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NAME:	CLASS:	INDEX NO:
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QUEENSWAY SECONDARY SCHOOL
MID YEAR EXAMINATION 2017
SECONDARY 2EXPRESS

Parent's Signature:

LOWER SECONDARY SCIENCE

8May 2017
1 hour 30 minutes

No additional materials are required.

READ THESE INSTRUCTIONS FIRST

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

There are **two** sections. Answer **all** questions.

Section 1: Physics (35 marks)

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

Section 2: Chemistry(45 marks)

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

The number of marks is given in brackets [] at the end of each question or part question.
At the end of the examination, hand in your answers to Section 1 and Section2 separately.

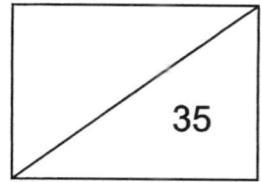
A copy of the Periodic Table is printed on page 22.

The use of an approved scientific calculator is expected, where appropriate.

This document consists of **22**printed pages.

Setters: Mr Jimmy Ong, Mrs Sassi (Phy)
Ms Lim SK, Mr Wilson Ng (Chem)

[Turn over



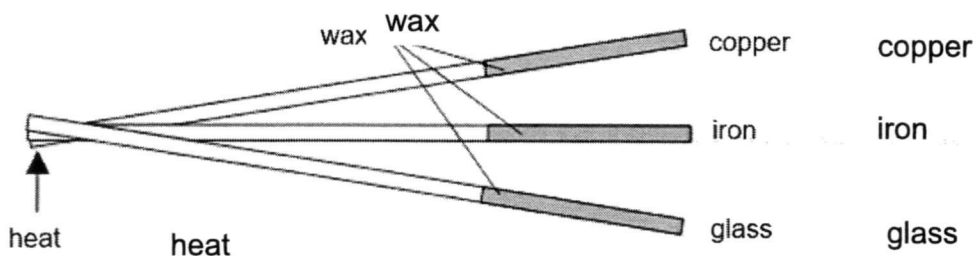
SECTION 1: PHYSICS SECTION

SECTION 1 (A): Multiple Choice Questions (10 marks)

Answer **all** the questions in this section in the table on **page 5**.

- 1 Which of the following statements about effects of thermal energy on solids, liquids and gases is **incorrect**?
 - A Liquid expands more than solid.
 - B Gas expands more than liquid.
 - C Solid contracts more than liquid.
 - D Gas contracts more than liquid.

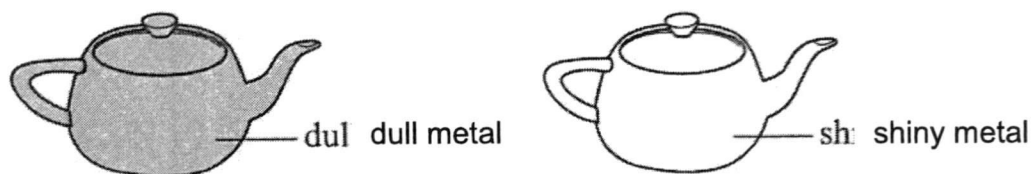
- 2 In a simple experiment to test the thermal conductivity of copper, iron and glass, one end of each rod is coated with wax and the other end was heated as shown below.



It was found that the wax coated on copper rod started to melt first, followed by iron rod and lastly glass rod. What can you deduce from the above observation?

- A Copper is a better conductor of thermal energy than iron and glass.
- B Copper is a better insulator of thermal energy than iron and glass.
- C Iron is a better conductor of thermal energy than copper and glass.
- D Iron is a better insulator of thermal energy than copper and glass.

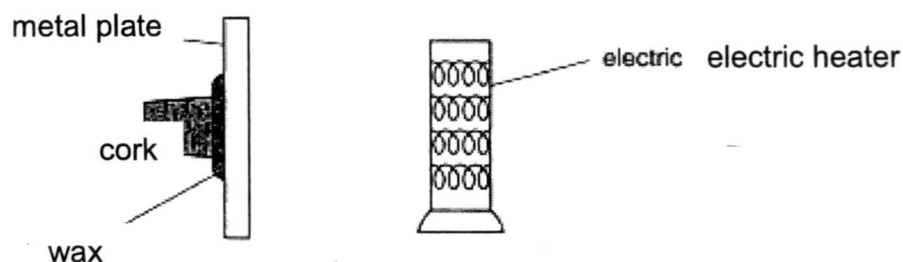
- 3 Equal volumes of hot water at 95°C are poured into two tea pots of the same size. One tea pot is made of dull metal and the other tea pot made of shiny metal.



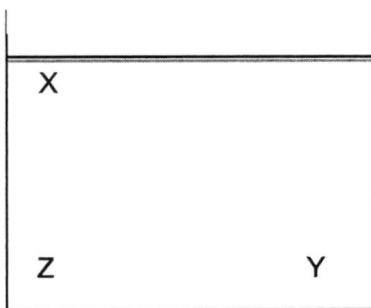
What is the likely temperature in each tea pot after 10 minutes?

	Dull metal	Shiny metal
A	95°C	95°C
B	70°C	60°C
C	60°C	70°C
D	60°C	60°C

- 4 Sheep have thick layers of fur covering their bodies which help to keep them warm in cold climates. Which of the following best explains how sheep are kept warm?
- A The fur traps air, and air is a poor conductor of thermal energy.
 B The fur traps air, and air is a good conductor of thermal energy.
 C The fur is a solid, and solids are poor conductors of thermal energy.
 D The fur is a solid, and solids are good conductors of thermal energy.
- 5 A small cork is fixed with wax onto a metal plate as shown below. An electric heater is placed close to the plate. After some time, the wax melts and the cork drops off. How does thermal energy reach the wax from the heater?



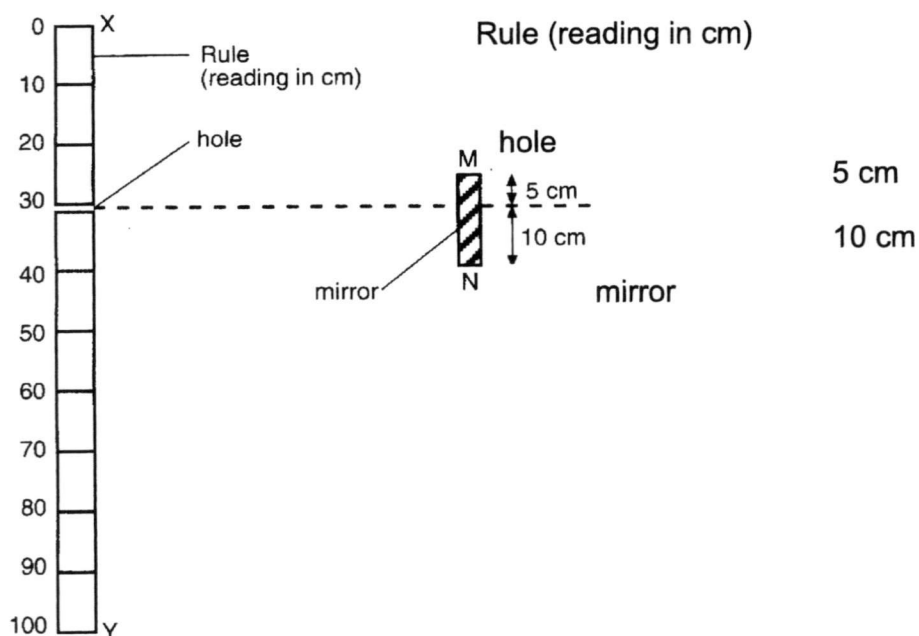
- A By conduction only.
 B By convection and conduction.
 C By convection and radiation.
 D By radiation and conduction.



- 1 Heat at position Z.
- 2 Cool position X by placing an ice cube.
- 3 Cool position Y by wrapping an ice cube with wire gauze.

- A** 2 only
B 1 and 2 only
C 2 and 3 only
D 1, 2 and 3

- 7 The diagram below shows a metre rule **XY** with a small hole drilled at the 30 cm mark. A plane mirror **MN** is placed in front of the ruler and is parallel to it. If an observer peeps through the hole and looks at the mirror, the greatest extent to which he can see the metre rule is between the _____.



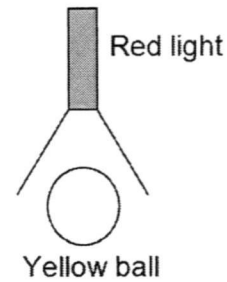
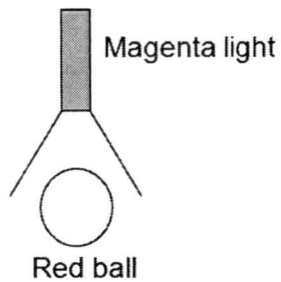
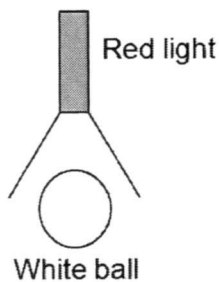
- A** 0 cm and 90 cm mark.
B 10 cm and 70 cm mark.
C 20 cm and 50 cm mark.
D 20 cm and 60 cm mark.

8 Concave mirrors are used as _____.

- I side mirrors on cars
- II shaving mirrors
- III cosmetic mirrors
- IV car headlights

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

9 In how many of the setups shown below would the ball appear to be red?



- A 3
- B 2
- C 1
- D 0

10 The formation of a rainbow is the result of light undergoing _____.

- A deflection
- B dispersion
- C irregular reflection
- D regular reflection

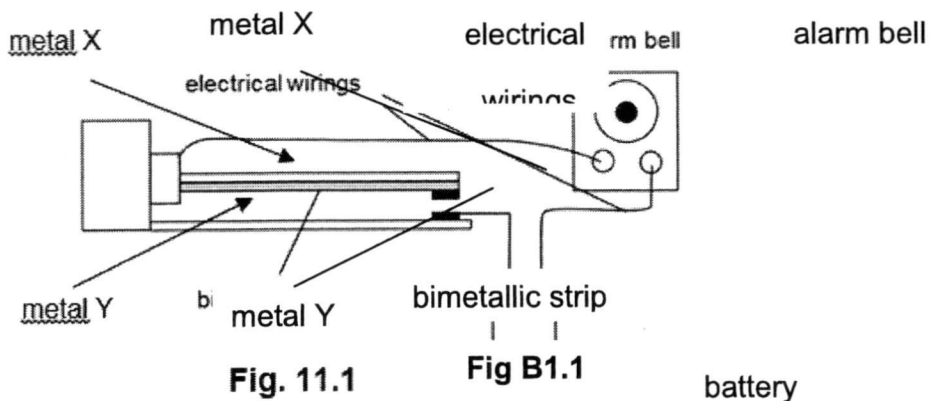
Qns	1	2	3	4	5
Ans					
Qns	6	7	8	9	10
Ans					

END OF SECTION 1 (A)

SECTION 1 (B): Structured Questions (17 marks)

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

- B1** Alan has to construct a fire alarm system as shown in **Fig. B1.1** for his Science project. He was asked to choose from five different metals **A, B, C, D** and **E** to form the bimetallic strip. The rates of expansion of the five metals are shown in **Table B1.2**, with 4 being the metal that expands the most and 1 being the metal that expands the least.

**Fig. 11.1****Fig B1.1**

battery

Table B1.2

metal	rates of expansion
A	2
B	1
C	3
D	4
E	3

- (a) Describe how the fire alarm system works.

.....

[2]

- (b) Identify two metals from Table B1.2 which should **not** be used in the bimetallic strip. Explain your answer.

.....
[2]

- (c) Suggest the two **best** metals from **Table B1.2** that Alan can use as metal X and metal Y in the fire alarm system. Explain your answer.

.....
[2]

- B2** (a) **Fig. B2.1** shows a solar energy collector used to heat water in a household.

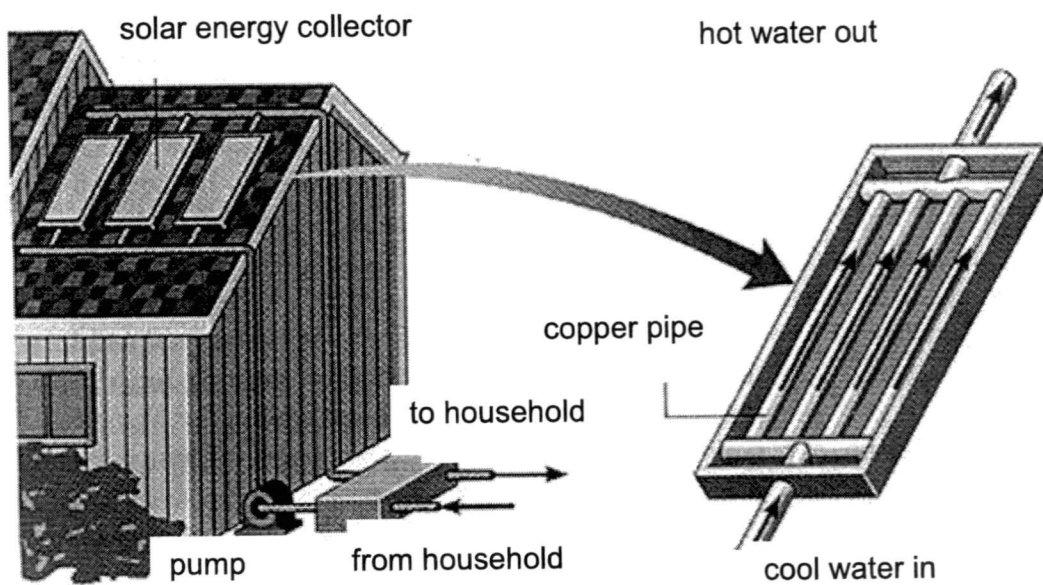


Fig. B2.1

- (i) State how thermal energy from the sun reaches the Earth.

.....[1]

- (ii) Suggest the colour that should be painted on the copper pipes to maximize the amount of solar energy collected. Explain your choice.

.....

[2]

- (iii) Explain why there are multiple rows of copper pipes in the solar energy collector.

.....

[2]

- (b) The heated water from the copper pipes is pumped into a storage tank containing cold water. A simplified diagram of the tank is shown in **Fig. B2.2**.

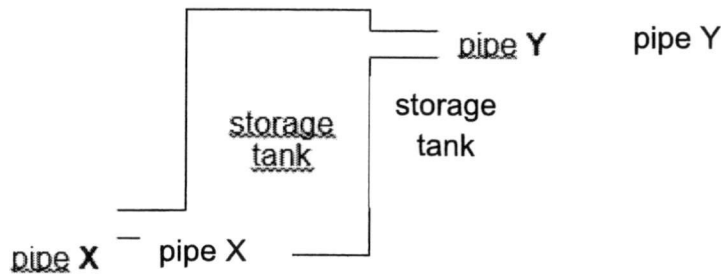


Fig. B2.2

State whether the heated water should enter the tank through pipe **X** or **Y** in order to heat up all the cold water within the tank. Explain your choice.

.....

.....

.....[2]

- B3** (a) The archer fish has a unique way of catching its prey. It shoots a jet of water upwards to knock insects off from low branches. The prey falls to the water and is eaten up by the archer fish as shown in **Fig. B3.1**.

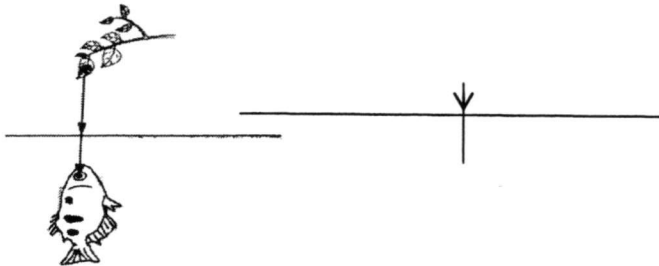


Fig. B3.1

Using your understanding of refraction of light, explain why the fish always shoots from a position directly underneath the prey.

.....

.....

.....

.....[3]

- (b) An optician's test panel is located 30 cm behind the eyes of a patient who looks at a plane mirror 250 cm in front of him, as shown in **Fig. B3.2**.

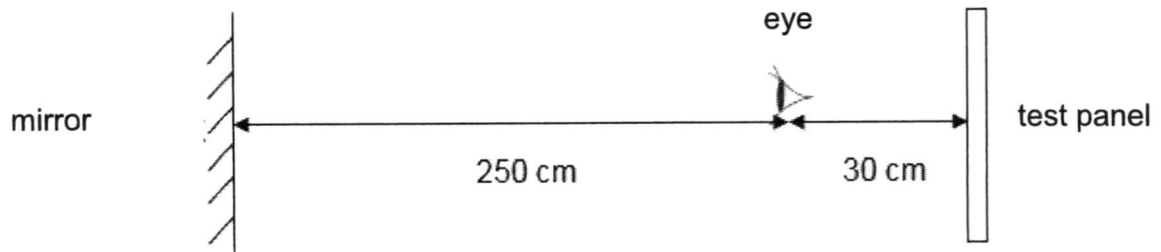


Fig. B3.2

Calculate the distance of the image of the test panel in the mirror from the patient's eyes.[1]

END OF SECTION 1 (B)

SECTION 1 (C): Structured Questions (8 marks)

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

C4 (a) Define refraction.

.....
[2]

(b) Complete the path of the light ray in **Fig. C4.1** until it exits back into air again. Indicate all your rays in your answer. [3]

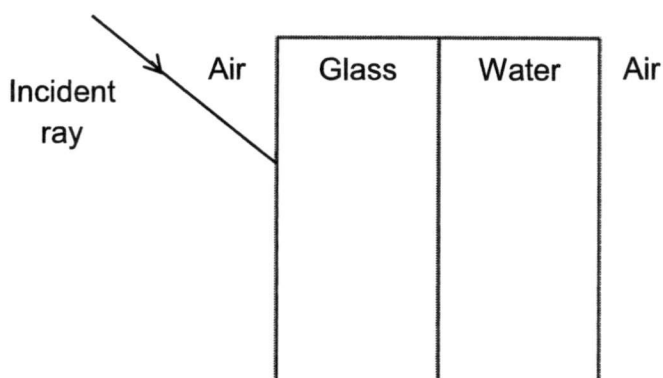


Fig. C4.1

(c) (i) **Fig.C4.2** shows how an eye sees an image of object 'X' in the mirror. Draw the image of X in the mirror. [1]

(ii) On **Fig. C4.2**, complete the ray diagram to show how the eye sees object 'X'. [2]

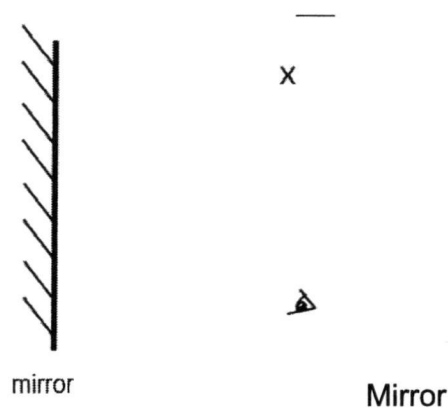


Fig. C4.2

END OF SECTION 1

QUEENSWAY SECONDARY SCHOOL
Science Department

MID-YEAR EXAMINATION 2017

MARK SCHEME

Level: 2 Express

**Subject: Lower Secondary Science
(Physics)**

Total Marks: 35

Setter: Mr Jimmy Ong/ Mrs Sassi

Section A [10 marks]

Qn	1	2	3	4	5	6	7	8	9	10
Ans	C	A	C	A	D	B	C	C	A	B

Section B [17 marks]

- B1** (a) During a fire, the bimetallic strip will be heated and **metal X will expand more than metal Y, causing the strip to bend downwards** and come into contact with the electrical contact. This **completes the circuit, causing the fire alarm to be set off.** 1
- (b) **C and E.** 1
 They have the **same rate of expansion and hence would not bend when heated.** 1
 OR Bimetallic strip requires two metals with different rate of expansion in order to bend when heated.
- (c) Metal X is **D** and metal Y is **B.** 1
 These two metals have the **greatest difference in expansion, leading to better response to fire.** 1

Total = 6

B2	(a)	(i) Radiation	1
		(ii) Black.	1
		Black surface is a good absorber of thermal energy.	1
	(iii)	This arrangement increases the total surface area of the pipes	1
		exposed to the sun's radiation so that rate of absorption is higher/ water heats up faster.	1
	(b)	Pipe X.	1
		A convection current can be set up in the water since hot water rises because its less dense and cold water sinks because its dense.	1

Total = 7

B3	(a)	Light ray entering the fish's eyes coincides with the normal to the water	1
		surface/ has an angle of incidence of zero, and the light ray does	1
		not bend/refract. Fish's aim will be accurate as it sees the actual position of the insect.	1
	(b)	Image distance	
		= 30 cm + 250 cm + 250 cm	
		= 530 cm	1

Total = 4

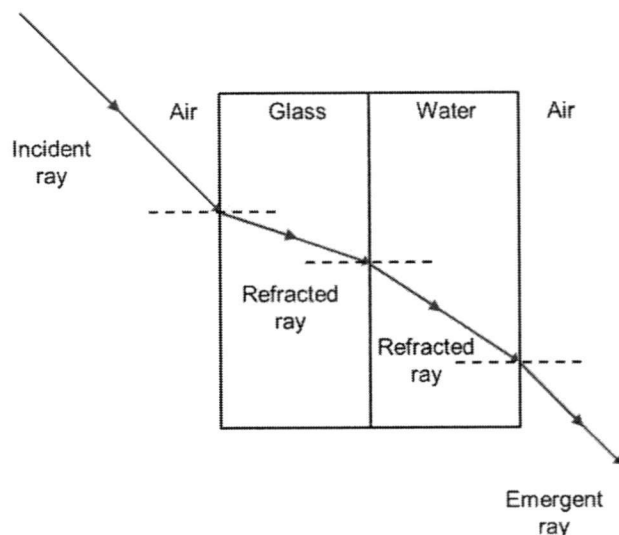
Section C [8 marks]

C1 (a) Refraction is the **bending of light ray** as it passes from one **medium to another medium of different optical density**.

1
1

(b)

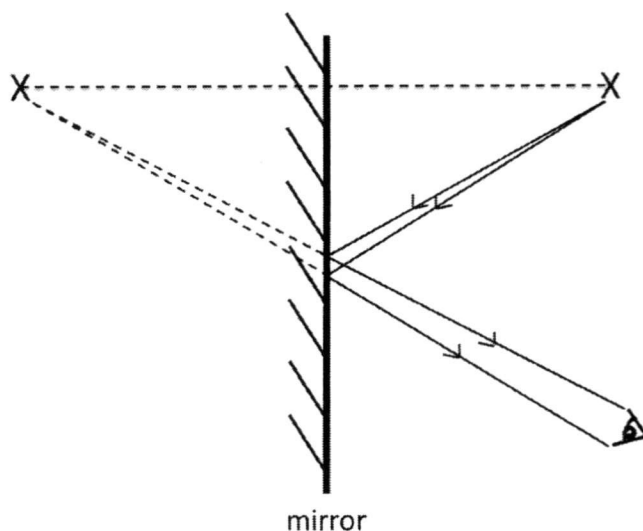
3



1m: refracted ray in glass towards normal
 1m: refracted ray in water away from normal (but not as much as air)
 1m: emergent ray away from normal parallel to incident ray

(c)

3



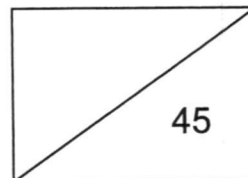
1m: Image distance equals object distance. Image labelled correctly.
 1m: Straight lines from object to eye and from image to eye.
 1m: Arrows to show direction of light ray travelling from object to eye.

Total = 8

The End

NAME:	CLASS:	INDEX NO:
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SECTION 2: CHEMISTRY SECTION



SECTION 2 (A): Multiple Choice Questions (15 marks)
 Answer **all** the questions in this section in the table on **page 14**.

- 1 Which of the following compounds contains the greatest number of different elements?

A H_2SO_4 **B** $\text{C}_3\text{H}_7\text{COOH}$ **C** $\text{LiAl}(\text{OH})_4$ **D** KMnO_4

- 2 A particle has 7 protons, 10 electrons and 8 neutrons.

Which of the following statements about this particle is correct?

- A** It is found in Group VII.
B It is a positively charged ion.
C It has a nucleon number of 17.
D It has 2 fully filled electron shells.

- 3 Which of the following contributes the **least** to the mass of an atom?

A proton **B** electron **C** neutron **D** nucleus

- 4 The electronic configuration of an ion is 2.8.8.

Which of the following is a possible identity of this ion?

	S^{2-}	Ca^{2+}
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 5 What will be the chemical formula of a compound formed from Y^{3+} and X^{2-} ?

A X_3Y_2 **B** X_2Y_3 **C** Y_3X_2 **D** Y_2X_3

- 6 What is the chemical formula of iron(II) carbonate?

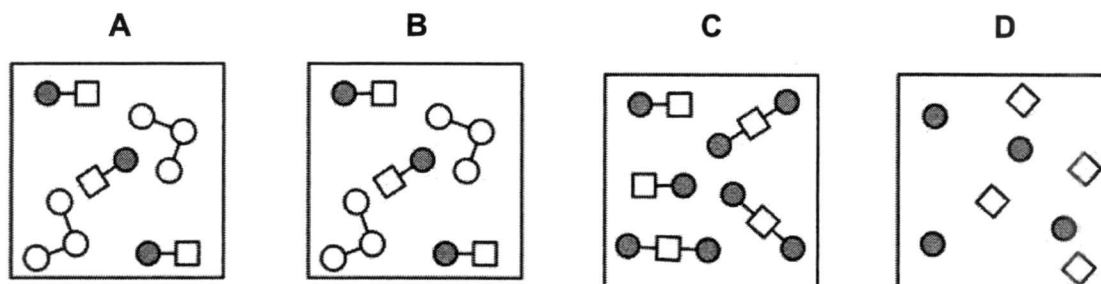
A Fe_2CO_3 **B** $\text{Fe}(\text{CO})_3$ **C** $\text{Fe}_2(\text{CO})_3$ **D** FeCO_3

- 7 When sodium (Na) reacts with chlorine gas (Cl_2), it forms sodium chloride.

What will be the correct chemical equation for this reaction?

- A $\text{Na} + \text{Cl} \rightarrow \text{NaCl}$
 B $\text{Na} + \text{Cl}_2 \rightarrow \text{NaCl}_2$
 C $\text{Na}_2 + \text{Cl}_2 \rightarrow 2\text{NaCl}$
 D $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$

- 8 Which of the diagrams represents a mixture of an element and a compound made up of two elements?



- 9 Copper(II) sulfate is a salt. Its crystals are blue in colour.

Which of the following statements best shows that copper(II) sulfate is a mixture?

- A Copper(II) sulfate solution contains copper(II) ions and sulfate ions.
 B The crystals can be obtained by evaporating the salt solution.
 C The crystals can dissolve in water without any heat needed.
 D The crystals dissolve in water to give a blue solution.

- 10 The table below contains information about four elements.

element	nucleon number	proton number
P	3	2
Q	7	3
R	9	4
S	12	6

Which element(s) is/are metallic in nature?

- A P only B P and S C Q and R D R and S

- 11 A compound has the chemical formula $\text{Mn}_2(\text{CO}_3)_3$.

How many elements and atoms are present in the compound?

	numberof elements	numberof atoms
A	2	10
B	2	15
C	3	12
D	3	14

- 12 A pupil adds some black crystals to hot water in a test tube. After stirring, the water turns brown.

Which of the following correctly identifies the solution, the solute and the solvent?

	solution	solute	solvent
A	black crystals	brown water	colourless water
B	colourless water	brown water	black crystals
C	brown water	black crystals	colourless water
D	colourless water	black crystals	brown water

- 13 Tom carried out an experiment on a colourless liquid **Q**. He observed that there was no residue when liquid **Q** was filtered.

What could he deduce about liquid **Q**?

- | | |
|------------------------------------|--|
| A The liquid is water. | B The liquid is a salt solution. |
| C The liquid is a compound. | D The liquid is not a suspension. |

- 14 A tablespoonful of sugar was added to a saturated sugar solution.

How could one dissolve the sugar crystals in the solution?

- | | |
|---|---|
| A Stir the solution more vigorously. | B Stir the solution for a longer time. |
| C Cool the solution. | D Heat the solution. |

- 15 Ali's shirt has an ink stain on it. The stain remains when it is cleaned with large amount of water but disappears when it is cleaned with a small amount of turpentine.

What conclusion could you draw from this observation?

- A** The ink is soluble in hot water but not cold water.
B The ink is soluble in small amount of water.
C Water is not a solvent for the ink.
D Both water and turpentine are solvents for the ink.

Qns	1	2	3	4	5
Ans					
Qns	6	7	8	9	10
Ans					
Qns	11	12	13	14	15
Ans					

END OF SECTION 2 (A)

SECTION 2 (B): Structured Questions (21 marks)

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

- B1** A student heated some elements, named **X**, **Y** and **Z**, in air and tabulated the results in **Table B1.1** given below. **X**, **Y** and **Z** are not the chemical symbols of these elements.

Table B1.1

Element	Observations		
	before heating	during heating	after heating
X	silvery grey solid	bright glow was given off	white solid
Y	reddish brown solid	black solid	black solid
Z	silvery grey solid	molten silvery grey droplets	silvery grey solid

- (a) Decide whether each substance in the '**after heating**' column should be classified as an element, compound or mixture. Show your decision by ticking (✓) the correct box for each substance in the table below.

Substance	Element	Compound	Mixture
white solid			
black solid			
silvery grey solid			

[2]

- (b) (i) The student claims that elements **Y** and **Z** underwent a chemical change. Is the student correct? Explain your answer, supported with evidence from **Table B1.1**.

.....

[2]

- (ii) During heating of element **X**, a bright glow was given off. What does the observation of the bright glow indicate?

.....

[1]

- B2 (a)** The diagrams below show models of molecules of carbon dioxide, water and oxygen gas.

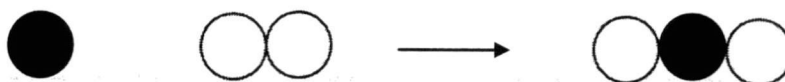
**S1****S2****S3**

- (i) Identify the atoms, labelled **E1** to **E3**, as represented in the models.

	E1	E2	E3
atom			
name			

[1]

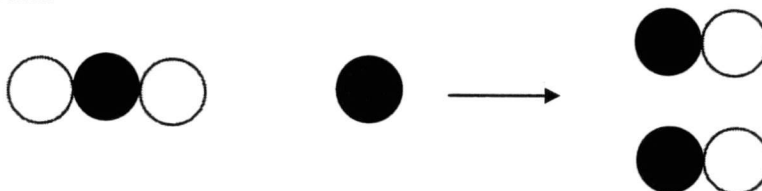
- (ii) A molecule of **S3** is produced when **S2** reacts with **E2**.
The equation for the reaction can be diagrammatically represented as follows:



Write the chemical equation as represented by the above diagram.

.....[1]

- (iii) The reaction between **S3** and **E2** can be represented in the following diagram:



- 1 Suggest the chemical formula of the compound formed in the reaction.

.....[1]

- 2 Write also the chemical equation to represent the above reaction.

.....[1]

(b) Barium (Ba) is a Group II element while iodine (I) is a Group VII element.

- (i) Complete **Table B2.1** below by filling in the missing chemical formulae.
The first one has been done for you.

Table B2.1

name of compound	chemical formula	chemical formula	
		positive ion	negative ion
hydrochloric acid	HCl	H ⁺	Cl ⁻
aluminium hydroxide		Al ³⁺	OH ⁻
barium iodide	BaI ₂		
silver nitrate	AgNO ₃		

[3]

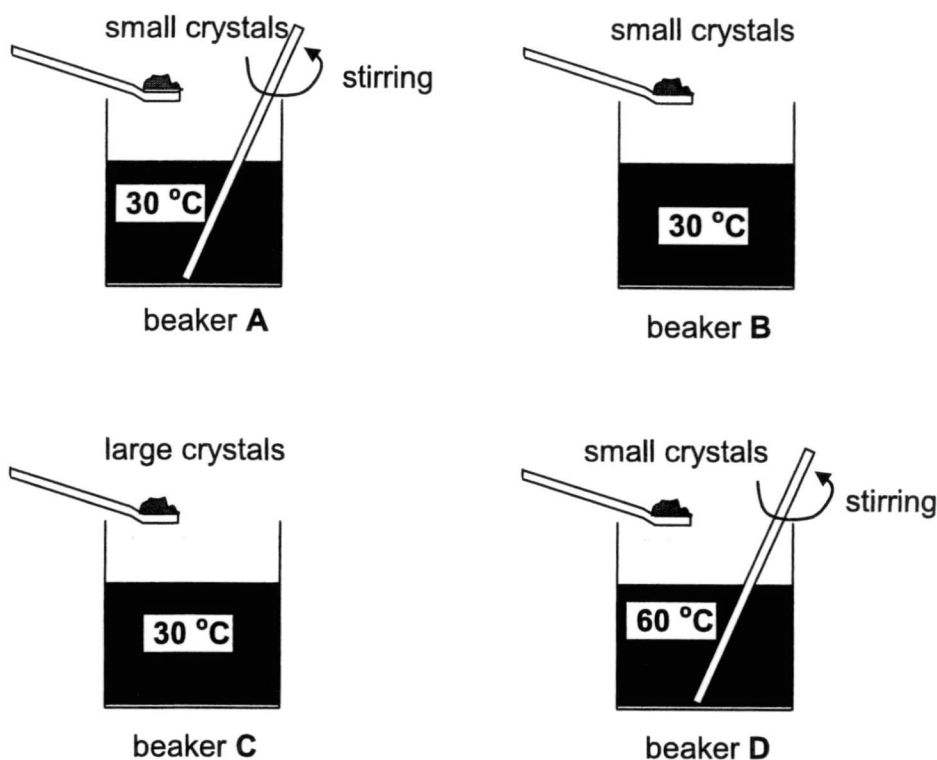
- (ii) Barium iodide reacts with silver nitrate to form barium nitrate and silver iodide. Write a **balanced** chemical equation for the reaction.

.....[2]

- B3** An experiment was carried out to investigate the factors affecting the rate of dissolving salt crystals in water.

Four samples, each weighing 10 g, of salt crystals were added to separate beakers, **A**, **B**, **C** and **D**, containing 25 cm³ of water at 0900hrs.

The salt crystals dissolved in the water under different conditions are shown in the diagram below.



- (a) The time when all the crystals had dissolved in the water were recorded in the table below.

Complete the table by writing the beaker label, **A**, **B**, **C** or **D**, that matches the time.

Time	0908hrs	0920hrs	1005hrs	1115hrs
Beaker				

- (b) (i) With reference to the results, explain how size of crystals affect the rate at which the crystals dissolve.

.....
.....[2]

- (ii) Which beakers, **A**, **B**, **C** or **D**, could be used to support your answers in (b)(i)?

.....[1]

- (c) What factors, other than size of crystals, affect the rate at which the crystals dissolve in the above experiment?

.....
.....[2]

END OF SECTION 2 (B)

SECTION 2 (C): Free-Response Questions (9 marks)

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

C1 Group VII elements are known as halogens. The name 'halogen' means 'salt-producing' and halogens tend to react with metals to form many salts, such as sodium chloride and magnesium fluoride.

(a) Tennessine, Ts, is an element newly discovered in 2010 and named after the state of Tennessee in USA. It is located in Group VII below astatine.

(i) Tennessine has two naturally occurring isotopes, $^{294}_{117}\text{Ts}$ and $^{293}_{117}\text{Ts}$. Complete **Table C1.1**.

Table C1.1

	$^{294}_{117}\text{Ts}$	$^{293}_{117}\text{Ts}$
Number of protons		
Number of neutrons		
Number of electrons		

[2]

(ii) Which period is tennessine in?

Period[1]

(iii) State the chemical formula of tennesside ion.

.....[1]

(iv) Table C1.2 provides information about four substances, A, B, C and D.

Table C1.2

substance	melting point / °C	boiling point / °C	electrical conductivity as a solid	electrical conductivity as a liquid
A	650	1091	good	good
B	776	1497	poor	good
C	350	610	poor	poor
D	1607	2227	poor	poor

1 Which substance could be magnesium?

.....[1]

2 Which substance could be tennessine?

.....[1]

(b) In the space below, draw the dot-and-cross diagram for magnesium fluoride.

[3]

END OF PAPER

The Periodic Table of Elements

Group																			III	IV	V	VI	VII	0
I	II																		2					
												1 H hydrogen 1					2 He helium 4							
Key proton (atomic) number atomic symbol name relative atomic mass																			5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
3 Li lithium 7	4 Be beryllium 9													13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40					
11 Na sodium 23	12 Mg magnesium 24	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84							
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131							
55 Cs caesium 133	56 Ba barium 137	57 – 71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -							
87 Fr francium -	88 Ra radium -	89 – 103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -		114 Fl flerovium -		116 Lv livermorium -									

lanthanoids

actinoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

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

QUEENSWAY SECONDARY SCHOOL
Science Department

MID YEAR EXAMINATION 2017

MARK SCHEME

Level: 2 Express

**Subject: Lower Secondary Science
(Chemistry)**

Total Marks: 45

Setter: Lim SK & Wilson Ng

SECTION 2(A): Multiple Choice Questions [15 marks]

1	C	4	A	7	D	10	C	13	D
2	D	5	D	8	B	11	D	14	D
3	B	6	D	9	B	12	C	15	C

SECTION 2(B): Structured Questions [21 marks]

B1 (a)

[2]

Substance	Element	Compound	Mixture
white solid		✓	
black solid		✓	
silvery grey solid	✓		

3 correct answers [2]

2 correct answers [1]

0 to 1 correct answer(s) [0]

(b) (i) No, he is not.

Only element Y underwent a chemical change because the **reddish brown** element became a **black** solid after heating, which indicates that a **new substance is formed**.

[1]

Element Z did not undergo a chemical change because the **silvery grey solid remained as a silvery grey solid**/there was **no change in colour** after heating, indicating that no new substance is formed/no chemical reaction happened.

[1]

(ii) The bright glow indicates that a chemical reaction took place.

[1]

B2 (a) (i)

	E1	E2	E3
atom			
name	hydrogen	carbon	oxygen

(ii) $C + O_2 \rightarrow CO_2$

[1]

(b)	(i)					
		name of compound	chemical formula	chemical formula		
				positive ion	negative ion	
		hydrochloric acid	HCl	H ⁺	Cl ⁻	
		aluminium hydroxide	Al(OH)₃	Al³⁺	OH⁻	[1]
		barium iodide	BaI ₂	Ba²⁺	I⁻	[1]
		silver nitrate	AgNO ₃	Ag⁺	NO₃⁻	[1]
	(ii)	BaI ₂ + 2AgNO ₃ → Ba(NO ₃) ₂ + 2AgI (Eqn correct : [1]; balanced eqn :[1])				[2]

B3 (a)

Time	0908	0920	1005	1115
Beaker	D	A	B	C

[1]

(b) (i) The smaller crystals will **dissolve faster** as they have **bigger surface area**. [2]

(ii) **B and C** [1]

(c) 1. Temperature of the solvent/water [1]
2. Act of stirring [1]

SECTION 2(C): Free-Response Questions [9 marks]

C1 (a) (i)

[2]

Table 1.1

	$^{294}_{117}\text{Ts}$	$^{293}_{117}\text{Ts}$
No. of protons	117	117
No. of neutrons	177	176
No. of electrons	117	117

2 marks for all boxes correct
 1 mark for at least 4 boxes correct
 0 mark for 3 or less boxes correct

(ii) 7

[1]

(iii) Ts^-

[1]

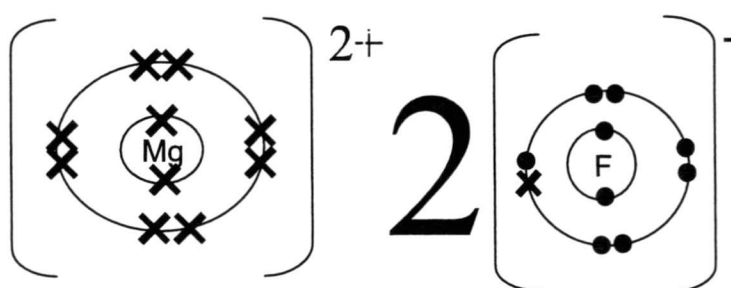
(iv) 1 A
 2 C

[1]

[1]

(b)

[3]



Correct ratio of magnesium ion to fluoride ions [1]
 Correct labelling of charges and chemical formulae of elements [1]
 Correct drawing of dots and crosses [1]
 Reject:
 hollow dots, all valence electrons of fluoride ion are dots/cross