Index Number	Class	Name

CHIJ ST JOSEPH'S CONVENT
SEMESTRAL ASSESSMENT 2

O O

SCIENCE (CHEMISTRY)

Secondary 1 Express

Monday, 10 October 2016
50 minutes

Candidates answer on the Question Paper.
Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A
There are **ten** questions. 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.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

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

The number of marks is given in brackets [ ] at the end of each question or part question.
Show all your working on the same page as the rest of the answer.
Omission of essential working will result in loss of marks.
Electronic calculator may be used in this paper.
The total of the marks for this paper is **40**.

A copy of the Periodic Table is printed on page 14.

FOR EXAMINER'S USE	
A	
B	
Total	40

This document consists of 14 printed pages.

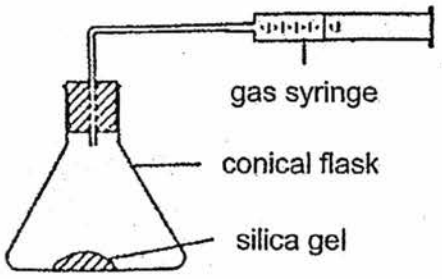
Setter(s) : Mrs Tang Hui Sun and Ms Ho Yan Yi

Section A (10 marks)

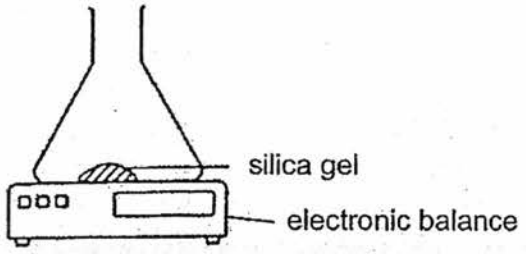
Answer **all** questions.

1 Silica gel can be used to limit the growth of mould on leather goods and electronic equipment by absorbing water vapour from the air.
Which of the following methods can be used to study the rate of absorption of water vapour in silica gel in 15 minutes?

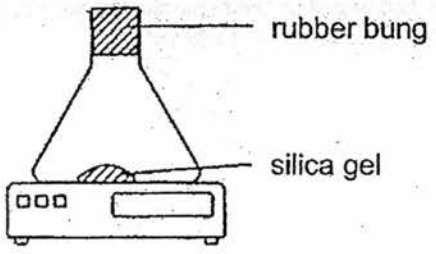
A



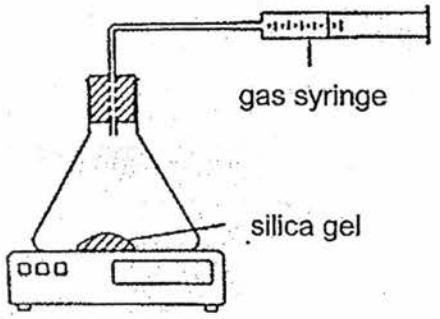
B



C



D



2 An element is found to have the following properties:
- good electrical conductivity,
- shiny in appearance,
- solid at room temperature.

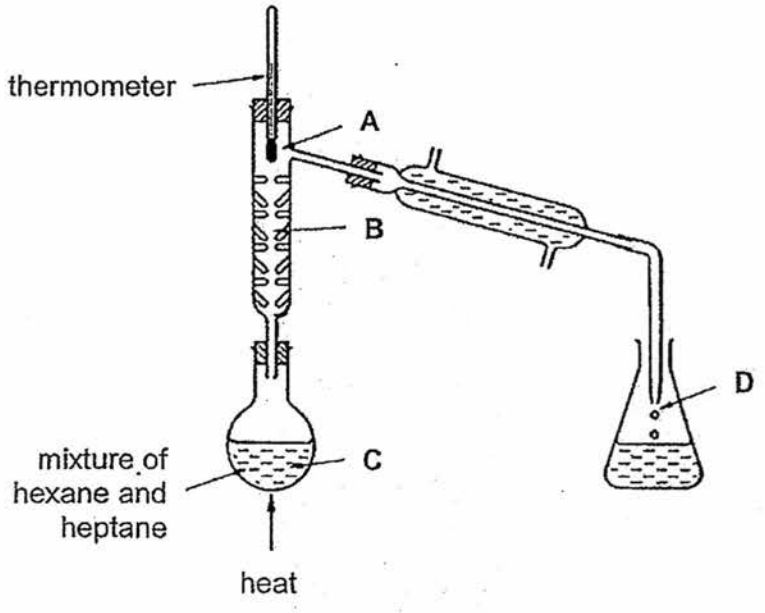
What is the element most likely to be?

A aluminium
B carbon
C nitrogen
D silicon

3 Urea is a compound with the chemical formula, $CO(NH_2)_2$.
Which of the following shows the correct information about one molecule of urea?

	number of elements	number of atoms
A	3	6
B	3	7
C	4	7
D	4	8

4 A mixture of hexane (boiling point, 70°C) and heptane (boiling point, 98°C) was separated by fractional distillation.
When the thermometer shows 70°C, at which point will there be the highest proportion of hexane?



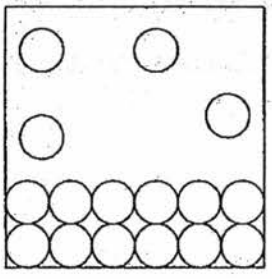
5 Octane and water are immiscible liquids.
Which method could be used to separate a mixture of octane and water and how is the purity of separated octane checked?

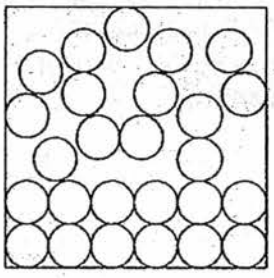
	method of separation	purity check
A	filtration	find the boiling point
B	filtration	obtain a chromatogram
C	using separating funnel	find the boiling point
D	using separating funnel	obtain a chromatogram

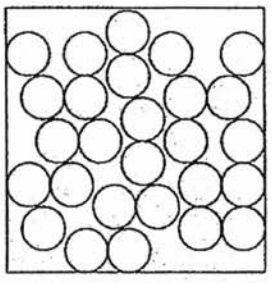
6 Which of the following remains constant when a liquid undergoes freezing?

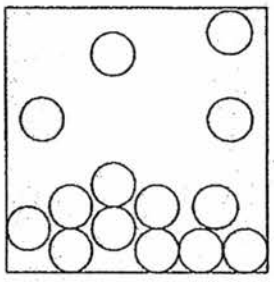
A energy level of particles
B size of particles
C distance between particles
D attractive forces between particles

7 Which of the following best represents the change in arrangement of the particles when ammonium chloride undergoes heating?

A 

B 

C 

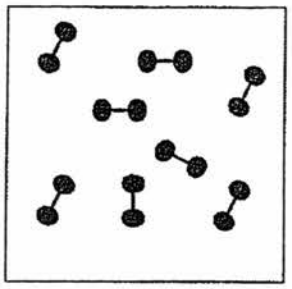
D 

8 Isotopes of the same element contain

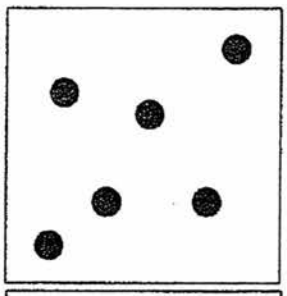
A equal numbers of electrons, protons and neutrons.
B different numbers of electrons, protons and neutrons.
C the same numbers of protons and electrons but a different number of neutrons.
D the same numbers of electrons and neutrons but a different number of protons.

9 Which of the following diagrams represents molecules of methane?

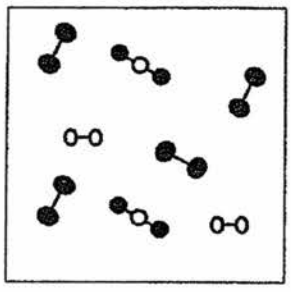
A



B



C



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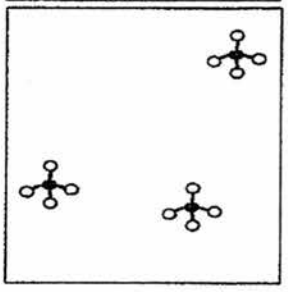


10 Which of the following sub-atomic particles determines the chemical properties of an atom?

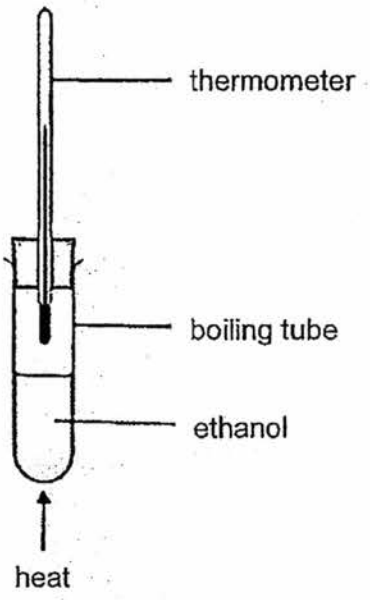
A proton
B neutron
C electron
D nucleus

Section B (30 marks)

Answer **all** questions.

For Examiner's Use

1 The diagram shows the apparatus setup by a student to find the boiling point of ethanol.



Identify a mistake in the setup. Explain your answer and state how you can modify the setup to correct the mistake.

mistake.....

explanation.....

.....

modification.....

..... [2]

For Examiner's Use

2 Information about four substances, **P**, **Q**, **R** and **S** is given below.

Substance **P**: It is a white solid. Only some parts dissolve in an excess of water.
Substance **Q**: It is a white solid formed by burning magnesium in oxygen.
Substance **R**: It is a grey solid which cannot be decomposed into anything simpler.
Substance **S**: It is a blue liquid. When it is distilled, a colourless liquid is collected.

(a) Classify each of the substances as either an element, a compound or a mixture. Complete the table below by placing a tick (✓) in the correct box in each row.

substance	element	compound	mixture
P			
Q			
R			
S			

[4]

(b) State two differences in properties between substances **P** and **Q**.

difference 1.....

.....

difference 2.....

..... [2]

[Turn Over

3 The solubility of three solids in two different solvents, **P** and **Q**, are shown in the table below.

For Examiner's Use

solid	solubility	
	solvent **P**	solvent **Q**
sand	insoluble	insoluble
sulfur	soluble	insoluble
salt	insoluble	soluble

You have a mixture of sand, sulfur and salt.
Describe the steps you would carry out to obtain dry sample of each solid from the mixture.

.....

.....

.....

.....

.....

.....

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.....

.....

..... [4]

4 Upon reaching home from school, a student realised that someone is baking in the kitchen even though she was just at the doorstep.

For Examiner's Use

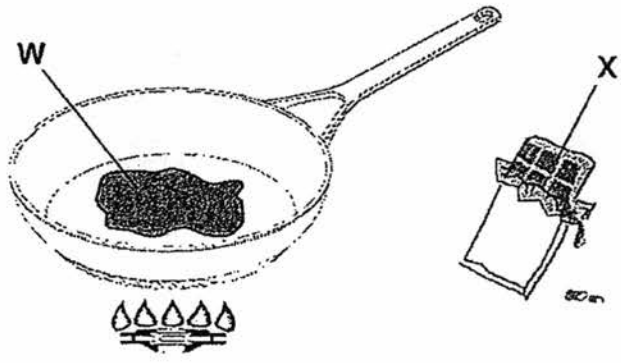
(a) Explain the student's observation.

.....

.....

..... [2]

(b) The student walked to the kitchen and saw her mother heating some chocolate in a pan and there is a bar of chocolate on the table. The diagram below shows what the student saw.



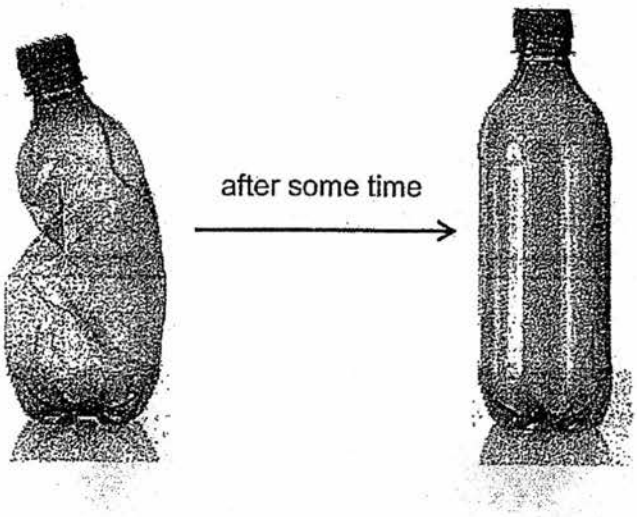
Complete the table below about the characteristics of particles in **W** and **X**.

	W	X
arrangement		
movement		

[2]

(c) The student helps her mother by putting some of the ingredients back in the refrigerator. While doing so, she found a crushed empty plastic bottle in the refrigerator, which was still capped at its opening. She placed the crushed bottle on the kitchen table and the diagram below shows her observation after some time.

For Examiner's Use



(i) Using Kinetic Particle Theory, explain her observation.

.....

.....

.....

.....

.....

.....

(ii) Explain why there was no change in the mass of the bottle and its content.

.....

..... [4]

5 The table below shows some information about the atoms of elements, **Q** and **R**. The letters do not represent the chemical symbols of the elements.

For Examiner's Use

element	atomic number	number of neutrons	mass number
Q	7		14
R	14	14	

(a) **(i)** Complete the table above.

(ii) Draw the full electronic structure of **R** in the space below.

[2]

(b) Explain why the mass number of an atom does not include the number of electrons.

.....

..... [1]

(c) Atoms of element **Q** can form diatomic molecules.
What is a diatomic molecule?

.....

..... [1]

(d) Both elements **Q** and **R** can react with hydrogen to form QH_3 and RH_4. State a similarity and a difference between molecules of QH_3 and RH_4.

For Examiner's Use

similarity.....

.....

.....

difference.....

.....

..... [2]

6 A student found a bottle of an unknown substance in the lab. She realised that the label has fallen off. She found the following information on the bottle.

For Examiner's Use

information:
- melting point = 650°C
- boiling point: 1107°C
- element found in Group II, Period 3

(a) Based on the information above, write the chemical symbol, with proton and nucleon numbers, of the unknown substance in the box below.

[2]

(b) The student did some research online and learnt that atoms of the unknown substance can form ions by losing 2 electrons.

(i) Suggest the charge of the ion formed.

.....

(ii) Explain your answer in **(b)(i)**.

.....

.....

..... [2]

– 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 = 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.).

Sec 1 EXP SA2 Chemistry Answer Key

Section A (10 marks)

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

Section B (30 marks)

No.	Marking points	Marks
1	mistake: should not be heated in naked flame explanation: ethanol is flammable modification: heat in water bath **OR** mistake: should not be stoppered explanation: pressure will build up and the boiling tube may break modification: remove the stopper *1m for mistake & explanation ; 1m for modification	1 1
2a	<table><tr><th>substance</th><th>element</th><th>compound</th><th>mixture</th></tr><tr><td>P</td><td></td><td></td><td>✓</td></tr><tr><td>Q</td><td></td><td>✓</td><td></td></tr><tr><td>R</td><td>✓</td><td></td><td></td></tr><tr><td>S</td><td></td><td></td><td>✓</td></tr></table>	1 1 1 1
2b	P melts and boils over a range of temperature but **Q** has fixed melting and boiling points. P has variable composition by mass but **Q** has fixed composition by mass. ** or any correct property*	1 1
3	Add solvent P to dissolve sulfur Filter the mixture to remove sand and salt as residue Evaporate the filtrate to dryness to obtain sulfur Add solvent Q to sand and salt to dissolve salt Filter the mixture to obtain sand as residue Wash sand with a little cold distilled water Dry sand with two sheets of filter paper Evaporate the filtrate to dryness to obtain salt **OR** Add solvent Q to dissolve salt Filter the mixture to remove sulfur and sand as residue Evaporate the filtrate to dryness to obtain salt Add solvent P to sulfur and sand to dissolve sulfur Filter the mixture to obtain sand as residue Wash sand with a little cold distilled water Dry sand with two sheets of filter paper Evaporate the filtrate to dryness to obtain sulfur *1m for 2 correct steps	4

4a

Diffusion has occurred. — 1

Particles of the aroma/ food/ cake moved out randomly in all directions / spread throughout the house. — 1

4b

	W	X
Arrangement	particles are closely packed in disorderly manner	particles are very closely packed in an orderly manner
Movement	particles slide over one another	particles vibrate about fixed positions.

1 1

** deduct 1m if no mention of 'particles'*
*1m for 2 correct points

4ci

When the temperature increases, air particles in the bottle gain heat, they move faster and further apart from one another.
This causes the volume of the air to increase
therefore push the bottle back to its original shape.

*1m for 2 correct points — 3

4cii

no change in the number of air particles in the bottle — 1

5ai

element	atomic number	neutron number	mass number
Q	7	7	14
R	14	14	28

1

5aii

draw 2.8.4, with R or Si written in the center — 1

5b

Electrons have negligible mass compared to protons and neutrons. — 1

5c

A molecule made up of two atoms chemically combined. — 1

5d

Similarities — 1
- Both QH_3 and RH_4 contain hydrogen atoms.
- Both contain two different types of atoms.

Differences — 1
- QH_3 contains 3 hydrogen atoms while RH_4 contains 4 hydrogen atoms.
- QH_3 contains atoms of Q and hydrogen while RH_4 contains atoms of R and hydrogens.
- QH_3 is made up of 4 atoms in total but RH_4 is made up of 5 atoms.

**or any correct similarity or difference*
*1m for 1 correct point

6a

$^{24}_{12}Mg$ — 2

*1m for correct symbol ; 1m for correct proton and nucleon numbers

6bi

+2 — 1
* do not accept "positive charge"

6bii

2 more protons than electrons *or equivalent* — 1

Index Number	Class	Name

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SEMESTRAL ASSESSMENT 2

O **O**

SCIENCE (BIOLOGY)

Secondary 1 EXPRESS

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FOR EXAMINER'S USE	
Total	40

This document consists of 10 printed pages.

Setter(s) : Ms Koh PL and Ms Vera Yuen

[Turn over

Section A (10 marks)

Answer **all** the questions.

1 Which of the following have both cytoplasm and chloroplasts?

A root hair cells

B xylem vessels

C red blood cells

D mesophyll cells

2 Red blood cells have a relatively large surface area.

How does this help the red blood cell carry out its function?

A It can contain more haemoglobin.

B It can absorb oxygen at a faster rate.

C It can move more quickly through the blood.

D It can pass through narrow blood vessels easily.

3 The pancreas is a human organ that secretes proteins involved in digestion.

Which of the following organelles is **not** likely to make up a large part of a pancreatic cell?

A golgi apparatus

B ribosomes

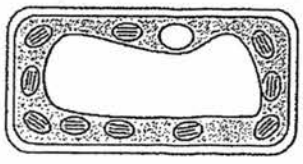
C rough endoplasmic reticulum

D smooth endoplasmic reticulum

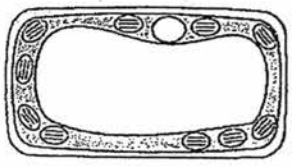
4 Which of following best describes the process of diffusion?

	type of molecules	direction of movement	presence of partially permeable membrane
A	solute	high to low solute concentration	no
B	solute	low to high solute concentration	yes
C	water	high to low water potential	no
D	water	low to high water potential	yes

5 The diagram shows the results of an experiment, where two plant cells were placed in solutions X and Y respectively for 30 minutes.



solution X



solution Y

Which process took place in the experiment and what was the relative water potentials of solutions X and Y?

	process	water potential
A	osmosis	solution X has higher water potential than solution Y
B	diffusion	solution X has lower water potential than solution Y
C	osmosis	solution X has lower water potential than solution Y
D	diffusion	solution X has higher water potential than solution Y

6 Which processes can take place in a muscle cell when oxygen is not available?

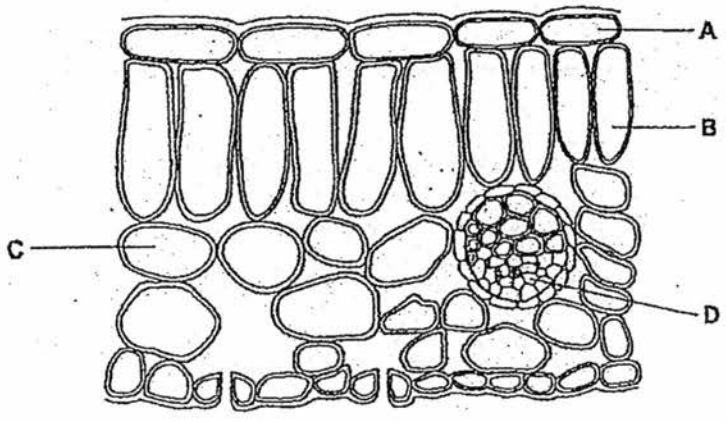
I osmosis
II diffusion
III active transport
IV aerobic respiration

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

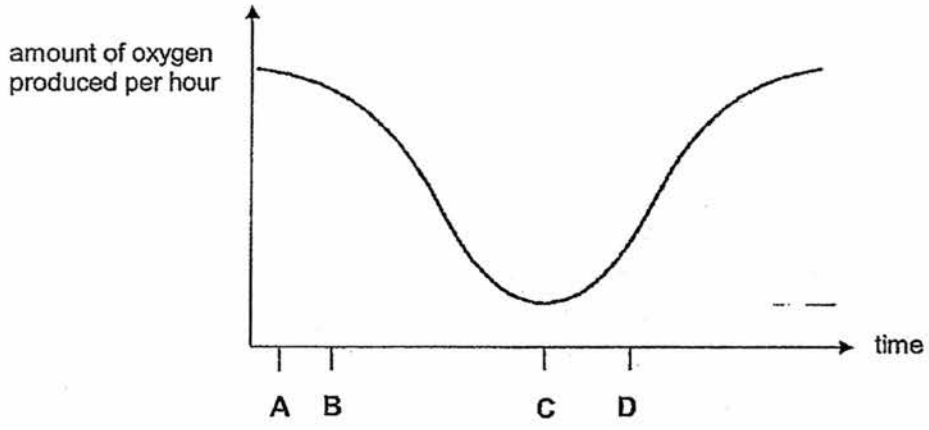
7 A human red blood cell is placed in hypotonic solution. What is the net movement of the water molecules and the effect on the cell?

	net movement of water	effect on cell
A	out of the cell	cell is plamolysed
B	out of the cell	cell crenates
C	into the cell	cell is turgid
D	into the cell	cell bursts

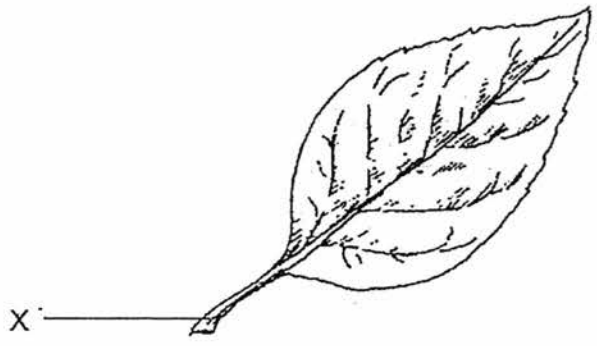
8 The diagram shows a section of a leaf of a green plant.
During exposure to bright light, which cell contains the most starch?



9 The graph below shows the amount of oxygen produced by a green plant over a 24-hour period, on a warm, sunny day. Which letter represents a point in the day where light intensity is the highest?



10 The diagram below shows a leaf.



Which of the following statements explains how feature X helps the leaf to optimise its function?

A ensures that carbon dioxide rapidly reaches the inner cells of the leaf

B carries manufactured food away from lamina to other cells of the plant

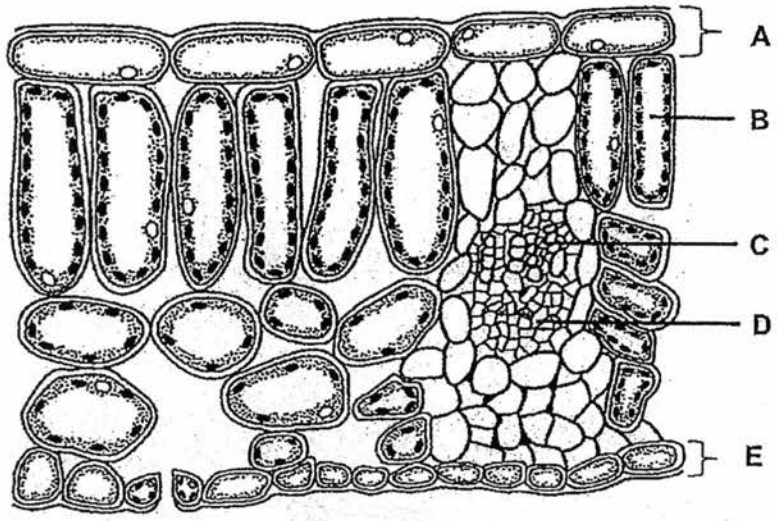
C increases surface area to volume ratio to maximise light absorption

D holds the leaf lamina away from the stem so that it receives optimum light

Section B (30 marks)
Answer all questions.

For examiner's use

B1 The diagram shows the internal structure of a leaf.



(a) Identify cells **B** to **D**.

B: .....

C: .....

D: ..... [3]

(b) State the function of **D**.

..... [1]

(c) State two differences between **A** and **E**.

.....

.....

.....

..... [2]

For examiner's use

B2 *Elodea* is a water plant that grows fully submerged in water. Its leaves are thin and narrow.

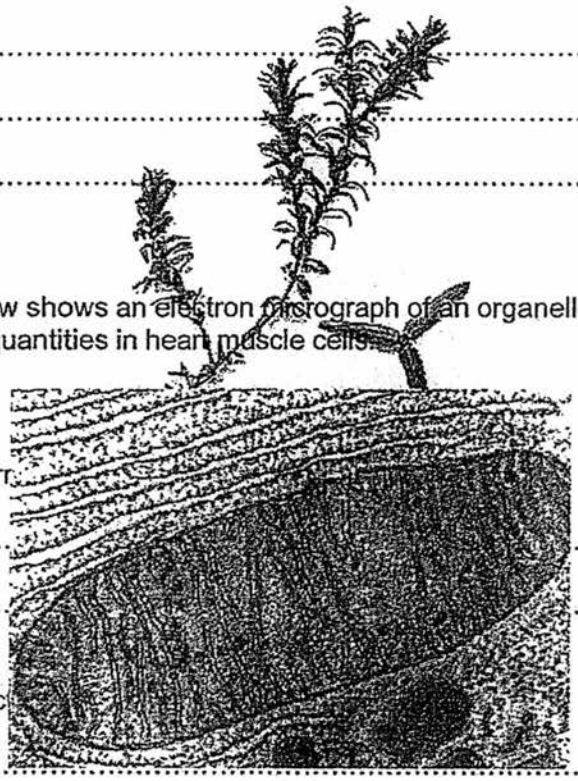
Suggest and explain one way to reduce the survival of *Elodea* in an infested pond.

.....

.....

..... [2]

B3 The diagram below shows an electron micrograph of an organelle. The organelle is found in large quantities in heart muscle cells.



(a) (i) Define the term

.....

..... [1]

(ii) State the function

.....

(a) (i) State the name of the organelle.

..... [1]

..... [1]

(iii) Predict and explain whether *Elodea* contains xylem tissue.

(ii) State the function of the organelle.

.....

..... [1]

(b) Explain why the organelle is found in large quantities in heart muscle cells.

..... [2]

(b) Explain how the thin and narrow shape of *Elodea* leaves enables the plant to make food more efficiently.

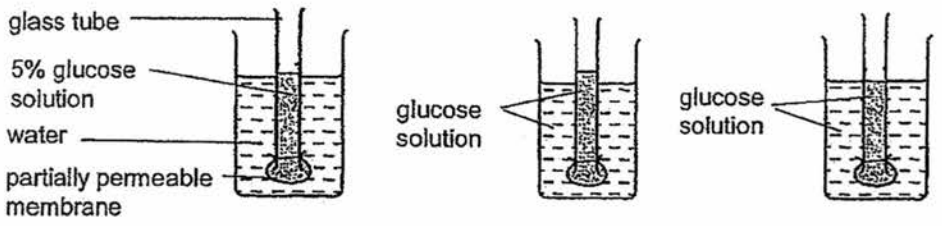
..... [2]

.....

..... [2]

B4 The diagram below shows the apparatus used during an experiment.

For examiner's use



time: 0 minutes time: 10 minutes time: 30 minutes

(a) With reference to the diagram, identify the process that describes the movement of glucose and water molecules respectively in the experiment.

molecule	process involved
glucose	
water	

[1]

(b) A change in solution level of the glass tube is observed after 10 minutes. Explain how this change occurs.

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..... [3]

(c) State the concentration of glucose in glass tube and the beaker after 30 minutes.

	concentration of glucose
glass tube	
beaker	

[1]

For examiner's use

B5 Four identical strips of potato, each weighing 4 g with dimensions 1×1×3 cm, were placed in four sugar solutions of different concentrations (**A-C**) for one hour. They were subsequently removed and weighed. The weight of each potato strip was recorded.

sugar solution	weight of potato strip/ g
A	4.5
B	4.1
C	4.2
D	4.7

(a) Rank the four sugar solutions in increasing water potential.

	lowest water potential ⟶ highest water potential			
sugar solution				

[1]

(b) Explain your answer in **(a)**.

.....

.....

.....

.....

..... [3]

(c) A second identical experiment was conducted. However, the potato strips, each weighing 4 g, were cut into strips of dimensions 1×2×1.5 cm. To obtain the same experiment results, suggest and explain a change that can be made to the experimental procedure.

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..... [3]

End of Paper

Answers for Sec1 Exp Bio SA2 2016

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

B1			
a	B: Palisade mesophyll cell (accept palisade mesophyll); C: Xylem; D: Phloem;		1 1 1
b	Transport **manufactured food** (sucrose and amino acids) **from leaves to all/other parts of the plant**		1
c	E has a **thinner cuticle** than A E has **stomata** unlike A E has **guard cells** unlike A (accept any 2 out the 3 – comparison must be made)		2
B2			
ai	A **group of cells** with **similar structure** that work together to perform a **common/specific function**		1
aii	Transport **water and mineral salts** from roots to other parts of plant / leaves (must state direction) (Accept: mechanical support)		1
aiii	Does not contain xylem tissue; Does not need a water and mineral salt transport system as these can directly **diffuse / be absorbed into all parts of the plant** (since it is fully submerged in water); (If student says it contains xylem tissue, no mark awarded even if explanation is correct)		1 1
b	(Thin and narrow) for greater SA to vol ratio for more efficient diffusion of CO2 / exposure to sunlight; OR (Thin) for CO2/sunlight to enter inner cells of leaves quickly; CO2/sunlight is used in photosynthesis;		1 1
c	Shade pond from sunlight (e.g. by planting trees beside it) / reduce carbon dioxide level in pond water; (Accept: any measure that reduces availability to CO2 / sunlight) So as to reduce photosynthetic rate; (Must state how measure affects photosynthesis)		1 1
B3			
ai	Mitochondrion (Accept: mitochondria)		1
aii	Site of **aerobic respiration** (to release energy for cell)		1

b	Heart muscle cells **require a lot of energy** (to pump blood); Hence more mitochondria are needed to **release more energy** for the cell through aerobic respiration		1 1
B4			
a	Diffusion; Osmosis;		1
b	**Net movement** of water molecules from **water to glucose solution** as water has a **higher water potential**; **Net movement** of glucose molecules from **glucose solution to water** as glucose solution has a **higher glucose concentration**; Water molecules enter glass tube **more rapidly** than glucose molecules exiting		1 1 1
c	2.5%, 2.5%		1
B5			
a	B,C,A,D		1
b	Water molecules **enter the cytoplasm of potato cells** as the solutions have **higher water potentials**. The **greater the difference in water potential**, the more weight gained (r/s between water potential and weight gained has to clearly stated for mark to be awarded)		1 1 1
c	Time taken for experiment can be **reduced**. The potato strip in the second experiment has a **higher surface to volume ratio**, allowing a **faster rate of osmosis.** (If students provide values for SA/V, values be to be accurate for mark to be awarded)		1 1 1