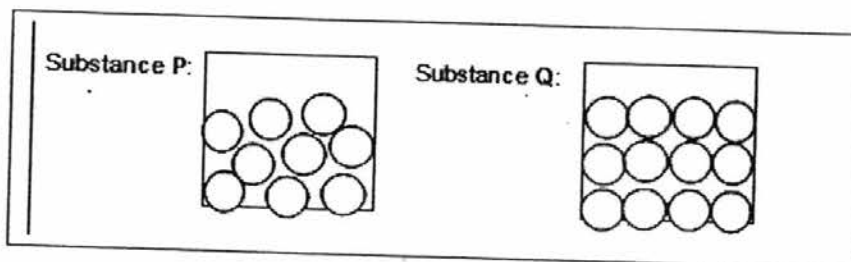
Substance	Melting point / °C	Boiling point / °C
P	10	87
Q	120	312

(a) State the physical state(s) of substance **P** and **Q** for the temperatures below; [2]

At 11°C, state(s) of substance **P**: **(liquid)**

At 312°C, state(s) of substance **Q**: **(liquid and gas)**

(b) Draw the arrangement of the particles of substance **P** and **Q** at 80 °C. [2]



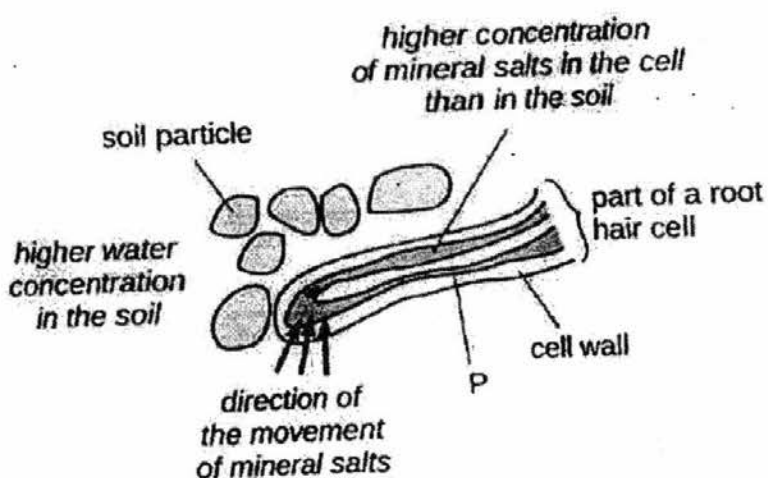
(c) Describe the changes in movement and arrangement of the particles of substance **Q** as it is heated from 300 °C to 350 °C. [3]

At 300°C, the particles are sliding over one another and are arranged randomly and closely packed together. As it is heated to 312 °C, the particles gain energy and slide over one another at higher speeds. When the temperature increases beyond 312 °C and until 350 °C, particles now move freely at high speeds and are spaced far apart from one another.

- (d) Complete the following table by writing the chemical formulae of the compounds given: [2]

Name of compound	Chemical formula
Iron (III) nitrate	$\text{Fe}(\text{NO}_3)_3$
Ammonium sulfate	$(\text{NH}_4)_2\text{SO}_4$

- 4 The following diagram shows a part of root hair cells.



It is found that in the soil, the concentration of water is high but low in minerals salts, in comparison to their respective concentrations found in the root hair cell.

- (a) (i) Suggest the direction of water movement. [1]

..... From the soil into the root hair cell

- (ii) Explain why water moves in the direction stated in (i). [2]

There is a higher water potential in the soil than in the cell [1]. Hence, water moves from its high water potential region to its low water potential region [1].

- (b) The cell contains high concentration of other substances such as proteins but they are unable to move out from the cell into the soil. This is because their movement is restricted by structure P.

(i) What is P?

Cell membrane

[1]

(ii) Explain if protein can pass through P.

[1]

Particles with bigger size cannot pass through the partially permeable cell membrane.

- 5 (a) In the alimentary canal, digestion is aided by three types of enzymes.

[4]

Complete the table below to show the names, substrates and end products of these digestive enzymes.

Name of enzymes	Name of substrate	End products
Maltase	Maltose	Glucose
Protease	Protein	Amino acids
Lipase	Fat	Glycerol and fatty acids

- (b) Describe the digestion of protein in the body.

[2]

Protein digestion starts in the stomach, where pepsin digests proteins to form polypeptides [1]
In the small intestine, trypsin secreted by the pancreas, digests proteins to form polypeptides [1]

- 6 In normal birth the left and right sides of the heart are separated by a thick wall of muscle. In a few rare cases this sheet of muscle is incomplete and leaking.

Describe and explain how this defect may affect a person's activity.

[3]

Oxygenated blood in the left ventricle and deoxygenated blood in the right ventricles would mix [1], making the blood entering the aorta less Oxygenated. [1]

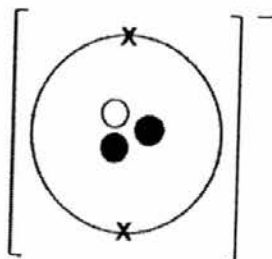
The patient cannot lead an active life. [1]

END OF SECTION A

SECTION B (40 marks)

Answer Q7 and any 3 other questions in this section.

- 7 Tritium is an isotope of hydrogen. An ion of tritium has the following structure.



- (a) Complete the following table to show the names and charges of the particles in the ion of tritium. [3]

Symbol	Name	Charge
●	NEUTRON	0
○	proton	+1
X	ELECTRON	-1

- (b) Using the symbol, T, to represent tritium, state the formula of [2]

(i) the ion of tritium, T⁻

(ii) The compound formed between tritium and calcium. CaT₂

- (c) (i) Explain what is meant by the term *isotope*. [1]

Isotopes are atoms of the same element, with the same proton number but different neutron number.

- (ii) Explain why isotopes have similar chemical properties but slightly different physical properties. [2]

Isotopes have similar chemical properties as they have the same number of valence electrons which are involved in chemical reactions. [1]

Different physical properties as they have different relative atomic masses (proton number) which determine their physical property. [1]

- (d) Nitrogen combines with sodium to form sodium hydride. Draw a dot and cross diagram to show the electronic structure of sodium hydride. You only need to show outer electrons. [2]

1m – correct number of ions formed

1m – correct number of electrons for Na and N

- 8 Fig. 9.1 shows an experiment to investigate the effect of pH on the activity of substance X which catalyzes the breakdown of proteins. A few drops of acid solution with different pH values are added into the solution in each set of the investigation.

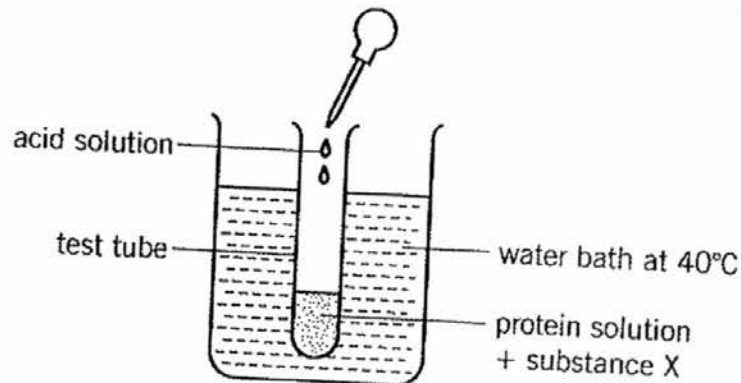


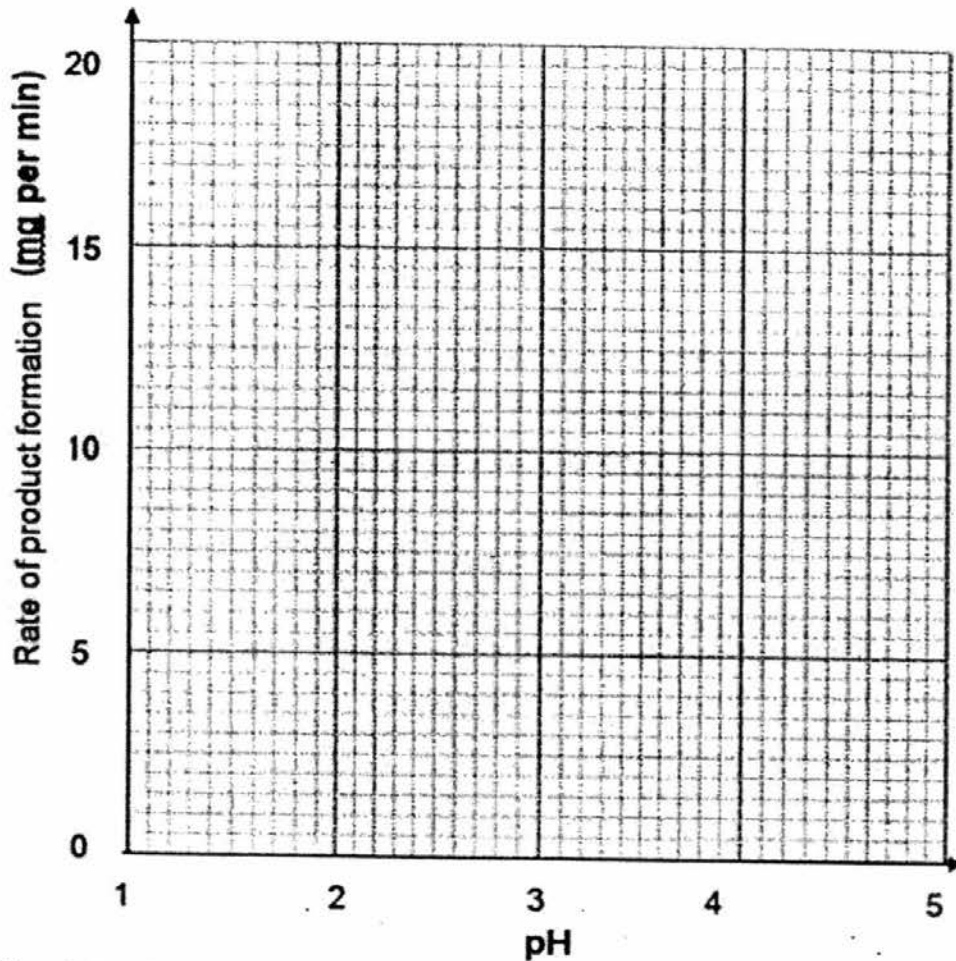
Figure 9.1

Table 9.1 shows the results of the experiment.

pH	1.0	2.0	3.0	4.0	5.0
Rate of product formation (mg per minute)	17.5	16	11.5	4.5	0

- (a) Suggest the name of substance X. **Protease/ Pepsin** [1]
-
- (b) What is the product formed when proteins are broken down by substance X? [1]
- Polypeptides**
-

- (c) Draw a graph to show the rate of product formation against pH on the grid [2]
provided below.



All points plotted accurately [1]

Best-fit line drawn [1]

- (d) What conclusion can you draw from the graph? [1]
The optimum pH for substance X is from pH 1 to 2
.....
- (e) In which part of the alimentary canal might the substance X be found? [1]
Stomach
.....
- (f) Why is it necessary to break down proteins in the human alimentary canal? [2]

Proteins are large molecules that cannot be absorbed into the blood stream [1].
They are broken down into smaller molecules in order to pass through the
intestinal lining to be absorbed into the bloodstream [1]

- (g) The surface of the small intestine has many finger-like parts called villi. [2]
How do the finger like structures relate to the function of the small intestine?

.....
They increase the surface area [1] so that the absorption of food substances is faster [1].

- 9 (a) In order to make computer processing easier, a code system is used to process various chemical substances. The system makes use of a certain number of elements.

Name	Formula	Code
Sodium chloride	NaCl	11,17
Iron(II) bromide	FeBr ₂	26,35(2)
Aluminium oxide	Al ₂ O ₃	13(2), 8(3)

- (i) A student records the code for potassium nitride, K₃N as 39(3), 14. [2]
The substance fails to register in the computer system.
Explain why the student is wrong and give the correct input for this substance.

The student used the mass number [1] instead of proton/atomic number. 19(3) [1]

- (ii) Write down the chemical formula of these substances. [1]

12,16,8(4): **MgSO₄**

- (iii) Translate the following chemical substances into appropriate codes. [1]

Sugar, C₆H₁₂O₆: **6(6),1(12),8(6)**

- (b) Iron powder is a grey solid. Chlorine is a yellow-green gas. When red-hot iron comes into contact with chlorine, it glows white-hot, sparks are seen flying and a brown solid is formed in the flask. The brown solid is compound Iron(III) chloride.

- (i) Give one reason to explain why the above is an example of a chemical change. [2]

A new compound is formed. [1] or The compound has different properties from the elements that its made of [1]. Or Heat was released [1]

- (ii) Write a chemical equation for the above reaction. [2]

2 Fe + 3 Cl₂ → 2 FeCl₃ 1m correct eqn, 1m correct chemical formula

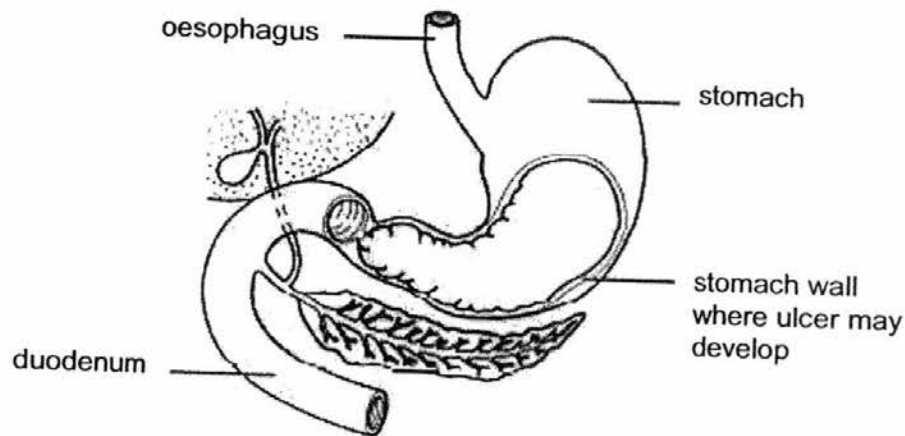
- (iii) Some decomposition processes occur naturally. [2]
Explain why decomposition has beneficial uses as well as harmful effects.

Benefits:

- Decomposition is needed to return nutrients back to soil/recycled for use by plants. or
- Without decomposition, dead organisms will be everywhere, taking up space.

Harm: Causes wastage of food and resources.

- 10 (a) The figure below shows some parts of the human alimentary canal and associated organs.



- (i) Name and describe the process that moves food down the oesophagus to the stomach. [3]

Name of process: Peristalsis [1]

Description of process:

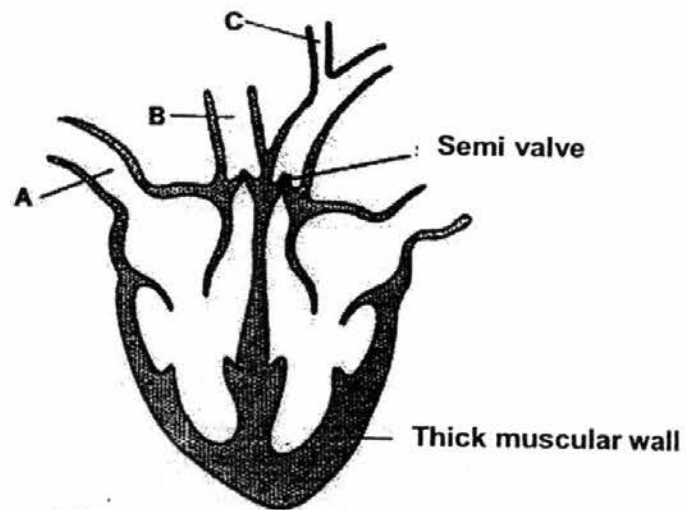
- Wave like, rhythmic contractions of oesophagus wall [1]
- Pushes food down towards stomach [1]

- (iii) A sore can develop on the wall of the stomach. This sore is called an ulcer, which can cause pain. The pain may be relieved by taking a drug that neutralise the amount of acid produced by the cells in the stomach wall. [5]

Suggest and explain how the processes taking place in the stomach may be affected in a person taking this drug.

- Decrease in acidity, increases pH in stomach [1]
- Not an optimum pH for gastric enzymes to work [1]
- Decreases enzyme activity [1]
- Decrease in digestion of proteins [1]
- Bacteria is not killed [1]

- (b) The diagram below shows the human heart and some associated blood vessels. The arrows on the diagram show the direction of blood flow.



Name blood vessels **A**, **B** and **C**.

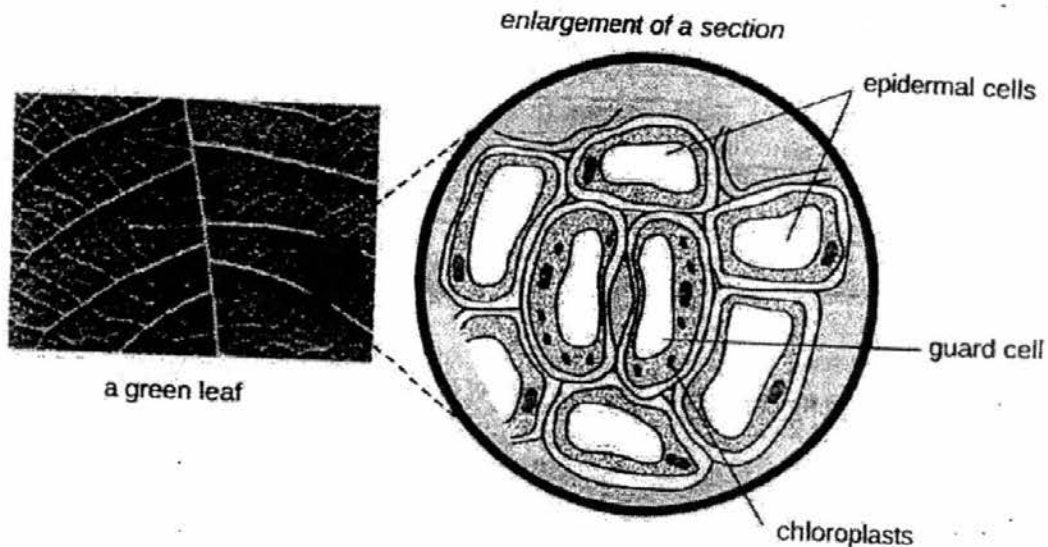
[2]

A: Vena Cava

B: Pulmonary artery

C: Aorta [minus 1m for 1 wrong ans]

- 11 The diagrams below show the cells found underside of a green leaf during a warm sunny day.



- (a) (i) Name two chemical reactions that take place in the guard cells during a warm sunny day. [1]

Respiration and Photosynthesis

- (ii) Hence, write the word equation that represent each chemical reactions. [2]

Photosynthesis: Carbon dioxide + water $\rightarrow$ glucose + oxygen

Respiration: Glucose + oxygen $\rightarrow$ carbon dioxide + water

- (b) When tested with iodine solution, only the guard cells give blue-black colour. The epidermal cells give brown colour. [2]

Explain why the epidermal cells do not show blue-black colour as seen in the guard cells during a warm sunny day.

Epidermal cells do not have chloroplasts, so there is no chlorophyll to capture the sunlight for photosynthesis to take place. [1]

Hence, no excess glucose is stored as starch in the epidermal cells. [1]

- (c) (i) Explain if capillaries have thin walls surrounding the body cells. [1]

Yes. Diffusion of substances can be made easier between blood and body cells.

- (ii) Describe and explain what happens to the guard cells when it is placed in a high concentrated sucrose solution. [4]

Water potential in the guard cell is higher than the sucrose solution [1].

Therefore, water moves from guard cell into the sucrose solution [1] via osmosis. [1]

As a result, the cell shrinks and become flaccid. [1]

END OF PAPER

The Periodic Table of the Elements

The Periodic Table of the Elements																						
I		II		Group																		
				1 H Hydrogen 1											III	IV	V	VI	VII	0		
7 Li Lithium 3	9 Be Beryllium 4																11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12																27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36					
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54					
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86					
Fr Francium 87	226 Ra Radium 88	227 Ac actinium 89																				

*58-71 Lanthanoid series

†90-103 Actinoid series

Key	a X b	a = relative atomic mass X = atomic symbol b = proton (atomic) number
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140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).