13

NAME:	CLASS:	INDEX NO:

QUEENSWAY SECONDARY SCHOOL

MID-YEAR EXAMINATION 2016

SECONDARY TWO EXPRESS

LOWER SECONDARY SCIENCE

11th May 2016
1 hour 30 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Write your name, Class and Index No. above.

There are **TWO SECTIONS**. Answer **ALL** questions.

SECTION 1: PHYSICS [35 marks]
Answer **all** the questions in the spaces provided.

SECTION 2: CHEMISTRY [45 marks]
Answer **all** the questions in the spaces provided.

INFORMATION FOR CANDIDATES:
The intended number of marks for questions is given in [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page 24.

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

Hand in **SECTIONS 1** and **2** separately.

This document consists of **24** printed pages.

Setter: Physics: Mr J Ong
Chemistry: Miss Lim MX & Miss S Teo

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SECTION 1: PHYSICS SECTION

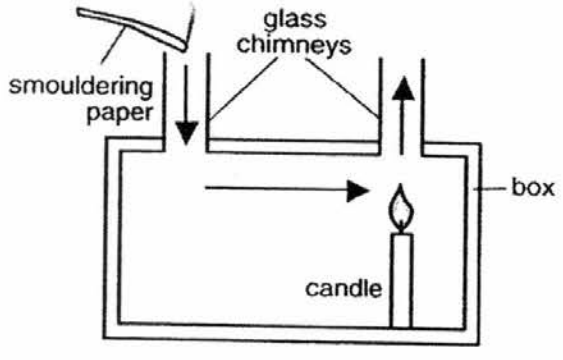
35

SECTION 1 (A) Multiple Choice Questions [10 marks]
Answer **all** the questions in this section in the table on **page 6**.

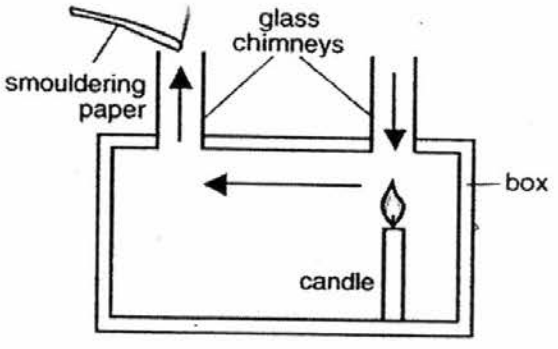
1 When hot water is poured in a thick glass, it cracks. This is due to

A the glass melting.
B the glass turning to gas.
C uneven contraction of the inner walls compared to the outer walls.
D uneven expansion of the inner walls compared to the outer walls.

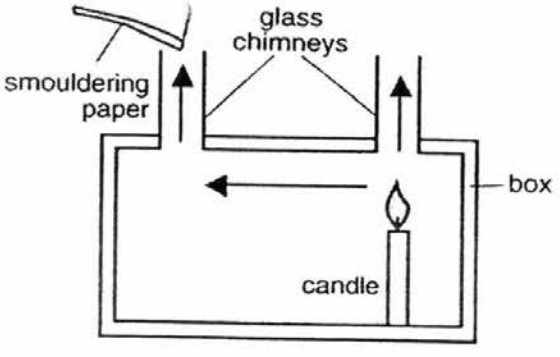
2 Which of the following diagrams shows the correct direction of the convection current set up in the box?



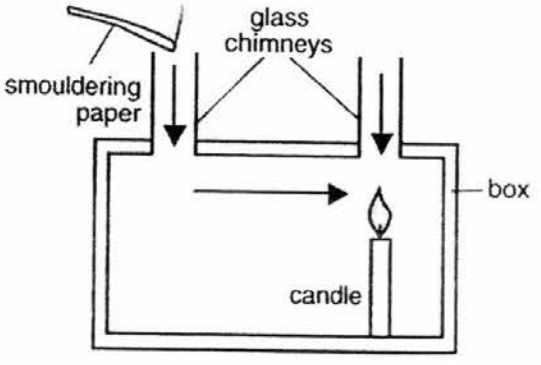
A



B



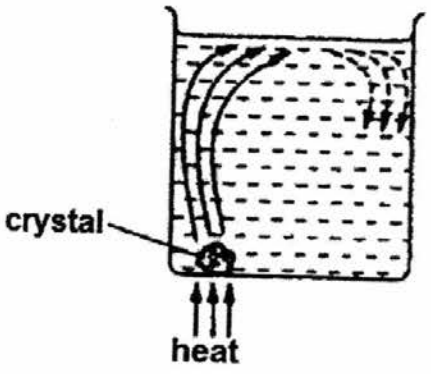
C



D

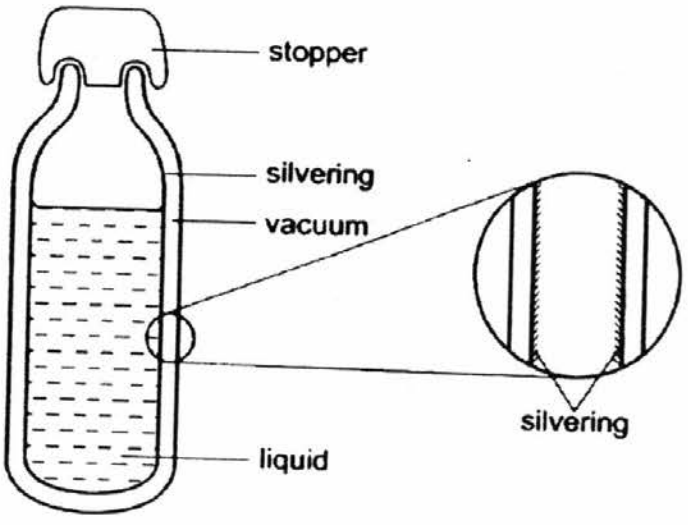
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3 The diagram shows a crystal being heated in a beaker of water. The crystal releases a dye which shows how the water circulates around the beaker. Why does the water above the crystal rise?



A The water contracts and its density decreases.
B The water contracts and its density increases.
C The water expands and its density decreases.
D The water expands and its density increases.

4 The diagram shows a vacuum flask and an enlarged view of a section through the flask wall.



The main reason for the silvering is to reduce heat transfer by

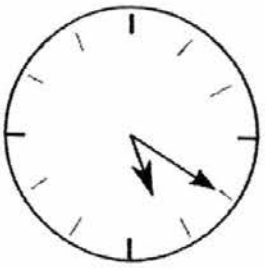
A conduction only.
B conduction and convection.
C radiation only.
D radiation and convection.

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5 Which of the following statements about the property of mirror image is **incorrect**?

A The image is laterally inverted.
B The image is twice the size of the object.
C The object is upright.
D The object is virtual.

6 A man looked into a plane mirror and saw the image of a clock as shown below.



What was the actual time shown?

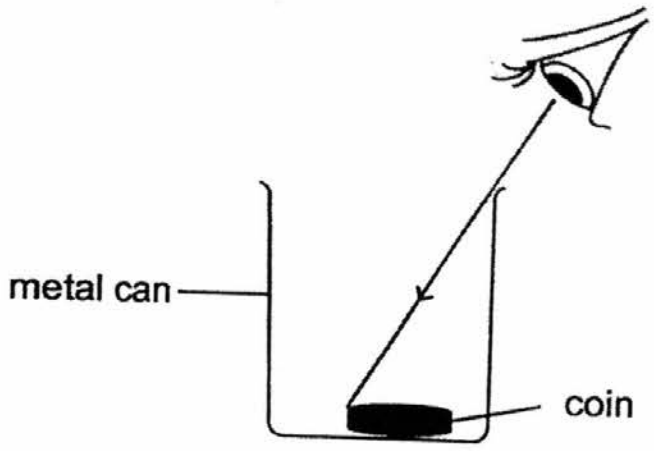
A 5 : 20
B 6 : 40
C 11 : 50
D 12 : 10

7 Which pair of mirrors shows their correct usages?

	concave mirror	convex mirror
A	dentist's mirror	security mirror
B	microscope	rear view mirror of a car
C	security mirror	microscope
D	security mirror	dentist's mirror

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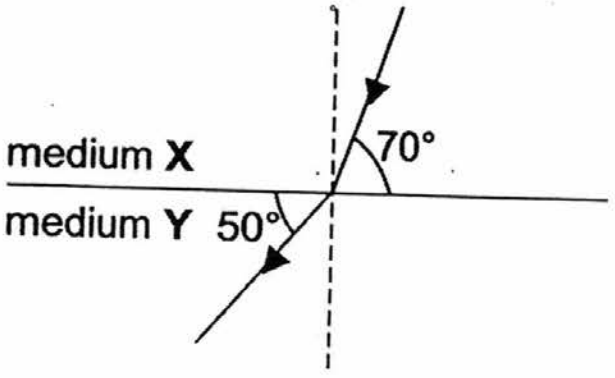
8 In the given diagram, the coin is just out of sight.



If water is poured into the metal can, the coin will

A appear larger.
B become further away.
C become visible.
D float to the surface.

9 The diagram below shows how a ray of light travels from medium **X** to medium **Y**.

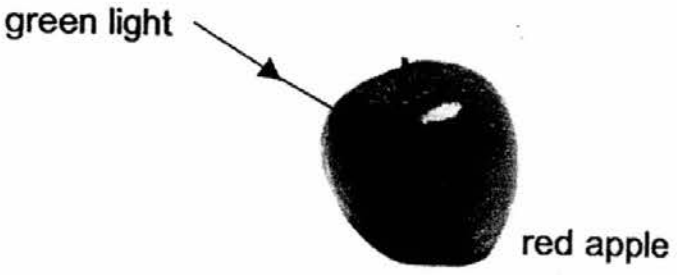


What are the values for the angle of incidence and the angle of refraction?

	Angle of Incidence	Angle of Refraction
A	20°	40°
B	20°	50°
C	70°	40°
D	70°	50°

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10 The diagram below shows green light being shone on a red apple.



How will the apple appear to an observer?

A black
B green
C red
D white

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

[END OF SECTION 1(A)]

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

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

11 **Fig. 11.1** below shows the results from an experiment.

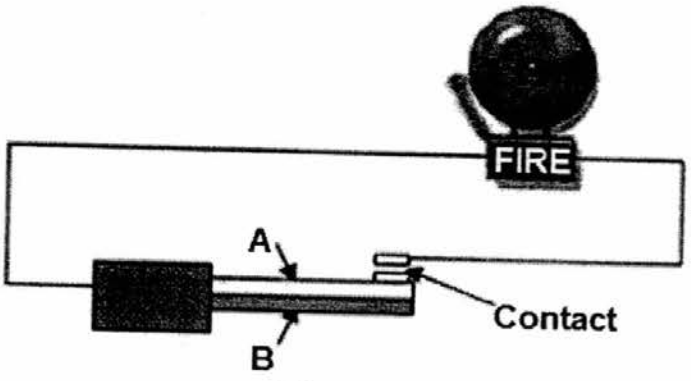


Fig. 11.1

(a) The bimetallic strips in the fire alarm is made up of brass and steel. Which metal is brass, **A** or **B**?

.....[1]

(b) Explain how the fire alarm works when there is a fire.

.....

.....

.....

.....[2]

(c) What would happen to the fire alarm after the fire has been put out?

.....

.....

.....

.....[2]

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12 **Fig. 12.1** below shows a method of heating a room using solar energy instead of conventional sources of energy. A brick wall with a blackened surface is placed behind a double-glazed window facing the Sun. During the day, the wall stores energy received from the Sun as heat energy.

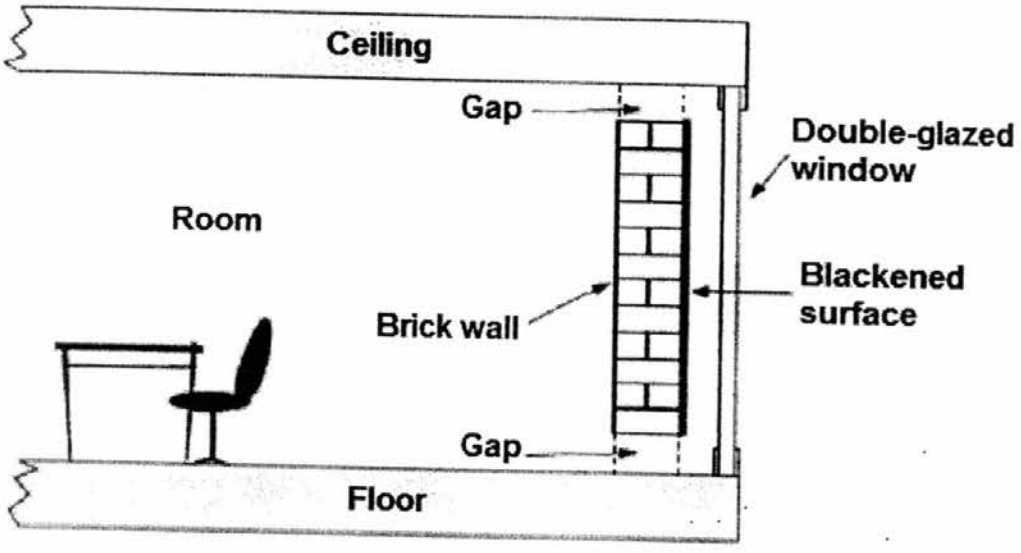


Fig. 12.1

(a) Name the process by which energy from the Sun is transferred to the Earth.

.....[1]

(b) Why is the surface of the wall painted black?

.....

.....[1]

(c) Name the process by which heat energy from the black surface wall is transferred to the air near to it.

.....[1]

(d) Describe how this heated air is uniformly distributed throughout the room.

.....

.....

.....[2]

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(e) The double-glazed window consists of two sheets of glass which trap a layer of air between them. Explain how using a double-glazed window affects the rate at which the temperature of the room changes.

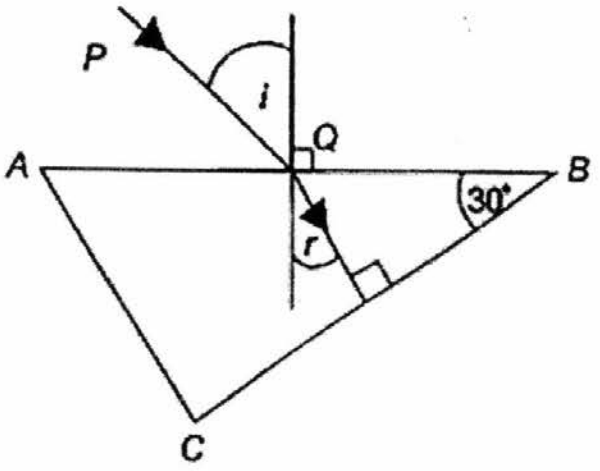
.....

.....

.....[2]

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13 **Fig. 13.1** represents a ray of **red** light passing from air to glass.



(Diagram not drawn to scale)

Fig. 13.1

(a) Explain why the light ray bends towards the normal when it passes through the glass at **AB**.

.....

.....[1]

(b) On **Fig. 13.1**, draw the path of the red light ray after it hits side **BC**. [1]

(c) A ray of **blue** light is also incident to the surface **AB** at the same angle of incidence. Determine whether will there be any difference in the paths travelled by red and blue light through the prism. Explain your answer.

.....

.....

.....[2]

(d) The colour black is actually not a colour. It is the absence of light. If so, how can black objects be seen, like the black alphabets and words of this question on the white paper?

.....

.....[1]

[END OF SECTION 1(B)]

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

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

14 A pencil, covered with blue and yellow stripes, is placed in front of a mirror in an enclosed room. **Fig 14.1** below shows the location of the image of the pencil. X' marks the image of the pencil's tip.

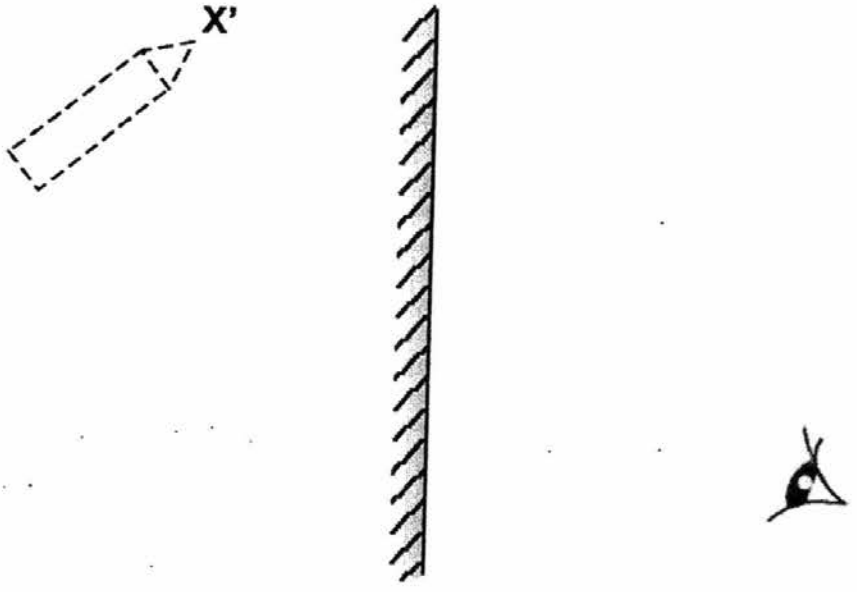


Fig. 14.1

(a) On **Fig. 14.1** above, draw

(i) the actual position of the pencil. [1]

(ii) two reflected rays reaching the observer's eye from the pencil's tip. [1]

(iii) draw the two corresponding incident rays coming from the pencil's tip. [1]

(b) Explain why the image of the pencil is drawn with a dotted line.

.....[1]

(c) Describe and explain how the distance between the pencil and its image change when the pencil is brought nearer to the mirror by 1 cm.

.....

.....

.....[2]

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(d) If the light source in the room is changed to one that only gives out green light, what colour(s) would the pencil appear to the observer? Explain your answer.

.....

.....

.....[2]

[END OF SECTION 1]

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Name : ..... ( ) Class : .....

ST JOSEPH'S INSTITUTION

END-OF-YEAR EXAMINATION (SECONDARY 2)

LOWER SECONDARY SCIENCE

PAPER 1

5 OCTOBER 2016

45 minutes

1045 – 1130 hrs

Additional Materials: Optical Answer Sheet

READ THESE INSTRUCTIONS FIRST

1. Answer all questions by shading your answers in the appropriate spaces in the optical answer sheet.
2. Use a 2B pencil only. Make sure all amendments on the optical answer sheet are thoroughly erased using a soft eraser.
3. Use pi (π) value preprogrammed in calculator.
4. Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

This document consists of **14** printed pages.

[Turn over]

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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 Sulphur 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 = 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 (30 marks)

*There are thirty questions in this section. Answer **all** questions. For each question there are four possible answers, **A**, **B**, **C** and **D**. Choose the one you consider correct and shade your choice in the appropriate oval in the optical answer sheet provided.*

A1 Which of the following is measured in Newtons?

A Weight
B Mass
C Density
D Length

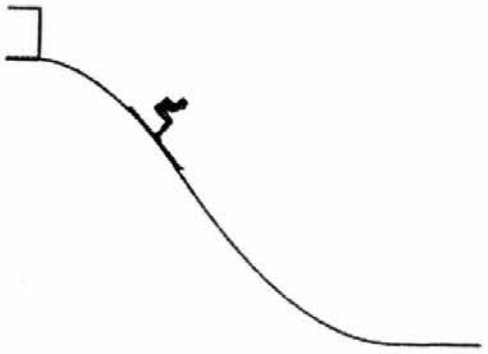
A2 Which of the following apparatus are needed to determine the density of an irregularly shaped rock?

A Vernier calipers, spring balance
B Metre ruler, electronic balance
C Measuring cylinder, electronic balance
D Measuring tape, spring balance

A3 What form of energy do we get directly from the Sun?

A Electrical
B Nuclear
C Chemical potential
D Light

A4 A skier walks to the top of a ski slope at a constant speed and gains 125 000 J of energy. She skis down the slope and when she reaches the bottom of the slope, she has 45 000 J of kinetic energy.



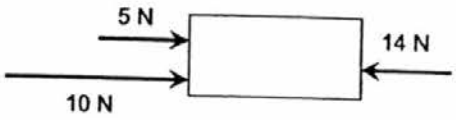
How much energy has been converted to heat and sound at the bottom of the slope?

A 170 000 J
B 125 000 J
C 80 000 J
D 45 000 J

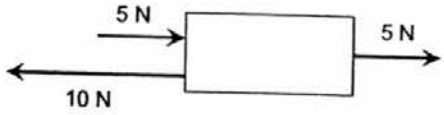
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A5 Which of the following results in a net force to the left?

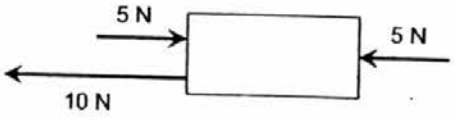
A



B



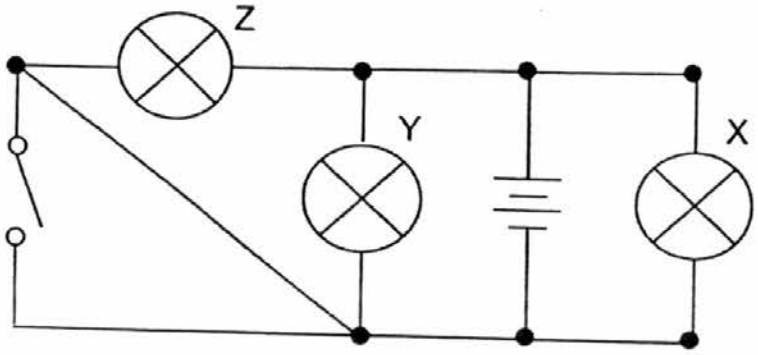
C



D



A6 A student sets up the circuit shown. The switch is open (off).
Which lamps are on and which lamps are off?



	Lamp X	Lamp Y	Lamp Z
A	Off	Off	Off
B	On	Off	Off
C	Off	On	Off
D	On	On	On

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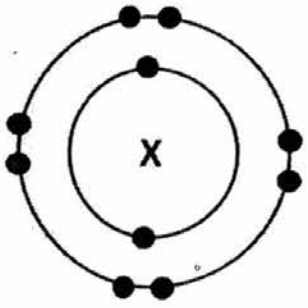
A7 Which of the following generates the **least** amount of energy if operated from the same voltage supply?

A a 5000 W electric cooker used for 1 minute
B a 1000 W electric motor used for 10 minutes
C a 500 W electric iron used for 1 hour
D a 100 W lamp used for 1 day

A8 Which part of an electrical appliance should the earth wire be connected to?

A fuse
B metal case
C on/off switch
D plastic handle

A9 Three elements **X**, **Y** and **Z** have consecutively increasing proton numbers. The atomic structure of element **X** is shown below.



What will be the symbol for the ion of element **Z** in its compounds?

A Z^-
B Z^{2-}
C Z^+
D Z^{2+}

A10 If a new element Ja is discovered with 6 valence electrons in its atom. Which of the following statements is true about element Ja?

A It can conduct electricity.
B It reacts vigorously with water.
C It loses 2 electrons to form a positive ion of 2+ charge.
D It readily reacts with oxygen to form a covalent compound

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A11 The table below shows the atomic structures of six particles, represented by the letters **E** to **J**. The letters are not the symbols of the elements.

Particle	Number of		
	Protons	Neutrons	Electrons
E	16	8	8
F	18	10	8
G	16	8	10
H	12	12	10
I	11	12	10
J	12	12	12

Which of the two particles from the table are an atom and a positive ion of the same element?

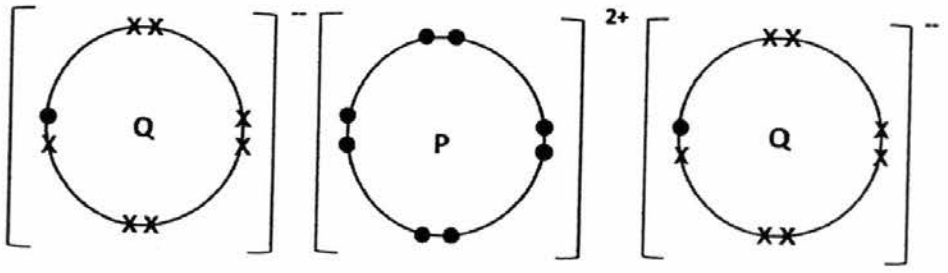
A **E** and **F**
B **F** and **G**
C **I** and **J**
D **H** and **J**

A12 Which of the following element compounds does not have any covalent bonds?

A Ammonium chloride
B Nitrogen dioxide
C Potassium hydroxide
D Sodium oxide

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A13 Elements **P** and **Q** are from Period 3 of the Periodic Table. The diagram below shows the dot and cross diagram of a compound formed by **P** and **Q**.



Which of the following is the correct electronic structure of **P** and **Q** before bonding occurs?

	P	Q
A	2,8	2,7
B	2,8,2	2,8,6
C	2,8,2	2,8,7
D	2,8,8	2,8,8

A14 A solid **R** has the following properties:

1. It is green in colour.
2. It is insoluble in water.
3. It produces effervescence when added to dilute sulfuric acid

What is **R**?

A Calcium hydroxide
B Copper(II) carbonate
C Lithium oxide
D Zinc

A15 Which of the following acids of equal concentration will produce the highest amount of hydrogen (H^+) ions in water?

A Carbonic acid
B Hydrochloric acid
C Nitric acid
D Sulfuric acid

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A16 The figure below shows four test tubes **A**, **B**, **C** and **D** containing a piece of metal in dilute acid.

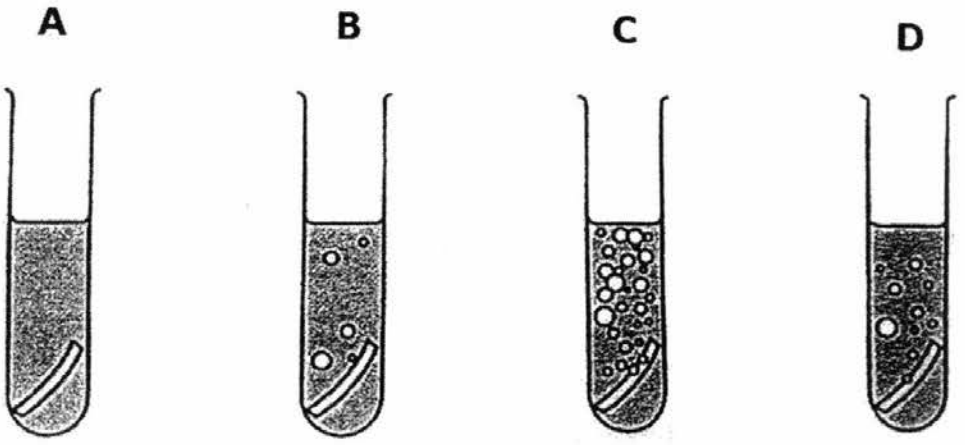
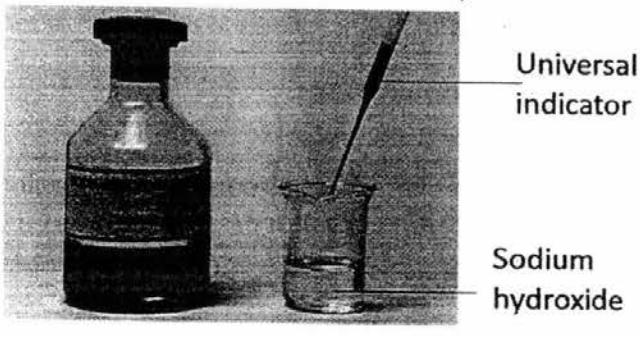


Figure A16

Which of the following shows the correct pair of metal and dilute acid in the test tube respectively?

A Calcium and dilute ethanoic acid
B Copper and dilute hydrochloric acid
C Magnesium and dilute sulfuric acid
D Sodium and dilute nitric acid

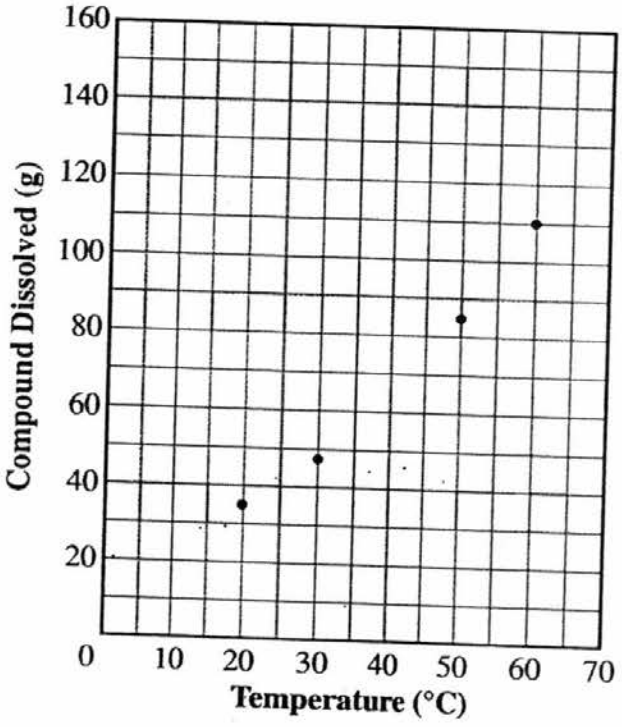
A17 The pH of aqueous sodium hydroxide is 14. A few drops of Universal indicator are added to a test tube of aqueous sodium hydroxide. What will be the final colour of the mixture when one spatula of sodium chloride is added to the test tube?



A Green
B Red
C Violet
D Yellow

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A18 Students in Joseph 101 are investigating how temperature, in degrees Celsius (°C), affects the solubility of a compound (X) in 100 millilitres (ml) of water. The students were given a graph that shows the solubility of a certain compound, as shown below.

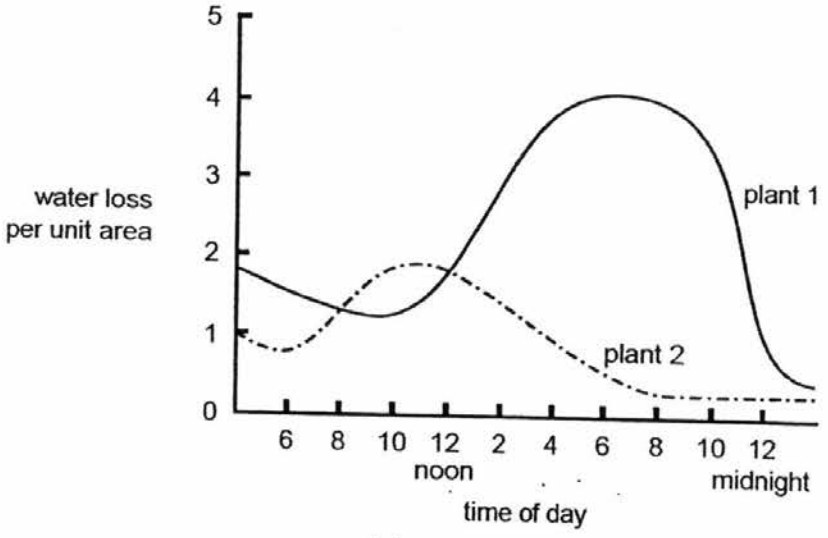


The students had to predict how many grams (g) of X will dissolve in 100 ml of water at 40°C. Based on the information in the graph, which of the following is the best prediction of how many grams of X will dissolve at 40°C?

A 40g
B 65g
C 80g
D 100g

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A19 The amount of water lost per unit area from the leaf surface of two different plants was measured. Both plants were grown in the same conditions. The results are shown in the graph.



Which of the following can you conclude from the information obtained?

A Plant 2 will be more likely to survive in a dry environment than plant 1.
B At 10.00 am the stomata opening will be greater in plant 1 than in plant 2.
C At 12.00 noon, plant 1 has a greater water loss per unit area than plant 2.
D At 5.00 pm the rate of photosynthesis will be greater in plant 2 than in plant 1.

A20 Under which of the following environmental conditions will transpiration in a well-watered potted plant be expected to be highest?

A Still air and bright sunlight
B Still air and shade
C Moving air and bright sunlight
D Moving air and shade

A21 Which of the following substance builds up in a muscle as a result of anaerobic respiration?

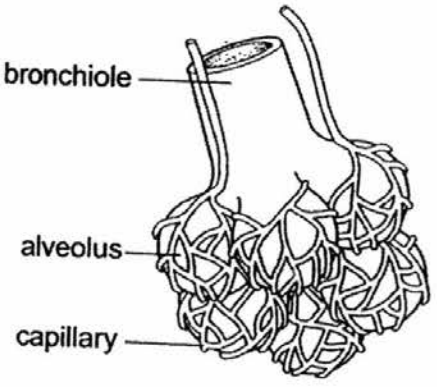
A Ethanoic acid
B Ethanol
C Lactic acid
D Carbon dioxide

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A22 Which of the following is a harmful waste material that leaves the blood and travels through the lungs before leaving the body?

A Carbon dioxide
B Nitrogen
C Oxygen
D Water

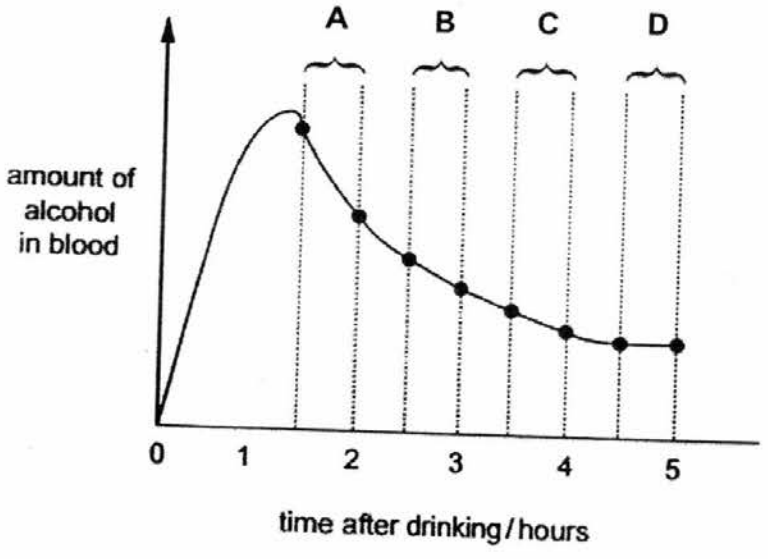
A23 The diagram below is a bunch of alveoli in the human lung.



Which one of the following adaptations increases the total surface area of the alveoli?

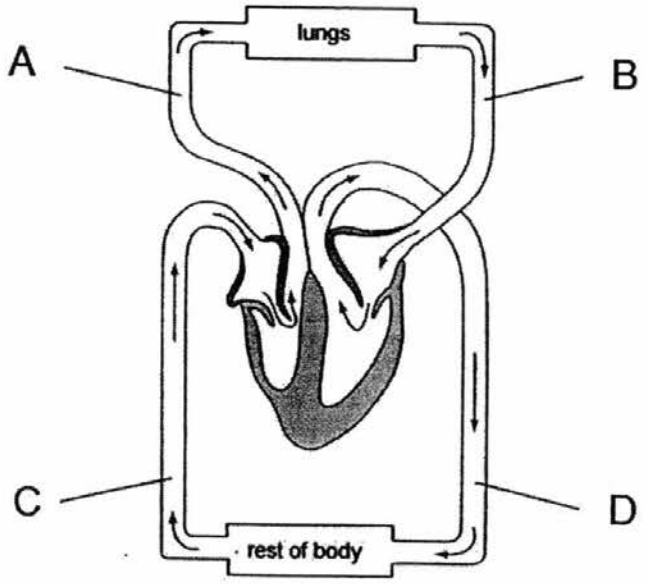
A It exists in large numbers.
B It has a cell wall which is one-cell thick.
C It has a moist surface.
D It is surrounded by numerous blood capillaries.

A24 Samples of blood are taken every half hour from a person who has been drinking alcohol. The graph shows the amount of alcohol in this person's blood. During which period is alcohol removed fastest from the blood?



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A25 The figure below shows the human circulatory system. In which vessel is the blood pressure highest?



A26 Which of the following statement are correct?

I. Bile is acidic and is produced by the gall bladder.
II. Digestion begins in the mouth.
III. Peristalsis in the oesophagus pushed food down to the stomach.

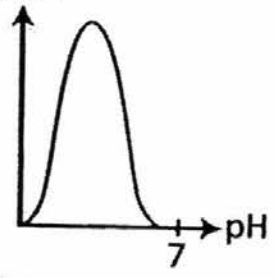
A I and II
B I and III
C II and III
D I, II and III

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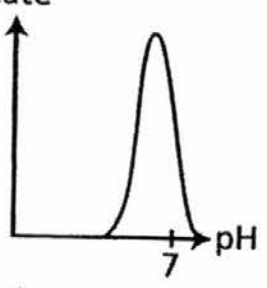
A27 Enzymes are catalysts which are made of proteins that increased the rates of reactions without themselves being changed at the end of the reaction.

Enzymes are found in many different parts of the human body. Which of the following graph shows the effects of an enzyme which is found in the mouth?

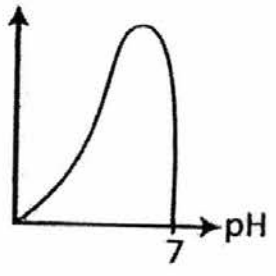
A



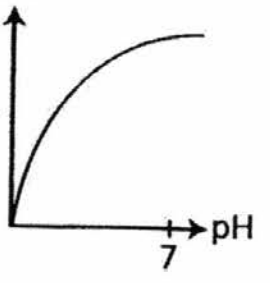
B



C



D

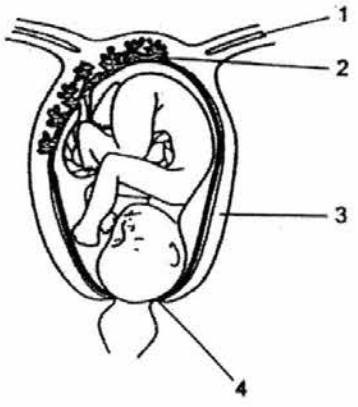


A28 A male chimpanzee has 48 chromosomes in each of his regular body cells. How many chromosomes would be found in each of his sperm cells?

A 96
B 48
C 24
D 12

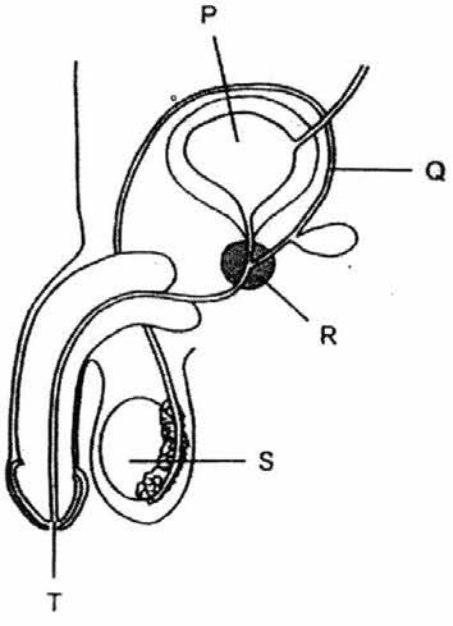
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A29 Where are the uterus and the cervix?



	Uterus	Cervix
A	1	2
B	2	1
C	4	3
D	3	4

A30 The diagram shows part of the male reproductive system.



Which structures produce seminal fluid and sperm?

	Seminal fluid	Sperm
A	Q	R
B	P	Q
C	S	T
D	R	S

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Answers to LSS Sec 2 – Paper 1

End-of-Year Examination 2016

Section A

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

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QUEENSWAY SECONDARY SCHOOL
Science Department

MID-YEAR EXAMINATION 2016

MARK SCHEME

Level: 2 Express

Subject: Lower Secondary Science (Physics)

Total Marks: 35

Setter: Jimmy Ong

Section A [10 marks]

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

Section B [17 marks]

11 **(a)** B: Brass 1

(b) When there is a **fire outbreak**, the bimetallic strip will **bend upward**, 1
as metal B expands more than metal A, and **close the circuit**. The fire alarm is switched on subsequently. 1

(c) Once the **fire is put out**, the bimetallic strip will **return to its original position** due to contraction, 1
hence **opening the circuit** and switching off the fire alarm. 1

Total = 5

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12 (a) Radiation. 1

(b) Black is a good/best absorber of heat/radiation/IR 1

(c) Conduction (only). 1

(d) Any 2 of the following points:
- By convection 1
- Warm/hot air (beside blackened surface) expands, becomes less dense and rise. 1
- Cooler, denser air inside sinks to replace the warm rising air. 1

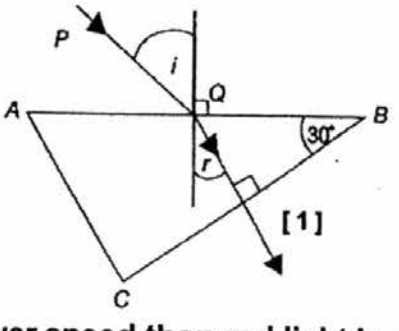
max 2

(e) Air is a good insulator/poor conductor of heat (or two sheets of glasses are both insulator of heat) 1
Heat lost to outside/surroundings is minimized (or more heat is retained in the room) + temperature rise faster. 1

Total = 7

13 (a) The glass is **denser** than air. / The speed **decreases** when light travels into the glass. 1

(b)



[1]

(c) **Blue light travels at a lower speed than red light in glass** 1
thus it will **refract at different angles/bend more than red light** 1
resulting in different paths of travel.

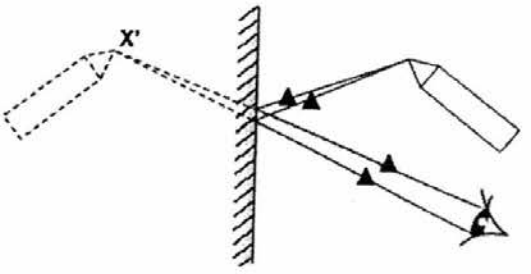
(d) Black objects cannot be seen by our eyes because there is no light reflected into our eyes from these objects. Rather, our eyes detect the colours framing these black objects, thus determining the outlines of the objects. Black objects absorb all colours. 1

Total = 2

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Section C [8 marks]

14 (a) Solid line ½
Correct distance and orientation ½
Correct rays 2



(b) To illustrate that the image is <u>virtual</u>. 1

(c) The distance will be shorter ½
by 2 cm. ½
As distance between image and mirror is equal to distance between object and mirror.

(d) Black 1
and green stripes ½
The <u>blue will absorb the green light</u> and reflect none, ½
while the yellow will absorb none and <u>reflect green light</u>. ½ ½

Total = 8

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SECTION 2: CHEMISTRY SECTION

NAME:	CLASS: 20_	INDEX NO:	/45

SECTION 2 (A) Multiple Choice Questions [15 marks]
Answer **all** the questions in this section in the table on **page 16**.

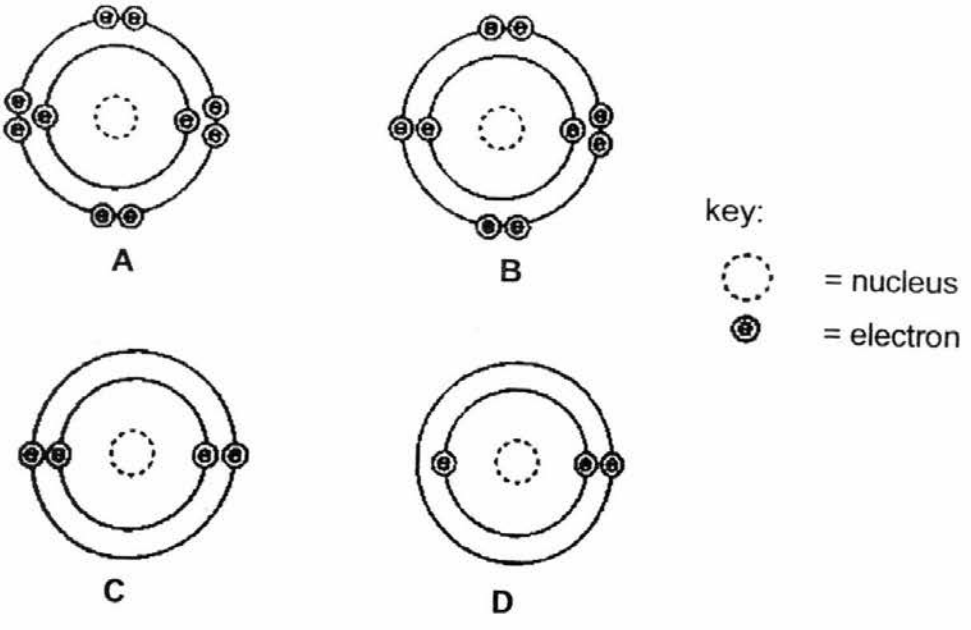
1 Element **X** is represented by the symbol $^{85}_{37}X$.
Which of the following statements is true about element **X**?

A It has 37 neutrons.
B It has 85 electrons.
C It has 48 protons.
D The total number of protons and electrons is 74.

2 An ion of element **Z** has 4 protons, 2 electrons and 5 neutrons.
What is the mass and charge of this ion?

	Mass	Charge
A	6	2+
B	6	2-
C	9	2+
D	9	2-

3 The electronic structures of four atoms are shown.
Which atom is chemically unreactive?



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4 A compound has the chemical formula $Fe(NO_3)_3$.
How many elements and atoms are present in the compound?

	number of elements	number of atoms
A	3	11
B	3	13
C	4	11
D	4	13

5 Element **X** has the electronic configuration 2.8.3.
Element **Y** has the electronic configuration 2.8.6.

Which of the following shows the correct formula of the compound formed between element **X** and element **Y**?

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

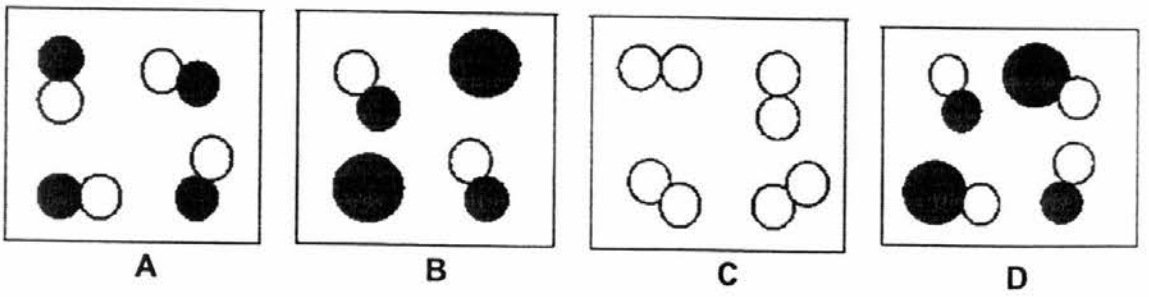
6 An element **Z** has two isotopes, ^{238}Z and ^{236}Z.

How does ^{238}Z differ from ^{236}Z?

A It has 2 more neutrons.
B It has 2 more protons.
C It has 2 more neutrons and 2 more electrons.
D It has 2 more protons and 2 more electrons.

7 In the diagram, each circle represents an atom.
Circles of different sizes represent different atoms.

Which diagram represents a mixture of compounds?



A **B** **C** **D**

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8 Which of the following list contains an element, a compound and a mixture?

A air, steel, sugar
B carbon dioxide, oxygen, sodium chloride
C copper, seawater, sulfur
D crude oil, iron, water vapour

9 Element **X** has the following properties.

I good conductor of heat
II silver solid at room temperature
III malleable

Identify element **X**.

A argon
B calcium
C copper
D mercury

10 Which method can be used to separate steel powder from sulfur powder?

A Distillation
B Evaporation to dryness
C Filtration
D Magnetic attraction

11 A student makes some crystals.

What should the student check to test the purity of the crystals?

A colour of crystals
B melting point
C shape of crystals
D size of crystals

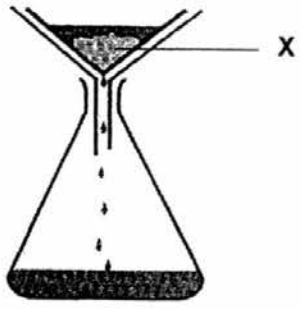
12 Which of the following factors will affect the solubility of a solute?

I rate of stirring
II temperature of solvent
III type of solvent

A I and II
B II and III
C I and III
D All of the above

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13 A mixture of sodium chloride, potassium chloride and silver chloride is added to a beaker containing water. Only silver chloride cannot dissolve in water. The solution is filtered as shown below.



Which of the following is most likely to be **X**?

A A residue of silver chloride
B A distillate of silver chloride
C A residue of sodium chloride and potassium chloride
D A filtrate of silver chloride

14 Which of the following statements is **not** true of all solutions?

A No residue is collected after filtration.
B They are colourless.
C They are homogeneous.
D There is no separation of solute and solvent when left to stand.

15 Which of the following substance forms a suspension when mixed with water?

A chalk
B salt
C sugar
D vinegar

ANSWERS :

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)]

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SECTION 2 (B): Structured Questions [20 marks]

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

16 The following elements are found in the same period of the Periodic Table and some of their electronic configurations are shown below.

Na	Mg	Al	Si	P	S	Cl	Ar
			2.8.4	2.8.5	2.8.6		2.8.8

(a) Write down the missing electronic configurations. [1]

(b) Explain, in terms of structure, why the elements above belong to Period **3**.

.....[1]

(c) **(i)** Name the element that will readily lose one electron to attain a noble gas configuration.

.....[1]

(ii) Write the chemical formula of the ion formed.

.....[1]

(d) An experiment was carried out by burning magnesium metal, which is a good conductor of electricity, in yellowish-green chlorine gas to produce white solid of magnesium chloride.

During the experiment, a bright light was given off. A test was conducted on the white solid and it was found that it is not a conductor of electricity.

(i) Write a word equation to represent the above reaction.

.....[1]

(ii) Draw '**dot and cross**' diagrams to show the electronic structure of magnesium chloride. [3]

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(iii) State two characteristics of a compound, supported with evidence from the above description. [3]

Characteristic **1**:

.....

.....

Evidence **1**:

.....

.....

Characteristic **2**:

.....

.....

Evidence **2**:

.....

.....

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17 The boxes in **Fig. 17.1** contain descriptions of four different substances, **P**, **Q**, **R** and **S**.

Solid **P** is a white solid that can be separated into two different substances by adding water and filtering.	Liquid **Q** is made up of a fixed ratio of carbon, hydrogen and oxygen that are chemically combined.
Solid **R**, when heated, melts to a yellow liquid that cannot be made into a simpler substance.	When electricity is passed through colorless liquid **S**, it breaks down to produce hydrogen and oxygen.

Fig. 17.1

(a) Decide whether each substance should be classified as an element, compound or mixture. Show your decision by ticking (✓) the correct box shown in **Table 17.1**.

Table 17.1

Substance	Element	Compound	Mixture
P			
Q			
R			
S			

[2]

(b) (i) Identify liquid **S**.

.....[1]

(ii) Using the answer from part **(i)**, write a **word** equation to represent the breakdown of liquid **S** to form hydrogen and oxygen.

.....[1]

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(c) Complete **Table 17.2**.

	Name of compound	Positive ion	Negative ion	Chemical formula
(i)		$A\beta^{3+}$		$AlCl_3$
(ii)	Sodium carbonate	Na^+		
(iii)	Calcium hydroxide		OH^-	
(iv)	Copper (II) sulfate			$CuSO_4$

[4]

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18 Jason wants to find out whether fine sugar or sugar cubes will dissolve faster in water. He placed 5.0 g of fine sugar in Beaker **A** and 5.0 g of sugar cubes in Beaker **B**, keeping all the other conditions to be the same.

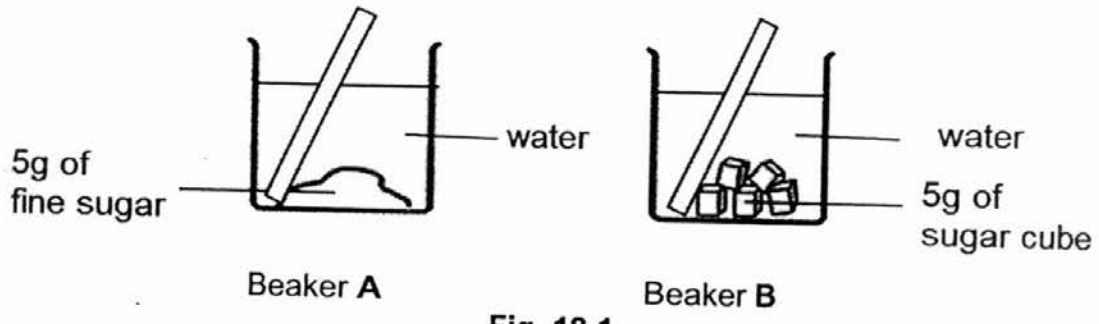


Fig. 18.1

(a) Identify the solute and solvent used in both beakers. [1]

Solute ..... Solvent .....

(b) Given that both beakers are stirred at the same rate, explain whether sugar in Beaker **A** or **B** will dissolve faster.

.....

.....

.....[1]

(c) State one other method that Jason can use to increase the rate of dissolving.

.....[1]

[END OF SECTION 2(B)]

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SECTION 2 (C): Free-Response Question [8 marks]

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

19 A mixture of liquids, listed in **Table 19.1**, is to be separated using the setup as shown in Fig. 19.2 below.

Table 19.1

Name of Liquid	Boiling point / °C	Volume / cm^3
Dichloromethane	41	20.0
Ethanol	78	20.0
Hexene	64	10.0

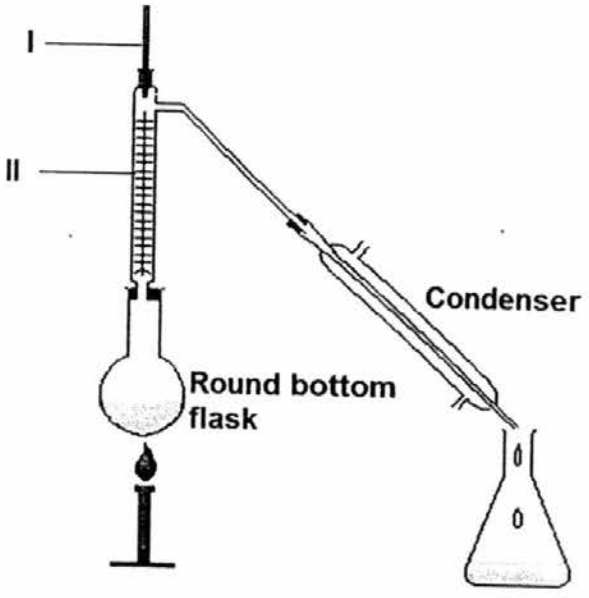


Fig. 19.2

(a) Name the method of separation shown above.

.....[1]

(b) Name apparatus **I** and **II** that are used in this set-up.

.....[2]

(c) Explain why it is necessary for the water flow at the condenser to be as indicated.

.....[1]

(d) State the order in which the distillates will be collected.

.....[1]

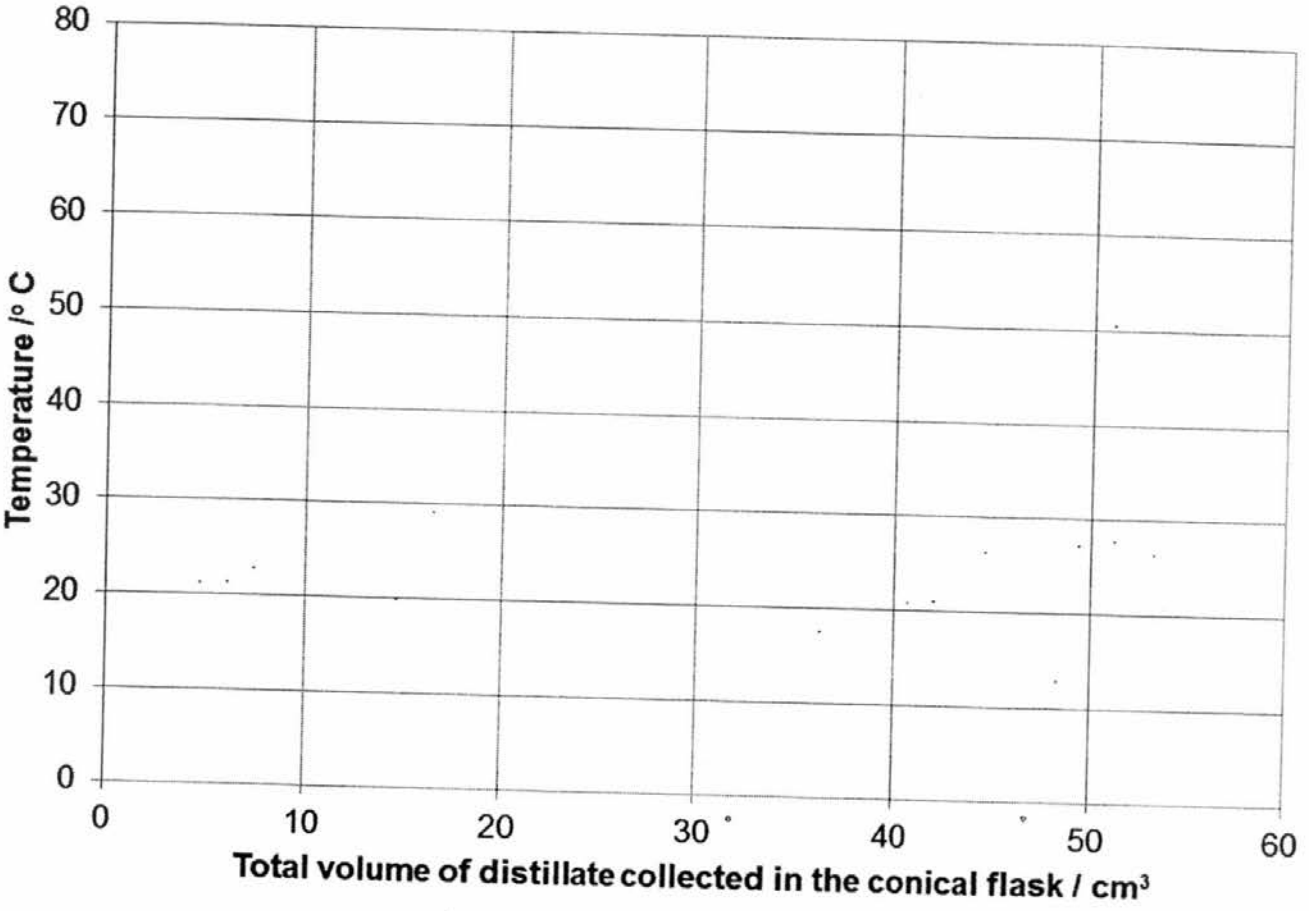
(e) A student carried out the above experiment and noticed that the setup was shaken vigorously during boiling. Describe a modification to the above setup which will lessen the shaking.

.....[1]

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(f) Given that the same conical flask is used to collect all the distillates, sketch a line graph and label the total volume of distillate collected as temperature changes.

[2]



[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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QUEENSWAY SECONDARY SCHOOL
Science Department

MID-YEAR EXAMINATION 2016

MARK SCHEME

Level: 2 Express

Total Marks: 45

Subject: Lower Secondary Science (Chemistry)

Setter: Lim Mei Xuan & Sharelyn Teo

Section A [15 marks]

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

Section B [22 marks]

16 (a)

Na	Mg	Al	Si	P	S	Cl	Ar
2.81	**2.82**	**2.83**	2.8.4	2.8.5	2.8.6	**2.87**	2.8.8

(All four electronic configurations must be correct. No ½ mark) 1

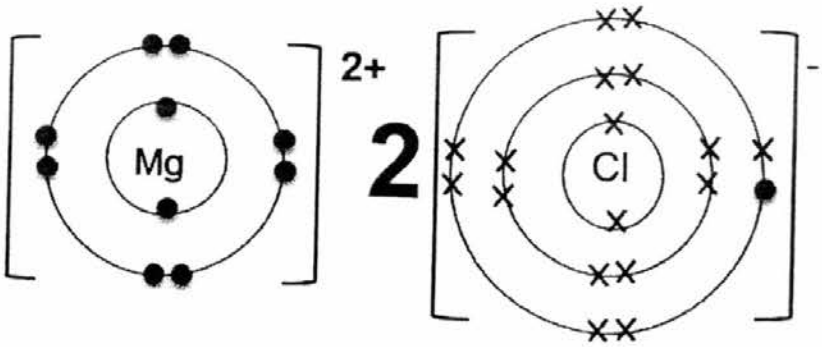
(b) All elements have **3 electron shells.** 1

(c) (i) Sodium 1

(ii) Na^+ 1

(d) (i) magnesium + chlorine → magnesium chloride 1

(ii) Each correct ion – 1m each
Correct ratio – 1m 3



1

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(iii) Characteristic: A compound is formed by chemical reaction OR There is an energy change when a compound is formed. 1

Evidence: A bright light was given off during the reaction . ½

Characteristic: The properties of a compound is different from its constituent elements. 1

Evidence: The white solid formed could not conduct electricity/ A white solid is formed from a silvery solid and greenish-yellow gas (other charateristics of compound are not acceptable) ½

Total = 10

17 (a) Each tick ½ mark.

Substance	Element	Compound	Mixture
P			✓
Q		✓	
R	✓		
S		✓	

2

(b) (i) water 1

(ii) water → hydrogen + oxygen 1

(c) ½ mark each

	Name of compound	Positive ion	Negative ion	Chemical formula
(i)	**Aluminium Chloride**	$A\beta^{3+}$	**Cl^-**	$AlCl_3$
(ii)	Sodium carbonate	Na^+	**CO_3^{2-}**	**Na_2CO_3**
(iii)	Calcium hydroxide	**Ca^{2+}**	OH^-	**$Ca(OH)_2$**
(iv)	Copper (II) sulfate	**Cu^{2+}**	**SO_4^{2-}**	$CuSO_4$

4

Total = 8

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18 (a) Solute: sugar
Solvent: water

No ½ mark, both answers must be correct. 1

(b) Sugar in Beaker A will dissolve faster.
Fine sugar has a larger surface area to come into contact with water. 1

(c) Increase temperature
Increase rate of stirring 1

Total = 3

Section C [8 marks]

19 (a) Fractional Distillation 1

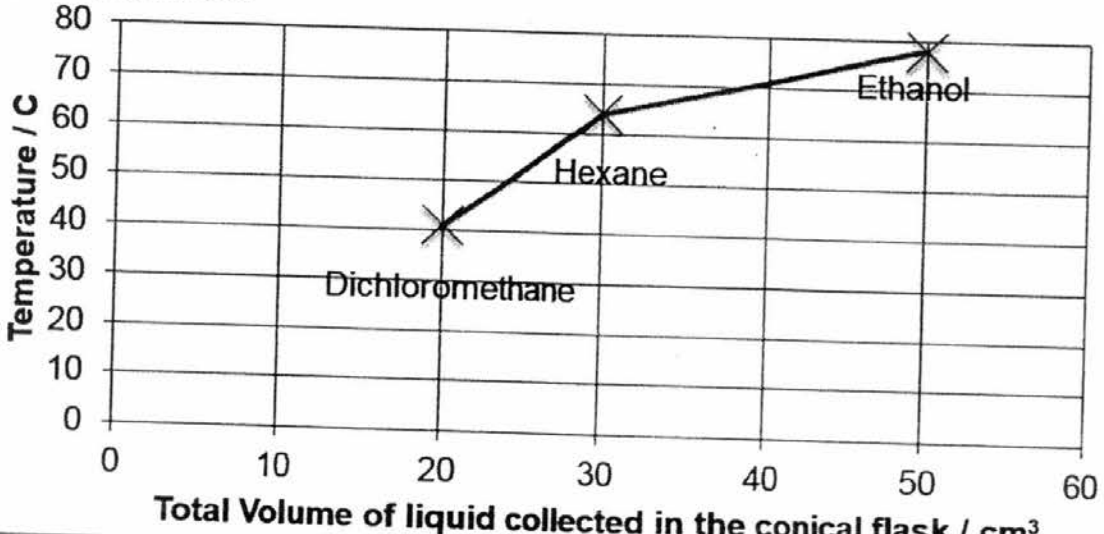
(b) I: Thermometer
II: fractionating column 1
1

(c) So that the **entire condenser can be filled with cold water**. 1

(d) Dichloromethane, Hexene, Ethanol 1

(e) The student can add boiling chip into the distillation flask. 1

(f) 1 m – correct point plotted
1 m – correct label



2

Total = 8

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