Name	Index Number	Class	Parent's Signature

BALESTIER HILL SECONDARY SCHOOL
END OF YEAR EXAMINATION (2014)
SECONDARY TWO EXPRESS

SCIENCE (BIOLOGY AND CHEMISTRY)

Wednesday, 8 October 2014

1hour

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

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces provided at the top of this page.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams, graphs or rough working.
You may use a calculator.
Do not use staples, paper clips, glue or correction fluid.

Section A
There are **ten** 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 the optical answer sheet provided.
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.

Section C
Answer **any two** questions in the spaces provided.
The number of marks is given in brackets [ ] at the end of each question or part-question.

A copy of the Periodic Table could be found in Page 13.

For Examiner's Use	
Section A	**/10**
Section B	**/20**
Section C	**/20**
TOTAL	**/50**

Setter: Mdm Stella Soh
Vetter: Mr Justin Lee

This document consists of 13 printed pages.

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[Turn Over]

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Section A

Answer **all** the questions in this section.
Shade your answers on the OMR sheet provided.

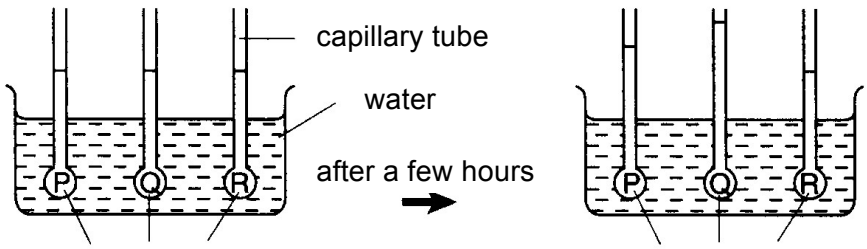
1 This substance is stored in seeds. It is broken down by enzyme amylase during seed germination. What could this substance be?

A Fats
B Proteins
C Starch
D Sucrose

2 Why is digestion important in animals?

A It allows energy from food to get into their blood.
B Large food molecules have to be made small enough for absorption into the bloodstream.
C Large pieces of food need to be broken down into smaller pieces.
D Waste materials have to be eliminated from food.

3 The experiment below shows what happen to three different concentrations of starch solution after a few hours.



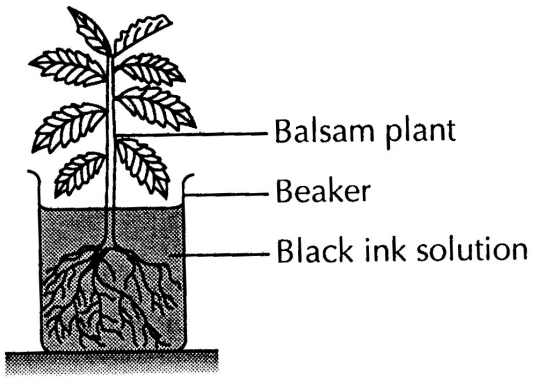
Which row lists the starch solutions in increasing concentrations?

	Lowest	→	Highest
A	P	Q	R
B	P	R	Q
C	R	P	Q
D	Q	P	R

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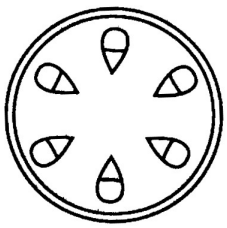
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4 Emma put a balsam plant in a beaker of black ink as shown below.

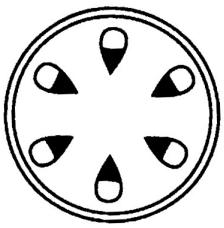


After 3 days, she cut open a section of the stem and observed it. Which diagram would she expect to observe?

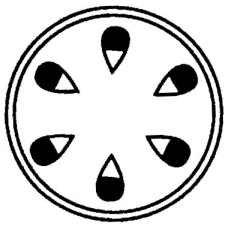
A



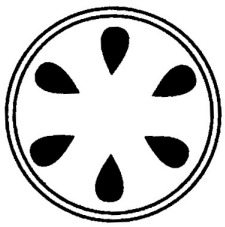
B



C



D



5 Which pathogens cause AIDS, gonorrhoea and syphilis?

	AIDS	**Gonorrhoea**	**Syphilis**
A	Bacterium	Bacterium	Virus
B	Bacterium	Virus	Bacterium
C	Virus	Bacterium	Bacterium
D	Virus	Virus	Bacterium

6 A woman has a 28-day menstrual cycle. Her period starts on the 17th July. On which day is she likely to start ovulation?

A 24th July

B 30th July

C 7th August

D 14th August

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7 Which of the following shows the correct gases given off for the reactions of acids with metals and acids with carbonates?

	Acids and metals	**Acids and carbonates**
A	Carbon dioxide	Hydrogen
B	Carbon dioxide	Water
C	Hydrogen	Carbon dioxide
D	Hydrogen	Water

8 Which of the following involves only physical changes?

I Drying cement on a brick wall
II Drying clothes on a clothing line
III Switching on an electric cooking stove

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

9 Which statement is true about a food chain?

A A food chain must always start with a producer.
B Food chains usually have five links.
C The number of consumers always increases along a food chain.
D The size of the consumers decreases along a food chain.

10 Which processes release carbon dioxide to the atmosphere?

I Combustion
II Decomposition
III Photosynthesis
IV Respiratiion

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

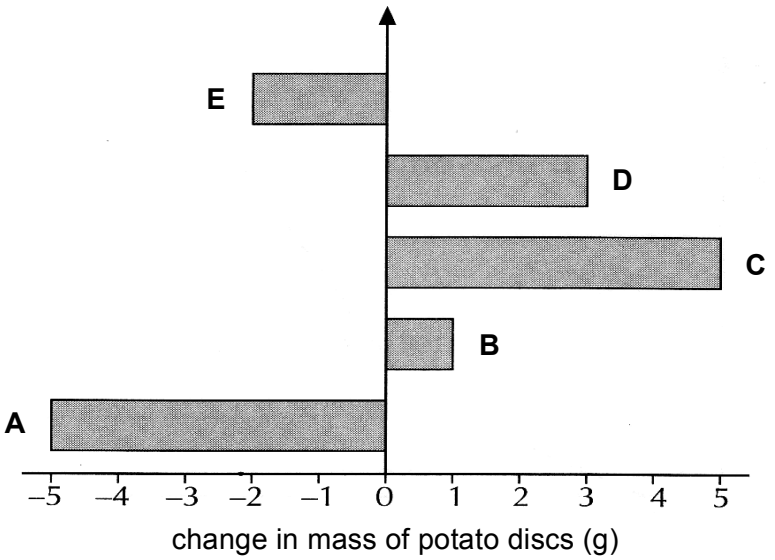
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Section B

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

1 Five discs of fresh potato (**A** – **E**), each weighing 10 grams were immersed in sugar solutions of different concentration for two hours, and then dried and reweighed. The change in the mass of each potato disc was recorded in a bar chart as shown in diagram below.



(a) Name the process that caused the change in mass of the potato discs.

[1]

.....

(b) Arrange the potato discs (**A** – **E**) in ascending order of the concentration of the sugar solution that each was immersed in.

Sugar solution	Potato discs
Lowest concentration ↓	
Highest concentration	

[1]

(c) Describe and explain what caused the changes in potato disc **C**.

.....

.....

.....

.....

[3]

[Total: 5]

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2 The table below shows the statistics of HIV infected Singaporean by age from year 1985 to year 2007.

HIV Infected Singaporeans by Age (1985 – Jun 2007)

Age Group	1985 – 2000	2001	2002	2003	2004	2005	2006	2007 Jan-Jun
0-9	13	2	2	1	3	3	3	0
10-19	11	1	1	1	4	4	2	2
20-29	304	27	32	29	47	44	57	19
30-39	543	67	56	83	89	95	99	41
40-49	294	68	73	74	89	84	97	47
50-59	108	38	45	32	44	56	66	40
60 & above	89	34	25	22	35	31	33	15

(a) What does HIV stand for?

.....

[1]

(b) Name the sexually transmitted disease that is caused by HIV.

.....

[1]

(c) The table above shows that Singaporeans in the age group of 0-9 can also be infected by HIV despite not being sexually active. Suggest how they maybe infected by HIV.

.....

.....

[1]

(d) Suggest **two** ways to reduce HIV infection among Singaporeans.

1. .....

2. .....

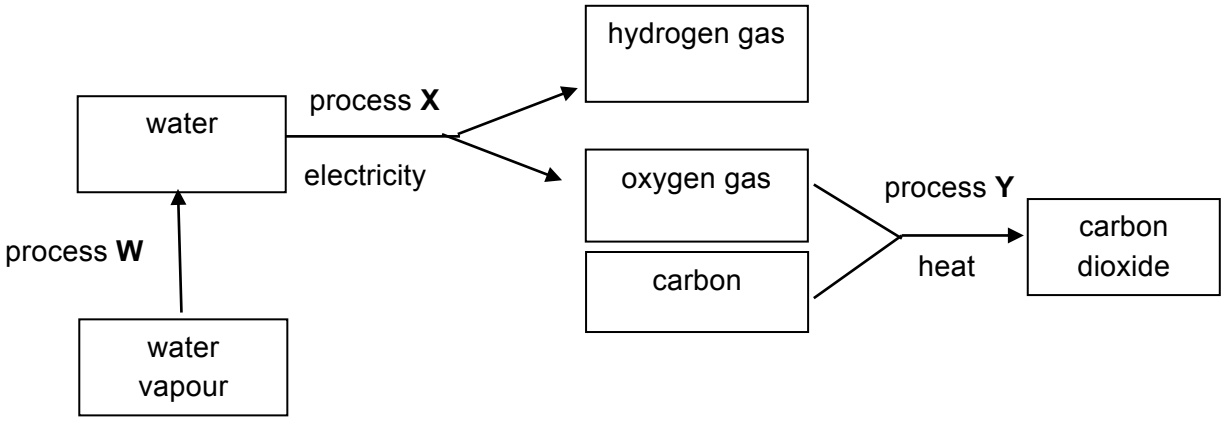
[2]

[Total: 5]

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3 The diagram shows how some substances undergo a series of changes.



(a) Identify the processes that have taken place.

	Process	**Name of process**
(i)	**W**	
(ii)	**Y**	
(iii)	**Z**	

[3]

(b) **(i)** Write a word equation to represent the reaction that has taken place in process **Y**.

[1]

.....

(ii) Suggest **one** reason why process **Y** is considered as a chemical change.

.....

.....

[1]

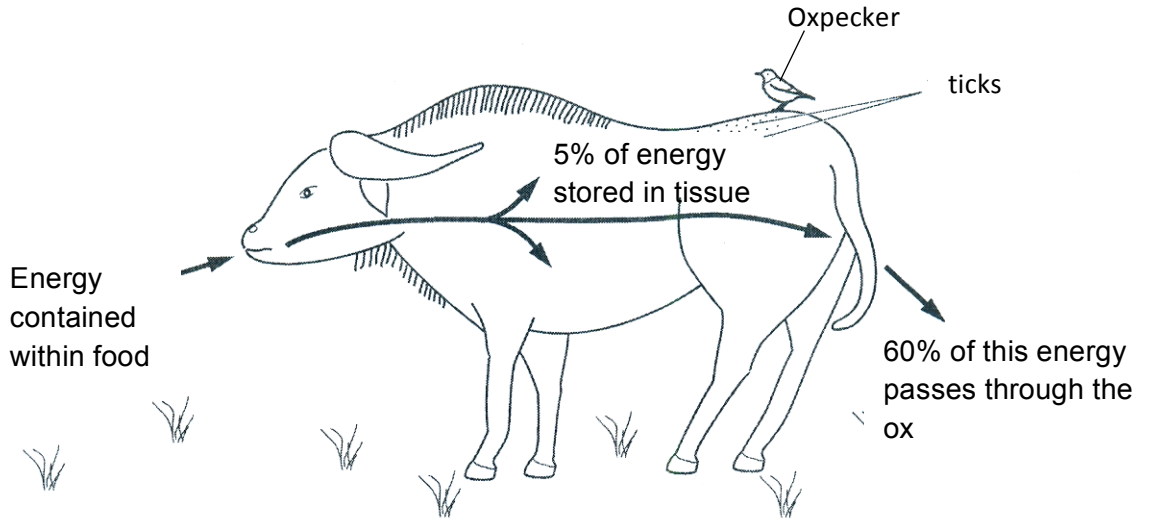
.....

[Total: 5]

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4 The diagram below shows what happens to energy as it passes through an ox.



(a) State the source of the energy in the food eaten by the ox.

[1]

.....

(b) Name the process that uses up the remaining 35% of the energy in the food available to the ox.

[1]

.....

(c) What kind of feeding relationship is formed by the ticks with the ox? Explain your answer.

.....

.....

[2]

.....

(d) The oxpecker found on the back of the ox feeds on both the ticks as well as the blood from the ox's wounds. In the space below, draw a food web to show the feeding relationships of the organisms.

[1]
[Total: 5]

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Section C

Answer any **two** questions in the spaces provided.

1 Alice ate a curry puff with chicken meat and potato filling.

(a) Describe how the curry puff with chicken meat and potato filling can be digested in the mouth, stomach and small intestine.

[5]

(b) Due to stomach cancer, Alice has to remove part of her stomach. Describe **two** ways in which her diet needs to be modified.

1.

2.

[2]

(c) Explain why Alice needs to ensure she has included the three main nutrients (carbohydrates, fats and proteins) in her diet.

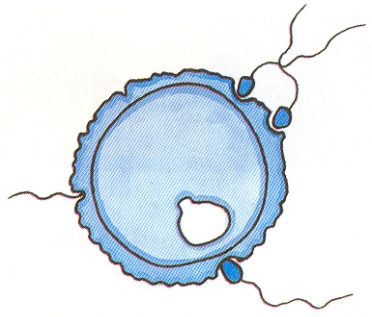
[3]

[Total:10]

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2 (a) The diagram below shows a few sperms surrounding an egg. One of the sperms has successfully fertilized the egg.



(i) Where in the female reproductive system does this process take place?

[1]

.....

(ii) Describe the events after sexual intercourse that will lead to fertilization of an egg.

.....

.....

.....

[2]

(iii) Upon fertilisation, the fertilised egg will move to the uterus. How does the fertilised egg move to the uterus?

.....

.....

.....

.....

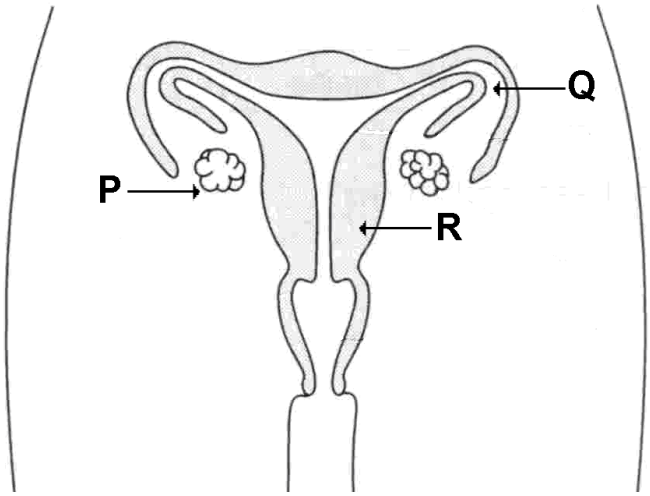
.....

[2]

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(b) The diagram below shows the female reproductive system.



(i) Name the parts labelled **P**, **Q** and **R.**

P: .....

Q: .....

R: ..... [1]

(ii) Ligation is a permanent method of contraception. Mark with the letter "**X**" on the diagram above the site where ligation would be carried out. [1]

(iii) How does ligation prevent pregnancy in a female?

.....

.....

..... [1]

(iv) Intra-uterine device is another type of contraception method that a female can use. Mark with letter "**Y**" on the diagram where an intra-uterine device can be placed. [1]

(v) How does the Intra-uterine device help prevent pregnancy in a female?

.....

.....

..... [1]

[Total: 10]

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3 **(a)** The followings are chemical changes that can be brought about by interactions with heat, light and electric current or other matter. Write them in the correct group to show what causes these changes.

- Combination of iron and sulfur to form iron sulfide
- Production of carbon dioxide from coal
- Splitting of water into oxygen and hydrogen
- Formation of glucose from carbon dioxide and water
- Formation of salt and water from a dilute acid and an alkali
- Copper-plating using copper sulfhate solution

Interaction with heat	
Interaction with light	
Interaction with electric current	
Interaction with other matter	

[6]

(b) A flask contains the juice of several oranges. Would you expect the pH of the orange juice to be between 1 and 6 or between 8 and 14?

.....

.....

[1]

(c) Some pieces of magnesium were added to some of the orange juice. Effervescence of a colourless and odourless gas was seen.

(i) Name the gas produced.

.....

[1]

(ii) How would you test the presence of the gas you named in **(i)**?

.....

.....

[2]

[Total: 10]

End of Paper

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The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	64 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	– Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La lanthanum 57 *	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	– Po polonium 84	– At astatine 85	– Rn radon 86
– Fr francium 87	– Ra radium 88	– Ac actinium 89 †															

*58-71 Lanthanoid series

†90-103 Actinoid series

140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	– Pm promethium 61	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	162 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71
232 Th thorium 90	– Pa protactinium 91	238 U uranium 92	– Np neptunium 93	– Pu plutonium 94	– Am americium 95	– Cm curium 96	– Bk berkelium 97	– Cf californium 98	– Es einsteinium 99	– Fm fermium 100	– Md mendelevium 101	– No nobelium 102	– Lr lawrencium 103

Key: a / X / b

a = relative atomic mass

X = atomic symbol

b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

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Sec 2E EOY 2014- SA2

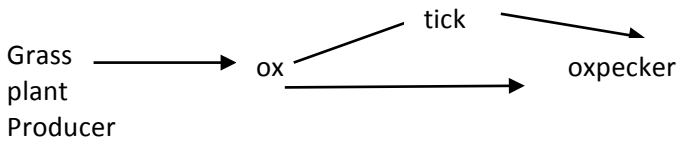
Section A-MCQ

No	Answer
1	C
2	B
3	C
4	B
5	C
6	B
7	C
8	C
9	A
10	C

Section B

No		Answers	Marks
1	**(a)**	osmosis	1
	(b)	Lowest concentration : C D B E Highest concentration: A	1 * all must be correct to get 1 mark
	(c)	The water potential of cell sap of potato disc C is lower than the sugar solution in the surrounding. Hence water molecules move from the sugar solution to the cell sap of poatato disc C to the sugar solution by osmosis. The potato disc C becomes greater in mass due to water gain	1 1 1
2	**(a)**	Human Immunodeficiency Virus	1
	(b)	Acquired Immune Deficiency Syndrome (AIDS) HIV passed from their mother during pregnancy.	1 * Accept if students write acronyms
	(c)	They were infected by their HIV positive/ infected parents.	1
	(d)	Any one of the followings (max 2 mark): 1. Be faithful/ loyal to your spouse. 2. Educate the public to have only one sexual partner. 2. Use protection sheath such as condom. 3. Avoid sharing intravenous needles, syringes or any personal items that may leads to the sharing of body fluid.	2
3	**(a)**	(i) process w : condensation process X : electrolysis/decomposition process Y:combustion/burning	1 1 1
	(b)	(i) carbon + oxygen → carbon dioxide	1
	(b)	(ii) The change is **irreversible**/ **new substance is formed/ heat is given out/ properties of product is different from the reagents.**	1 (Any 1 answer)

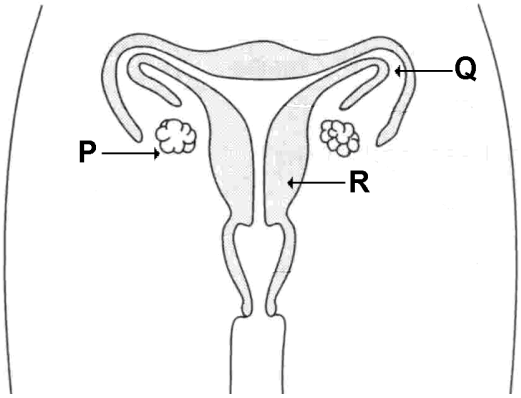
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4	**(a)**	Sunlight/light	1
	(b)	Respiration	1
	(c)	Parasitism. Ticks benefit but ox is harmed.	1 1
	(d)		1

Section C

No		Answers	Marks
1	(a)	In the **mouth,** starch (potato) digested by **salivary amylase** to become simple sugar. In the **stomach**, **protein** (meat) is broken down into shorter chains by **protease** In **small intestine, carbohydrates** broken down by **carbohydrases** to form **glucose** Shorter protein chains further digested into **amino acids** with the help of protease. **Fats** broken down into **small fat molecules by bile**. Further digested to **glycerol** and **fatty acids** with help of **lipase**	1 1 1 1 1
	(b)	**Small meals** **Frequent meals** **Softer and more fluid based food** **Cleaner food** **Chew food properly**	1 1 (Any of the 2 answer)
	(c)	Fats supply energy to the body and they are used mainly to store food/ protect the body against cold. Carbohydrates are an intermediate form of energy to the body. Proteins are needed by the body for growth and repair of worn-out tissues.	1 1 1
2	(a)	(i) oviduct/fallopian tube	1
		(ii) sperm deposited in the vagina swim up through the cervix, uterus and into the fallopian tube.	1 1
		(iii) Muscular contractions of the wall of the oviduct sweeping motions of the cilia continue to move zygote towards the uterus.	1 1

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<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i) P- ovary
Q- fallopian tube/oviduct
R- womb/uterus</td><td>1
(All 3 for 1 mark)</td></tr>
<tr><td></td><td>(b)</td><td>
</td><td></td></tr>
<tr><td></td><td></td><td>(ii) Stops eggs from the ovaries from passing along the fallopian tubes into the uterus</td><td>1</td></tr>
<tr><td></td><td></td><td>(iv) Prevents fertilized egg from implanting in the uterus</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>(a)</td><td>
<table>
<tr><td>Interaction with heat</td><td>• Combination of iron and sulphur to form iron sulphide
• Production of carbon dioxide from coal</td></tr>
<tr><td>Interaction with light</td><td>• Formation of glucose from carbon dioxide and water</td></tr>
<tr><td>Interaction with electric current</td><td>• Splitting of water into oxygen and hydrogen
• Copper-plating using copper sulphate solution</td></tr>
<tr><td>Interaction with other matter</td><td>• Formation of salt and water from a dilute acid and an alkali</td></tr>
</table>
</td><td>[6]</td></tr>
<tr><td></td><td>(b)</td><td>pH between 1 and 6</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i) Hydrogen gas</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii) Use lighted splint.
If hydrogen is present, lighted splint extinguished with a “pop” sound.</td><td>1
1</td></tr>
</table>

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Name	Index Number	Class	Parent's Signature

BALESTIER HILL SECONDARY SCHOOL
END OF YEAR EXAMINATION 2014
SECONDARY TWO EXPRESS

SCIENCE (PHYSICS)

Wednesday, 8 October 2014

1 hour

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

READ THESE INSTRUCTIONS FIRST

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At the end of the examination, answers to Section A must be handed in separately.
For Sections B and C, the number of marks is given in brackets [ ] at the end of each question or part-question.
The use of an approved scientific calculator is expected, where appropriate.

For Examiner's Use	
Section A	**/10**
Section B	**/20**
Section C	**/20**
TOTAL	**/50**

Setter: Mr Kenny Sng
Vetter: Mr Justin Lee

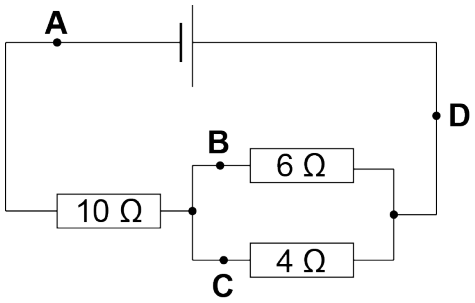
This document consists of 16 printed pages.

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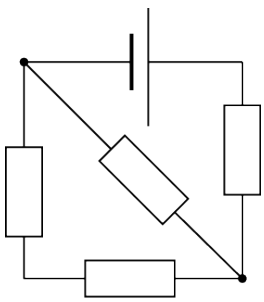
Section A [10 marks]

Answer **all** questions on the **Multiple Choice Answer Sheet** provided.

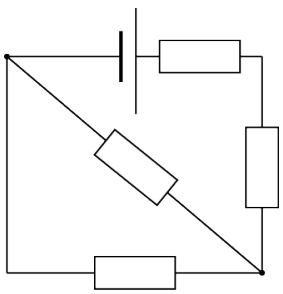
A1 In the circuit shown below, resistors of varying resistances are connected. At which point is the current the **smallest**?



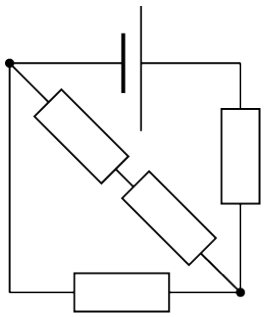
A2 In the circuits below, all the resistors are identical. Which of the circuits have the same total resistance?



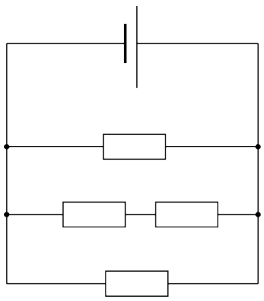
I



II



III



IV

A **I** and **II**

B **I**, **II** and **III**

C **I**, **II**, **III** and **IV**

D **I** and **III**

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A3 Friction can be reduced by _____.

I making the surface of contact smoother
II using ball bearings
III using lubricants
IV using rollers and wheels

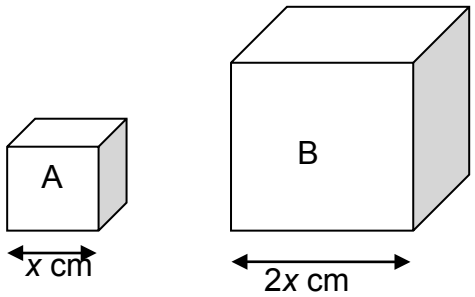
A **I** and **II** only

B **I**, **II** and **IV** only

C **I**, **III** and **IV** only

D **I**, **II**, **III** and **IV**

A4 Two cubic boxes are resting on the floor. Box B has sides which are twice as long as those of Box A.



Which statement is true?

A No conclusion can be made based on the information given.

B The pressure exerted by A on the floor is equal to the pressure exerted by B on the floor.

C The pressure exerted by A on the floor is 2 times the pressure exerted by B on the floor

D The pressure exerted by A on the floor is 4 times the pressure exerted by B on the floor.

A5 Jeremy threw a basketball upwards. Which of the following statements correctly describes what happens to the kinetic energy and gravitational potential energy of the ball just **before** it reaches the highest point?

A It gains both kinetic and gravitational potential energy.

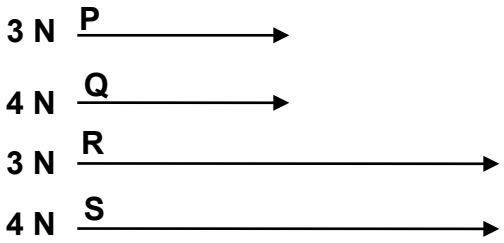
B It gains gravitational potential energy but loses kinetic energy.

C It gains kinetic energy but loses gravitational potential energy.

D It loses both kinetic and gravitational potential energy.

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A6 Forces of 3 N and 4 N are used to move objects **P, Q, R** and **S** over the distances shown in the diagrams below.



Which statement correctly describes the work done by the forces?

A The most work is done to move **Q**.

B The most work is done to move **S**.

C The same amount of work is done to move **P** and **Q**.

D The same amount of work is done to move **R** and **S**.

A7 As sound travels through the air, it eventually fades away. The reason for this is _____.

A sound does not need a medium to travel

B sound travels in a straight line

C sound loses energy as it travels

D sound travels slower than light

A8 If the string of a guitar vibrates 225 times in 3 minutes, what is the frequency of the sound produced?

A 0.75 Hz **B** 1.25 Hz

C 12.5 Hz **D** 75 Hz

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A9 Anthony finds it hard to unscrew the cap of a bottle of jam. What should he do?

A Cool both the cap and the bottle.

B Cool the bottle.

C Heat both the cap and the bottle.

D Heat the bottle.

A10 For the same decrease in temperature, _____.

A liquids contract less than solids but more than gases

B liquids contract more than solids but less than gases

C liquids expand less than solids but more than gases

D liquids expand more than solids but less than gases

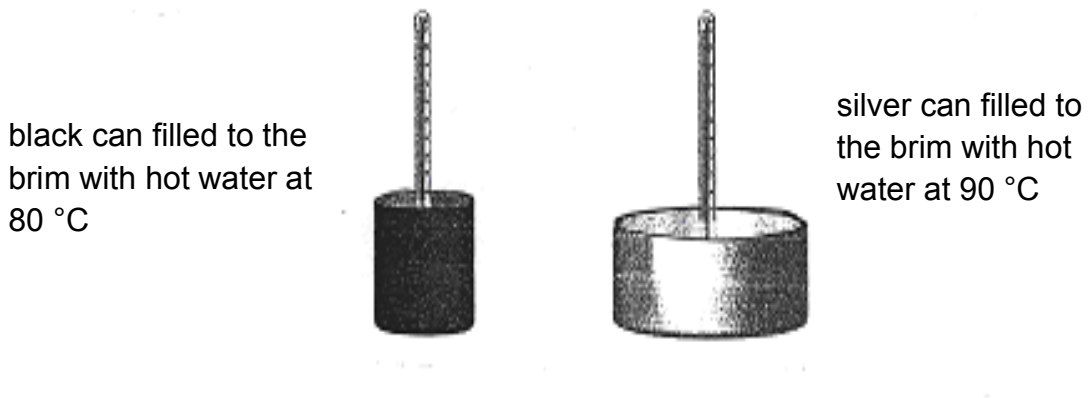
----- End of Section A -----

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Section B [20 marks]

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

B1 An experiment was carried out to find out how the nature of the surface affects heat lost by radiation. The set up of the experiment is shown in the figure below.



(a) Define *radiation*.

_____

_____ [1]

(b) State **two** mistakes made in the setup above that made the experiment unfair.

1. _____

2. _____ [2]

(c) After making the necessary corrections to the experiment, the water is left to cool. State and explain in which can will the water cool down faster.

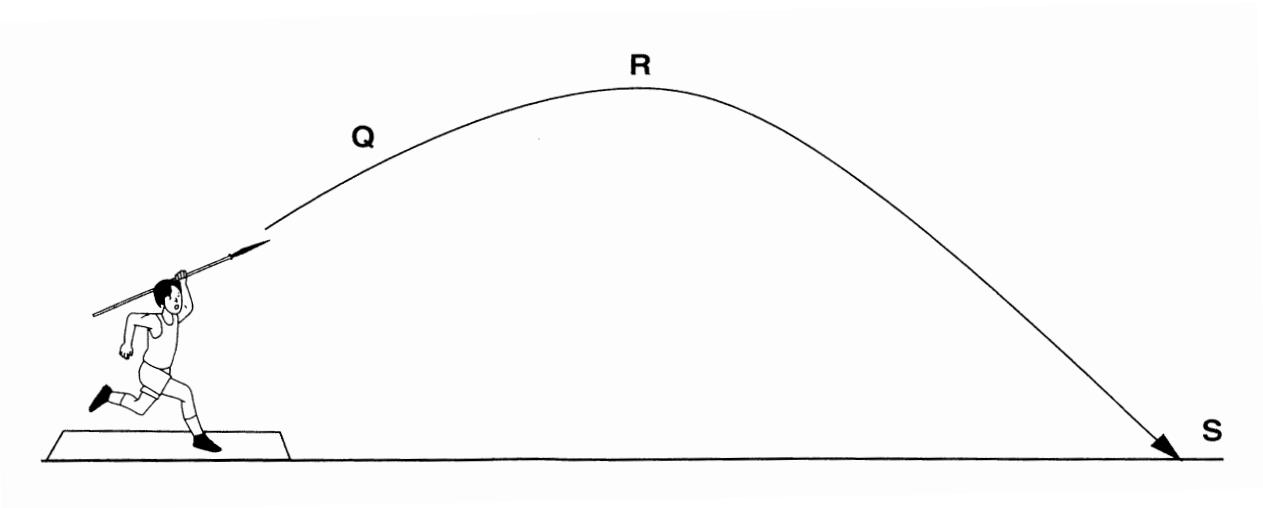
_____

_____ [2]

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B2 At the recent Youth Olympic Games, a javelin thrower used 250 J of energy to throw his javelin from a stationary position. The path taken by the javelin is shown in the figure below.



(a) State the point (**Q**, **R** or **S**) in the above figure where the javelin has

(i) the highest gravitational potential energy,

_____ [1]

(ii) the highest kinetic energy.

_____ [1]

(b) State and explain whether the kinetic energy at point **S** is equal to 250 J.

_____

_____ [2]

B3 A hammer strikes one end of a 600 m long metal pipe. A sensitive sound detector at the other end detects two sounds at an interval of 1.9 s between them.

(a) Explain why two sounds are detected by the sound detector.

_____

_____ [2]

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(b) The speed of sound in air is 300 m/s. Calculate

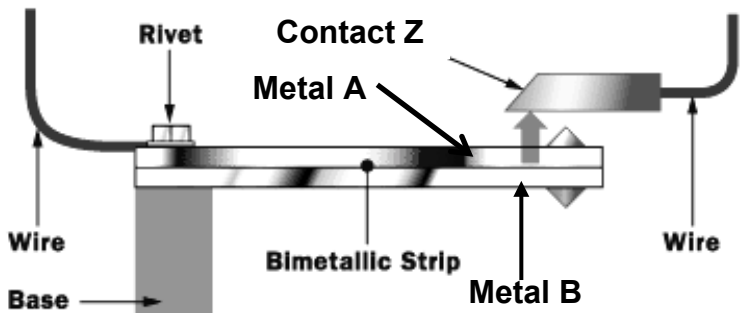
(i) the time taken for the sound to reach the detector by air,

Time taken = _____ s [2]

(ii) the speed of sound in the metal pipe.

Speed of sound in metal pipe = _____ m/s [2]

B4 The diagram below shows a bimetallic strip thermostat used to turn on and off an oven. The contacts are now open as the interior of the oven is now at 350 ^{o}C.



(a) State which metal, A or B, contracts more when cooled.

_____ [1]

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(b) If a higher temperature in the oven is desired, state and explain briefly whether contact Z should be moved nearer or further away from the bimetallic strip.

_____

_____ [2]

(c) Suggest **two** possible modifications to this thermostat to enable it to work in an air conditioner.

1. _____

2. _____ [2]

----- End of Section B -----

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Section C [20 marks]

Answer any **two** questions in the spaces provided.

C1 (a) **Figure 1** shows an experiment to measure the friction between the object and the surface of a floor.

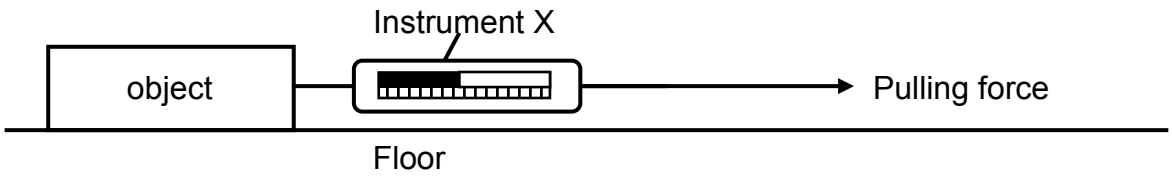


Figure 1

(i) State the name of Instrument X.

_____ [1]

(ii) On the diagram, indicate the direction of the frictional force acting on the object. [1]

(b) **Figure 2** below shows a stool. Each leg of the stool has a square base of side 5 cm.

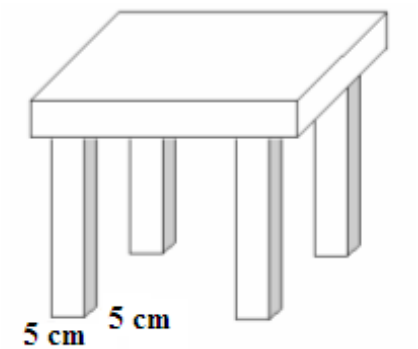


Figure 2

(i) Define *pressure*.

_____ [1]

_____

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(ii) Find the pressure exerted on the floor if the weight of the stool is 6 N.

Pressure = _____ N/cm^2 [2]

(iii) Find the pressure exerted on the floor when a lady of weight 50 N sat on the stool.

Pressure = _____ N/cm^2 [2]

(iv) The stool is now replaced by another stool of the same weight which has only three legs, each of which has a square base of side 5 cm. State and explain how this would affect your answer in **(iii)** if the lady now sits on this stool.

_____

_____

_____ [3]

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C2 **(a)** **Figure 3** below shows an experimental setup using a glass flask containing air. The tube of the flask is immersed in water.

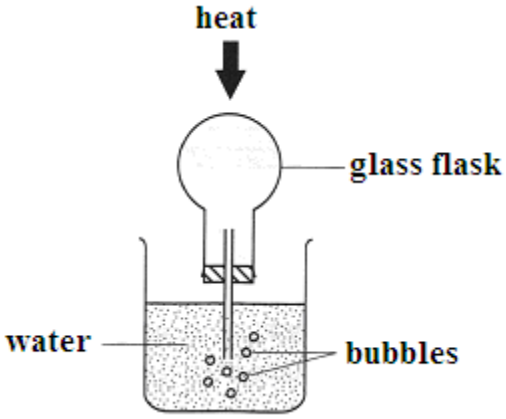


Figure 3

(i) When the flask is heated, bubbles are observed in the water. Explain this observation.

_____

_____ [2]

(ii) The flask is then cooled. Predict and explain what would be observed.

_____

_____

_____

_____ [3]

(b) Explain how a sea breeze is formed by convection.

_____

_____

_____

_____ [3]

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(c) Paper steamboat is a very popular Japanese cuisine where the food is placed in paper and cooked over the flame. Explain, using knowledge of the process of thermal energy transfer, why the paper will **not** catch fire easily.



Figure 4

_____

_____

_____ [2]

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C3 (a) In the experiment shown in **Figure 5**, one hand is pressed onto an end of a flexible plastic ruler against a table top. The other hand pushes the free end of the ruler and releases. A sound is heard.

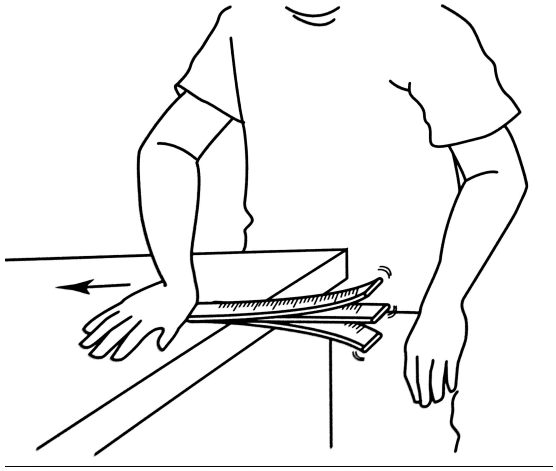


Figure 5

(i) State what produces the sound that is heard.

_____ [1]

(ii) As the plastic ruler moves up and down, the ruler is moved in the direction of the arrow shown in **Figure 5** so that less of it extends over the table's edge. State and explain what happens to the pitch of the sound produced.

_____

_____

_____ [3]

(iii) The experiment is repeated again by striking the ruler with a larger force. State and explain the difference in the sound obtained.

_____

_____ [2]

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(b) **Figure 6** below shows a man firing a gun. He stands 150 m away from a cliff and 300 m away from a second man. The speed of sound is approximately 300 m/s.

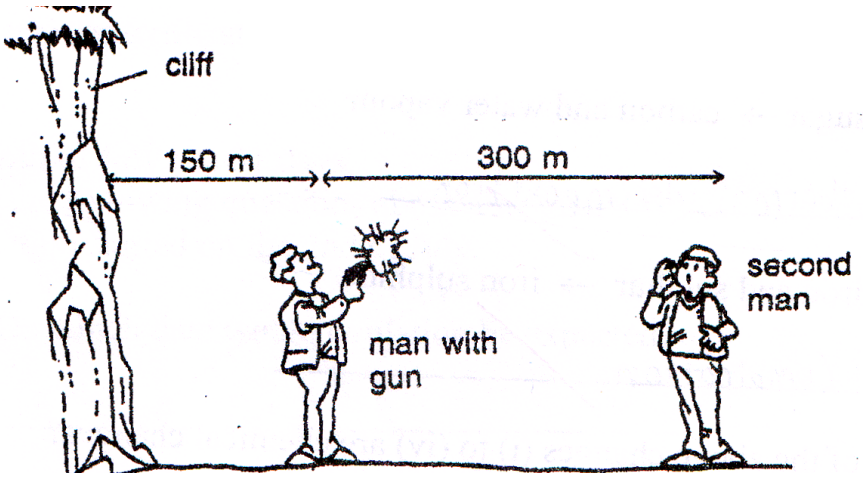


Figure 6

(i) Calculate the time taken for the second man to hear the gun shot after it was fired.

Time taken = _____ s [1]

(ii) Calculate the time taken for the second man to hear the echo from the cliff after the firing.

Time taken = _____ s [2]

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(iii) Describe one useful application of echo.

_____

_____ [1]

----- End of Paper -----

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Balestier Hill Secondary School
End Of Year Examination (2014)
Secondary Two Express
Science (Physics)
Marking Scheme

Section A (10 marks)

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
B	D	D	A	B	B	C	B	B	B

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Section B (20 marks)

Question			Answer	Mark	Remarks
B1	**a**		Transfer of heat/gain or loss of heat **without the need for a medium**	1	
	b		Starting temperature of the water is different for both cans Surface area is different for the water for both cans	1 1	
	c		Water in black can will cool faster Black/Darker surfaces loses more heat **per second**/loses heat **faster**/are better emitters of heat/better radiator of heat	1 1	
B2	**a**	**i**	R	1	
		ii	S	1	
	b		The kinetic energy would not not be equal to 250J Energy is lost to the surrounding due to friction/air resistance **OR** energy is converted into other forms of energy throughout its motion	1 1	
B3	**a**		Sound travels faster in the metal pipe than in air Hence, the sound travelling through the pipe reaches the detector first	1 1	
	b	**i**	$\text{Time taken} = \frac{600}{300}$ $= 2 \text{ s}$	1 1	
		ii	Time taken for the sound to travel through the pipe $= 2 - 1.9$ $= 0.1 \text{ s}$	1	

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			Speed of sound in metal pipe $= \frac{600}{0.1}$ $= 6000$ m/s	1	
B4	**a**		Metal A	1	
	b		Contact Z should be moved nearer to the bimetallic strip. When the temperature cools, it will need to move a shorter distance to close the contact	1 1	
	c		Swap the position of Metal A and B/Change Metal B to another metal that contracts more than A/Move position of Z to side of Metal B instead of A	Any 2 of the points – 1 mark each	

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Section C (20 marks, 3 Questions Choose 2)

Question			Answer	Mark	Remarks
C1	**a**	**i**	Force meter/Spring Balance/Newton Meter	1	Weighing scale: Not accepted
		ii	Arrow drawn correctly in the opposite direction of the pulling force and close to the object and surface	1	
	b	**i**	Measure of the amount of force acting on a **unit** area	1	No marks to be awarded if the idea of unit area is not present
		ii	$\text{Pressure} = \frac{6}{4 \times 5 \times 5}$ $= 0.06 \text{ N/cm}^2$	1 1	No fractions allowed
		iii	$\text{Pressure} = \frac{6 + 50}{4 \times 5 \times 5}$ $= 0.56 \text{ N/cm}^2$	1 1	Allow ECF from (ii) No fractions allowed
		iv	Pressure will increase Area of contact has decreased/lesser unit area in contact with the ground Total weight of stool and lady remains the same	1 1 1	Surface area of the stool- not accepted
C2	**a**	**i**	The air in the flask expands when heated	1	No credit if students write

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			The expanded air escapes into the water	1	air particles expanded
		ii	The air in the flask contracts when cooled It occupies less space in the flask/empty spaces in the flask/lower air pressure inside/more air pressure outside The water flows into the flask to take up the space/water level in the tube rises to take up the space/water level in the beaker falls	1 1 1	
	b		On a **hot day**, the land heats up faster than the sea. Hot air over the land rises. Cold, denser air over the sea replaces this hot air. This results in a breeze from the sea to the land.	1 1 1	Do not accept if students simply write "hot air rises, cold air sinks" If students explain land breeze correctly instead of sea breeze, minus 1m
	c		Heat is transferred away from the paper by the water by convection The temperature of the paper rises at a slower rate/speed **OR** paper did not gain/absorb enough heat to burn **OR** paper remains cool enough	1 1	
C3	**a**	**i**	Vibration of the ruler	1	Do not accept "movement of

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					ruler”
		ii	The speed of the ruler’s vibration increases/vibrate faster Hence, frequency of the sound increases/number of vibrations per second increases Results in an increase in the pitch of the sound	1 1 1	
		iii	Volume of the sound will increase The size of the ruler’s vibration increases	1 1	
	b	**i**	$\text{Time taken} = \frac{300}{300}$ $= 1 \text{ s}$	1	No marks awarded if no working is shown
		ii	$\text{Time taken} = \frac{600}{300}$ $= 2 \text{ s}$	1 1	
		iii	Measure the depth of the ocean/determine location of shoals of fishes	1	No marks awarded if students simply wrote “echolocation”

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