Class	Candidate Name	Register Number

FIRST TOA PAYOH SECONDARY SCHOOL

MID-YEAR EXAMINATION 2012

Secondary Two Express

Lower Sec Science **4th May 2012**

Paper 2 **1 hour 15 minutes**

Candidates to answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

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

Section A (30 marks)
Answer **all** questions in the spaces provided.

Section B (30 marks)
Answer **all three** questions in the spaces provided. If working is needed for any question, it must be shown below that question.

The number of marks is given in brackets [ ] at the end of each question or part question.
A copy of the Periodic Table is printed on page 12.

For Examiner's Use	
Section A	
Section B	
B1	
B2	
B3	
TOTAL	60

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Section A (30 marks)

Answer **all** questions.
Write your answers in the spaces provided.

A1 The following is a list of substances.

steel	sea water	pure water	aluminium
chlorine	zinc	sugar	mercury
iodine	carbon dioxide		

Choose from the list the name of [3]

(a) a solid compound,

.....

(b) mixture of metallic elements,

.....

(c) an element used to make drink can,

.....

(d) a liquid mixture which is the raw material for salt,

.....

(e) a compound which is a gas at room temperature,

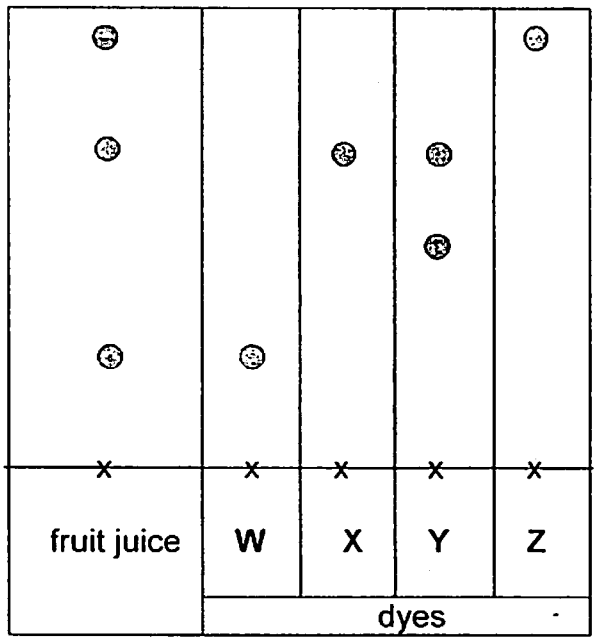
.....

(f) a non-metallic element used in bleaches for our clothes,

.....

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A2 (a) A chromatography was carried out on a fruit juice and four known coloured dyes, **W, X, Y** and **Z**. The results are shown in the chromatogram below.



(i) What dyes are present in fruit juice? [1]

.....

(ii) Which coloured dye is not pure? [1]

.....

(iii) Which dye is the most soluble in the solvent? Explain your answer. [2]

.....

.....

.....

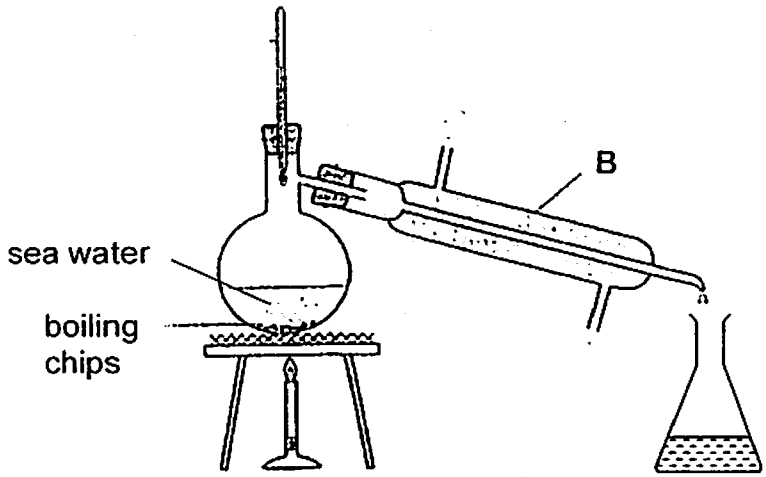
(b) A small slip of paper stained with ink is found at the scene of a crime. Why is chromatography often used in analysing the components of the ink? [1]

.....

.....

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(c) The apparatus below shows a technique of separating mixtures.



(i) What is the above separation technique called? [1]

_____

(ii) State the change in physical state of the distillate in the part labelled B. [1]

_____

(iii) Why are boiling chips placed in the distilling flask? [1]

_____

_____

A3 The pH values of five solutions are shown below.

Solution	A	B	C	D	E
pH	7	9	4	12	2

(a) Which solution reacts vigorously with magnesium ribbon? [1]

_____

(b) Which solution will turn Universal Indicator green? [1]

_____

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A4 (a) Iodine dissolves readily in alcohol to form a solution. Name the solute and the solvent in the solution. [1]

(i) solute: .....

(ii) solvent: .....

(b) Iodine does not dissolve readily in water. What does this tell you about the solubility of a substance? [1]

.....

(c) What can be done to dissolve a **large piece** of iodine crystal in alcohol quickly? [1]

.....

.....

(d) 'Tincture of iodine' need not to shake before you apply whereas a bottle of calamine lotion is to be shaken. Explain. [1]

.....

.....

.....

A5 Many people prefer not to live in industrial areas where there are many factories. One of the reasons is because some factories give off air pollutants when they burn fuels.

(a) Name the air pollutant(s) produced by burning fuels in an insufficient supply of oxygen. [1]

.....

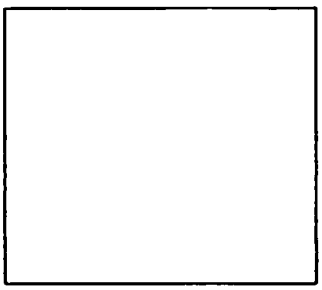
(b) Name the air pollutant(s) produced by burning fuels that can cause global warming. [1]

.....

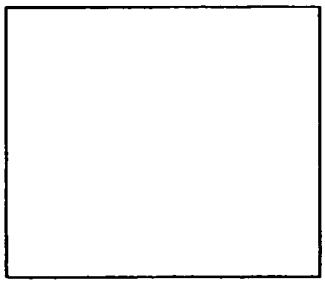
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A6 (a) The melting point of ethanol is -117 °C and it boils at 78 °C.

Use the boxes below to illustrate the arrangement of ethanol particles at -120 °C and 0 °C.



at -120 °C



at 0 °C

[2]

(b) Suggest why

(i) a liquid can take up the shape of a container. [1]

(ii) a solid has more mass than the same volume of gas. [1]

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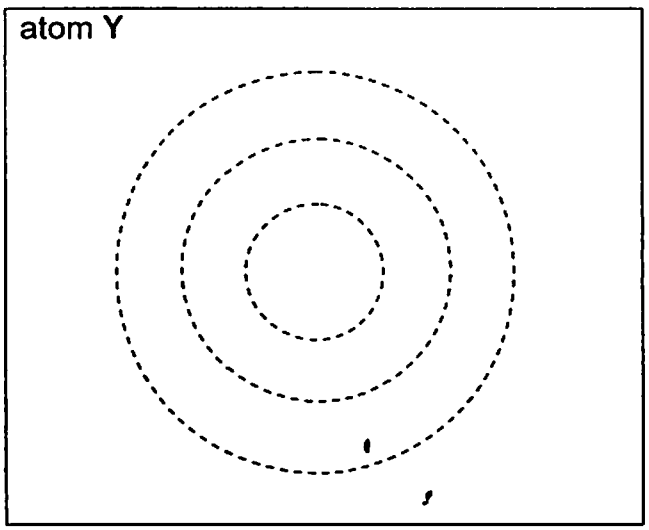
A7 (a) Refer to the Periodic Table provided and complete the table below.

ion / atom	nucleon number	number of		
		protons	neutrons	electrons
Mg	24			
Na^+			12	
	16	8		10

[4]

b The symbol of the unknown atom is $^{27}_{13}Y$

(i) Draw the full electronic structure of atom Y.
(Use cross 'x' to represent an electron) [1]



(ii) Which group in the Periodic Table does atom Y belongs to? [1]

_____

(iii) Identify element Y from the Periodic Table. [1]

_____

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Section B (30 marks)
Answer **all three** questions.
Write your answers in the spaces provided.

B1 **(a)** When a piece of magnesium ribbon burns in the air, a dazzling flame can be seen and a white powder is formed.

(i) Name the process described above. [1]

.....

(ii) Write a word equation to describe what happens when magnesium ribbon burns in air. [1]

.....

(iii) Is the product formed an element or a compound? Give a reason to support your answer. [2]

.....

.....

.....

(b) Is air a mixture or a compound? Give a reason to support your answer. [2]

_____

_____

_____

(c) **(i)** What is an element? [1]

_____

_____

(ii) Name the **two** main categories of elements in the Periodic Table. [1]

_____

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(iii) Sulfur and carbon are found in the Periodic Table. State one common physical property for both of them. [1]

.....

(iv) From the Periodic Table provided, name one element that has the similar chemical properties as sodium. [1]

.....

B2 (a) Rock salt is salt from the ground. It contains particles of common salt mixed with sand and other impurities. The table below gives some information about three substances in the rock salt.

components of rock salt	solubility in alcohol	solubility in water
common salt	insoluble	soluble
sand	insoluble	insoluble
other impurities	soluble	soluble

Describe briefly how you would obtain common salt from a piece of rock salt. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

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(b) Heating of water is a physical change while electrolysis of water is a chemical change.

(i) State two differences between a physical and a chemical change. [2]

physical change	chemical change

(ii) Describe in terms of particulate model of matter the changes in the energy and movement of the particles when water is heated. [2]

_____

_____

(c) **(i)** Using the symbol, ○ , to represent atoms of oxygen and ● , to represent atom of sulfur, draw the molecular diagrams to represent oxygen gas (O_2) and sulfur dioxide gas (SO_2) in the following table.

chemical formula	molecular diagram	chemical formula	molecular diagram
O_2		SO_2	

[2]

(ii) How does a molecule of oxygen and a molecule of sulfur dioxide different? [1]

_____

_____

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B3 (a) Mary was given a bottle of hydrochloric acid and a bottle of unknown colourless solution, **liquid Y**. She used red and blue litmus papers to test for **liquid Y**. The results are as follows:

	colour of red litmus	**colour of blue litmus**
liquid Y	turns blue	remains blue

(i) What is **liquid Y** most likely to be? [1]

.....

(ii) State two **other** physical properties of **liquid Y.** [2]

.....

.....

(iii) Name the products formed when **liquid Y** is mixed well with the hydrochloric acid. [1]

.....

(iv) Name the process to describe the reactions that took place in **(iii).** [1]

.....

(b) Mary poured some **hydrochloric acid** into a test tube containing **calcium carbonate.** A colourless gas was given off.

(i) Name the gas that was given off. [1]

.....

(ii) Describe a test to identify the gas given off. [2]

.....

.....

.....

(iii) Write a chemical word equation for the reaction in **(b).** [2]

.....

- End of Paper -

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Group																
I	II										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	98 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 +														

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

*58-71 Lanthanoid series
+90-103 Actinoid series

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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FIRST TOA PAYOH SECONDARY SCHOOL
MID-YEAR EXAMINATION 2012
SECONDARY 2 EXPRESS
Lower Sec Science Marking Scheme

Paper 1 (20 marks) Answer all questions in the spaces provided.

1	C	6	C	11	A	16	B
2	D	7	A	12	B	17	D
3	B	8	D	13	B	18	D
4	A	9	B	14	D	19	B
5	B	10	D	15	B	20	B

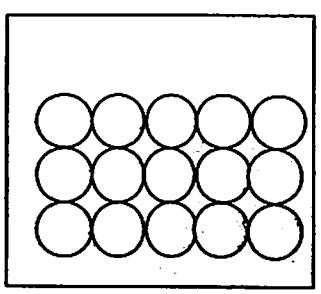
Paper 2
Section A (30 marks)
Answer all questions in the spaces provided

A1	a	sugar		½
	b	steel		½
	c	aluminium		½
	d	sea water		½
	e	carbon dioxide		½
	f	chlorine		½
A2	a	i	W, X and Z	1
		ii	Y	1
		iii	Z	1
			Its distance from the start line is the furthest.	1
	b	• This method requires only small amount of dye and gives an accurate quick result. • The components of the ink is coloured (visible) • Paper chromatography can be used to separate the dyes in the ink so that the dyes composition in the ink can be seen.		½, ½

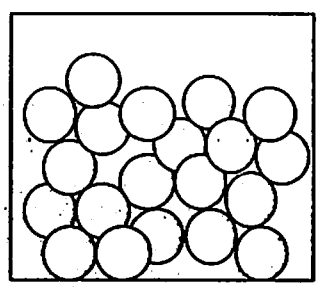
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	c	i	simple distillation	1
		ii	gaseous state changes to liquid state	1
		iii	to ensure smooth boiling	1
A3	a	solution E		1
	b	solution A		1
A4	a	i	iodine	½
		ii	alcohol	½
	b	Solubility of a substance is affected by the nature of the solvent.		1
	c	Pound the iodine crystal into smaller pieces. Increase the temperature of the alcohol. (any one) Stir the mixture **Heat the alcohol (cannot accept as alcohol is flammable)**		1
	d	Tincture of iodine is a solution, no particle will be settled down on standing whereas calamine lotion is a suspension, its particles settle on standing. Shaking is to allow the solid particles to mix well with the liquid.		½ , ½
A5	a	carbon monoxide		1
	b	oxides of nitrogen		1

A6 a



at -120 °C



at 0 °C

1,1

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	b	i	Particles of liquid are not arranged in a fixed, regular pattern and can move over one another.	1
		ii	The particles of solid are closely packed whereas the particles of gas are far apart. Therefore there are more particles packed in fixed amount volume of solid than that of gas.	1

A7 a

ion / atom	nucleon number	number of		
		protons	neutrons	electrons
Mg	24	**12**	**12**	**12**
Na^+	**23**	**11**	12	**10**
O^{2-}	16	8	**8**	10

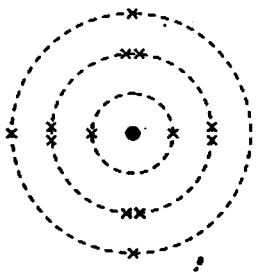
[4]

b

i

atom Y

atom Y



[1]

		ii	group III	1
		iii	Al (aluminium)	1

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Section B : Answer All three questions

B1	a	i	Combustion / Combination	1
		ii	magnesium + oxygen ⟶ magnesium oxide	½, ½
		iii	A compound It is formed by two different elements chemically combined together.	1 1
	b	It is a mixture. • It is formed by simply mixing its component gases. No reaction occurs between the components. • Air has the properties of its components • Air can be separated into its components by fractional distillation. • The properties of the constituent gases in air may vary with place and time.		1 1 (any 1)
	c	i	An element is a substance which cannot be broken down into two or more simpler substances by chemical methods.	1
		ii	metal and non-metal	½ , ½
		iii	dull, brittle, non-ductile, poor conductor of heat, low density	1 Any 1
		iv	Any element in group I (lithium, potassium, rubidium, caesium, francium)	1
B2	a	• Add alcohol to the rock salt and stir the mixture to dissolve other impurities. • Filter the mixture to remove other impurities in the filtrate. • Common salt and sand are retained on the filter paper as a residue. • Add water to the residue collected to dissolve common salt. • Filter the mixture, sand will be collected as a residue and common salt is present in the filtrate. • Evaporate the filtrate to obtained solid common salt.		½ ½ ½ ½ ½ ½
	b	i	**physical change**	**chemical change**
			No new substances are formed	New substances are formed [1]
			The change is reversible	The change is irreversible [1]

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		ii	When water is heated, the particles gain energy and vibrate and move about more vigorously and freely.		1 1

(c) i

chemical formula	molecular diagram	chemical formula	molecular diagram
O_2		SO_2	

1,1

		ii	Molecule of oxygen is made up of two atoms of the same kind whereas, molecule of sulfur dioxide is made up of three atoms of two different kinds.	½ ½

B3	a	i	An alkali	1
		ii	It tastes bitter. It has a soapy feel. It is corrosive. It is an electrical conductor. It turns Universal Indicator indigo or violet.	2 (any 2)
		iii	salt and water	½ , ½
		iv	neutralisation	1
	b	i	Carbon dioxide	1
		ii	Pass the gas through the limewater, carbon dioxide turns limewater cloudy / a white precipitate is formed.	1 1
		iii	calcium carbonate + hydrochloric acid → calcium carbonate + carbon dioxide + water	1,1

End of Paper

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