HILLGROVE
SECONDARY SCHOOL

END OF YEAR EXAMINATION 2017

Secondary 1 Express

SCIENCE

2 OCT 2017

TIME: 10:00 a.m. – 11:45 a.m. **DURATION:** 1 hour 45 minutes

Additional material: OAS

INSTRUCTIONS TO STUDENTS:
Write your name, class and register number on all the work you hand in.
Write in blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

SECTION A
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 (2B) on the separate OAS.

SECTION B
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

SECTION C
Answer **three** questions.
Question 12 is in the form of an **EITHER / OR** question. Only one should be answered.
Write your answers in the spaces provided on the Question Paper.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 100.

Name of Student: _____ ( )

Class: _____

Parent's Signature: _____

Setter: Mr Sia Jiale

For Examiner's Use	
Section A	30
Section B	40
Section C	30
Total	100

This question paper consists of 25 printed pages including this page.

Section A
Multiple Choice Questions [30 marks]

Answer **all** questions. Shade your answers with 2B pencil in the OAS provided.

1. A student wants to find out why cactus is able to survive very long without water in its environment.
Which attitude has he displayed?

A curiosity
B integrity
C perseverance
D responsibility

2. Which is a scientific investigation?

A counting how many prime numbers there are between 100 to 300
B conducting a survey to find out how many people listen to pop music
C excavating to find out things which were used in ancient China
D using cooking oil in cars to see whether it can be a substitute for liquid petroleum

3. Annabelle noticed that paint on walls faded after some time.
Which is a hypothesis for this observation?

A Is the paint quality good?
B Paint is a mixture.
C Rain washed off the paint.
D Samples of paint need to be analysed.

4. Which statement is inferred and not a direct observation?

A A swan can fly.
B Matter is made up of particles.
C Pure ice freezes at 0 °C.
D The moon orbits around the Earth.

5. Which statement is correct about laboratory safety?

A Drinking distilled water in the laboratory is allowed.
B Entering the lab is not allowed without teacher's supervision.
C Reporting accidents to the teacher only if someone is injured.
D Tasting of chemicals is allowed when one is identifying them.

6. Silicon carbide is a hard substance. This means that it _____.

A can withstand weights without breaking
B cannot be easily hammered into shapes
C cannot be easily scratched
D cannot go back to its original shape after being bent

7. What is the laboratory apparatus shown below?

A beaker
B conical flask
C flat-bottomed flask
D triangular beaker

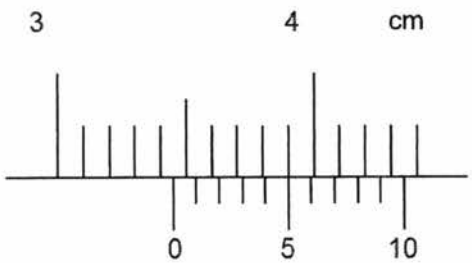
8. John wanted to see if sublimation will affect the density of a substance. He started with 100g of solid iodine. After undergoing sublimation, only 80g of solid iodine is left. What can you say about the density of solid iodine?

A The density decreased by 20%.
B The density decreased by 25%.
C The density increased by 20%.
D The density remained the same.

9. The table below shows properties of substances **A**, **B**, **C** and **D**. Which substance is most likely a metal?

	melting point / °C	boiling point / °C	electrical conductivity	
			solid state	liquid state
A	1020	3561	nil	good
B	34	700	good	nil
C	660	2470	good	good
D	−77	−33	nil	nil

10. The diagram shows the reading on a pair of Vernier calipers when measuring the thickness of a book. The Vernier calipers has a zero error of +0.03cm.



What is the actual thickness of the book?

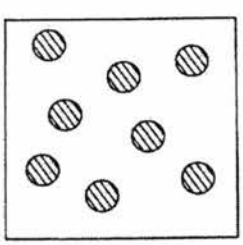
A 3.42 cm
B 3.45 cm
C 3.48 cm
D 3.50 cm

11. Ethanol is found in alcoholic drinks. Its chemical formula is C_2H_6O. This means that ethanol contains the elements _____.

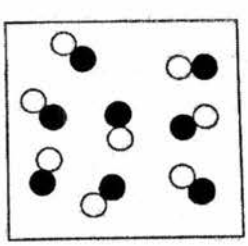
A carbon and hydrogen only
B carbon and water only
C copper, hydrogen and oxygen only
D carbon, hydrogen and oxygen only

12. Which diagram shows the model of a mixture of compound and element?

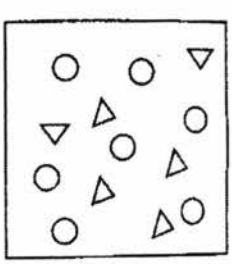
A



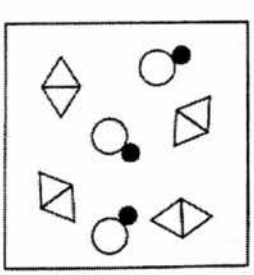
B



C



D



13. Which is the correct term to describe the mixture of sand and water?

A emulsion
B residue
C solution
D suspension

14. Which is a mixture?

A alloy
B mercury
C salt
D water

15. After separating salt solution into its components, salt and water, they _____.

A chemically changed as the substances are chemically combined
B chemically changed as the substances are physically mixed
C remain chemically unchanged as the substances are chemically combined
D remain chemically unchanged as the substances are physically mixed

16. Fractional distillation is best used to separate _____.

A substances of boiling points that are far apart
B substances of different but close boiling points
C substances which are immiscible
D substances with different solubilities

17. When distilling a liquid, it is sometimes advisable to place porcelain chips in the distillation flask. This is because porcelain chips _____.

A can absorb excess heat
B can remove any impurities present
C do not allow the liquid to boil till dryness
D ensure smooth boiling

18. The diagram shows a cross-section of a red blood cell. The red blood cell is biconcave as shown.

Which statement best explains the function of this adaptation?

A It does not have a nucleus.
B It has a larger surface area to absorb oxygen.
C It has more space to contain oxygen.
D It is easier to travel in the bloodstream.

19. A scientist removed the cell wall of a unicellular organism. The cell continued to move and feed for several days. However, the cell died a few days later from an infection caused by a bacteria present in air. The experiment was repeated several times and similar results were obtained.
What can be inferred from this experiment?

A The cell wall gives the cell its regular shape.
B The cell wall helps the cell feed better.
C The cell wall helps to protect the cell.
D The nucleus helps the cell to reproduce.

20. The small intestine is an organ because it is made up of _____.

A different types of tissues working together
B many different types of specialised cells
C many tissues carrying out different tasks
D same types of cells working together

21. Which statement describes the behaviour of gaseous particles?

A They are moving randomly at high speeds.
B They are widely and equally spaced apart.
C They settle to the bottom after some time.
D They slide over one another.

The table below shows the melting and boiling points of four substances **A**, **B**, **C**, **D**. Study the table and answer questions 22 and 23.

	A	**B**	**C**	**D**
melting point / °C	−73	−131	5	9
boiling point / °C	60	−1	5	103

22. Which substance has the weakest attractive force between its particles at 4°C?

23. Which substance undergoes sublimation?

24. Which statement about particles is correct when liquid freezes to become a solid?

A The particles decrease in size.
B The particles stop moving.
C The particles move further apart.
D The speed of the particles decreases.

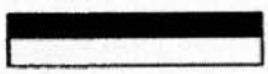
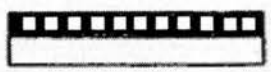
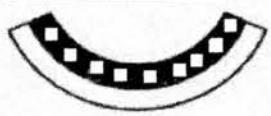
25. Dust particles in the air appear to move on their own in random directions. Which statement correctly explain this observation?

A The dust particles change speed randomly.
B The dust particles collide with gas particles in the air.
C The dust particles collide with one another.
D The dust particles collide with water particles.

26. Wei Meng found an element which contains 5 neutrons, 3 protons and 3 electrons. Which statement correctly describes the identity of the element?

A Beryllium, because it has 5 neutrons.
B Lithium, because it has 3 protons.
C Lithium, because it has 3 electrons.
D Insufficient information was given to identify the element.

27. The table below shows two bimetallic strips, **X** and **Y** which are made up of different metals, **P**, **Q** and **R**.

	bimetallic strip **X**	bimetallic strip **Y**
before heating		
after heating		

Legend: Metal **P** Metal **Q** Metal **R**

Which correctly arranges the worst thermal conductor to the best thermal conductor?

A P, Q, R
B Q, P, R
C R, P, Q
D R, Q, P

28. The tyres of cars and bicycles deflate after some time.
Which statement best explains this observation?

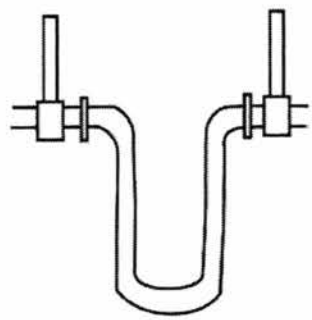
A The air particles contract during cold weather and escape the tyres.
B The tyres are made of rubber which loses elasticity and hence deflate.
C The tyres contract during cold weather, making it look deflated.
D There are tiny holes in the tyres which allow air particles to escape.

29. The diagram shows a saucepan.

Which material is suitable to make the handles of a saucepan?

A aluminium
B brass
C glass
D plastic

30. The diagram shows a loop in a pipe that carries steam to a machine.



The loop is necessary to _____.

A allow for expansion of the pipe when hot
B allow for contraction of the pipe when hot
C increase the flow of steam in the pipe
D reduce the flow of steam in the pipe

Section B
Short Structured Questions [40 marks]
Answer **all** questions. Write your answers in the spaces provided.

1. **Table 1.1** shows the density of various materials.

Table 1.1

material	density (g/cm^3)
mercury	13.6
sea water	1.3
gold	19.3
ice	0.92
aluminium	2.7

(a) With reference to **Table 1.1**, explain one advantage of using aluminium to build aircrafts. [1]

_____

_____

(b) **Figure 1.1** shows the mixture obtained when all of the above materials were put into a container. Write down the identity of the materials in the boxes. [3]

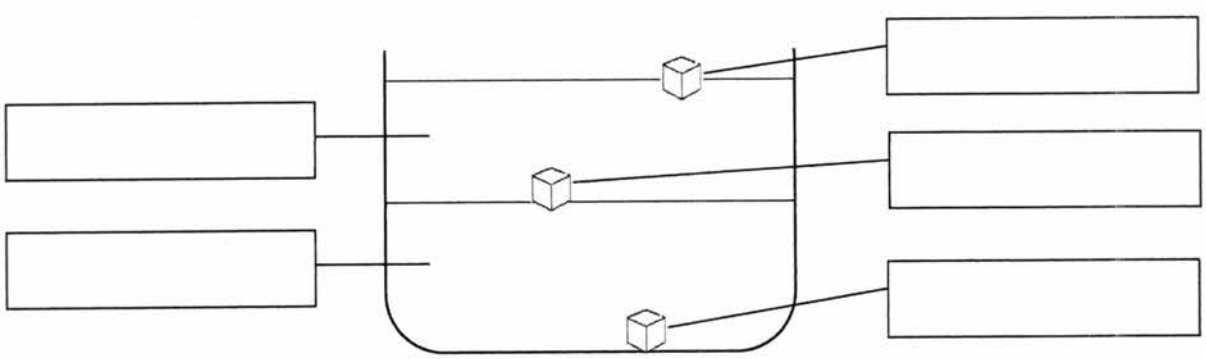


Figure 1.1

[Total: 4 marks]

2. Mary placed some fish balls in boiling water to cook them. After some time, she found that the fish balls which originally sank in water, began to float.
Explain this observation. [2]

_____

_____

_____

[Total: 2 marks]

3. **Figure 3.1** shows a drawing of a Bunsen burner.

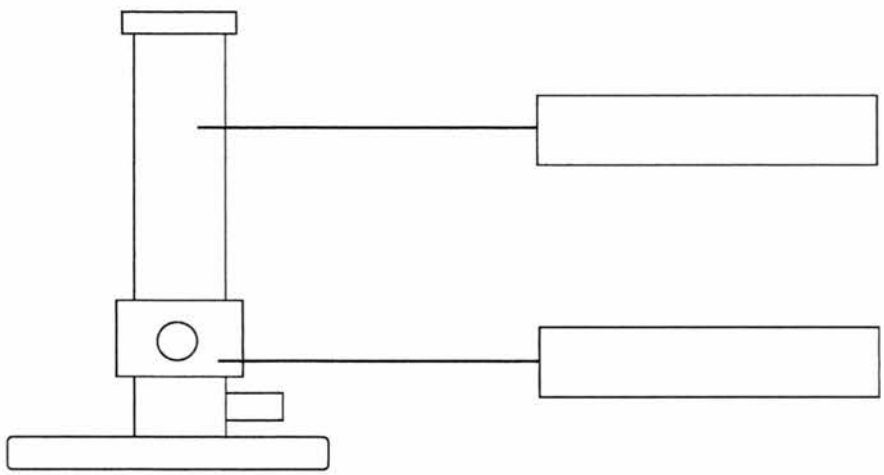


Figure 3.1

(a) Complete **Figure 3.1** by naming the parts of the Bunsen burner in the boxes. [2]

(b) Explain why it is important to close the air-hole before lighting a Bunsen burner. [1]

_____

_____

(c) Explain why leaving a Bunsen burner unattended with an open air-hole is more dangerous than with a closed air-hole. [2]

_____

_____

_____

[Total: 5 marks]

4. Sugar has the chemical formula $C_6H_{12}O_6$. When heated, steam and a black coloured substance is formed.

(a) State if the change is chemical or physical. Give a reason to support your answer. [1]

_____

_____

(b) A student proposed that the black coloured substance is the element iodine. Based only on the information given above, explain why the substance is not iodine. [2]

_____

_____

_____

_____

(c) Given that the black substance is an element in the solid state, suggest the identity of the black substance. [1]

_____

(d) Explain why sugar is a compound. [1]

_____

_____

[Total: 5 marks]

5. **Figure 5.1** shows the process of reverse osmosis.

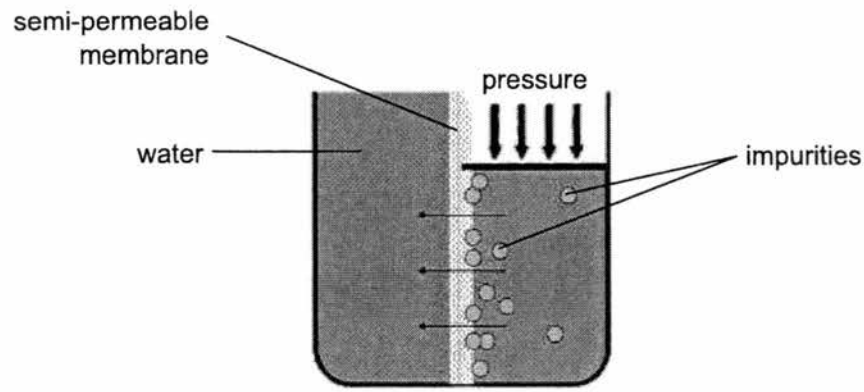


Figure 5.1

(a) Define "*semi-permeable membrane*". [1]

(b) Describe how this process is different from filtration. [1]

(c) Explain why the water that is produced from reverse osmosis may not be pure. [1]

(d) Suggest a reason why reverse osmosis is an expensive process. [1]

[Total: 4 marks]

6. **Figure 6.1** shows the concentration of oxygen in blood samples at three different places in the circulatory system.

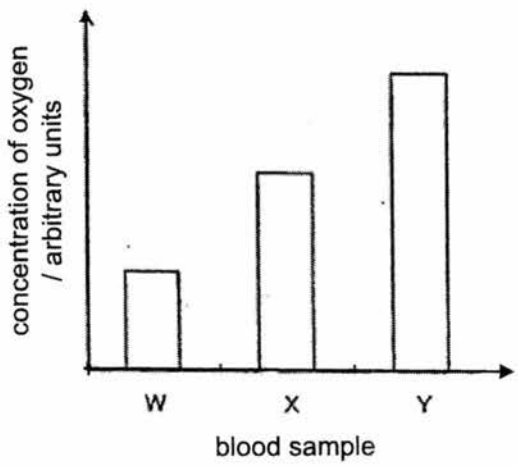


Figure 6.1

(a) Which sample was taken from a blood vessel which has been transported through the liver? Explain your answer. [1]

(b) Which blood sample has the lowest amount of carbon dioxide? [1]

(c) With reference to the movement of dissolved substances between the blood stream and organs, explain the advantage of capillary walls being only one cell thick. [2]

[Total: 4 marks]

7. **Figure 7.1** shows a model of a plant cell.

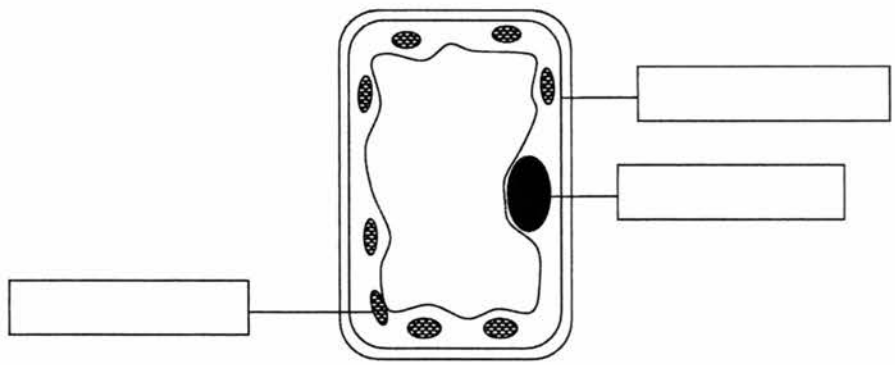


Figure 7.1

(a) Label the parts of the plant cell in **Figure 7.1**. [3]

(b) Describe two differences between a typical plant cell and a typical animal cell. [2]

1. _____

_____

2. _____

_____

[Total: 5 marks]

8. **Figure 8.1** shows a flask of air with a drop of dye in the capillary tube.

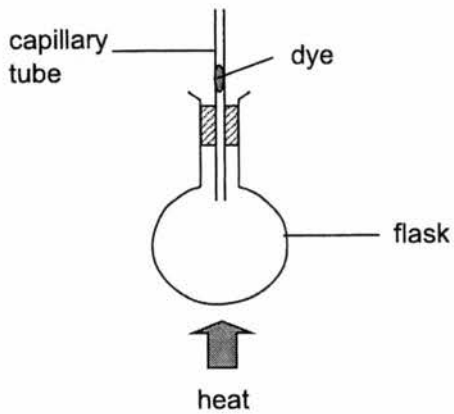


Figure 8.1

(a) When the flask was heated strongly, the dye moved down for a moment before moving upwards. Explain this observation. [2]

(b) Explain why a small flame would not cause an obvious downward movement of the dye. [1]

(c) One flask was filled with air and the other flask was filled with water. Both flasks were warmed gently to ensure that no boiling takes place. State how the upward distance moved by the dye would be different. Explain your answer. [2]

[Total: 5 marks]

9 **Figure 9.1** shows two sealed containers filled with boiling water at 100°C. The thermometers measure the temperature of the water in the containers. The containers are wrapped with different colours of paper as shown. They are left in the same place to cool.

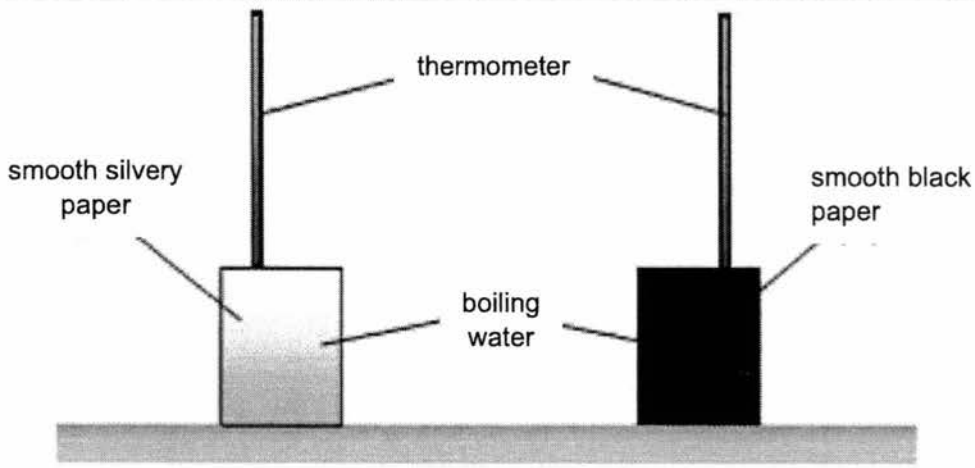


Figure 9.1

(a) State the SI unit of temperature. [1]

(b) State and explain which container will reach room temperature first. [2]

(c) Suggest a change which you can make to the texture for both papers to increase the rate of heat loss. [1]

(d) Radiation is the only mode of heat transfer from the Sun to the Earth. Explain why heat cannot be transferred to Earth via conduction or convection. [2]

[Total: 6 marks]

Section C
Long Structured Questions [30 marks]

Answer three questions. Question 12 is in the form of an **EITHER / OR** question. Only one should be answered. Write your answers in the spaces provided.

10. (a) Hydrochloric acid is commonly used in the production of batteries. It has the chemical formula H*Cl*. Figure 10.1 shows the representation of hydrogen and chlorine as found in the periodic table.

Figure 10.1

(i) State the proton number and nucleon number for chlorine. [2]

proton number: _____ nucleon number: _____

(ii) Calculate the number of neutrons in a hydrogen atom. [1]

_____

_____

(iii) In the space below, draw circles to represent the H*Cl* molecule. [2]

(b) Figure 10.2 shows the model of an atom. Label the parts of an atom in the boxes below. [2]

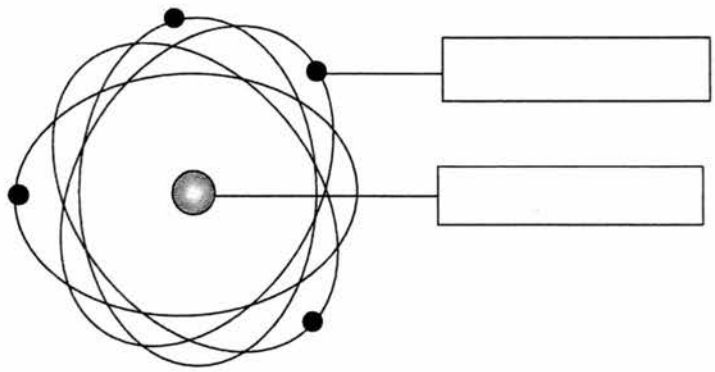


Figure 10.2

(c) Explain why an atom is electrically neutral even though it has negatively charged electrons. [3]

_____

_____

_____

_____

_____

[Total: 10 marks]

11. (a) **Figure 11.1** shows a setup of heating a beaker filled with water.

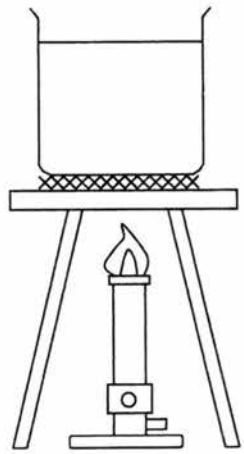


Figure 11.1

(i) On **Figure 11.1**, draw the convection current formed in the water. [1]

(ii) With reference to the particulate nature of matter, explain why heated water has lower density. [4]

(b) **Figure 11.2** shows rods of three different materials being mildly heated at one end. All three rods have the same length and they have equal masses of wax attached at the other end of the rod.

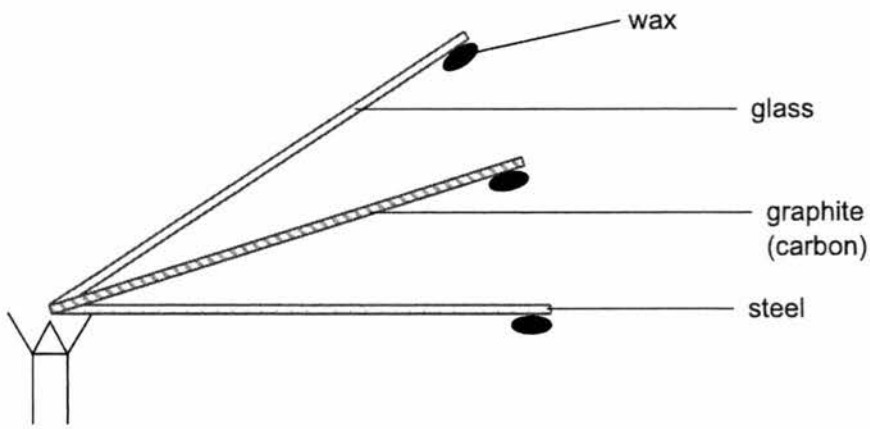


Figure 11.2

(i) Explain which wax will melt first. [2]

_____

_____

(ii) State the mode of heat transfer from the flame to the wax. [1]

_____

(iii) With reference to the particulate nature of matter, explain how heat energy is transferred from the flame to the wax. [2]

_____

_____

_____

[Total: 10 marks]

EITHER

12. **Table 12.1** shows the maximum mass of four substances **A**, **B**, **C** and **D** that can dissolve in various solvents **W**, **X**, **Y** and **Z**. 20g of each substance is dissolved in the same amount of solvent.

Table 12.1

solvent	maximum mass of substance dissolved /g			
	A	**B**	**C**	**D**
W	4	10	0	0
X	14	13	20	11
Y	3	6	13	12
Z	11	2	12	10

(a) If a shirt was stained with substance **A**, state the best solvent to remove the stain. [1]

_____

(b) If substance **B** and **D** are mixed together, state the best solvent to separate them. [1]

_____

(c) Given that both substances **B** and **D** are solids at room temperature, describe how you would carry out your separation using the solvent stated in 12(b). State clearly where the substances can be obtained after separation. [3]

_____

_____

_____

_____

_____

_____

(d) State the combination of solvent and substance that will produce a solution without sediments. [1]

_____

(e) Describe three ways to increase the rate of dissolving a solid in a solvent. [3]

_____

_____

_____

_____

_____

(f) A student wants to dissolve more of substance **A** in solvent **W**. Without changing the amount of **A** and volume of **W**, describe one way to dissolve more of substance **A** in solvent **W**. [1]

_____

_____

[Total: 10 marks]

OR

12. **Figure 12.1** shows a potometer that measures the rate of water movement through a leafy shoot (no roots are present). The experiment was conducted in various weather conditions and the distance moved by the air bubble was recorded.

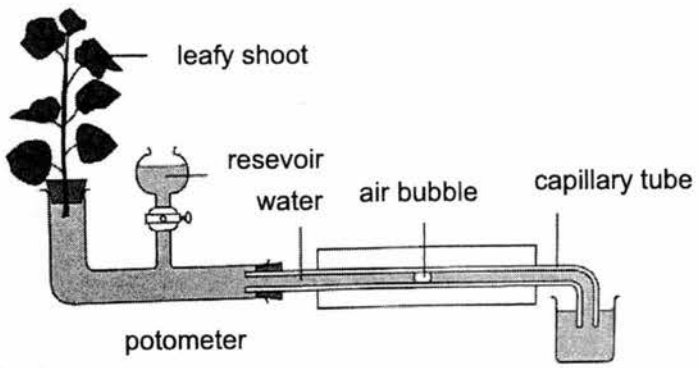


Figure 12.1

(a) State the direction which the air bubble will move after it has been left in the open for one day. Explain your answer. [1]

_____

(b) State two factors affecting the rate of intake of water by the plant **and** describe how they affect the intake of water. [2]

factor 1: _____

_____

factor 2: _____

_____

(c) Name the part of the shoot which transports water. [1]

_____

(d) Name the part of the shoot which transports dissolved sugar, and describe the direction of movement of the dissolved sugar. [2]

_____

_____

_____

_____

(e) Give two reasons to explain why the plant needs water. [2]

_____

_____

_____

(f) When pure water was used for the setup, the plant died after a few days. Given that the plant is an aquatic plant, and that it received sufficient sunlight, suggest a reason for this observation. [1]

_____

_____

(g) Describe one variable which must be kept constant throughout all experiments. [1]

_____

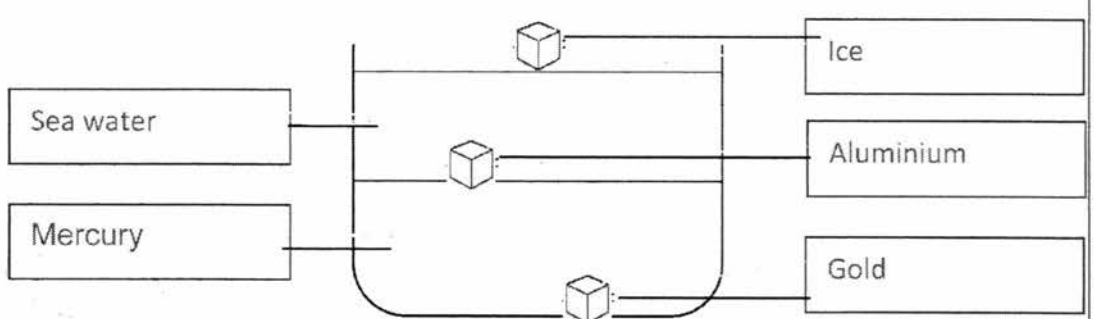
_____

[Total: 10 marks]

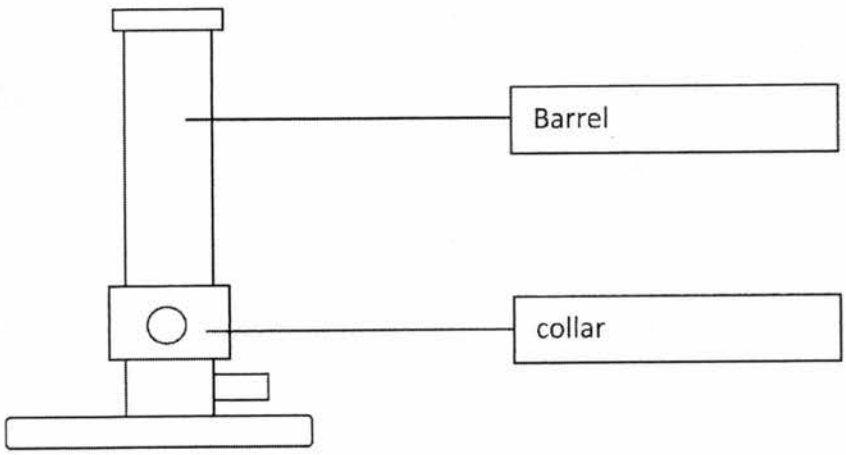
SECTION A – MULTIPLE CHOICE QUESTIONS (30 MARKS)

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

SECTION B – SHORT STRUCTURED QUESTIONS (40 MARKS)

Qs	Suggested answer	Remarks	Marks
1 (a)	Aluminium is <u>not dense</u>, and <u>aircraft needs a light body to fly</u>.	OWTTE	1
1 (b)	 1 mark for correct placement of seawater and mercury 2 marks for ice aluminium and gold. -1 mark for every wrong placement of the solids.		3
			Total: 4 marks
2	The fish balls <u>expanded / increased in volume</u> when heated. [1] Hence <u>density decreased to become lesser than density of water</u>. [1] causing the fishball to float.		2

Total: 4 marks

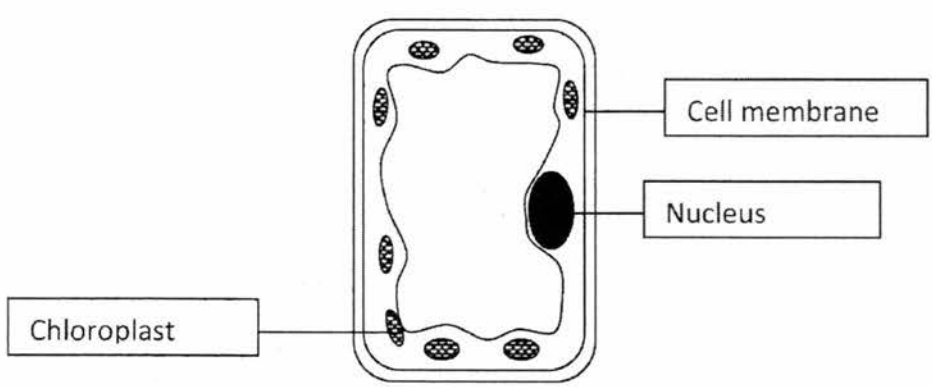
3(a)			2
3(b)	This is to prevent a strikeback from occuring.		1
3(c)	The flame is difficult to see [1] and it is also much hotter [1], potentially causing serious burns.		2

Total: 5 marks

4(a)	Chemical. <u>A new substance is formed</u>	No marks for just stating chemical reaction.	1
4(b)	Sugar is not made up of Iodine. [1] OR Sugar only contains C, H, and O. No new elements can be created [1] from the chemical reaction.		2
4(c)	carbon	CAO	1
4(d)	It is made up of 3 different elements <u>chemically combined.</u>		1

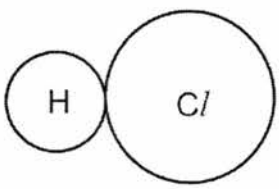
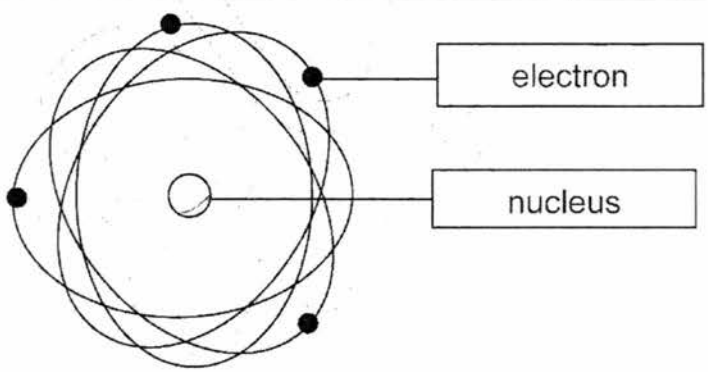
Total: 5 marks

5(a)	A semi-permeable membrane <u>only allows certain substances to pass through</u>. OR only allows small substances to pass through.		1
5(b)	Pressure is involved. ACCEPT: Filtration uses gravitational pull		1
5(c)	Some impurities are small enough to pass through the membrane. [1] making the water not pure.		1
5(d)	Membranes need to be changed frequently		1

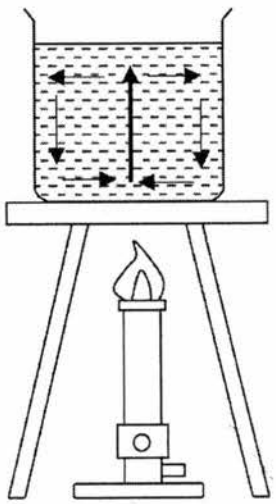
	OR The energy used to exert the force/pressure is expensive.		
			Total: 4 marks
6(a)	W or X Oxygen from the blood has diffused to the liver. [1] Hence it has less oxygen content.		1
6(b)	Y	CAO	1
6(c)	This is because the distance between the substances and the organs is short. [1] ACCEPT: thin walls will hinder the movement of the substances to a lesser extent. (OWTTE) Hence, there is faster rate of diffusion of substances across the walls [1]		2
			Total: 4 marks
7(a)	 REJECT: spelling error		3
7(b)	The plant cell has cell wall but an animal cell doesn't. [1] The plant cell has chloroplasts but an animal cell doesn't. [1] The plant cell has a central large vacuole but an animal cell has many small vacuoles. [1]	Any 2 points. Max 2 marks. Must show comparison	2
			Total: 5 marks
8(a)	The <u>flask expanded</u> first, hence the dye moved down to fill the space. [1] ACCEPT: <u>air pressure</u> in flask decrease	OWTTE	2

	The air inside the flask then expanded, pushing the dye up. [1]		
8(b)	The flask would not expand fast enough before the heat reaches the air. [1]		1
8(c)	The distance moved will be lesser. [1] Since gases expands more than liquids. [1] (OR Liquids expands less than gases)		2
			Total: 5 marks
9(a)	K OR Kelvin		1
9(b)	The container with black paper. [1] The black container is a better radiator of heat. [1] OR The black container lose heat to the surrounding faster. [1]	2nd point either statement	2
9(c)	Use rough paper.		1
9(d)	There is only vacuum in space [1] Conduction and convection requires matter to transfer heat [1]	OWTTE	2
			Total: 6 marks

SECTION C – LONG STRUCTURED QUESTIONS (30 MARKS)

Qs	Suggested answer	Remarks	Marks
10(ai)	Chlorine: Proton number: 17 Nucleon number: 35.5		2
10a(ii)	1 – 1 = 0 [B1]		1
10(aiii)	 ** Labelling of chemical symbol need not be shown.	Show different sizes of circles. [1] Circles must stick together. [1] ACCEPT overlap	2
10(b)			2
10(c)	• An atom has <u>protons which are positively charged [1]</u> • <u>The number of protons and electrons in an atom are equal. [1]</u> • The <u>positive charges cancel out the negative charges [1]</u> and hence the atom is electrically neutral.		3

Total: 10 marks

11(a) (i)			1
11(aii)	Water particles gain energy and slide around faster [1]. The spaces between particles increase [1] and thus volume increase [1]. Since mass stays the same, density decreases. [1]		4
11(bi)	The wax on the steel bar. [1] Steel bar is the best conductor of heat and it conducts heat to the wax fastest. [1]		2
11(bii)	Conduction.		1
11(biii)	The particles gain energy and vibrate faster. [1] The particles pass on the kinetic energy from one end of the rod to the other via vibration. [1]		2

Total: 10 marks

12 (a)	Solvent X		1
12 (b)	Solvent W		1
12 (c)	Dissolve the mixture in solvent W. [1] Filter the resulting mixture. [1]		3

	The residue will be D and the filtrate will be B. [1]		
12 (d)	Substance C and solvent X		1
12 (e)	Heat up the mixture / use a warm solvent [1] Stir faster [1] when dissolving the solute Cut the solid into smaller pieces before dissolving [1]		3
12(f)	Heat up the mixture / solvent.		1
			Total: 10 marks
12 (a)	The bubble will move toward the plant. OR The bubble will move left This is because water is taken in by the leaf shoot. [1]		1
12 (b)	The higher the temperature, the faster the intake of water. [1] OR The higher the humidity, the slower the intake of water. [1] OR The more windy it is, the faster the intake of water. [1] OR The higher the light intensity, the faster the intake of water. [1]	Choose any 2 Max 2 points OWTTE	2
12 (c)	Xylem		1
12 (d)	Phloem [1] transports dissolved sugar from the leaves to the cells in the stem. [1]	REJECT roots	2
12 (e)	Plant needs water for photosynthesis OR Plant needs water for chemical reactions happening in the plant.	Choose any 2	2

	OR Plant needs water so that substances can be dissolved and transported around the plant. OR Plants need water to maintain turgor pressure to keep the shoot upright.		
12 (f)	Pure water does not have minerals which is essential for the plant.		1
12 (g)	Volume of water OR Type of plant OR Number of leaves	Choose 1	1
			Total: 10 marks