BOON LAY SECONDARY SCHOOL

END-OF-YEAR EXAMINATION

2019

Name	**MARK SCHEME ( )**
Class	

Subject	:	**SCIENCE**
Level	:	**SECONDARY ONE EXPRESS**
Date/Day	:	**7 OCTOBER 2019 / MONDAY**
Time	:	**0800 – 0930**
Duration	:	**1 HOUR 30 MINUTES**

READ THESE INSTRUCTIONS FIRST

Before you start your exam, check that you have received the correct paper and the number of printed pages are correct.
Write your name and index number on all the work you hand in.
Do not use staples, paper clips, glue or correction fluid.

The paper has 3 sections:

Section A:
There are **twenty** multiple choice 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 record your choice in **soft pencil** on the separate Answer Sheet.

Section B:
Answer **all** the questions. Write your answers in the spaces provided on the question paper.

Section C:
Answer any **two** questions. Write your answers in the spaces provided on the question paper.

A copy of Periodic Table is printed on page 20.
The use of an approved scientific calculator is expected, where appropriate.

Section A [20 marks]

Q no	Ans	Explanation
1	C	1,2,3,5 are obviously actions that are against lab rules. 4 is not observable in the picture
2	D	1 is observation not hypothesis; 2 is hypothesis; 3 is experimentation. 4 is data collection. So only 4 is correct.
3	B	Sample Q has a density between oil and water.
4	A	At room temperature, only olive oil and water have reached their melting points.
5	C	Rate of dissolving can be affected by stirring, size of particles and temperature.
6	A	Solute added to solvent form solution. In this case carbon added to molten iron and dissolved to form steel which is solution.
7	C	Water boils to form steam which then condenses back to water droplets when it touches a cool surface.
8	C	Silver chloride is insoluble and found as residue but sodium nitrate is soluble and go through the filter paper as the filtrate.
9	D	Classification is grouping organisms according to characteristics. It helps to study relationship among different groups of organisms.
10	C	Whales, fish and shrimps, though belong to different groups, can all swim.
11	C	There is only one marble which represents nucleus, several beads represent vacuoles and partially permeable tube represents cell membrane.
12	B	Trachea is the wind pipe and bronchi are parts of respiratory system.
13	B	Multicellular organism made of more than one cell is always true.
14	A	Melting, boiling and sublimation are processes that happen because of gain in heat.
15	D	As solid becomes a gas, the number of particles per unit volume decreases.
16	D	The atom has 4 electrons and 4 protons and 5 neutrons. Hence atomic number is 4 and mass number is 9
17	A	According to periodic table zinc has an atomic number that is 10 more than calcium.
18	D	Magnesium sulfate has 3 types of atoms, MG, S and O. Total number of atoms are 6.
19	A	A is the mirror image of the number plate when seen on the rear view mirror. It will be laterally inverted.
20	C	First prism disperse the white light and the second prism re combine the colours back to white light. This happens due to refraction.

Section B [40 marks]

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

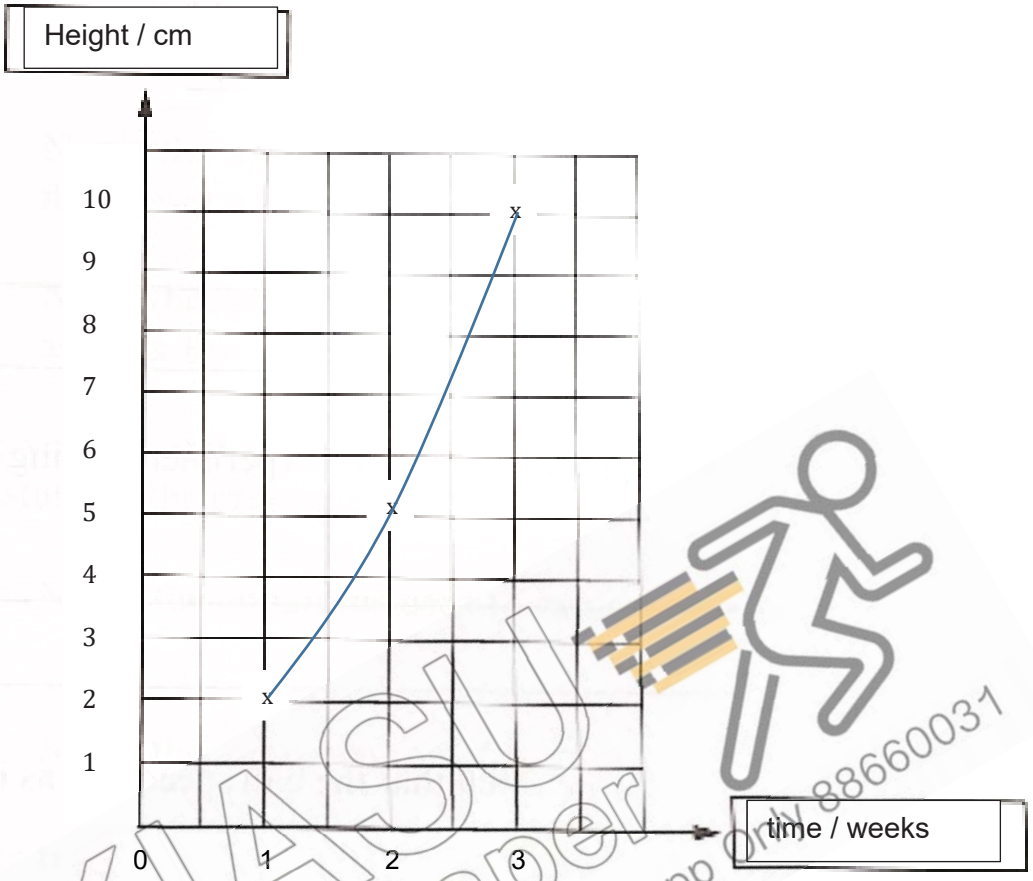
1 Fig. 1.1 shows the measurement of the height of a maize plant at different times.

Fig. 1.1

(a) Fill in the table below with the results shown in Fig. 1.1 [3]

week	height (cm)
1	**2.0**
2	**5.0**
3	**10.0**

(bi) Plot a graph of height (cm) against time (weeks). [4]



(bii) Using the graph in (bi), state the height of the maize plant in two and a half week. [1]

7 cm

2 Fig. 2.1 shows the Moh's scale of hardness which is used to compare the hardness of minerals from talc to a diamond.

Moh's hardness scale		Approximate hardness of common objects
Talc	1	
Gypsum	2	
Calcite	3	Fingernail (2.5)
Fluorite	4	Copper penny (3.5)
Apatite	5	Iron nail (4.5)
Feldspar	6	Glass (5.5)
Quartz	7	Steel file (6.5)
Topaz	8	Streak plate (7.0)
Corundum	9	
Diamond	10	

Fig. 2.1

(a) The fingernail can easily scratch some of these minerals. State these minerals. [1]

Gypsum and talc

(b) A mineral will scratch a copper coin but will not scratch an iron nail. State the mineral. [1]

Fluorite

(c) An unknown mineral can scratch all the common objects listed in the chart. This mineral has the hardness of at least 11 on the scale. [1]

(d) State one use of this mineral. [1]

It can be used as a cutting tool due to its hardness.

3 Fig. 3.1 shows a graph of the change in solubility of nine salts with different temperatures. The solubility of a salt is the maximum amount of salt that can dissolve in a given amount of water at a certain temperature.

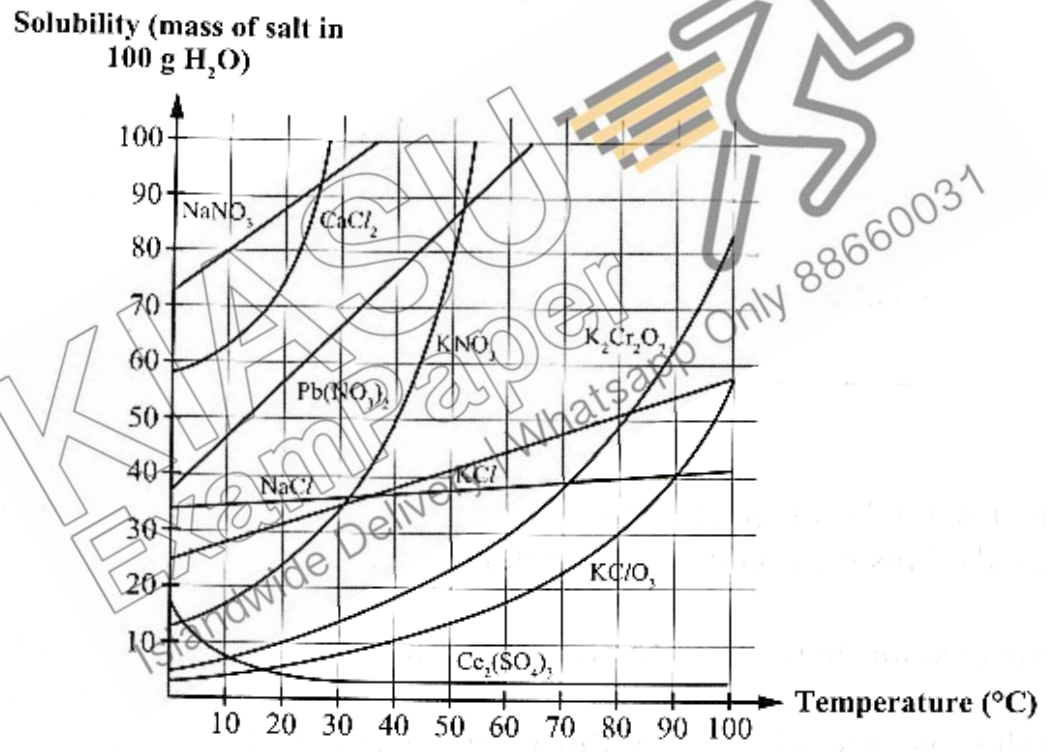


Fig. 3.1

(ai) State the maximum mass of sodium nitrate ($NaNO_3$) that can be dissolved in 100g of water at 10°C. [1]

80g

(aii) State the mass of sodium nitrate that can dissolve in 50g of water at 10°C. [1]

40g

(bi) At what temperature is the solubility of potassium dichromate $K_2Cr_2O_7$ 70g / 100g of water? [1]

95°C

(bii) With reference to Fig. 3.1, describe the change in solubility of potassium dichromate as the temperature of water increases from 50°C to 90°C?

[1]

The solubility of potassium dichromate increases from about 25g to 65g when temperature increases from 50 degrees to 90 degrees

(ci) Four salts, sodium nitrate, $NaNO_3$, lead nitrate, $Pb(NO_3)_2$, Potassium chloride, KCl and sodium chloride, NaCl, have solubility that increases uniformly with temperature.
With reference to Fig. 3.1, identify the salt with the smallest increase in solubility with the same increase in temperature.

Sodium chloride has the lowest percentage increase among the 4 salts [1]

(cii) Sodium chloride and potassium chloride have the same solubility at a certain temperature. State the temperature and the value of this solubility.

Temperature: **32ºC (accept 31 to 35 degrees)**

Solubility : : **35 g / 100 g water** [2]

4 After a horse race, urine samples from four horses, **A**, **B**, **C** and **D** were collected. Paper chromatography was performed on these samples and compared with two banned drugs. Caffeine and paracetamol. Fig. 4.1 and Fig. 4.2 shows the results.

spot	description
1	caffeine
2	paracetamol
3	urine sample horse A
4	urine sample horse B
5	urine sample horse C
6	urine sample horse D

Fig. 4.1

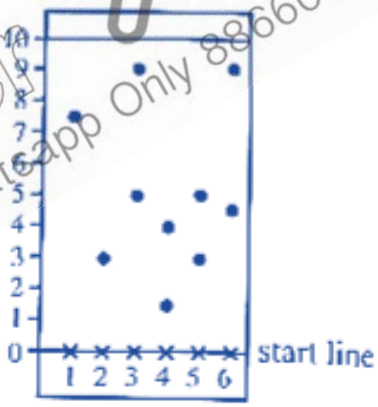


Fig. 4.2

(a) With reference to Fig. 4.1 and Fig. 4.2, which horse(s), if any, has / have taken caffeine? Explain how you arrived at that answer. [2]

None of the horses have taken caffeine as there is no dots that correspond to caffeine.

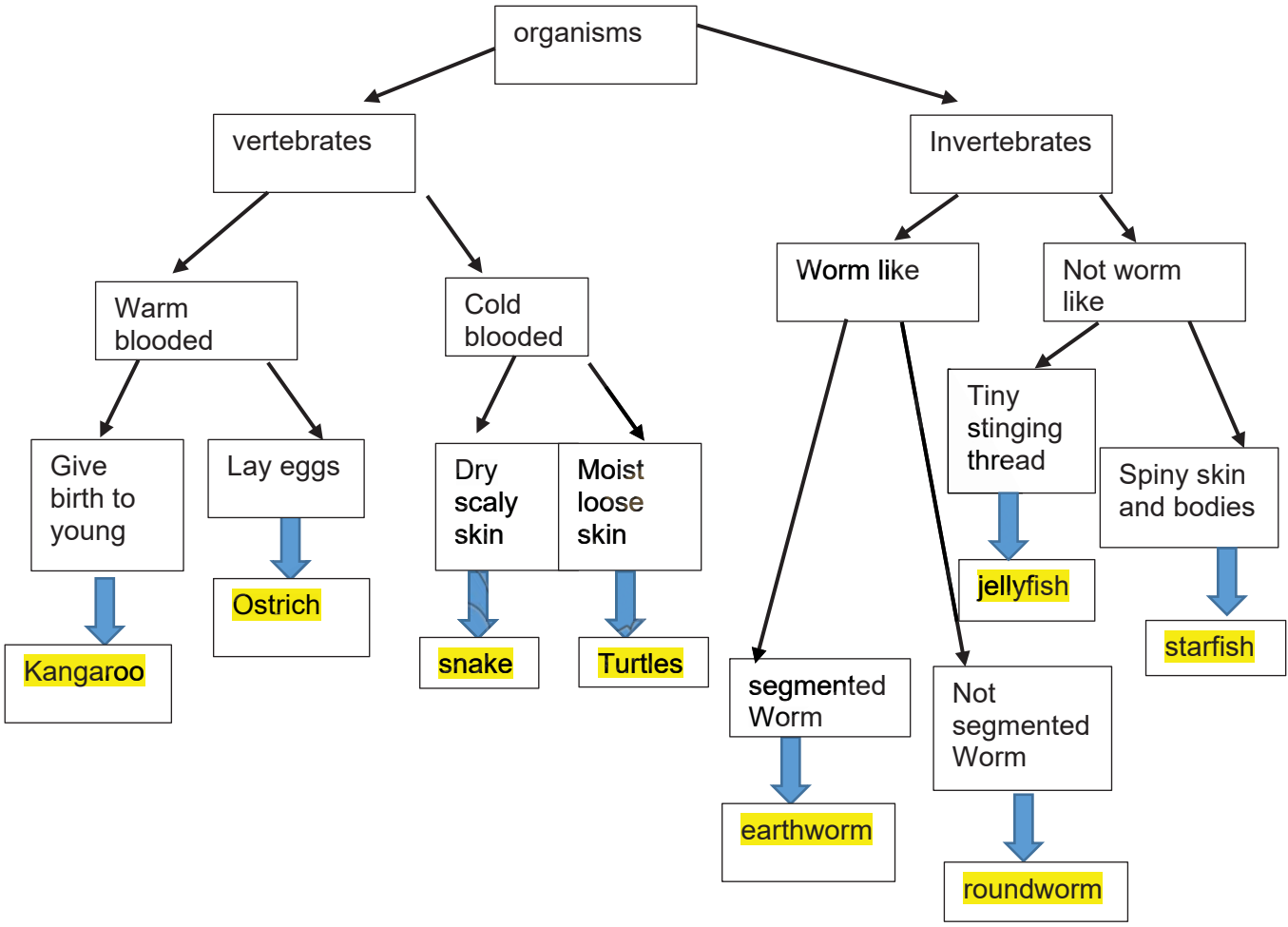
(b) With reference to Fig. 4.1 and Fig. 4.2, which horse(s), if any, will be banned from the competition and results annulled? Why? [2]

Horse C will be banned as it has taken paracetamol which is a banned drug

5 Construct a dichotomous key to identify the following organisms correctly. The first line is done for you. [4]

Jellyfish	Earthworm	Kangaroo	Ostrich
Turtle	Starfish	Roundworm	Snake

Sample answer: Accept any relevant answer



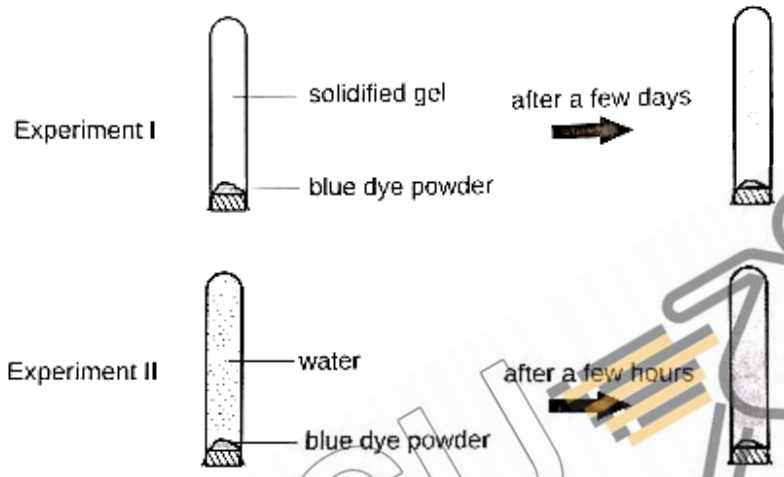
6 Table 6.1 describes the function of some organelles in cells. Fill Table 6.1 with the names of the organelles found in cells [6]

Table 6.1

Description	Name
The boundary of the cell that controls the movement of materials in and out of the cell.	Cell membrane
Gives support and shape to the cell.	Cell wall
Cellular liquid in which the nucleus and chloroplasts are suspended.	Cytoplasm

Controls the activities of the cell and required for cell division.	Nucleus
Stores cell sap (water and other substances) and regulates pressure in the cell.	vacuole
Disc shaped organelle containing pigments that is capable of absorbing sunlight.	Chloroplast

7 Fig. 7.1 shows experiments **I** and **II**, where a spoonful of blue dye powder is placed in a solidified colourless gel and water respectively.



It is observed that blue dye powder takes a shorter time in experiment II to turn the water blue completely.

(a) Explain why the solidified gel and water turns completely blue in the end of both experiments. [2]

Solid particles in the gel vibrate about their fixed position. Liquid particles in water slide past each other. This movement of particles will spread the blue dye particles until they spread throughout the gel and water.

(b) Explain, in term of distance between particles of substance, why the content in experiment **I** takes a longer time to turn blue completely than in experiment **II** [2]

The particles in a solidified gel are close together they only vibrate about the fixed positions hence takes a longer time to spread. Comparatively, the water molecules are slightly further apart and can slide past each other, hence the blue dye spread faster.

8 Complete the information about the two elements shown in Table 8.1.

Table 8.1

symbols	atomic number	mass number	number of		
			protons	electrons	neutrons
$^{27}_{13}Al$	13	**27**	**13**	**13**	14
$^{35}_{17}Cl$	**17**	35	**17**	17	**18**

[3]

9 Fig. 9.1 shows an incomplete path of a ray of light entering water from air.

(a)

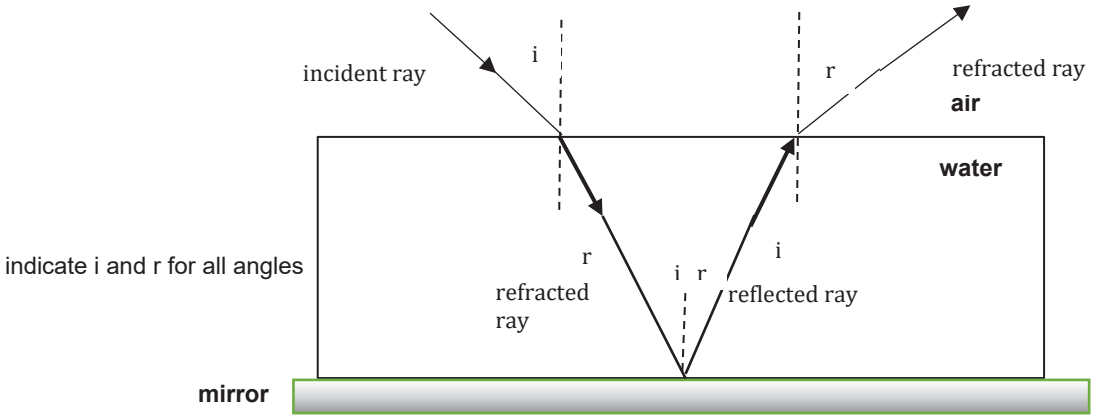


Fig. 9.1

Complete the Fig. 9.1 by indicating **the refracted ray**, **angle of incidence, *i*** and **angle of refraction, r, reflected ray, angle of reflection.** [4]

(b) State two characteristics of the image formed in a plane mirror. [2]

Image is upright, same size, laterally inverted, virtual. The distance between the object and mirror is the same as the distance between image and mirror. (any two)

(c) Fig. 9.2 shows a blind corner mirror and Fig. 9.3 shows a dental mirror.

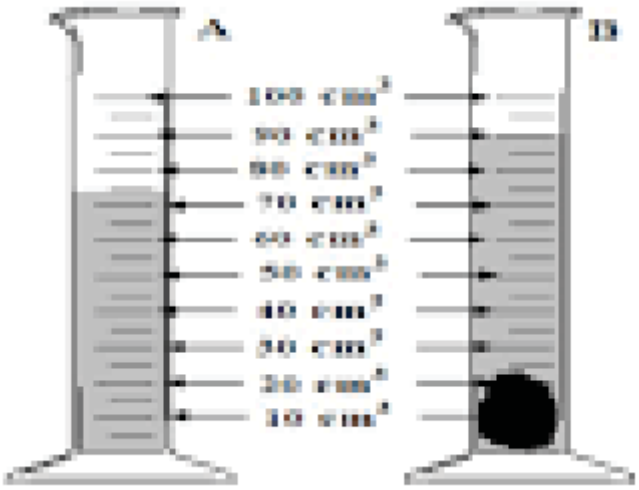
Fig. 9.2

Fig 9.3

State the type of reflecting surface used in both and describe one difference between the images formed by each reflecting surface. [4]

The blind corner mirror is convex and dental mirror is concave.
Convex mirror produce a small and distorted image while a concave mirror Produce a magnified and distorted image. The convex mirror provides a wider field of Vision but a concave mirror does not.

10 (a) Fig. 10.1 shows a method of finding the volume of a piece of irregular shaped rock. Describe the steps used to find the volume of the rock. [3]



Measure 70 cm^3 of water in a measuring cylinder (any appropriate volume)
Slowly lower the irregular shaped rock into the water.
Record the new volume of water.
To get the volume of the rock, subtract the originale volume of water from the new volume. Eg. 90 cm^3 – 70 cm^3 = 20 cm^3

(b) Fig. 10.2 shows some liquid in a container.

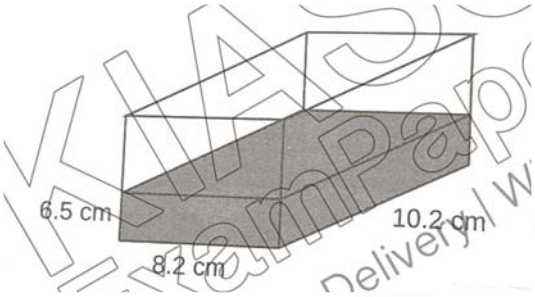


Fig. 10.2

(i) The density of the liquid is 800kg/m^3. Given that 1kg = 1000g and 1m^3 = 1000000cm^3, calculate the density of the liquid in g/cm^3 [3]

Density = 800000 g / 1000000 cm^3

= 0.8 g/cm^3

(ii) Calculate the mass of the liquid in grams. [4]

Volume = 6.5 X 8.2 X 10.2 cm^3

543.66 cm^3

Mass = Density X volume
= 0.8 g/ cm^3 X 543.66 cm^3
= 435 g

11 Fig. 11.1 shows water in its 3 states, **P, Q** and **R**.
A, B, C and **D** are processes that water undergoes to change its states.

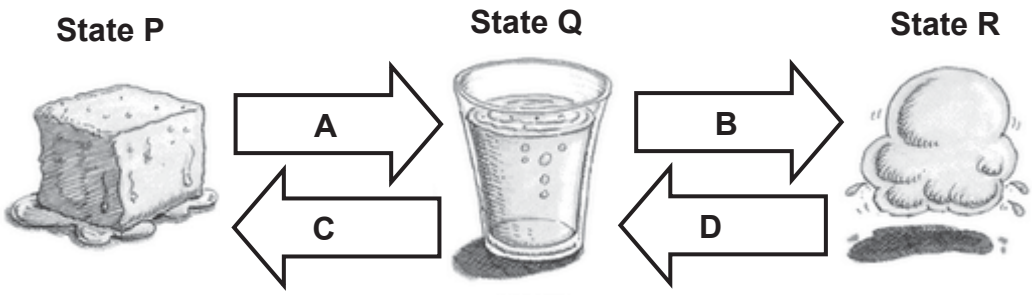


Fig. 11.1

(a) (i) State one process A, B, C or D which gives off heat energy. [1]

C and D (any one)

(ii) Name the process you have stated in (a) (i) [1]

C is Freezing; D is Condensation

(b) Draw the arrangement of the water particles when in states **P** and **R** in the respective boxes below. [2]

P **R**

(c) Using particulate model of matter, explain the difference between states P and R in terms of the movement of the water particles. [2]

In P the water particles are in fixed positions and only vibrate about their fixed positions. In R the water particles are far away from each other and moved at high speed in random way and freely

(d) Using particulate model of matter, explain why water in state R does not have a fixed volume. [2]

The water particles in R is far away from each other. There are a lot of spaces between the particles. The particles may come closer to fill up these spaces. Particles can also spread out to fill any available space. Hence gases do not have a fixed volume.

(e) Explain why water in state Q has a higher density than when in state R. [1]

In Q, there are more particles in a unit volume compared to R. Since Density is mass / volume, Mass of more particles will be higher and hence the density will be higher.

(f) Ryan dries his wet clothes in the sun. Name the process that enables his wet clothes to dry. [1]

Evaporation of water

End of Paper

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											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
19 K potassium 39	20 Ca calcium 40	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 –		

Key

proton (atomic) number
atomic symbol
name
relative atomic mass

lanthanoids	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
actinoids	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 dm^3 at room temperature and pressure (r.t.p.).