E

# GAN ENG SENG SCHOOL
## Mid-Year Examination 2012

CANDIDATE NAME

CLASS

INDEX NUMBER

## SCIENCE (Two Express)
Paper 1

11 May 2012
Papers 1 and 2 : 2 hours

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

Read the instructions on the OTAS very carefully.

Answers to Paper 1 and 2 must be handed in separately.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
You are advised to spend no more than 30 minutes on Paper 1.

Any rough working should be done in this booklet.

A copy of the Periodic Table is inserted on page 11.

Total Marks
30



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

1 What happens to the water particles in a water bag when the water bag is compressed by Joshua's hands?

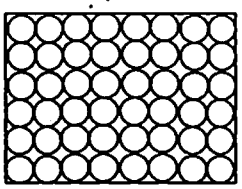
A Water particles will have greater space between each other.
B Water particles will shrink in size.
C Water particles will slide over one another.
D Water particles will have weaker forces of attraction between them.

2 A substance changes from the state in which its particles are arranged in regular pattern at 20°C to an irregular arrangement in 90°C.

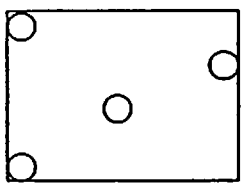
Which statement is **definitely** true?

A The particles of the substance are very closely packed at 20°C.
B The particles of the substance have weak forces of attraction between them at 100°C.
C The substance is a liquid at 90°C.
D The substance melts at above 20°C.

3 The diagrams show the arrangement of molecules in a substance at two different temperatures.



-200 °C



-50 °C

Which substance could the diagrams represent?

| | Melting Point (°C) | Boiling Point (°C) |
|---|---|---|
| A | -150 | -30 |
| B | -150 | -100 |
| C | -200 | -50 |
| D | -220 | -100 |

4 Which example can be explained by the particulate model of matter?

A Cloud
B Energy
C Light
D Vacuum



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5 An atom of an element has a proton number of 17 and mass number of 35.

Which statement is **definitely true** to describe the atomic structure of another isotope of this element?

A It has a proton number of 17 and mass number of 35.
B Its number of electrons is 18.
C Its number of neutrons is 19.
D Its number of protons is 17.

6 Which set of particles have the same electronic configuration?

A B, C, N, O
B H, Li, Na, K
C He, Ne, Ar, Kr
D $O^{2-}$, $F^-$, Ne, $Na^+$

7 Element L is from Group II and Element M is from Group V.

What is the chemical formula of the compound containing L and M?

A LM
B $L_2M_3$
C $L_2M_5$
D $L_3M_2$

8 Study the symbol of the element shown below.

$$^{184}_{74}\mathbf{W}$$

Which statement is not correct about the symbol?

A The element is tungsten.
B The number of neutrons is more than the number of protons.
C There are 74 electrons in the atom.
D There are 184 neutrons in the atom.

9 Hydrogen peroxide, initially liquid, is heated and becomes gases such as water vapour and oxygen.

What statement describes the above process correctly?

A Boiling takes place.
B Decomposition takes place.
C Evaporation takes place.
D Oxidation takes place.



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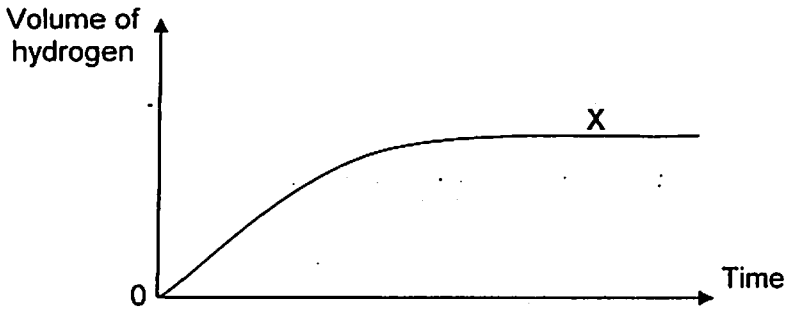
10 Magnesium is silver-grey in colour. When pure magnesium is heated in the presence of oxygen, magnesium oxide, a white substance, is formed.

$$2Mg + O_2 \rightarrow 2MgO$$

Which statement is **not** true?

A A bright light and heat are released in the reaction.
B Mg and $O_2$ gas undergo oxidation to form MgO.
C The properties of MgO is different from Mg.
D The total number of atoms of the reactants and the products are not conserved.

11 Zinc reacts with an **excess** dilute hydrochloric acid. The graph shows how the volume of hydrogen gas given off changed with time.




Why does the graph become horizontal at X?

A All the dilute hydrochloric acid has been reacted.
B All the zinc has reacted.
C Hydrogen is produced at a constant rate.
D The reaction has started to slow down.

12 Which chemical equation is correctly balanced where $x = 1$, $y = 2$, $z = 3$?

A $x\ Al_2(CO_3)_3 + z\ H_2SO_4 \rightarrow x\ Al_2(SO_4)_3 + x\ H_2O + z\ CO_2$
B $y\ C + x\ O_2 \rightarrow x\ CO$
C $x\ Ca(OH)_2 + y\ HNO_3 \rightarrow x\ Ca(NO_3)_2 + y\ H_2O$
D $z\ Fe + z\ O_2 \rightarrow y\ Fe_2O_3$

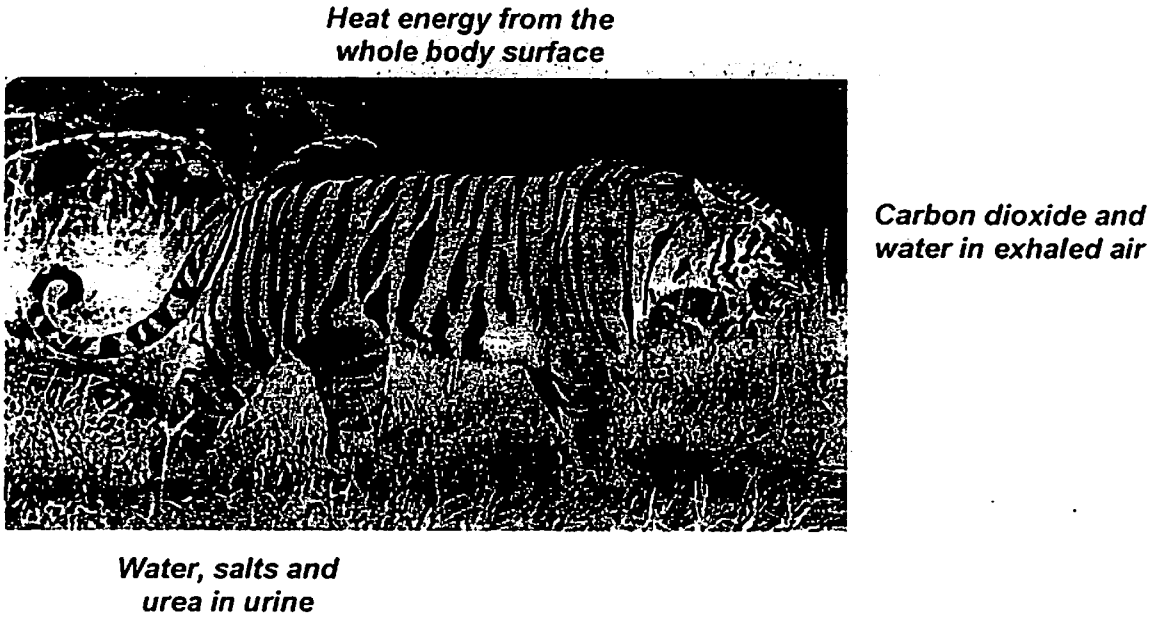
13 How does energy flow through ecosystems?

| | Energy enters as | Energy is transferred as | Energy leaves as |
|---|---|---|---|
| A | Chemical | Heat | Chemical |
| B | Chemical | Chemical | Heat |
| C | Light | Heat | Chemical |
| D | Light | Chemical | Heat |



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14 The diagram shows losses from a tiger to the environment




What will not be returned to the ecosystem and recycled?

A Carbon dioxide
B Heat energy
C Salts
D Urea

15 Which statement best describes ecosystem?

A Ecosystem is made up of a group of living things interacting among themselves and with their non-living physical surroundings.
B Ecosystem is made up of humans creating an environment for plants and animals to live.
C Ecosystem is made up of plants and animals interacting with each other while animals feed on plants.
D Ecosystem is made up of many eco-gardens combining together.

16 Army ants travel on the forest floor and stir up various flying insect species. As the insects flee from the army ants, the birds following the ants catch the fleeing insects. In this way, the birds benefit while the army ants are unaffected.

Which term best describe the relationship of army ants and birds?

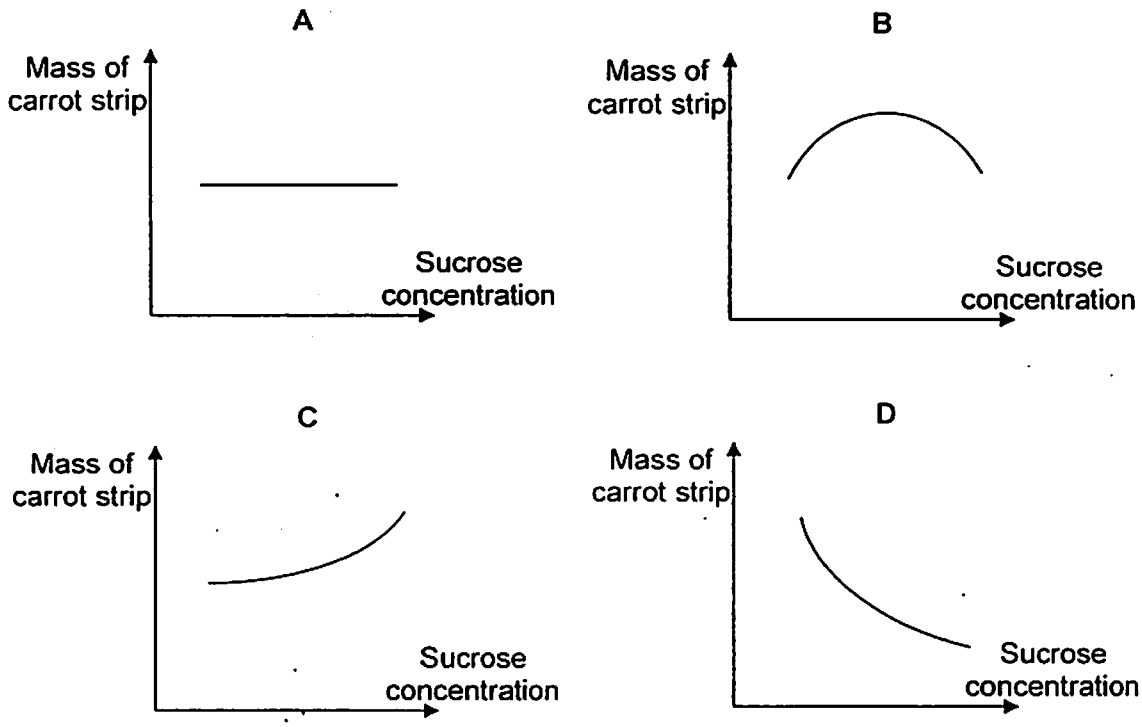
A Commensalism
B Mutualism
C Parasitism
D Predator-prey



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17 A carrot strip was placed in sucrose solutions of different concentrations. The changes in mass of the carrot strip are recorded onto a graph.

Which graph shows the results of the experiment?




18 The table shows the results of an investigation into the absorption of products of digestion in the presence and absence of oxygen.

| Product of digestion | Absorption in the presence of oxygen | Absorption in the absence of oxygen |
|---|---|---|
| Amino acids | 1.7 units | 1.7 units |
| Fatty acids | 5.0 units | 2.0 units |
| Glucose | 2.3 units | 2.3 units |
| Glycerol | 4.8 units | 2.7 units |

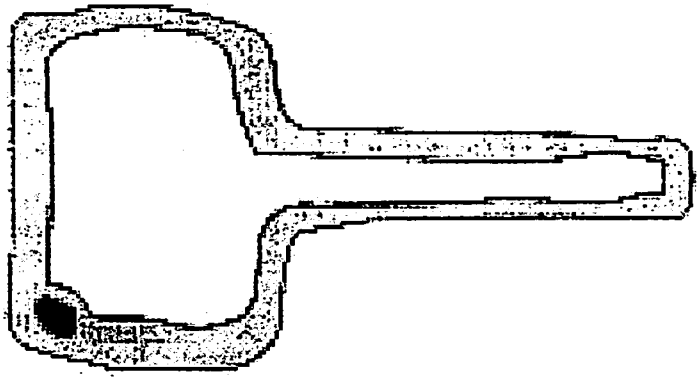
Which conclusion can be drawn from these results?

A All products of digestion are absorbed by both active transport and diffusion.
B All products of digestion are absorbed by diffusion only.
C Amino acids and glucose are absorbed mainly by diffusion.
D Fatty acids and glycerol are absorbed by active transport only.



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19 The diagram shows a root hair cell.



The inside of the root hair cell contains concentrated solution of mineral ions while the surrounding contains dilute solution of mineral ions.

Which statement is correct?

A Water molecules move into the root hair cell because the water potential is higher inside the cell.
B Water molecules move into the root hair cell because the water potential is lower inside the cell.
C Water molecules move out of the root hair cell because the water potential is higher inside the cell.
D Water molecules move out of the root hair cell because the water potential is lower inside the cell.

20 Which of the following examples is **not** suitable to demonstrate the process of diffusion?

A Alcohol on the tabletop disappears after a period of time.
B The foul smell of garbage can be detected from the ground level of HDB block.
C The spray of perfume in an enclosed room can be detected at all corners.
D Water becomes brownish when a tea bag is placed in it.

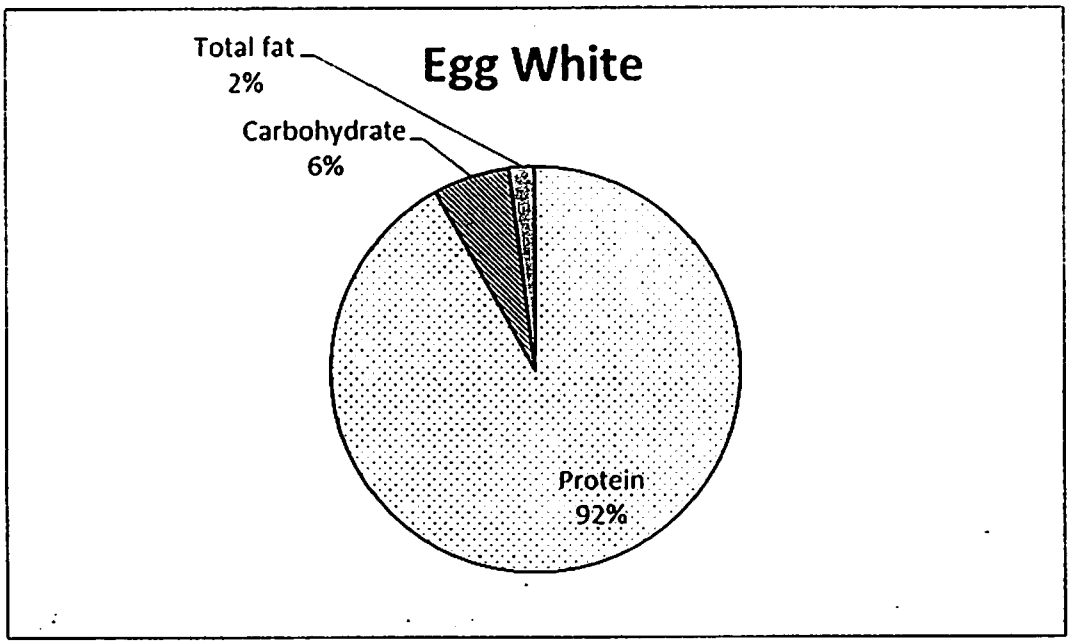
21 Which characteristic is true for bile?

A Bile digests fats into fatty acid and glycerol.
B Bile decreases the surface area is to volume of fats.
C Bile is bitter-tasting, dark green to yellowish brown fluid.
D Bile is produced in gall bladder and stored in liver.



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22 Hui Mei likes to eat egg white. The chart below shows the composition of the nutrients of egg white.




Which parts of the alimentary canal would the egg white be mostly digested?

A Mouth, oesophagus, stomach
B Mouth, stomach, ileum
C Stomach, duodenum, ileum
D Stomach, ileum, ascending colon

23 Carbohydrates will start to be digested in ..... and ends at .....

A mouth, ileum
B mouth, rectum
C mouth, stomach
D stomach, ileum

24 Gallstones are formed when bile contains too much cholesterol. If Hudson has gallstones in gall bladder, the doctor might advise him to go for surgery to remove his gall bladder. The surgical removal of the gall bladder is called cholecystectomy.

What happens if Hudson has his gall bladder removed?

A The cholesterol level will be reduced.
B The digestion of fats would stop.
C There will be only partial digestion of proteins.
D The speed of fat digestion becomes very slow.



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25 Four different liquids were extracted from the human alimentary canal.

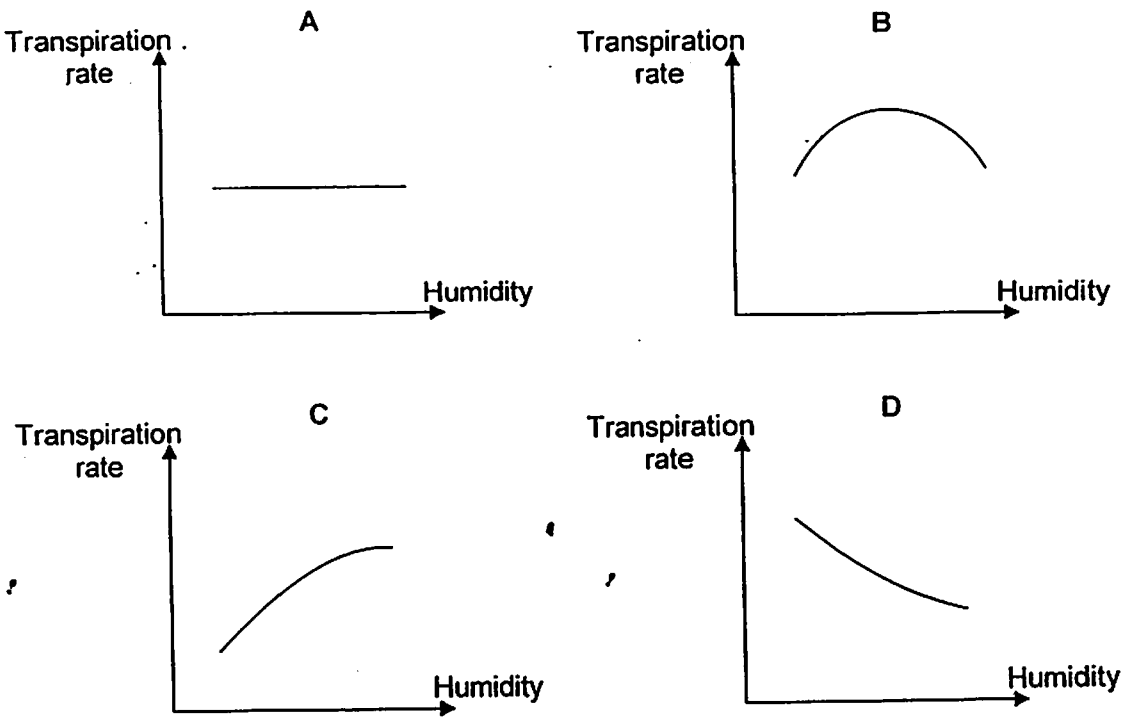
- Bile
- Gastric juice
- Pancreatic juice
- Saliva

Eliza took one of the liquid and mix with a piece of magnesium ribbon. When she inserted a lighted splint into the gas released from the reaction, a 'pop' sound was heard.

Which liquid did Eliza use?

A Bile
B Gastric juice
C Pancreatic juice
D Saliva

26 Which graph shows the effect of increased humidity on the transpiration rate of a plant?




27 Which process does not help in moving water up the stem from the roots?

A Capillary action
B Diffusion
C Root pressure
D Transpiration pull



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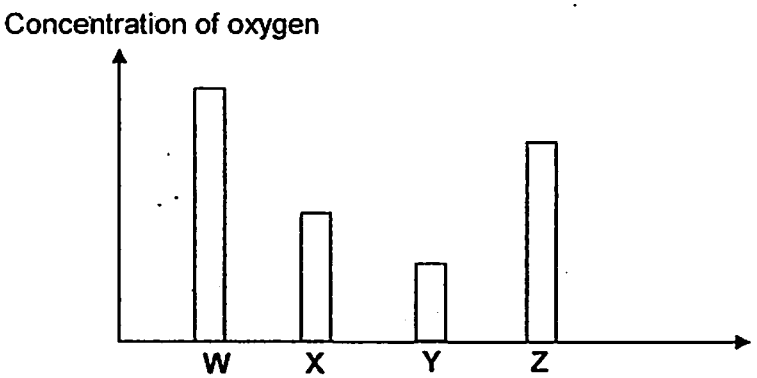
28 Which shows the correct flow of the blood in the human circulatory system from the heart to the lungs and back to the heart?

A Left atrium → Pulmonary vein → Lungs → Pulmonary artery → Right ventricle
B Left ventricle → Pulmonary artery → Lungs → Pulmonary vein → Right atrium
C Right atrium → Pulmonary vein → Lungs → Pulmonary artery → Left ventricle
D Right ventricle → Pulmonary artery → Lungs → Pulmonary vein → Left atrium

29 When a sample of blood is dehydrated, which component of the blood will decrease in amount significantly?

A Plasma
B Platelets
C Red blood cells
D White blood cells

30 Blood samples from four different blood vessels (aorta, pulmonary artery, pulmonary vein and vena cava) were collected and their levels of oxygen were investigated.




Which blood vessel is X?

A Aorta
B Pulmonary artery
C Pulmonary vein
D Vena cava

**END OF PAPER**



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## The Periodic Table of the Elements

| Group I | Group II | | | | | | | | | | | Group III | Group IV | Group V | Group VI | Group VII | Group 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

| 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 |

Key: a X b — a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 $dm^3$ at room temperature and pressure (r.t.p.).



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GAN ENG SENG SCHOOL - Mid-Year Examination 2012 - SCIENCE

Answers:

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



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# GAN ENG SENG SCHOOL
## Mid-Year Examination 2012

CANDIDATE NAME

CLASS

INDEX NUMBER

## SCIENCE (Two Express)
Paper 2

11 May 2012
Papers 1 and 2: 2 hours

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.

Answer **all** questions in Section A.
Answer **four** questions in Section B of which **Question 8 is compulsory**.
**Enter the numbers of the Section B questions you have answered in the grid below.**

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 | |
| Section B | |
| Q8 | |
| Q | |
| Q | |
| Q | |
| Total | 70 |

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## SECTION A (30 marks)

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

1 **(a)** An atom (not of isotope) has 20 neutrons.

**(i)** Write down all possible chemical formula of the compounds formed when this atom becomes an ion and combines with a carbonate ion. [2]

.....

**(ii)** What gas will be produced when the compounds mix with a nitric acid? [1]

.....

**(iii)** Describe how you can test the presence of the gas in **(a) (ii)**? [2]

.....

.....

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**(b)** "*An atom will always have the number of neutrons greater than or equal to the number of protons.*" [2]

Comment on the reliability of this statement.

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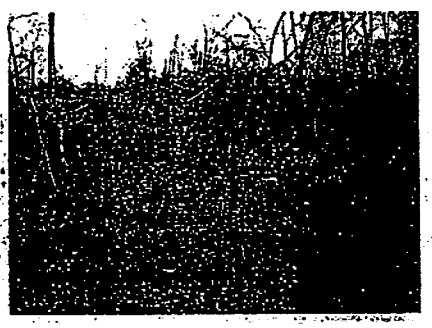
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2 Study the pictures below.

The left picture shows a plot of land before factories were built near it. The right picture shows the same plot of land after 15 years which the factories were built.





**(a)** The air pollutants suspected for this above change can be carbon dioxide, carbon monoxide, lead compounds, oxides of nitrogen, and sulfur dioxide. Name two air pollutants responsible for this. [2]

.....

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2 (b) Give another similar harmful effect on **man** by the air pollutants stated in **(a)**. [1]

.....

.....

(c) Explain how this phenomenon in the long run can lead to global warming. [2]

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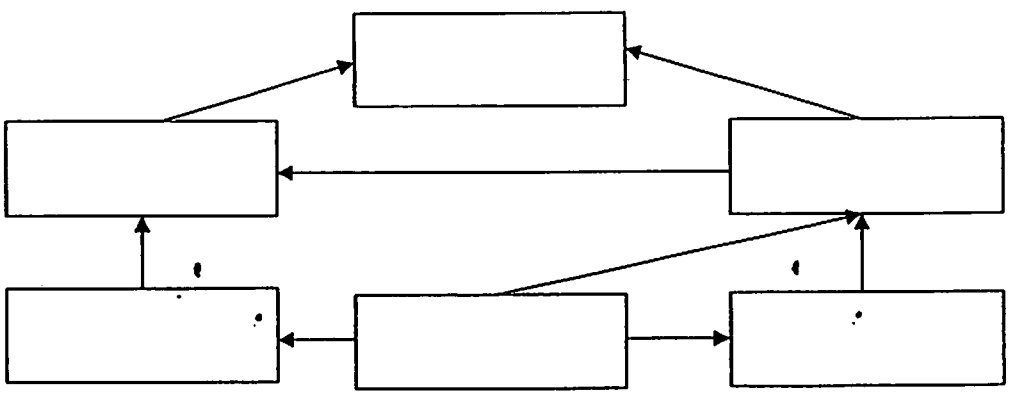
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3 Study the relationship between the six new species – Aripos, Bintos, Carlos, Dinnos, Elesos, and Fisgos.

*Aripos feed on Carlos and Elesos.*
*Bintos and Dinnos feed on Fisgos.*
*Carlos feeds on Fisgos and Dinnos.*
*Elesos feed on Bintos and Carlos.*

(a) Complete the food web by filling in the correct species. [3]



(b) Write down the longest food chain from this food web. [1]

.....

.....

(c) One of the species is an omnivore. Identify the omnivore. [1]

.....

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4 Study the melting points and boiling points of Substances P, Q, R and S.

| Substance | Melting Point / °C | Boiling Point / °C |
|---|---|---|
| P | -101 | 10 |
| Q | -15 | 78 |
| R | -10 | 101 |
| S | 77 | 380 |

**(a)** Which substance(s) are in liquid state at room temperature 25°C? [1]

.....

**(b)** Which liquid will evaporate the fastest at room temperature? Explain. [2]

.....

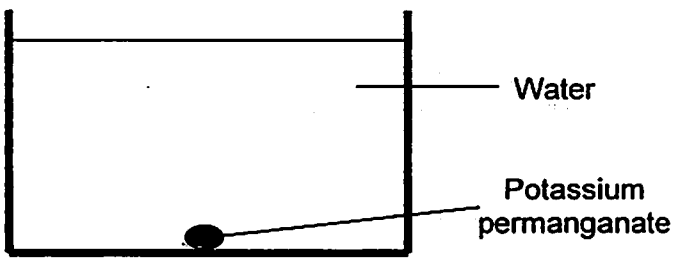
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**(c)** Using the particulate model of matter, describe Substance S in terms of forces of attraction at room temperature. [1]

.....

5 A drop of potassium permanganate, purple in colour, was placed at the base of the tank filled with water.




The mixture was in the tank for a few days without stirring.

**(a)** What happens to the water in the tank after few days? [1]

.....

**(b)** Explain what happens in **(a)**. [2]

.....

.....

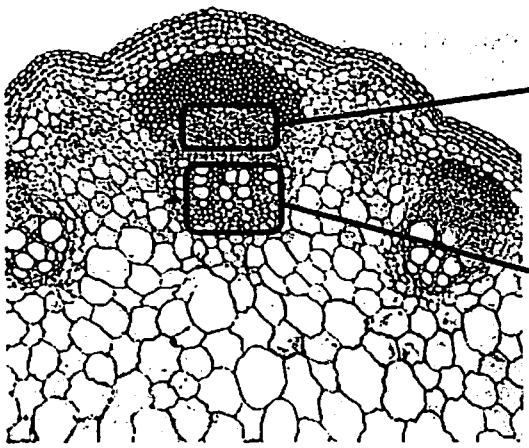
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6 The diagram below shows a section of the transport system in a typical flowering plant.



| | Name of tissues | Made of? |
|---|---|---|
| (i) | | |
| (ii) | | |

**(a)** Fill in the table the names of the vessels and what they are made up. [2]

**(b)** What is the function the vessels in **(i)**. [1]

.....

.....

7 **(a)** Name **all** the organs of the alimentary canal which do **not** have digestion of fats or starch taking place. [1]

.....

**(b)** What is the main function of proteins? [1]

.....

.....

**(c)** Write down the end products of proteins after digestion. [1]

.....

**END OF SECTION A**

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## SECTION B (40 marks)

Answer Q8 and any 3 other questions in this section.

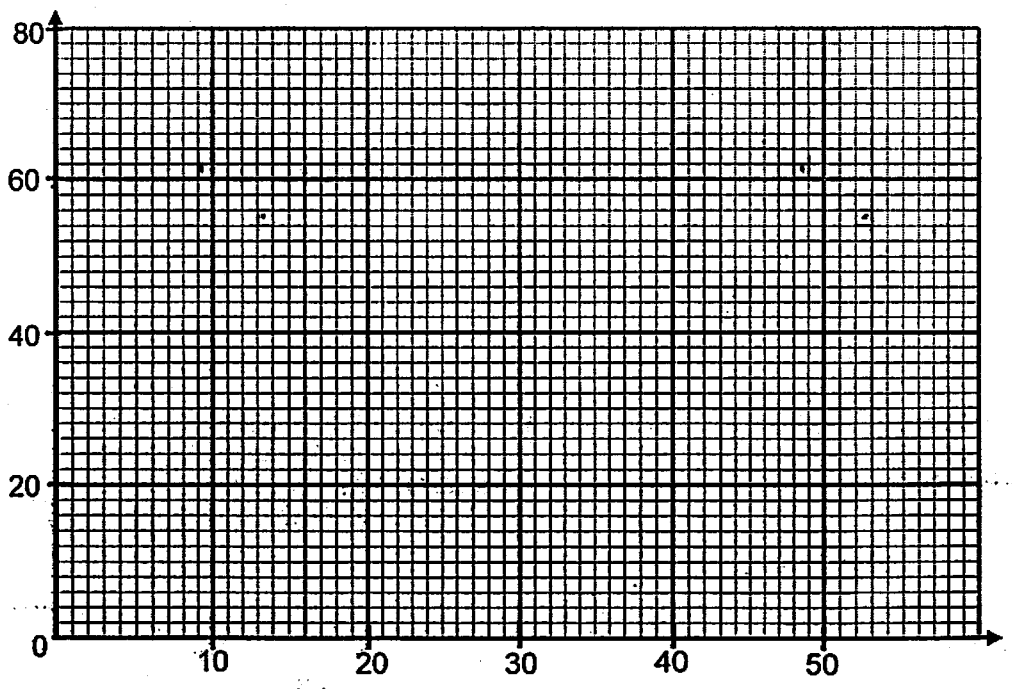
8 The blood circulatory system consists of heart, blood vessels and blood.

Points A, B, C and D may be the starting points of the heart, an artery, a vein and a capillary (not in the same order) where the pressure of the blood is measured. The pressure of the blood differs at each starting point of the different parts of the blood circulatory system.

The table below shows the pressure of the blood as it completes one circulation of the body (excluding the lungs).

| Distance from Point A / units | Pressure of blood / units | Starting point of Blood Circulatory System |
|---|---|---|
| 0 | 10 | A |
| 10 | 6 | B |
| 14 | 80 | - |
| 18 | 64 | - |
| 22 | 70 | - |
| 26 | 56 | - |
| 30 | 60 | C |
| 40 | 20 | D |
| 50 | 10 | A |

**(a)** Plot the graph of pressure of blood against distance from Point A of the blood circulatory system using the table above. Use multi straight lines to connect all the points. [4]




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8 (b) State which labeled section (A, B, C of D) of the graphs shows the pressure of the blood as it passes through the [2]

(i) artery: .....

(ii) capillary: .....

(iii) heart: .....

(iv) vein: .....

(c) Suggest why the blood pressure in the pulmonary artery is not as high as that in the aorta. [2]

.....

.....

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(d) List down two differences between an artery and a vein. [2]

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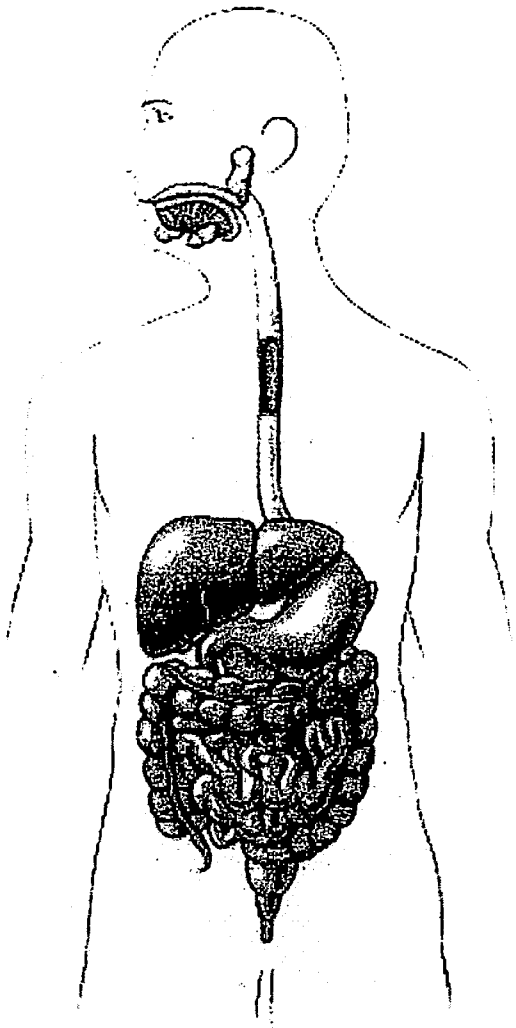
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9 The diagram below shows a human alimentary canal.



(a) Mark 'P', 'Q', and 'R' on the organs which help digestion but are not part of the alimentary canal in the above diagram and write down one function of each organ in the table. [3]

| Organs | Function |
|---|---|
| P | |
| Q | |
| R | |

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9 (b) List down three physical digestions occurring in the alimentary canal in the table below. [3]

| Organs of alimentary canal | How the physical digestion takes place |
|---|---|
| | |
| | |
| | |

(c) Describe how starch is broken down to its simplest form from the start to the end of the alimentary canal. [4]
(*In your description, write down the organs where the digestions occur, the actions of enzymes for starch and the end products of starch.*)

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**10** Study the table below.

| Particle | Atomic number | Nucleon number | No. of protons | No. of electrons | No. of neutrons |
|---|---|---|---|---|---|
| A | 7 | 14 | | | |
| B | 8 | 16 | | | |
| C | 9 | 19 | | | |
| D | 10 | 20 | | | |
| E | 11 | 23 | | | |
| F | 12 | 24 | | | |

Kisshan conducts a research about Particles **A** to **F**.

Particles **A**, **C** and **F** are atoms.
Particles **B**, **D** and **E** have the same number of electrons.

**(a)** With the given information about Particles **A** to **F**, complete the table above. [3]

**(b)** Explain how you determine the number of electrons for Particles **B**, **D** and **E**. [1]

.....

.....

**(c)** Particle **B** can combine with Particle **E** to form a compound.

**(i)** Write down the chemical formula of this compound. [1]

.....

**(ii)** Use 'dot' and 'cross' diagram, draw the electronic structure of the compound in **(c) (i)**. [3]

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10 (d) Sean discovers a new particle G which has 7 protons and 8 neutrons.

(i) Which particle (A to F) is an isotope of G? [1]

.....

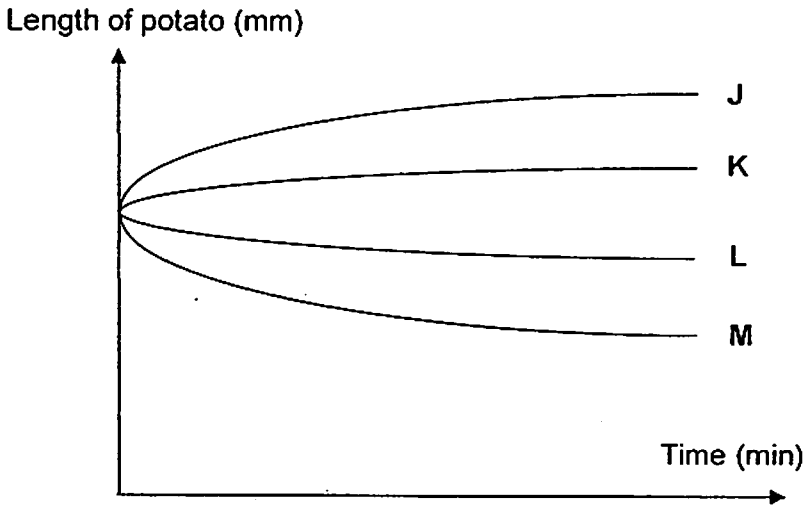
(ii) Explain your choice in (d) (i). [1]

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11 (a) Four identical potato strips are placed in four different solutions J, K, L and M. Each solution could be 0.1 mol/dm$^3$ sucrose solution, 0.3 mol/dm$^3$ sucrose solution, 0.6 mol/dm$^3$ sucrose solution or distilled water. The length of each potato strip is recorded on the graph over time.




(i) Which solution is distilled water? Explain. [3]

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(ii) Estimate and write down the sucrose concentration of the potato strip before immersing into the solutions. [1]

.....

(iii) On the graph in (a), predict and draw the length of potato strip over time if the potato strip is placed in a solution with the same sucrose concentration mentioned in (a) (ii). [1]

(iv) Explain the graph you have drawn in (a) (iii). [2]

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11 (b) Due to drinking insufficient water, Kevan had developed an ulcer on his mouth. He was in intense pain and decided to see a doctor.

After consulting Dr Ryan, Kevan was advised to put some salt on his ulcer.

(i) What happens to the size of the ulcer when salt is placed on it? [1]

.....

(ii) Explain your answer in **(b) (i)**. [2]

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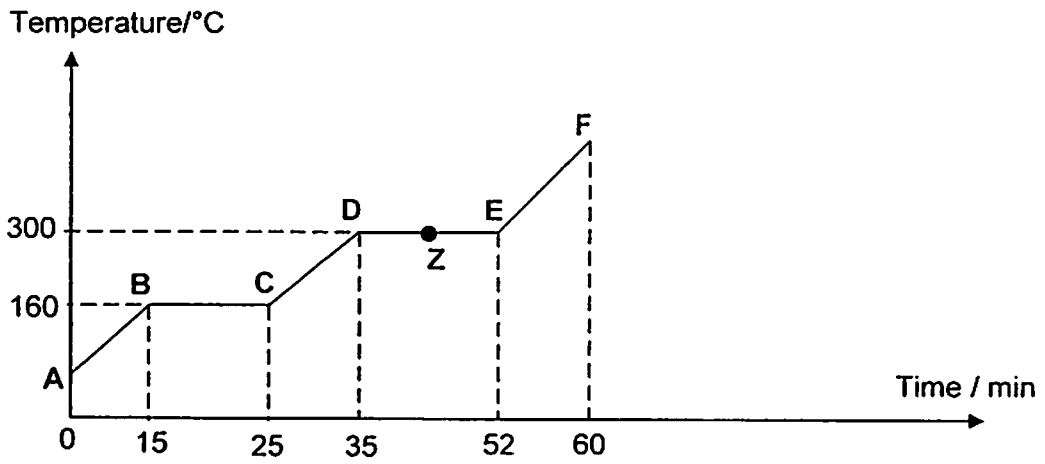
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12 The graph below shows a heating curve of an unknown substance ***X***.




**(a)** List down the section(s) which ***X*** is and could be a solid. [1]

.....

**(b)** Using the particulate model of matter, explain what happens to ***X*** along Section **DE**. [4]

.....

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**(c)** Draw the arrangement of particles at Point **Z** in the space provided. [1]

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12 **(d)** After 60 minutes of heating, the substance ***X*** is cooled to 200°C.

**(i)** On the graph in **Q12**, complete the graph by including the above information. [1]

**(ii)** Using particulate model of matter, describes the particles at 200°C in terms of their motion and forces of attraction. [3]

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**END OF PAPER**



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## The Periodic Table of the Elements

| Group I | Group II | | | | | | | | | | | Group III | Group IV | Group V | Group VI | Group VII | Group 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

| 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 |

Key: $\,{}^{a}_{b}X$ — a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 $dm^3$ at room temperature and pressure (r.t.p.).

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Section A

**1ai** $K_2CO_3$ **[1]**, $CaCO_3$ **[1]**

**1aii** Carbon dioxide **[1]**

**1aiii** Pass the test gas into the limewater. **[1]**
White precipitates formed in the limewater **[1]** will indicate the presence of carbon dioxide.

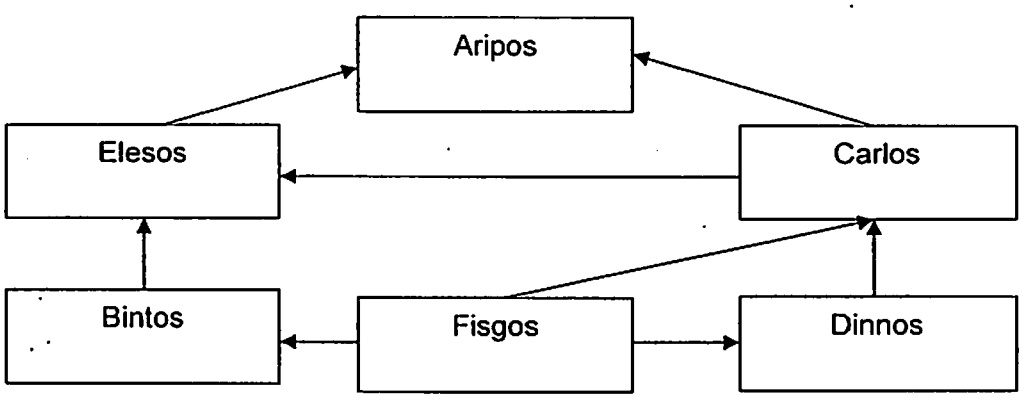
**1b** False **[1]**, hydrogen has more protons than neutrons **[1]**.

**2a** Sulfur dioxide **[1]**, oxides of nitrogen **[1]**

**2b** They cause respiratory problems / damage lungs / alter metabolism rate **[1]**.

**2c** Plants damaged will lead to less carbon dioxide being absorbed / more carbon dioxide in the atmosphere **[1]**.
Excess carbon dioxide in the atmosphere will create a greenhouse effect **[1]** which will lead to global warming.

**3a**




**[3]** – {1 mark for every 2 correct answers. No ½ mark.}

**3b** Fisgos → Dinnos → Carlos → Elesos → Aripos **[1]**

**3c** Carlos **[1]**

**4a** Q and R **[1]** {no ½ mark}

**4b** Q **[1]**,
because it has lower boiling point / its boiling point is closer to the room temperature **[1]**

**4c** Very strong **[1]**

**5a** The water turns purple in colour **[1]**.

**5b** Concentration of potassium permaganate in the drop is higher than that in the water **[1]**.
Potassium permaganate molecules move away from the drop to the rest of the water via diffusion **[1]**.



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6a

| | Name of vessel | Made of? |
|---|---|---|
| (i) | Phloem | Living cells |
| (ii) | Xylem | Dead cells |

[2] – {1 mark for each correct row. No ½ mark}

6b Carries dissolved food in the form of sucrose from the leaves to the rest of the plant [1]

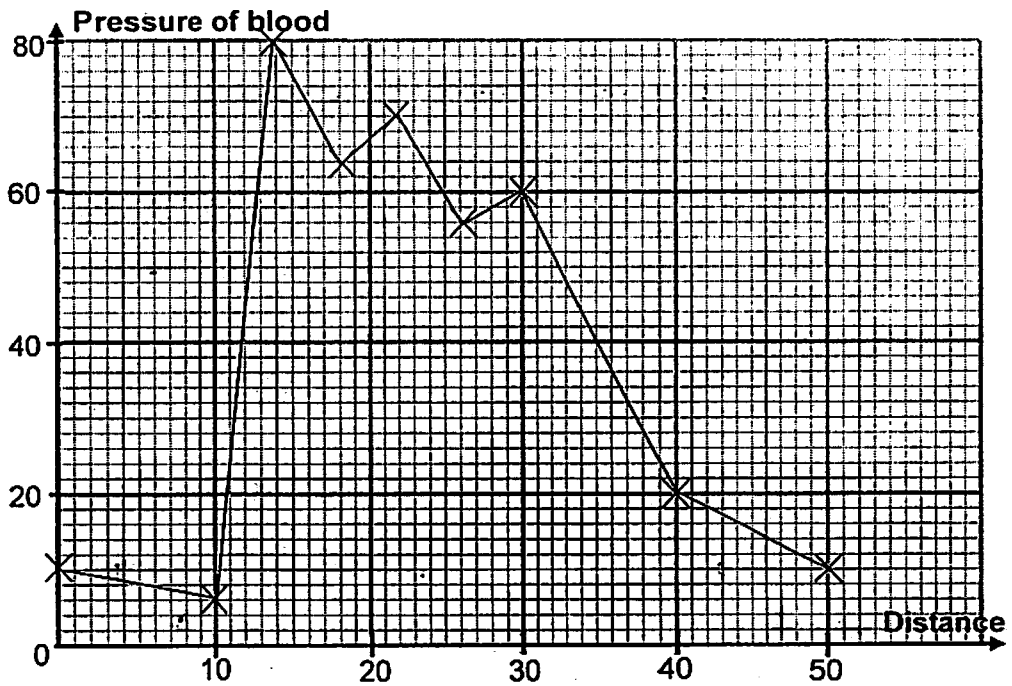
7a Stomach, large intestines/colons, rectum **[1]** {no ½ mark}

7b Used for growth of new cells / repair of damaged tissues **[1]**

7c Amino acids **[1]**

## Section B

8a Plot the graph of pressure of blood against distance from Section A of the blood circulatory system using the table above.




[1] – Correct labeling of axes
[2] – Correct points plotted (1 mark every 5 correct plotted points)
[1] – Correct straight lines drawn

**8bi** C
**8bii** D
**8biii** B
**8biv** A
[2] – 1 mark for every 2 correct answers

**8c** Pulmonary artery pumps blood to the lungs which is a shorter distance **[1]**.
Aorta pumps blood to the whole body **[1]**.

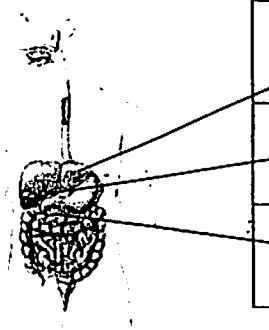
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8d

| Artery | Vein |
|---|---|
| Carry blood away from the heart | carry blood towards hea |
| blood at high pressure, moves in spurts | blood at the lowest press |
| no valves | valves to stop backflow of |
| thick muscular walls | thinner walls with less mus compared to arteries |
| no substance enters or leaves the vessel | no substances enters or lea vessel |
| pulse created by heart pumping and contraction of wall muscle | no pulse |
| strong walls | flexible and squashed eas pushed further along vess |

[2] – any 2

9a




| Organs | Function |
|---|---|
| P | Produces bile [1] |
| Q | Stores bile [1] |
| R | Produces pancreatic juice [1 |

{1 full mark awarded for correct label and function. No ½ mark given}

9b

| Organs of alimentary canal | How the physical digestion takes plac |
|---|---|
| Mouth | Chewing [1] large food particles to smaller food part |
| Stomach | Churning [1] of food particles for enzymes to act |
| Duodenum / Small intestines | Emulsifying of fats/Breaking large fats molecules int smaller fats molecules [1] by bile |

{1 full mark for correct organ and process. No ½ mark given}

9c

In the mouth

- Starch is broken down into maltose by salivary amylase secret

In oesophagus

- Starch is broken down into maltose by salivary amylase from mou

In duodenum/small intestines

- Starch is broken down into maltose by pancreatic amylase. [1]
- Maltose is broken down into glucose by maltase. [1]



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**10a**

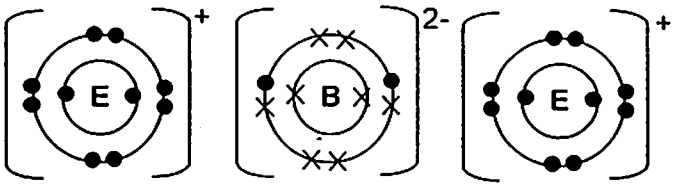
| Particle | Atomic number | Nucleon number | No. of protons | No. of electrons | No. of neutrons |
|---|---|---|---|---|---|
| A | 7 | 14 | *7* | *7* | *7* |
| B | 8 | 16 | *8* | *10* | *8* |
| C | 9 | 19 | *9* | *9* | *10* |
| D | 10 | 20 | *10* | *10* | *10* |
| E | 11 | 23 | *11* | *10* | *12* |
| F | 12 | 24 | *12* | *12* | *12* |

**[3]** – {1 full mark for every 2 correct rows; no ½ mark given}

**10b** Particle D cannot become an ion / has a stable electronic structure / is a noble gas **[1]**, so its number of electrons must be the same as its number of protons (10).
Particles B and E can lose/gain electrons to form ions.

**10ci** $E_2B$ **[1]**

**10cii**




**[1]** – correct positive ions drawn
**[1]** – correct negative ion drawn
**[1]** – correct charges indicated

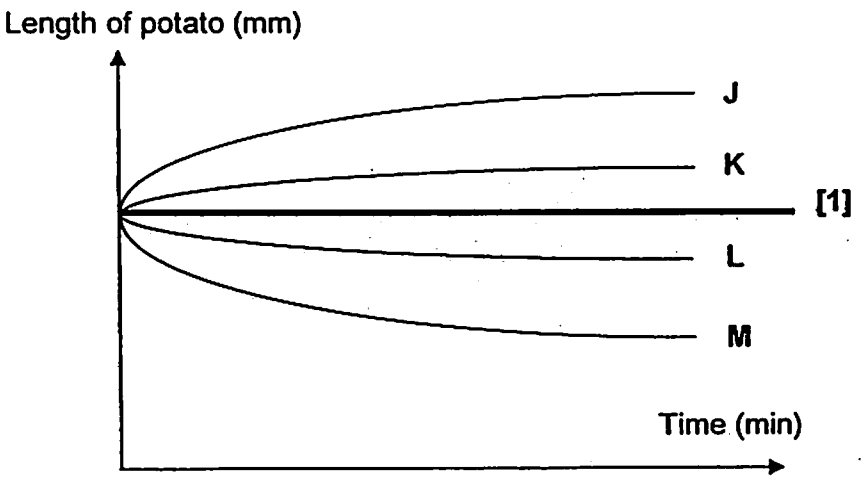
**10di** A **[1]**

**10dii** G has the same number of protons as A but different number of neutrons as A **[1]**
{1 full mark for same no. of protons and different no. of neutrons. No ½ mark}

**11ai** Solution J {*no mark awarded if solution is incorrect, even though explanation is correct*}
As water potential in distilled water is the highest compared to the potato strip **[1]**, more water will enter the potato via osmosis through the partially permeable membrane **[1]**.
The potato cells will have the largest increase in size **[1]** and will not burst with the presence of cell wall.

**11aii** Any value between 0.1 to 0.3 mol/dm$^3$ sucrose concentration **[1]**

**11aiii**




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**11aiv** As the water potential of the potato strip is the same as that in the solution **[1]**, there is no net movement of water **[1]** molecules moving in/out of the potato strip, resulting in no increase in length of potato over time.

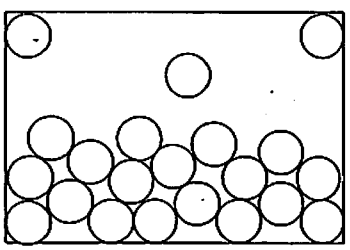
**11bi** The size of the ulcer will shrink / becomes smaller **[1]**.

**11bii** When salt is placed on the ulcer, the water potential in the ulcer is less than that in the surrounding **[1]**.
Most water molecules will leave the ulcer via osmosis through partially permeable membrane **[1]**.
This results in the size of ulcer shrinking.

**12a** AB, BC **[1]** {No ½ mark}

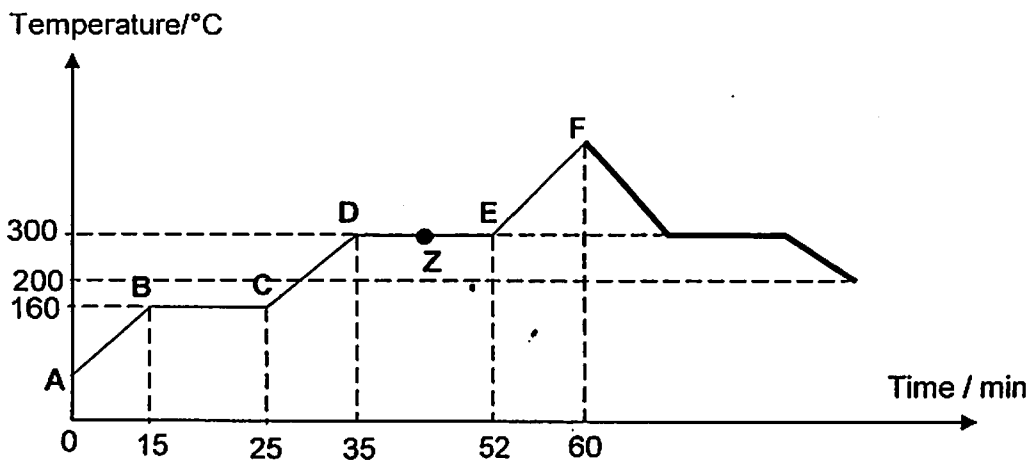
**12b** Heat is absorbed by the particles / The particles gain kinetic energy. **[1]**
The particles vibrate more vigorously **[1]**
Which weakens forces of attraction / breaks bonds of attraction between them **[1]**
This cause the particles to move further apart **[1]**
Now the particles move randomly at high speed **[1]**
{*any 4*}

**12c**



**[1]**

**12di**




**[1]** – correct shape of graph
**[1]** – indication of 300°C and 200°C at critical points

**12dii** The particles move by sliding past one another. **[1]**
The particles have strong / quite strong forces of attraction between them **[1]**.



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