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Name : () Class :



ST JOSEPH'S INSTITUTION

END OF YEAR EXAMINATION
(SECONDARY 1)

**LOWER SECONDARY SCIENCE
PAPER 1**

5 October 2016

45 minutes

(1100 – 1145 hrs)

Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

1. Answer all the questions in the spaces provided on the question paper.
2. Write in dark blue or black pen. You may use a soft pencil for any diagrams, graphs or rough working.
3. Use pi (π) value preprogrammed in calculator.
4. Express your final answer in 3 significant figures where appropriate, show all working, and include units in all your working.
5. Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

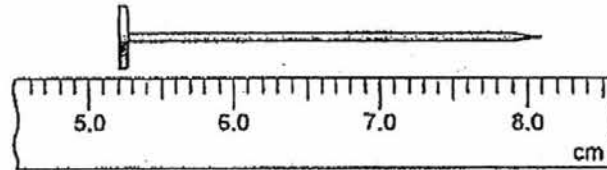
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Section A (30 marks)

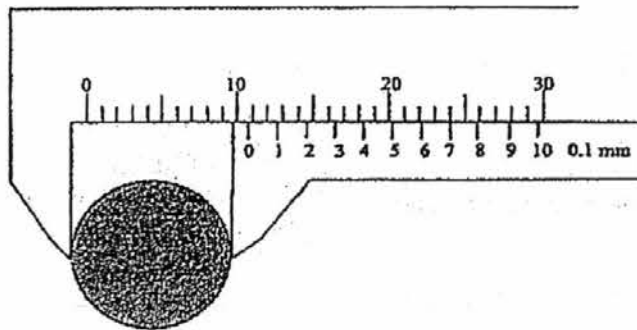
There are 30 multiple-choice questions in this section. For every question, select the most suitable option and shade in the appropriate circle in the OTAS provided.

1. What is the length of the nail as shown below?



- A 2.9 cm B 3.0 cm C 5.2 cm D 8.1 cm

2. The figure below shows an electrical wire placed between the jaws of a pair of vernier callipers.



The radius of the electrical wire is _____ cm.

- A 0.49 B 0.54 C 0.97 D 1.07
3. A plant specimen is viewed under the microscope installed with an eyepiece of magnification $10\times$ and objective lens of magnification $25\times$.
- When viewed under the microscope, the specimen has a length of 60 mm. What is the actual length of the specimen?

- A 0.24 mm B 1.7 mm C 2.4 mm D 6.0 mm

4. Sarah has been asked to calculate the volume of a piece of wire, which is about 0.17 cm in diameter and about 0.700 m long. Which are the most suitable measuring instruments she should use?

	Length	Diameter
A	Metre rule	Vernier callipers
B	Metre rule	Measuring tape
C	Measuring tape	Metre rule
D	Measuring tape	Measuring tape

5. Timothy placed a sample of an unknown solid in liquids of different densities. The table below shows the results of his observations.

Liquid	Density of liquid (kg/m^3)	Observation
V	1000	Floats
W	12 300	Floats
X	700	Sinks
Y	450	Sinks

What is the approximate density of the sample?

- A 700 kg/m^3
 B 1000 kg/m^3
 C Between 700 kg/m^3 and 1000 kg/m^3
 D Between 1000 kg/m^3 and 12 300 kg/m^3
6. On Earth, the gravitational field strength is about 10 N/kg. On Mars, the gravitational field strength is about 3.7 N/kg.
- If an object has a weight of 50 N on Earth, what is its weight on Mars?
- A 1.4 N B 5.0 N C 18.5 N D 135 N
7. Two forces 5 N and 7 N are acting on an object. Which one of the following is not a possible resultant force acting on the object?
- A 2 N B 6 N C 10 N D 14 N

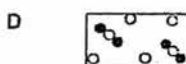
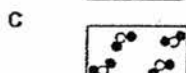
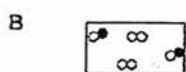
8. If metal X scratches metal Y and a scratch mark is left on metal Y, a tick (✓) is put in the box. Otherwise, a cross (x) is put in the box.

X \ Y	brass	gold	steel	titanium
brass		✓	x	x
gold	x		x	x
steel	✓	✓		x
titanium	✓	✓	✓	

Which one of the following correctly shows the metals arranged in increasing hardness?

- A brass, gold, steel, titanium
 B gold, brass, steel, titanium
 C steel, titanium, brass, gold
 D titanium, steel, brass, gold
9. Which of the following statements about diffusion is correct?
- A Diffusion can only take place in gases and liquids.
 B Diffusion shows that all particles are made up of molecules.
 C The greater the mass of the particle, the slower the rate of diffusion.
 D The speed of diffusion is not affected by temperature.
10. Which of the following statements about a compound is false?
- A A compound has a fixed melting point.
 B A compound is made up of at least 2 different types of atoms.
 C A compound has properties that is different from that of its constituent elements.
 D A compound can be separated into its constituent elements by separating techniques such as filtration, distillation, etc.
11. Which of the following ways can be used to distinguish between pure water and seawater?
- I) Adding sodium chloride (table salt)
 II) Adding distilled water
 III) Checking the boiling point
 IV) Using filtration
- A I only
 B III only
 C I, III and IV only
 D II, III and IV only

12. Which of the following diagrams describe a mixture of water vapour and chlorine gas?



13. Which of the following substances A, B, C or D (at room temperature) will contain particles that vibrate about fixed positions?

Substance	Melting point /°C	Boiling point /°C
A	-28	67
B	11	52
C	98	890
D	-101	-35

14. Which of the following mixtures can filtration be used to obtain the underlined substance?

- A Iron filings and sand
 B Oxygen and carbon dioxide
 C Salt and sugar
 D Oil and sand

15. Which of the following compounds contain exactly three elements?

- A Potassium oxide
 B Lead chloride
 C Sodium hydroxide
 D Carbon dioxide

16. A solid is thought to be pure iron fillings. Which of the following is the best way to test its purity?

A Measure its melting point.
B Pass a magnet over the solid and test whether it is attracted.
C React it with dilute hydrochloric acid.
D React it with aqueous sodium hydroxide.

17. A flask contains the liquids chloroform and water. They are separated using a separating funnel. Which conclusion can be made from this observation alone?

A Chloroform is very poisonous and must be handled carefully.
B Chloroform and water have different boiling points.
C Chloroform and water are immiscible liquids.
D Chloroform has a higher density than water.

18. A filter tip of a cigarette acts as both a filter and a condenser. Which of the following cannot be removed, assuming that the filter tip is 100% effective?

Substance	Boiling point / °C
A Carbon monoxide	-191
B Water	100
C Nicotine	247
D Tar	350 to 400

19. Which of the following is an inference and **not** an observation?

A Water evaporates quicker at higher temperatures
B All matter is made up of tiny particles.
C Dogs and cats are both covered in fur.
D Water drains quicker in sandy soil than clay soil.

20. Which of the apparatus below is most suitable for measuring exactly 28.7 cm³ of a liquid?

A Burette
B Displacement can
C Measuring cylinder
D Electronic balance

21. The table shows some characteristics of four types of cells. Which cell could be a red blood cell? Key: ✓ = present X = absent

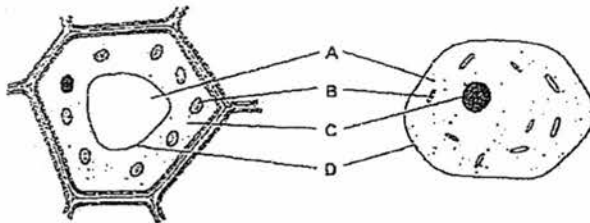
	Nucleus	Chloroplast
A	✓	✓
B	✓	X
C	X	✓
D	X	X

22. Which line in the table correctly identifies these body components?

- 1 brain, spinal cord and nerves
- 2 blood
- 3 xylem
- 4 stomach

	cell	tissue	organ	system
A	2	3	1	4
B	2	4	3	1
C	3	2	4	1
D	3	2	1	4

23. The diagram shows two cells as seen using a light microscope.



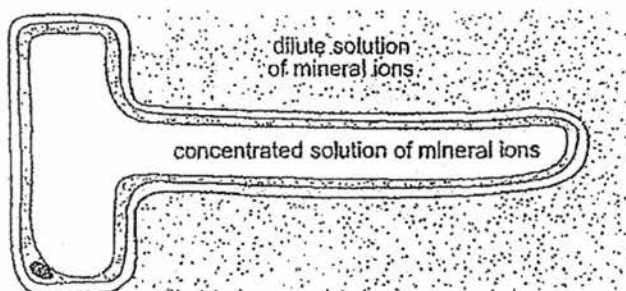
Which label is correct for **both** cells?

- A cell sap
- B chloroplast
- C cytoplasm
- D membrane

24. Four different foods were tested as shown below and the test results were recorded as positive (+) or negative (-). Which food contained both glucose and oil?

	Benedict's test	Biuret's test	Ethanol emulsion test	Iodine test
A	+	+	-	-
B	+	-	+	-
C	-	+	-	+
D	-	-	+	+

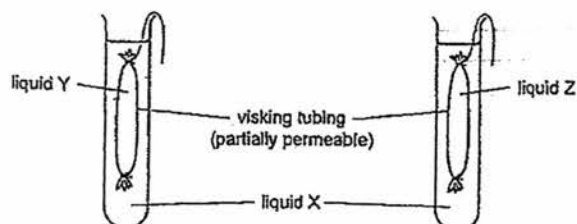
25. The diagram shows a root hair cell, surrounded by a dilute solution of mineral ions.



Which statement is correct?

- A Water molecules move into the root hair because the water potential is lower outside.
- B Water molecules move into the root hair because the water potential is higher outside.
- C Water molecules move out of the root hair because the water potential is lower outside.
- D Water molecules move out of the root hair because the water potential is higher outside.

26. The apparatus was set up as shown in the diagram.

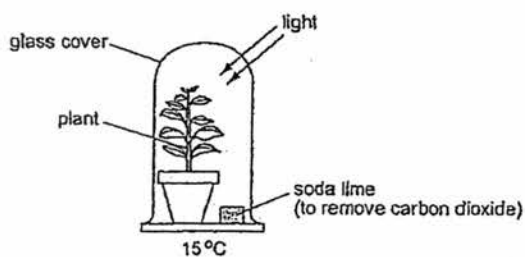


After 30 minutes, the partially permeable tubing containing liquid Y had collapsed while the tubing containing liquid Z was firm. Which could be a correct description of the liquids at the start of the experiment?

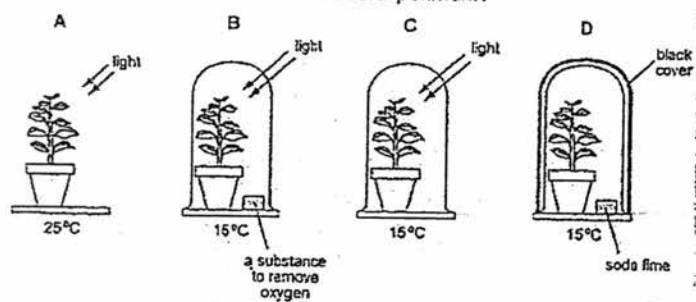
	Liquid X	Liquid Y	Liquid Z
A	10% sucrose solution	25% sucrose solution	water
B	25% sucrose solution	10% sucrose solution	water
C	water	25% sucrose solution	10% sucrose solution
D	10% sucrose solution	water	25% sucrose solution

Commented [A1]:

27. The diagram shows an experiment to find out whether carbon dioxide is needed for photosynthesis.



What is the most suitable control for this experiment?



28. What is a result of the action of stomata?

	Action of stomata	Result
A	open	Carbon dioxide diffuses in during daytime
B	open	Oxygen diffuses out during night-time
C	closed	Water vapour is not taken in by plant
D	closed	Photosynthesis stops

29. What do phloem and xylem vessels transport in a plant?

	xylem	phloem
A	water	sucrose
B	water	starch
C	sucrose	water
D	sucrose	amino acids

30. Which of the following environmental conditions would cause rapid transpiration?

	air	light	temperature
A	damp	bright	cold
B	damp	dim	warm
C	dry	bright	warm
D	dry	dim	cold

End of Paper

Answers to LSS Sec 1 – Paper 1
End of Year Examination 2016



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

11	B
12	A
13	C
14	D
15	C
16	A
17	C
18	A
19	B
20	A

21	D
22	C
23	D
24	B
25	B
26	D
27	C
28	A
29	A
30	C

Name : ()

Class :



ST JOSEPH'S INSTITUTION

END OF YEAR EXAMINATION
(SECONDARY 1)

**LOWER SECONDARY SCIENCE
PAPER 2**

5 October 2016

1 hour 45 minutes

Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

1. Answer all the questions in the spaces provided on the question paper.
2. Write in dark blue or black pen. You may use a soft pencil for any diagrams, graphs or rough working.
3. Use pi (π) value preprogrammed in calculator.
4. Express your final answer in 3 significant figures where appropriate, show all working, and include units in all your working.
5. Do not use staples, paper clips, highlighters, glue or correction fluid/tape.
6. A copy of the Periodic Table is found overleaf.

This document consists of 18 printed pages.

[Turn over]

Section A (40 marks)

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

- A1 Fig. 1.1 shows the setup of a pendulum experiment, while Fig. 1.2 shows the angle of release. The experiment was performed four times, each with a different length (L).

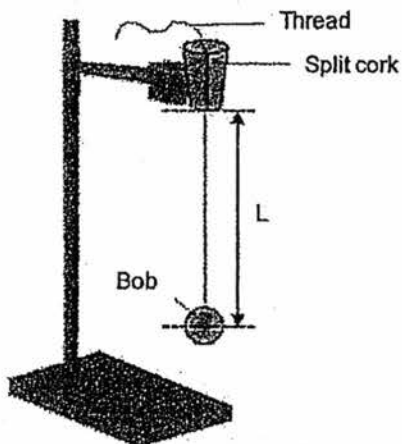


Fig. 1.1

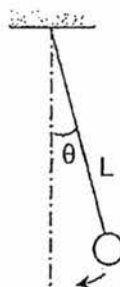


Fig. 1.2

The following results are obtained and tabulated below.

Experiment	Length L / m	Period T / s	Mass of bob M / kg	Angle of release $\theta / ^\circ$
1	0.10	0.638	0.250	10.0
2	0.15	0.775	0.250	10.0
3	0.20	0.901	0.250	10.0
4	0.25	1.003	0.250	10.0

Period is the time taken for one complete oscillation. The same type of thread is used for the experiments.

- (a) Suggest a possible hypothesis for the experiment.

[2]

.....

- (b) Identify the following variables for this experiment:

(i) Independent variable [1]

(ii) Dependent variable [1]

(iii) Controlled variables (list two) [2]

.....

- A2 (a) Fig. 2.1 shows how the volume of 10 g of water changes as the temperature rises from $-10\text{ }^{\circ}\text{C}$ to $+10\text{ }^{\circ}\text{C}$. The water melts at $0\text{ }^{\circ}\text{C}$.

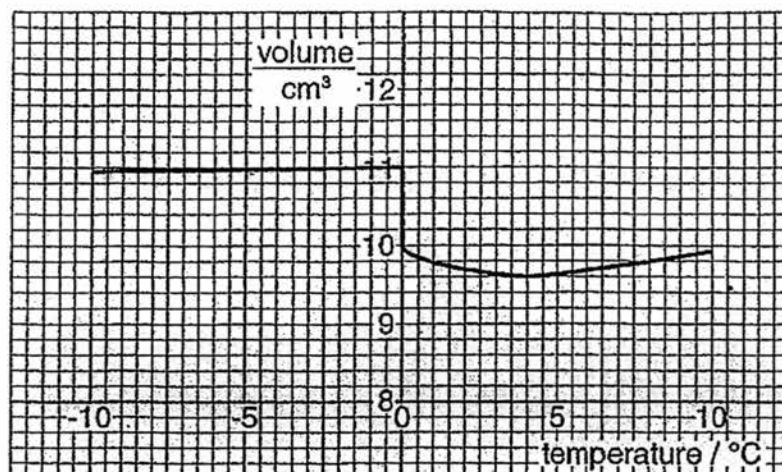


Fig. 2.1

Calculate the density of **unmelted** ice at $0\text{ }^{\circ}\text{C}$.

Density = [1]

- (b) State how the density of water changes as the temperature rises from $-10\text{ }^{\circ}\text{C}$ to $+10\text{ }^{\circ}\text{C}$.

You should refer to the **density changes**, if any, when water is in solid state, as it is melting and when it is in liquid state. No further calculation is necessary.

[2]

$-10\text{ }^{\circ}\text{C}$ to $0\text{ }^{\circ}\text{C}$:

.....

Melting at $0\text{ }^{\circ}\text{C}$:

.....

$0\text{ }^{\circ}\text{C}$ to $4\text{ }^{\circ}\text{C}$:

.....

$4\text{ }^{\circ}\text{C}$ to $+10\text{ }^{\circ}\text{C}$:

.....

- (c) The Plimsoll line is a reference mark located on the external surface of a ship's hull. This indicates the maximum depth to which the ship may be safely immersed when loaded with cargo. Hence when a merchant ship is loaded in a port, it should not be allowed to sink below the level marked on the Plimsoll line.

Fig. 2.2 shows the safe load levels indicated on the side of a ship.

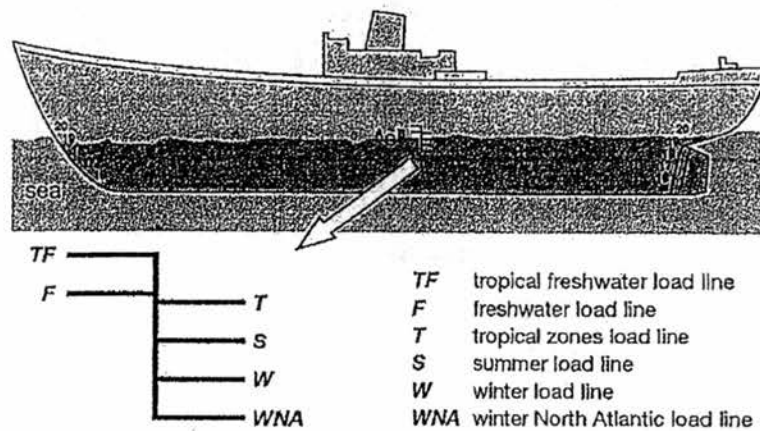


Fig. 2.2

- (i) Why is the safety load line higher in freshwater? [1]

.....

.....

- (ii) Why does a ship float higher in winter than in summer? [1]

.....

.....

- A3 (a) Fig. 3.1 shows the side view of a dam used to store water.

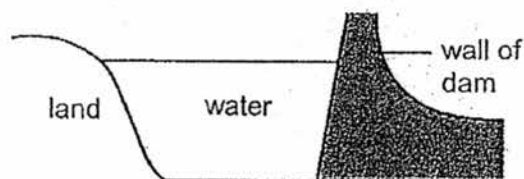


Fig. 3.1

Explain briefly, in terms of pressure, why the thickness of the wall of the dam is greater at the base than at the top.

[2]

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- (b) Fig. 3.2 shows a simple type of hydraulic braking systems used in a light vehicle.

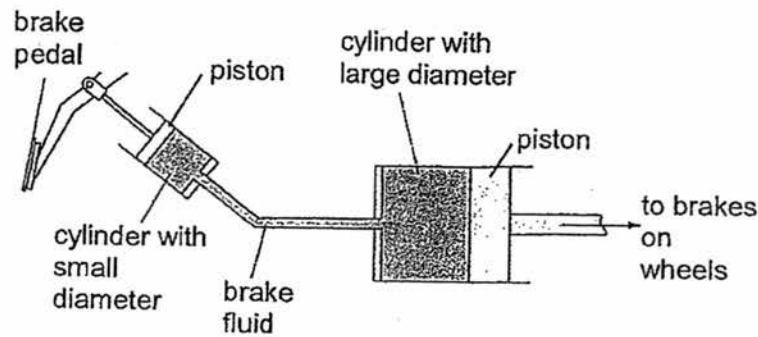


Fig. 3.2

The cross-sectional areas of the small cylinder and large cylinder are 0.0004 m^2 and 0.0024 m^2 respectively.

- (i) The brake pedal is pushed against the piston in the small cylinder with a force of 90 N . Calculate the pressure exerted on the brake fluid in the small cylinder.

Pressure = [1]

- (ii) State the amount of pressure exerted by the brake fluid on the piston in the large cylinder.

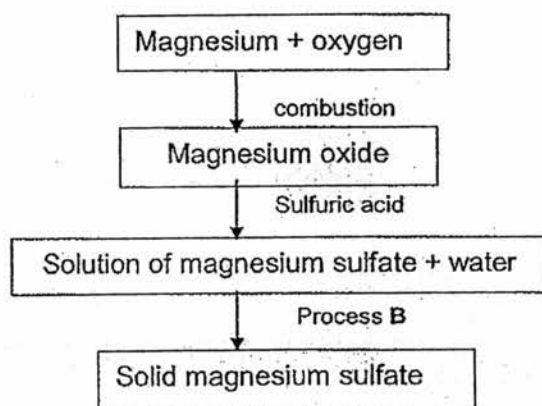
[1]

.....

- (iii) Determine the force exerted by the brake fluid on the piston in the large cylinder.

Force = [1]

A4 The diagram shows some reactions of magnesium.



- (a) A mixture of magnesium and oxygen, when not ignited, remains unchanged as a mixture of magnesium and oxygen. When ignited, the magnesium burns with a blinding white light.

State two reasons why the magnesium oxide formed is a compound and not a mixture. [2]

.....

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- (b) Name the Process B to obtain solid pure magnesium sulfate from magnesium sulfate solution. [1]

.....

- (c) Write down the chemical symbols for all the elements present in magnesium sulfate. [1]

.....

- (d) A sample of magnesium was found to be contaminated with iron fillings and sodium chloride solution. Select (by circling) suitable techniques to obtain pure magnesium.

Step 1:

distillation / separating funnel / filtration [1]

Step 2:

crystallization / magnetic attraction / evaporation to dryness [1]

- (e) A bottle of concentrated sulfuric acid was accidentally spilled in the laboratory. Fumes of sulfuric acid are choking and pupils present in the laboratory must be quickly evacuated for safety reasons.

- (i) State and define the process in which fumes of sulfuric acid spreads from the area of spillage to the rest of the laboratory. [2]

.....
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.....

- (ii) State a factor that can cause the process stated in (i) above to occur in a shorter period of time. [1]

.....
.....

A5 You are given different sets of three substances each. In each set, circle the odd one out and provide a reason for your answer.

(a) Sodium / lead / sulfur (*circle odd one out*)

[2]

Reason:

.....

(b) Air / brass / water (*circle odd one out*)

[2]

Reason :

.....

A6 (a) Write down what the acronym DNA stands for.

[1]

.....

(b) Outline the relationship between DNA, genes and chromosomes.

[2]

.....

.....

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- A7** In an investigation, the volume of samples of 20 dried raisins was measured. Each sample was then placed in water or sugar solutions of different concentrations. After 12 hours, the raisins were blotted dry and the volume of each sample of raisins was measured again. Fig. 7 shows the results.

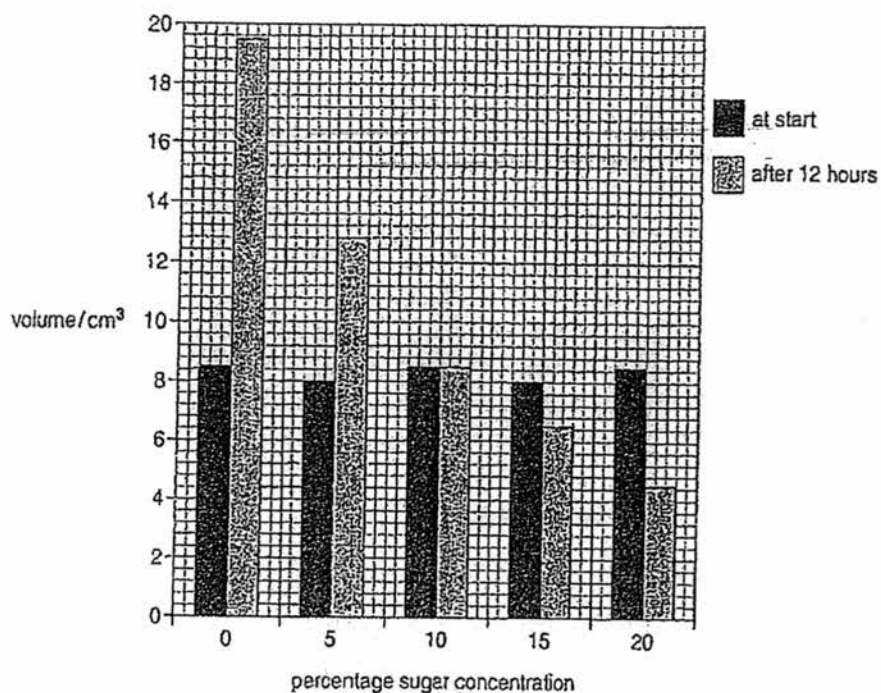


Fig. 7

- (a) Calculate the percentage change in the volume of the sample of raisins in 5% sugar solution.

Percentage change = [2]

- (b) Explain the results in the 10% sugar solution. [2]

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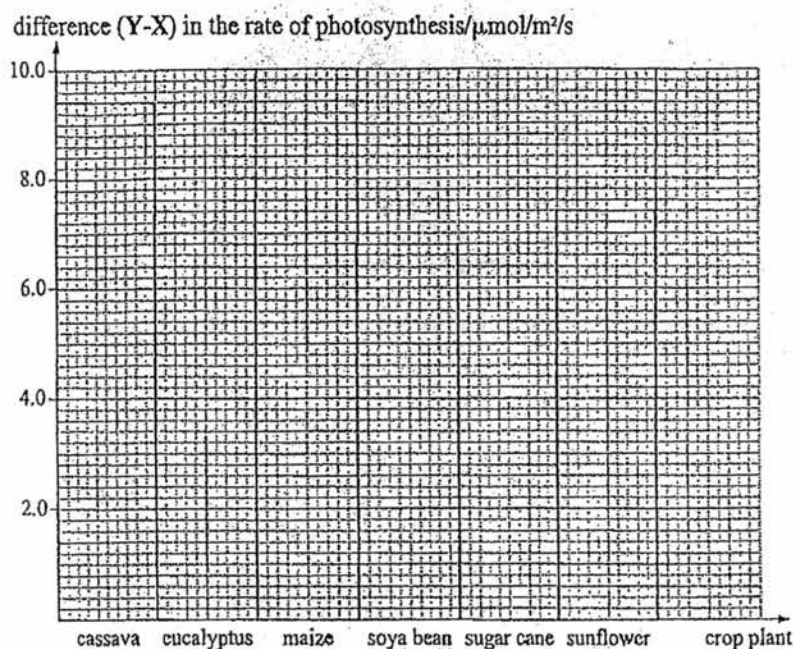
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- A8 The rate of photosynthesis in six tropical crop plants was measured when the plants were growing outside under normal conditions (rate X). The measurements were repeated when the plants were grown under controlled optimum conditions in a glasshouse (rate Y). The results are shown in the table and bar chart below.

Crop plant	Rate of photosynthesis (X) / $\mu\text{mol/m}^2/\text{s}$	Rate of photosynthesis (Y) / $\mu\text{mol/m}^2/\text{s}$	Difference in rate of photosynthesis (Y - X) / $\mu\text{mol/m}^2/\text{s}$
Cassava	13.7	23.1	9.4
Eucalyptus	18.4	26.0	7.6
Maize	23.4	26.0	2.6
Soya bean	18.3	25.1	6.8
Sugar cane	24.0	26.8	2.8
Sunflower	24.3	31.7	7.4



- (a) Which two crops show the greatest difference between the rate of photosynthesis? [1]

.....

- (b) The measurements of the rate of photosynthesis (X) of the plants are means of 10 readings. Suggest a reason why mean measurements were used. [1]

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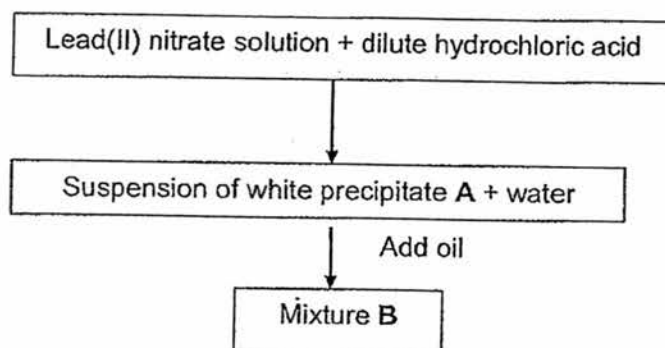
- (c) Suggest two factors that were changed when the plants were grown in controlled optimum conditions. [2]

.....
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Section B (30 marks)

Answer *all* questions in the spaces provided.

- B1 Study the flowchart given and answer the following questions.



- (a) State whether the reaction between lead(II) nitrate and hydrochloric acid is a physical or chemical change. [1]

.....

- (b) State one physical property of A. [1]

.....

Mixture **B**, upon standing for several minutes, separate out into three layers. The top layer looks like oil while the bottom layer is a chalky white substance.

- (c) Select, by circling, which of the following apparatus/technique can be used to check if mixture **B** is a solution or a suspension. [1]

Separating funnel / distillation / filtration / crystallization

- (d) Describe, in steps, how you would obtain a dry sample of substance **A** from mixture **B**. [3]

.....

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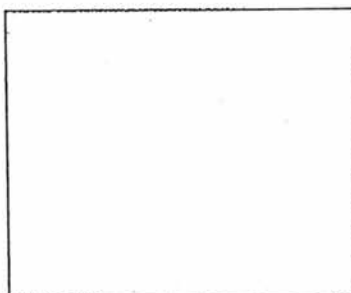
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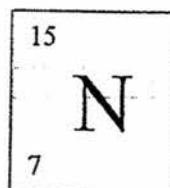
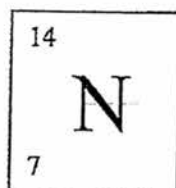
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- (e) The melting point of nitrogen is $-210\text{ }^{\circ}\text{C}$ while its boiling point is $-195\text{ }^{\circ}\text{C}$. Using one circle $\bigcirc$ to represent a diatomic molecule of nitrogen, draw some nitrogen molecules to show their arrangement at room temperature and pressure ($25\text{ }^{\circ}\text{C}$, 1 atm). [1]



- (f) The element nitrogen is found in all nitrate salts, as in the case with lead(II) nitrate. Several types of nitrogen atoms (known as "isotopes") have been discovered, differing only in the number of neutrons. The two most common nitrogen atoms can be depicted as follows:



- Using information about these two isotopes of nitrogen, complete the table [3]
below:

isotope	No. of protons	No. of electrons	No. of neutrons
$\begin{array}{ c } \hline 14 \\ \hline \text{N} \\ \hline 7 \\ \hline \end{array}$			
$\begin{array}{ c } \hline 15 \\ \hline \text{N} \\ \hline 7 \\ \hline \end{array}$			

- B2 (a) Define the term *transpiration*.

[1]

.....

.....

- (b) Explain how each of the following factors can affect the rate of transpiration:

- (i) High humidity of the air.

[2]

.....

.....

.....

- (ii) Increase in temperature of the air.

[2]

.....

.....

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- (b) Fig. B2 below shows a potometer.

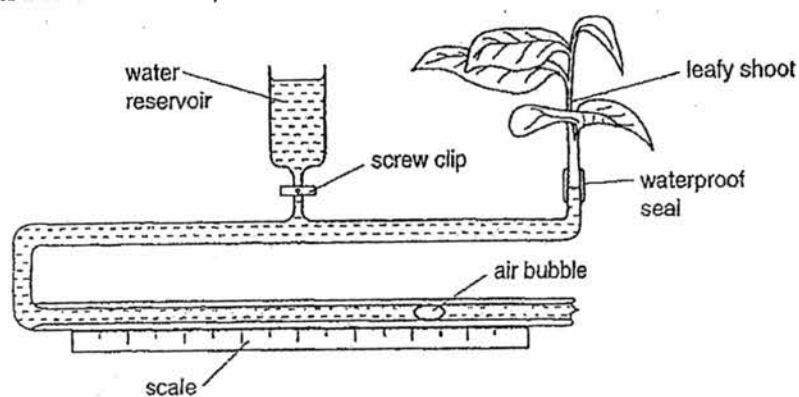


Fig. B2

- (i) Describe how you think the potometer can be used to measure the rate of water loss from the leafy shoot.
(Hint: position of air bubble)

[2]

.....

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- (ii) Hence, describe how the leafy shoot absorbs more water.

[1]

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.....

- (iii) The table shows the results of an investigation, using a potometer similar to that in (b), to measure the rate of water loss from a leafy shoot of a plant kept in different conditions.

Distance moved by bubble (mm)	
Still air	Moving air
8	16

State and explain the effect of moving air on the water loss from the leafy shoot.

[2]

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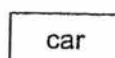
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- B3 (a) The engine of a car exerts a forward, horizontal force of 15 000 N to cause it to move along a rough road. The car moves at a constant speed of 50 km/h.

- (i) Complete the free body diagram of the car moving in the horizontal direction. Draw and label the **horizontal** forces acting on the car.

[1]



- (ii) State the amount of friction acting on the car.

[1]

.....

- (iii) Suggest a modification that can be made to the car to reduce the amount of air resistance acting on it when it moves.

[1]

.....

.....

- (b) When a head strikes another object, like the ground, two collisions occur. The first collision is between the skull and the ground, the second between the brain and the skull. It is important to wear a helmet in any activity with a risk of head collisions.

During a collision with a tree or the ground, a helmet crushes to absorb some of the impact of the collision. By slowing down over a longer period of time, the collision between the brain and the skull is reduced or avoided.

Fig. B3 shows modern cars designed to crumple on impact.

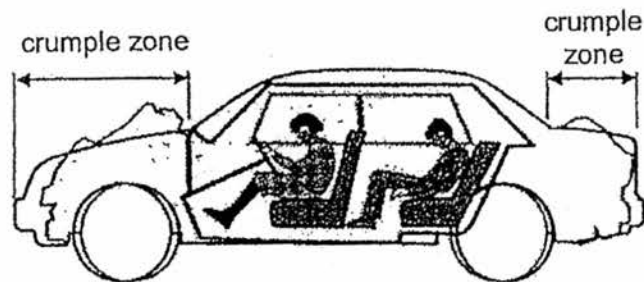


Fig. B3

Use the information about helmets above, to explain why it is important for cars to be designed with crumple zones.

[2]

.....

.....

.....

.....

B4 Fig. B4 shows the properties of some materials used in the manufacturing and building industries.

When choosing a material for a particular function or job, you need to consider the stiffness, strength and density of the material. You will also need to be aware of the cost involved too.

Material	Relative stiffness	Relative strength*	Density (kg/m ³)	Stiffness Density	Strength Density	Cost per tonne (USD)
Aluminium	7300	27 000	2700	2.7	10	1646
Brick	2100	5500	3000	0.7	1.8	30
CFRP	20 000	100 000	2000	10	50	3000
Concrete	1500	4000	2500	0.6	1.6	20
GRP	2000	50 000	2000	1	25	210
Steel	21 000	40 000	7800	2.7	5.1	300
Wood	1400	2700	500	2.8	5.4	100

* These strengths are for the materials under compression.

1 tonne = 1000 kg.

GRP: Glass reinforced plastic

CFRP: Carbon fibre reinforced plastic

Fig. B4

- (a) The relative stiffness and relative strengths of concrete, brick and wood are lower than the rest of the materials.

Why are they still often used for building houses?

[1]

.....

.....

- (b) (i) Explain what is meant by **strength** of a material.

[1]

.....

.....

- (ii) Stiffness measures the rigidity of a material — the extent to which it resists deformation when a force is applied on it. The stiffer a material is, the less flexible it is.

Explain the importance of calculating the ratios $\frac{\text{stiffness}}{\text{density}}$ and $\frac{\text{strength}}{\text{density}}$ of each material. [1]

.....

.....

- (c) GRP can be used to build small boats and even small minesweepers for the Navy. A minesweeper is a small naval warship designed to remove threats posed by naval mines. This ensures that waterways are safe for ships to travel in.

With the help of Fig. B4, suggest

- (i) Why is it useful to make minesweepers from GRP? [1]

.....

.....

- (ii) Why large naval ships, used for warfare, should not be made from GRP. [1]

.....

.....

End of paper

SUGGESTED MARK SCHEME

Section A (40 marks)

1. (a) If the length of thread increases, then the time of one complete swing increases. [2]
 1 mark: correctly identifies dependent (0.5 mark) and independent (0.5 mark) variables
 1 mark: hypothesis worded with directionality effect
- (b) (i) Length of thread [1]
 (ii) Period [1]
 (iii) mass of bob, angle of release, type of thread [2]
 [any two answers, 1/2 mark for each answer]
2. (a) Density = mass / volume
 = 10 / 11 [½]
 = 0.909 g/cm³ [½]
- (b) -10 °C to 0 °C: density of water remains constant at about 0.91 g/cm³. [½]
 Melting at 0 °C: density increases to 1 g/cm³. [½]
 0 °C to 4 °C: density increases further to a maximum of 1.04 g/cm³. [½]
 4 °C to +10 °C: density decreases to 1 g/cm³. [½]
- (c) (i) Freshwater is less dense. [½]
 With the same amount of load, the ship will be floating higher. [½]
- (ii) In winter, volume of water in the sea decreases. [½]
 This causes the density of the water to increase. [½]
3. (a) As the depth of water increases, the water pressure exerted on the wall of the dam increases. [1]
 To prevent the wall from cracking, the wall is thicker at the base [1]
- (b) Deduct ½ mark if wrong units or no formula.
 Award zero if no working shown.
- (i) Pressure = Force/ Area
 = 90 / 0.0004
 = 225 000 Pa (accept N/m²) [1]
- (ii) 225 000 Pa (accept N/m²) [1]
- (iii) Force = Pressure × Area
 = 225 000 × 0.0024
 = 540 N [1]

- 4 (a) (1) It has a fixed melting / boiling point. [2]
(2) It has properties different from its constituent elements.
[any other reasons that is correct also can be accepted]
- (b) crystallization [1]
- (c) Mg / S / O [1]
- (d) Step 1: filtration [1]
Step 2: magnetic attraction [1]
- (e) (i) Diffusion [1]
The process by which particles move down the concentration gradient [0.5] until equilibrium is reached [0.5]. [1]
- (ii) Any: raise temperature / greater spillage / etc [1]
No mark if just state "temperature" / "spillage" i.e must include direction of change
- 5 (a) Circle : sulfur [1]
Reason: it is non-metal whereas the other 2 are metals [1]
- (b) Circle: water [1]
Reason: it is compound whereas the other 2 are mixtures [1]
- 6 (a) Deoxyribonucleic acid [1]
- (b) A gene is a small section of DNA [1], located at a particular locus on a chromosome [1], which stores hereditary information. [2]
- 7 (a) % change = $[(12.8 - 8)/8] \times 100\%$ [1] = 60% [1] [2]
- (b) There is no change in the volume of the raisins. There is no net movement of water. [1]
The water potential of the raisins is the same as that of the 10% sugar solution.[1] [2]
- 8 (a) Cassava and eucalyptus [1]
- (b) To reduce random error / offset any anomaly in the readings, obtaining a more accurate result. [1]
- (c) Any 2 of the following: [2]
Temperature / amount of light / amount of carbon dioxide

Section B (30 marks)

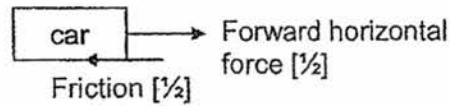
1.
 - (a) Physical change [1]
 - (b) Any logical answer eg: it is insoluble in water; it is insoluble in oil, etc. [1]
 - (c) Filtration [1]
 - (d) Step 1: Use a separating funnel to remove the oil layer (it remains in the separating funnel). [1]

 Step 2: Filter the mixture obtained from step 1. The residue will be substance A. [1]

 Step 3: Rinse residue A with distilled water and pat dry between pieces of filter paper. [1]
 - (e) [arrangement of particles in gaseous state] [1]
 - (f) Nitrogen-14: 7 protons, 7 electrons, 7 neutrons [3]
 Nitrogen-15: 7 protons, 7 electrons, 8 neutrons
 [0.5 mark for each correct sub-atomic particle]
2.
 - (a) Transpiration is the loss of water vapour through the aerial parts of the plant, mainly through the stomata in the leaves [1]
 - (b)
 - (i) The leafy shoot loses water in the form of water vapour during transpiration and absorbs water to replace the water loss. The air bubble moves. [1] The distance moved by the air bubble (final position – initial position) can be used to measure the rate of water loss by considering the time taken. [2]
 - (ii) Loss of water vapour via the stomata [1] creates a suction force (transpiration pull) which draws water up the xylem vessels in the stem and roots. [1] [2]
 - (b)
 - (i) Moving air results in more water loss from the leafy shoot as it removes the water vapour lost through stomata faster than still air. [1] The leafy shoot absorbs more water to replace the water lost and the bubble moves a longer distance. [1] [2]
 - (ii) High humidity means high amount of water vapour in the air. This decreases the water vapour concentration gradient between the air and inside the leaves. [1] The plant loses less water vapour via the stomata and the rate of transpiration is reduced. [1] [2]
 - (iii) A higher outside temperature means that the water vapour lost by the plant evaporates / diffuses faster. [1] There is a greater water vapour concentration gradient between the air and inside the leaves. The plant loses more water vapour faster and the rate of transpiration increases. [1] [2]

3. (a) (i)

[1]



(ii) 15 000 N

[1]

(iii) Adopt a more streamline shape for the car body.

[1]

(b) During a collision, the front and back parts of the car will **crush / crumple to absorb some impact**. [1/2]

Slows down the collision over a longer time period.

[1/2]

This reduces the risk of the passengers getting severely / fatally injured.

[1]

4. (a) Cheap / the costs per tonne are the lowest.

[1]

(b) (i) Ability to withstand a heavy load without breaking.

[1]

(ii) Materials are being compared according to the same **density base value** [0.5]. Allows **fair (or accurate)** comparison to be made [0.5]

[1]

(c) (i) Less dense than metals. Cheaper than aluminium or steel.

[1]

(ii) $\frac{\text{Stiffness}}{\text{Density}}$ value might not be high enough. [0.5]

[1]

Large naval ships can deform easily when a large force (e.g. due to bomb explosion) is exerted on them. [0.5]