KUO CHUAN PRESBYTERIAN SECONDARY SCHOOL
2016 End of Year Examination
Secondary 1 Express

NAME			
CLASS		INDEX NUMBER	

LOWER SECONDARY SCIENCE

12 October 2016

2 hours

Additional Materials: Multiple Choice Answer Sheet

Setter: Ms. Low Wai Kwan and Ms. Daphne Khoo

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.

This paper consists of 3 sections.

Section A consists of 30 multiple-choice questions.
Answer **all** questions.
For each question, choose the most appropriate answer and shade the letter corresponding to the answer in soft 2B pencil on the separate Multiple Choice Answer Sheet.

Section B consists of 10 structured questions.
Answer **all** the questions in dark blue or black pen in the space provided on the Question Paper.

Section C consists of 4 free response questions.
Answer **any 3** of the questions in dark blue or black pen in the space provided on the Question Paper.

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 31.

Parent's Signature	
For Examiner's Use	
Section A	
Section B	
Section C	
Total	

SECTION A (30 marks)

1 Peter found a bottle of substance that produces vapour which irritates his eyes and nose.
Which of the following hazard symbol should be placed on the bottle of substance?

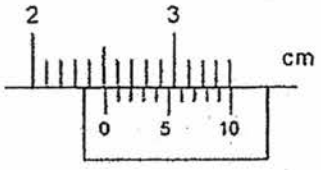
A 

B 

C 

D 

2 A pair of vernier calipers is used to measure the thickness of a book.



What is the thickness of the book?

A 2.03 cm
B 2.31 cm
C 2.51 cm
D 2.62 cm

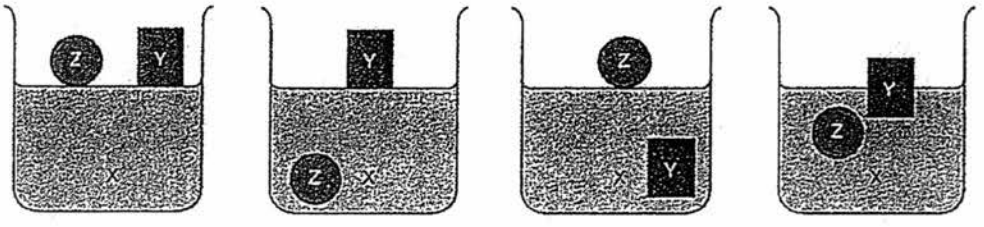
3 Which of the following statements is **true**?

A It is safe to direct the mouth of a test tube at others as long as they wear safety goggles.
B The dark blue zone of the Bunsen flame is the hottest.
C We should use a luminous flame for strong heating.
D When the air-hole is open, the Bunsen flame produced is non-luminous.

4 The density of three different substances are given in the table below.

material	density (g/cm^3)
liquid **X**	0.9
solid **Y**	0.3
solid **Z**	0.9

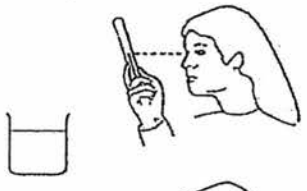
Which of the following diagrams shows the observations correctly when the three substances are placed together in a beaker?



A B C D

5 Which person will obtain the **most** accurate temperature reading?

A



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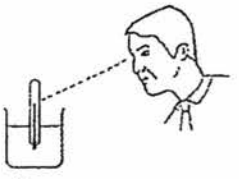

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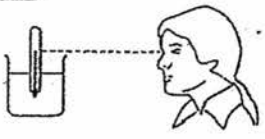
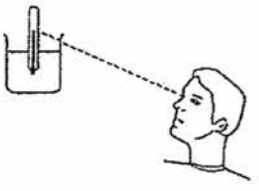


D



6 Which of the following is the most appropriate instrument for measuring the circumference of a flower pot?

A a measuring tape
B a metre rule
C a pair of vernier calipers
D a short ruler

7 The table shows information about four objects.

object	mass/ g	volume/ cm^3
P	30	6
Q	40	5
R	50	10
S	60	4

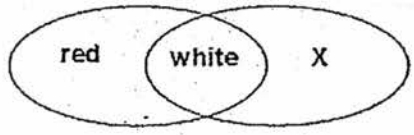
Which two objects have the same density?

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

8 Drivers make use of a _____ along a road to see round a bend.

A concave mirror
B convex mirror
C plane mirror
D rear view mirror

9 Two beams of coloured light, X and red were mixed as shown below.

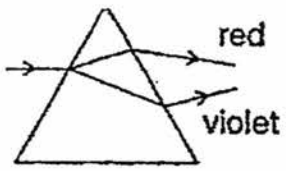


What could the coloured light X be?

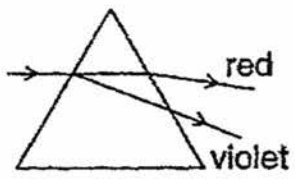
A blue
B cyan
C green
D magenta

10 Which diagram correctly shows how white light is split by a prism?

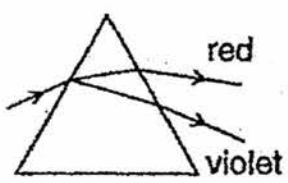
A



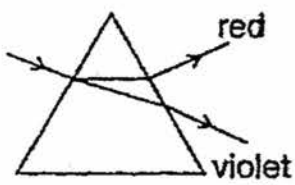
B



C



D



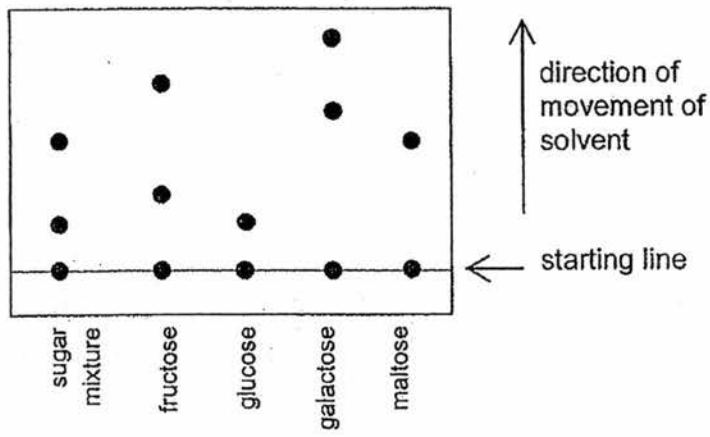
11 The ion X^{3+} contains 52 particles in the nucleus and 18 electrons. How many protons and neutrons are there in the nucleus of X^{3+}?

	number of protons	number of neutrons
A	18	34
B	21	31
C	24	28
D	52	73

12 How many atoms of each element are there in one molecule of ammonium phosphate, $(NH_4)_3PO_4$?

	N	H	P	O
A	1	4	1	12
B	1	4	3	12
C	3	12	1	4
D	3	12	3	4

13 A paper chromatography experiment was carried out to identify the sugars present in a mixture. The diagram below shows the results.



The sugars present in the sugar mixture

A fructose and galactose.

B fructose and maltose.

C galactose and glucose.

D glucose and maltose.

14 Which of the following **cannot** be separated using magnetic separation?

A iron from copper powder

B nickel from sulfur powder

C rubber casing from copper wires

D stainless steel filings from glass beads

15 Which two elements have similar chemical properties?

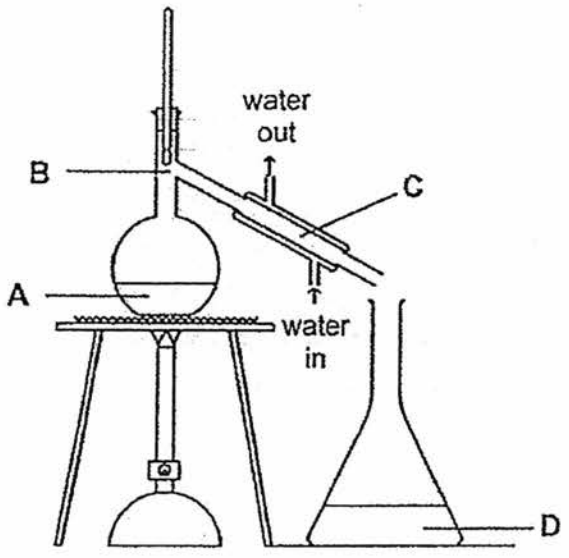
A Be and B

B H and He

C K and Ca

D Li and Na

16 The diagram shows a simple distillation set-up to collect water from a salt solution. At which point is the temperature 100°C?



17 The information given below shows a process of decomposition taking place in a test tube when a substance **X** is being heated strongly.

$$X \longrightarrow Y + Z$$

Which of the following statements is **incorrect**?

A Both Y and Z could be compounds.

B X could be an element.

C Y could be a compound.

D Z could be an element.

18 A substance is a mixture if

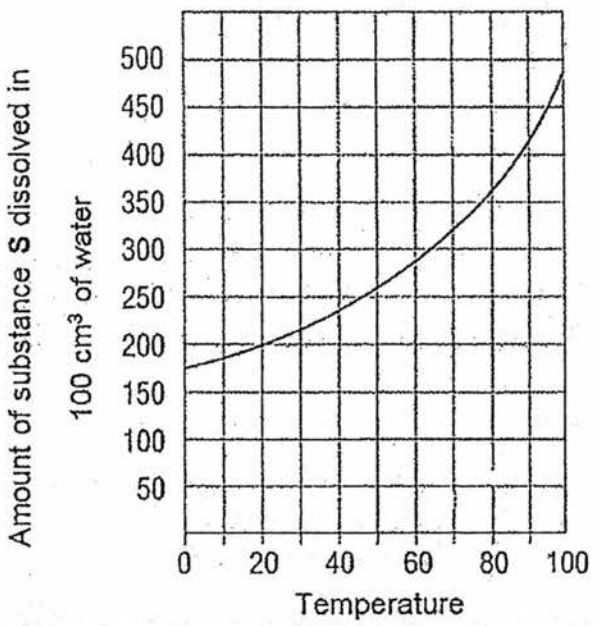
A it has a fixed melting point.

B it has properties similar to those of its components.

C its components are mixed in fixed proportion.

D there is light or heat formed during mixing.

19 The graph below shows the solubility curve of a substance **S**.



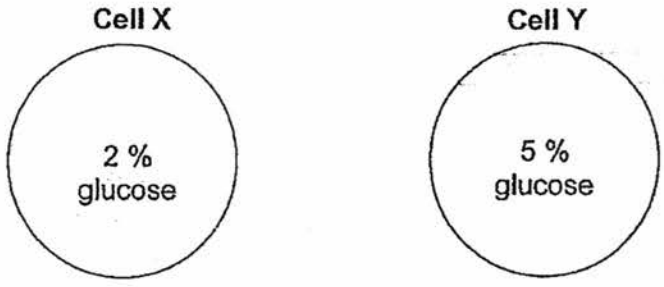
500 g of substance **S** was stirred into 100 cm^3 of water at 20° C.
How much of the substance will **not** be dissolved?

A 100 g
B 200 g
C 300 g
D 500 g

20 A particle that contains 11 protons, 10 neutrons and 10 electrons is

A a metal atom
B a negative ion.
C a noble gas atom.
D a positive ion.

21 The diagram shows the concentration of glucose in two cells, **X** and **Y**. If cell **X** and cell **Y** come into contact, the concentration of glucose in each cell will begin to change. When will there be no further change?



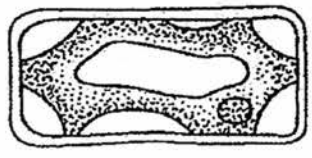
A When all the glucose is in cell **X.**

B When all the glucose is in cell **Y.**

C When cell **X** has a higher glucose concentration than cell Y.

D When cell **X** and Cell **Y** have the same glucose concentration.

22 The diagram below shows the appearance of a plant cell after being immersed completely in a sucrose solution for half an hour.



Which of the following statements about the sucrose solution is **true**?

A It has a lower sucrose concentration than in the plant cell.

B It has a lower water potential than in the plant cell.

C It contains substances toxic to the plant cell.

D It contains solute molecules that are able to move through the cell membrane of the plant cell.

23 The information below shows the levels of organisation in an organism.

Cell → **X** → **Y** → System → Organism

Which could be examples of **X** and **Y**?

	X	Y
A	blood	heart
B	blood	lungs
C	heart	blood vessels
D	heart	circulatory system

24 Which one of the following structures of the xylem supports its function?

A It contains only cytoplasm.

B It is made up of dead cells.

C Its walls are thickened with lignin.

D The cross walls between its cells contain many pores.

25 An amoeba had its nucleus removed. For several days, it continued to move and feed, but it did not reproduce. An intact amoeba, used as a control, reproduced twice in that time. What do you conclude from this experiment about the role of the nucleus in amoeba?

A The nucleus controls the normal activity of the cell.

B The nucleus is essential for cell division.

C The nucleus is essential for life.

D The nucleus is the only part of the cell to contain DNA.

26 Which of the following is an example of diffusion in a plant?

A Carbon dioxide from the air moving into a photosynthesizing leaf.

B Sugars in the phloem moving from leaves to roots.

C Water in the plant cells moving across the membrane.

D Water in the xylem moving from roots to leaves.

27 A piece of plant tissue is transferred from a beaker of water into a concentrated sugar solution. Which row correctly describe what happens?

	movement of water	volume of tissue cells
A	enters the cells	decreases
B	enter the cells	increases
C	leaves the cells	decreases
D	leaves the cells	increases

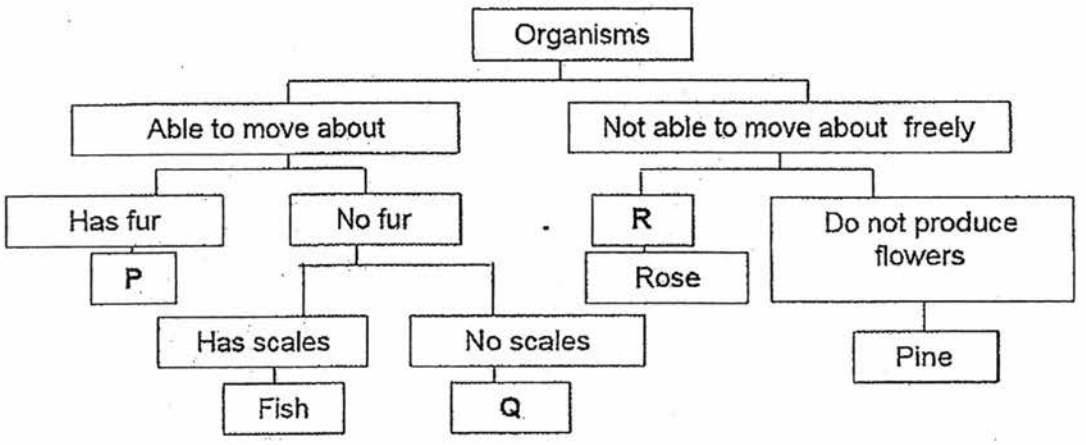
28 What is the tissue that protects a plant against injury and prevents it from drying air?

A epidermal tissue
B epithelial tissue
C supporting tissue
D vascular tissue

29 Division of labour among cells is **not** found in _____.

A a bacterium
B a coconut tree
C a mosquito
D an ant

30 The figure below shows a dichotomous key.



Which one of the following statements **best** matches the unknown blanks **P**, **Q** and **R** in the dichotomous key?

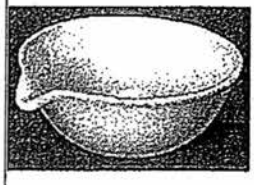
	P	Q	R
A	Giraffe	Snake	Produce cones
B	Giraffe	Penguin	Has true stem
C	Monkey	Snake	Has thorns
D	Monkey	Penguin	Produce flowers

Name: _____ ( ) Class: _____

SECTION B (40 marks)

Answer **ALL** *questions in this section.*
Show your working and write your answers in the space provided.

1 Identify each of the following apparatus and state its function.

		name	function
(a)			
(b)			

[4]

2 Fig. 2.1 shows a tank filled with a fixed volume of water.
A student then placed 200 lead shots into the tank as shown in Fig. 2.2.

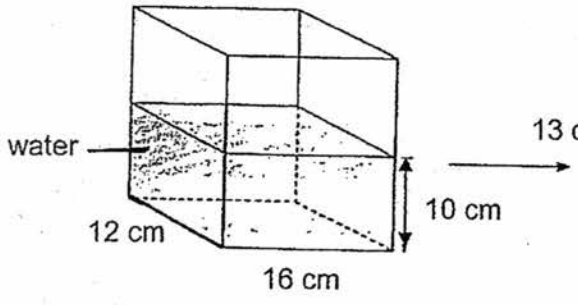


Fig. 2.1

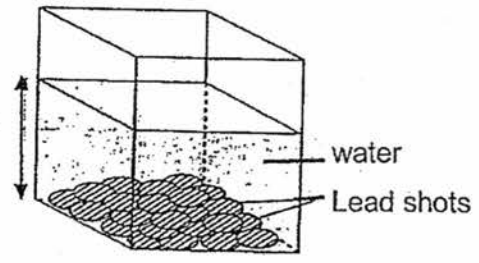


Fig. 2.2

(a) What is the initial volume of the water in the tank before the lead shots were put in?

Volume of water = ... [1]

(b) Calculate the total volume of the 200 lead shots? Hence, find the volume of one lead shot?

Volume of the 200 lead shots=.....

Volume of one lead shot = ... [2]

(c) Given that the total mass of the lead shots is 5184 g, what is the density of lead?

Density of lead=..... [1]

(d) Explain why 200 lead shots, rather than one lead shot, are used in this experiment to determine the volume of one lead shot.

.....

..... [1]

(e) If a liquid of density 10.3 g/cm^3 is used instead of water, state and explain if the experiment can be carried out?

.....

..... [1]

3 Table 3.1 shows the results from an experiment.

Table 3.1

volume of water (cm^3)	time taken to dissolve the salt (s)	temperature of the water (°C)	rate of stirring (times/min)	mass of salt (g)
50	13	40	15	5
50	15	40	13	5
50	17	40	11	5

(a) What is the hypothesis for this experiment?

..... [1]

(b) State

(i) the independent variable.

..... [1]

(ii) the dependent variable.

..... [1]

4 Fig. 4.1 shows two beakers. Both beakers have an object in it.

Beaker **A** is empty and the eye cannot see the object.

(a) Draw appropriate light rays in beaker **B** to show how the eye can see the object. [2]

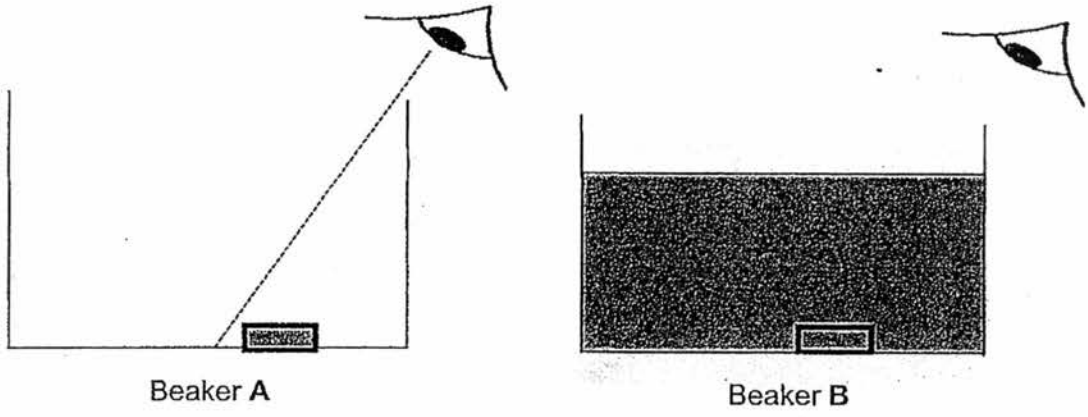


Fig. 4.1

(b) Explain how the eye is able to see the object in the second beaker.

.....

..... [2]

5 Fig. 5.1 shows a ray of light being refracted at points **A** and **B** on a semi-circular glass block.

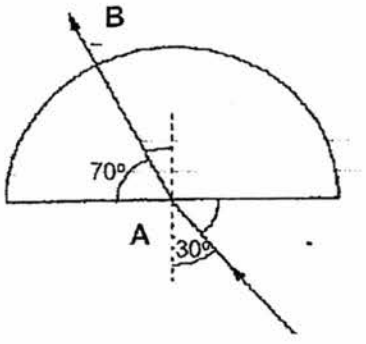


Fig. 5.1

(a) What causes the light to refract at point **A**?

..... [1]

(b) State the angle of incidence and angle of refraction at point **A**.

angle of incidence =..... angle of refraction =..... [1]

(c) Why did the light ray not change direction at **B**?

..... [1]

6 Fig. 6.1 shows the particles in six different substances at room temperature and pressure.

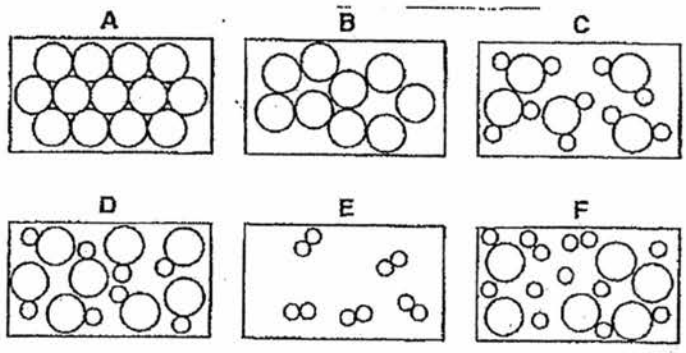


Fig. 6.1

Using information from diagrams, **A** to **F**, as shown above, identify which diagram best represents each of the following substances.
You may use each letter once, more than once or not at all.

substance	gold	a mixture	nitrogen	water
letter				

[2]

7 Fig. 7.1 shows drawings of the nuclei of five different atoms, **I**, **J**, **K**, **L** and **M**.

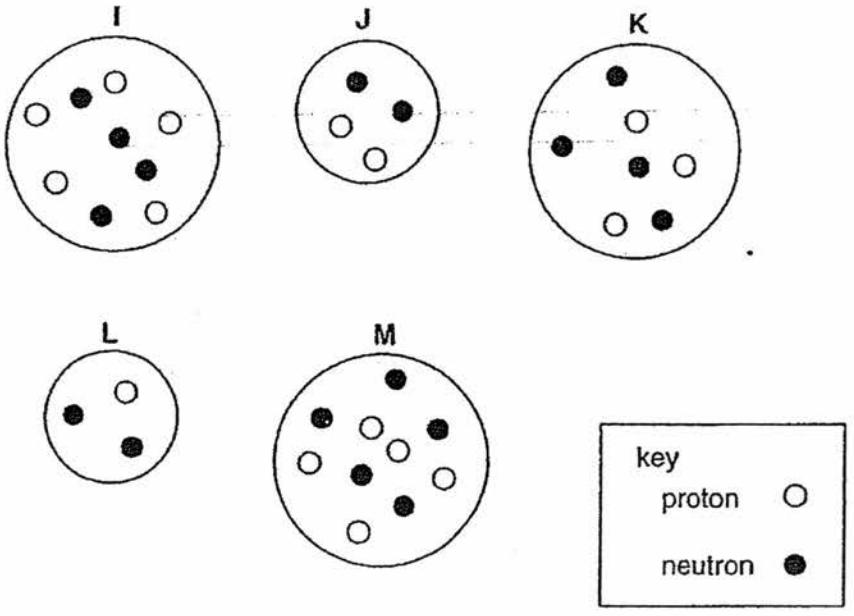


Fig. 7.1

(a) Which of the atoms, **I**, **J**, **K**, **L** and **M**

(i) has a nucleon number of 9?

..... [1]

(ii) has only one electron?

..... [1]

(iii) is given the symbol $^{10}_{5}\mathbf{X}$?

..... [1]

(iv) represents the nucleus of a helium atom?

..... [1]

(b) Using the Periodic Table, identify atom **K**.

..... [1]

8 Table 8.1 shows a list of substances.

Table 8.1

air	sodium chloride	carbonated drink
mercury	syrup	hydrogen
ozone	magnesium	ammonia gas

You may use each substance once, more than once or not at all.
From the list above, name **one substance** that

(a) is an element in liquid state at room temperature;

..... [1]

(b) is a mixture of solids and liquids;

..... [1]

(c) is an element naturally occurs as diatomic molecules in its gaseous state;

..... [1]

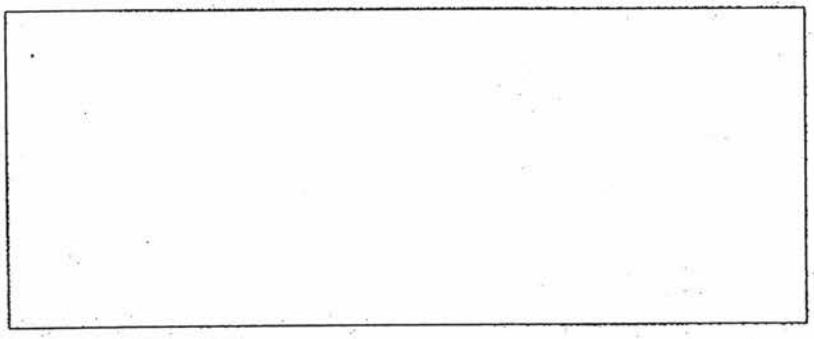
(d) has the chemical formula NH_3;

..... [1]

(e) does not have any neutrons in its atom.

..... [1]

9 Using the symbols,  ,  and  , draw a mixture of three diatomic molecules consisting of one molecule of an element and two molecules of a compound.



[2]

10 Fig. 10.1 shows the structure of a plant cell.

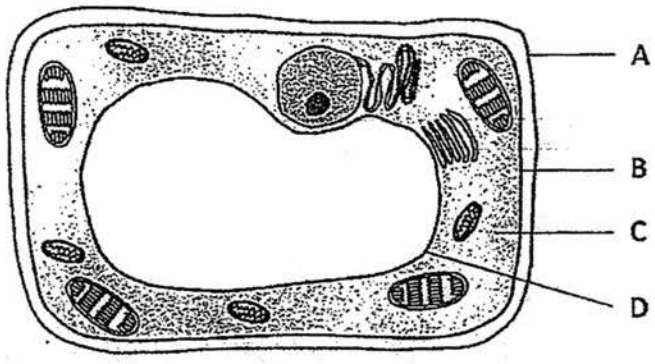


Fig. 10.1

(a) Identify the parts **A** to **D** and state their functions.

part	name	function
A		
B		
C		
D		

[4]

(b) State one difference you would expect to see between this plant cell and

(i) a root hair cell,

.....

..... [1]

(ii) a xylem cell.

.....

..... [1]

For Examiner's Use			
Q___		Q___	
Q___		Total	

Name: _____ ( )

Class: _____

SECTION C (30 marks)

Each question carries **10 marks.**
Answer **any 3** *questions in this section.*
Show your working and write your answers on the lines provided.

11 (a) A student cuts 9 equal-sized pieces of potato and places them in liquids as shown in Fig. 11.1.
After 30 minutes, the student finds that changes have taken place to the piece of potato in containers **B** and **C**. The changes are due to the process, osmosis.

A
dilute sugar solution

B
pure water

C
highly concentrated sugar solution

Fig. 11.1

(i) Define osmosis.

.....

.....

..... [2]

(ii) There is no change to the size of the potato pieces in container **A**.
Explain why.

.....

..... [1]

(iii) Describe the changes to the size of the potato pieces in containers **B** and **C**.

B: .....

.....

C: .....

..... [1]

(iv) Explain why there is a difference in the changes that have taken place in the potato pieces in containers **B** and **C**.

B: .....

..... [1]

C: .....

..... [1]

(b) Fig.11.2 shows human blood cells as seen through the high power lens of a microscope.

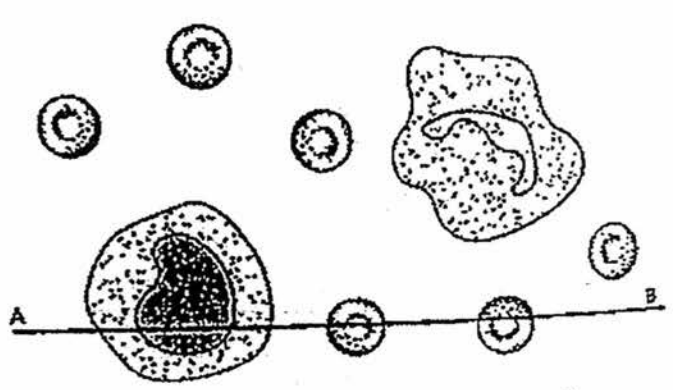


Fig. 11.2

(i) How many red blood cells are touching line AB?

..... [1]

(ii) What is the main function of the red blood cells?

..... [1]

(iii) How does the structure of the red blood cells, which you can see in the diagram, help them to carry out this function?

.....

..... [1]

(iv) A student accidentally cut his finger. However, he noticed that the bleeding stopped on its own after some time. Explain why.

.....

..... [1]

12 (a) Table 12.1 shows the melting and boiling points of three different substances.

Table 12.1

substance	melting point/ °C	boiling point/ °C
butane	-138	-0.5
copper	1083	2595
ethanoic acid	17	118

(i) Draw the arrangement of particles of a sample of butane at 25 °C, in the box.

[1]

(ii) Draw the arrangement of particles in a piece of copper wire at 10 °C, in the box.

[1]

(iii) Describe the movement and arrangement between particles of ethanoic acid at room temperature, 25 °C.

.....

.....

.....

..... [2]

(b) State the Kinetic Particle Theory.

.....

..... [1]

(c) Using Kinetic Particle Theory, briefly explain the following observations.

(i) Solids cannot be compressed.

.....

..... [2]

(d) The **ion** of element **X** contains 12 protons, 12 neutrons and 10 electrons.

(i) Use the Periodic Table given on Page 32 to identify element **X**.

..... [1]

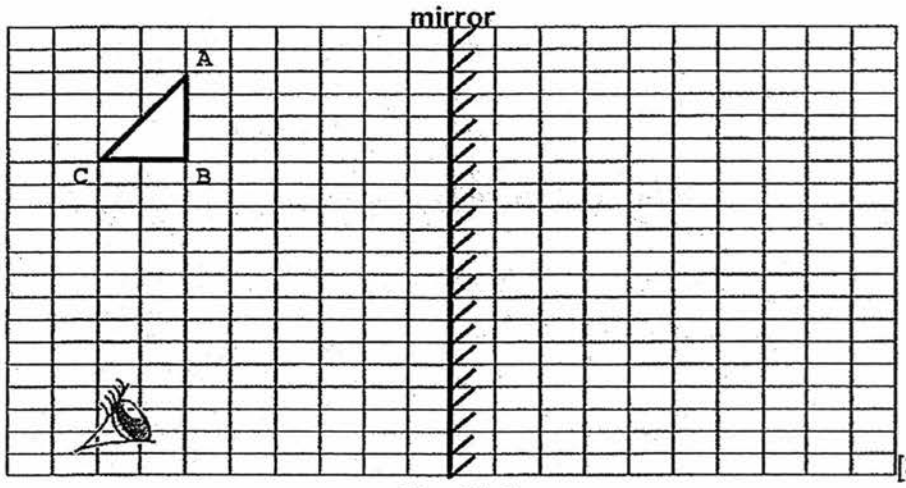
(ii) Write the chemical symbol for this ion. Include its charge.

..... [1]

(iii) Draw the electronic structure of an **atom** of **X**, showing all electrons.

[1]

13 (a) (i) Show how the image is formed, by drawing **one** light ray from point **B** and the reflected ray in Fig.13.1. Label the image A', B' and C'.



[3]

Fig. 13.1

(ii) The image formed by a plane mirror is said to be "virtual". What is a virtual image?

..... [1]

(iii) State two other characteristics of the image formed by the mirror.

.....

..... [2]

(b) A girl who stood 7 m away from a plane mirror was carrying a red shopping bag with the logo printed in blue.

(i) What would be the colour of the bag and its words under red light? Explain your answer.

.....

.....

..... [2]

(ii) Fig. 13.2 shows the logo that are printed on the bag.

FOREVER

Fig.13.2

Write down the words that are seen by the shopper in the mirror.

[1]

(iii) Another boy stood at a distance of 9 m behind the girl. What is the distance between the boy and the image of the girl?

..... [1]

14 Fig. 14.1 shows the human circulatory system.

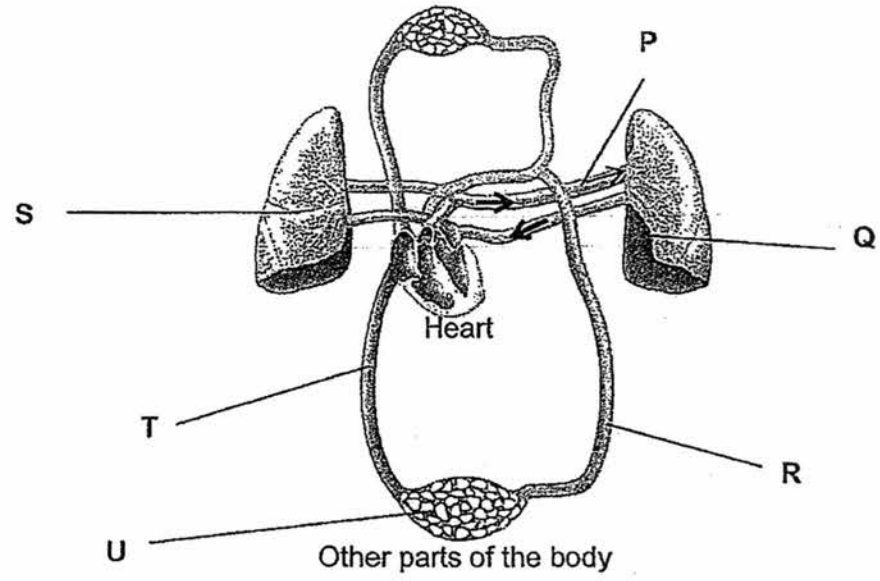


Fig. 14.1

(a) Identify parts **P** to **U**.

P ..... **R** .....

T ..... **U** ..... [2]

(b) State the functions of

R: .....

U: ..... [2]

(c) State and explain one structural feature of **R** that allows it to perform its function.

.....

..... [1]

(c) State and explain one structural feature of **T** that allows it to perform its function.

.....

..... [1]

(e) Describe how blood is circulated around the human body. In your answer specify the types of blood vessels involved and the oxygen content of the blood.

.....

.....

.....

.....

.....

..... [4]

END OF PAPER

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	– Ra radium 88	– 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.).

KUO CHUAN PRESBYTERIAN SECONDARY SCHOOL
SECONDARY ONE EXPRESS
GENERAL SCIENCE
END OF YEAR EXAMINATION 2016
Answer Scheme

Section A – Multiple Choice Questions (30 marks)

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
D	C	B and D	D	C	A	B	B	B	C

Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
B	C	D	C	D	B	B	B	C	D

Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
D	B	A	C	B	A	C	A	A	D

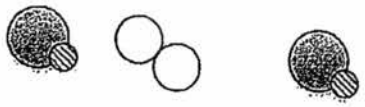
Section B Structured Questions (40 marks)

1	(a)	Tripod stand	To support apparatus during heating	2
	(b)	Evaporating dish	To heat and evaporate liquids.	2

Fairly done.

- Names of apparatus have to be stated and spelt correctly
- For 1(a), beaker/conical flask or any examples of apparatus were accepted. The idea that the apparatus are supported during heating must be demonstrated – simply stating 'above the Bunsen burner' is insufficient.
- For 1(b), 'heat' need not be stated but 'evaporate' must be stated. Liquids/water/solution/solvent accepted but not 'substances' as a substance might not be a liquid.

2	(a)	$V = 12 \times 16 \times 10 = 1920\ cm^3$	1
	(b)	$V = 12 \times 16 \times (13-10)$ $= 576\ cm^3$ Or Volume of 200 lead shots $= (12 \times 16 \times 13) - (12 \times 16 \times 10)$ $= 2496 - 1920 = 576\ cm^3$ Volume of one lead shot $= \frac{576}{200} = 2.88\ cm^3$	1 1
	(c)	Density $= \frac{5184}{576}$ ECF $= \mathbf{9.0\ g/cm^3}$	1
	(d)	The volume of one lead shot is **small** and so cannot give a large enough displacement of water to determine its volume accurately.	1
	(e)	This is because the density of one lead shot is ***less*** than the density of the liquid it will ***float*** and the volume cannot be determined.[1]	1

	c	M		1
	d	J		1
	e	Lithium		1
8	a	Mercury b) Syrup c) Hydrogen d) Ammonia e) Hydrogen		5
9				
10	a			

Part	Name	Function
A	Cell wall	Supports the cell and gives it a regular shape
B	Cell membrane	A partially permeable structure that only allows certain substances to pass through
C	Cytoplasm	The site where many chemical reactions take place
D	Vacuole	Contains cell sap made up of water and dissolved materials needed for plants

1 mark for every 2 correct answers — 4

	(b)	(i)	A root hair cell does not have chloroplast but this plant cell has or A root hair cell has protrusions but this plant cell does not have	1
		(ii)	A xylem cell does not have cytoplasm but this plant cell has	1

Section C

11	a	(i)	Osmosis is the net movement of water molecules from a region of higher concentration of water molecules(higher water potential) to a region of lower concentration of water molecules(lower water potential) through a partially permeable membrane	1 1
		(ii)	The water potential in the cell sap is the same as the water potential of the dil sugar solution in beaker A	1
		(iii)	The potato strips in B will increase in size The potato strips in C will decrease in size	½ ½
		(iv)	B: The water potential of the pure water is higher than that of the cell sap of the potato [1/2] Therefore water molecules from the pure water enters the potato cells by osmosis [1/2]	1
			C: The water potential of the cell sap is higher than that of the concentrated sugar solution.[1/2] Therefore water molecules from the potato cells leaves the potato cells by osmosis [1/2]	1
11	b	(i)	2 red blood cells	1
		(ii)	To transport oxygen around the body	1
		(iii)	It does not have a nucleus [1/2]so there is more space for haemoglobin which helps to absorb oxygen [1/2] or Red blood cells are biconcave in shape, which increases the surface-area-to-volume ratio of the cells. [1/2] This allows them to take in or release oxygen at a faster rate.	1

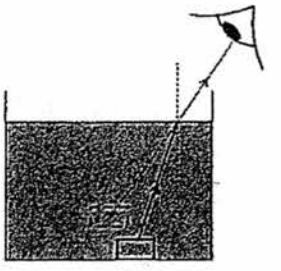
Generally well done.

- For 2(a), (b) and (c), marks were awarded if no units were presented in working
- For 2(a), (b) and (c), one mark was deducted overall if no units were presented in answers or wrong units were given
- For 2(d), as long as the student brought across the idea that one lead shot causes only a small change, mark was awarded.
- For 2(e), the student must answer if the experiment can be carried out. Also, the student must explicitly state that the density of the lead shot is less than the liquid – simply quoting data is insufficient. Float/not sink/partially submerged were accepted.

3	(a)	The higher the rate of stirring, the faster the salt dissolves.		1
	(b)	(i)	independent variable: Rate of stirring	1
		(iii)	Dependent variable: Time taken for 5 g of salt to dissolve completely	1

Fairly done.

- For 3(a), many students were not specific in their answer. Students must indicate the type of change in the independent variable (higher/lower) and its consequence on the dependent variable (faster/slower).
- Quite a handful of students mistook the independent variable for the dependent variable and vice versa

4 a	 Correct ray diagram that shows apparent depth: - light ray diagram from object to surface of water and from surface of water to eye [1] - dotted line to show how the eye can see the image [1]	2
4 b	Light rays bend away from the normal [1] as it travels from a more dense medium (water) to a less dense medium (air) [1]	2

Badly done.

- For 4(a), many could draw the normal and the light rays but arrowheads were often missing or in the wrong direction. Many could not draw the dotted line and the image. Quite a handful of students drew ray diagrams for reflection instead.
- For 4(b), majority could identify refraction but mistook the light rays for travelling in the reverse direction.

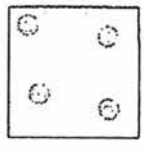
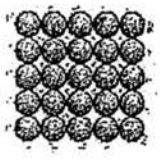
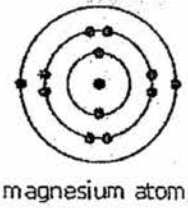
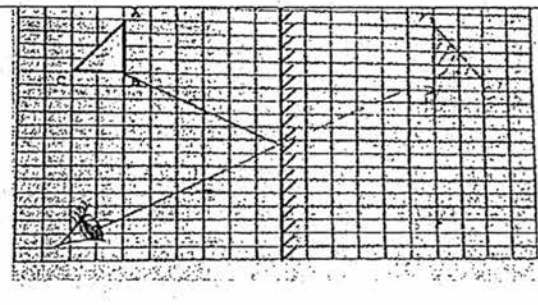
5	(a)	Light changes speed and direction as it travels from one medium to another	
	(b)	Angle of incidence=30 ° Angle of refraction=90-70=20 °	½ ½
	(c)	The light ray is incident perpendicularly to the glass surface/ glass-air boundary.	1
6			

Substance	Gold	A mixture	Nitrogen	Water
Letter	A	F	E	C

2

7	a	I	1
	b	L	1

2

		(iv)	Another component of blood is platelets [1/2] The function of platelets is to clot the blood [1/2]	1
12	a	(i)	Butane at 25 °C is a gas 	1
		(ii)	Copper at 25 °C is a solid 	
		(iii)	The particles slide past each other and closely packed with no fixed pattern.	2
	b	All matter is made up of **tiny particles** and that these particles are in **constant and random** motion. [1] (No mark will be awarded for any of the key words missing)		1
	c	(i)	The particles of a solid are very closely packed together [1]and have no space for them to move [1]	2
	d	(i)	magnesium	1
		(ii)	Mg^{2+}	1
		(iii)	 magnesium atom, Mg 2,8,2	1
13	a	(i)	 Correct drawing and labelling of image [1] Correct incident ray [1] Correct reflected ray [1]	3
		(ii)	A virtual image cannot be formed on a screen.	1
		(iii)	laterally inverted, upright, same size as object, object distance=image distance (any two)	1
	b	(i)	Red bag [1/2] with black words [1/2]on the bag	

			The red bag reflects the red light to our eyes [1/2] When red light falls on the blue words, no light is reflected so the words appear black [1/2]	1
		(ii)	Correct laterally inverted image	2
		(iii)	7+7+9= 23m	1
14	a	P: Pulmonary artery R: Main artery T: Main vein U: Capillaries (1 mark for every two correct answers)		2
	b	R: Bring oxygenated blood away from the heart to other parts of the body [1] U: Allow quick diffusion of nutrients and oxygen from the blood to the tissue cells. Waste substances such as carbon dioxide from the tissue cells can also diffuse into the blood. [1]		2
	c	Thick, muscular wall; to withstand high pressure of blood received directly from the heart or Elastic walls; enable the artery to stretch and recoil to push blood along the artery		1
	d	**Valves:** to prevent blood from flowing backwards. **Thin walls with less elastic tissue:** flow of blood is slower and hence blood pressure is lower compared to arteries.		1
	e	**Deoxygenated blood** pumped from **the right hand side of the heart** to the lungs via the **pulmonary artery.** In the lungs, oxygen diffuses into blood, while carbon dioxide diffuses out. [1] **Oxygenated blood** returns to the **left hand side of the heart** via **the pulmonary vein.**[1] **Oxygenated blood** is pumped from the heart to the **rest of the body** via the **artery.**[1] **Deoxygenated blood** is returned to the **right hand side of the heart** via the **veins.** [1]		4