E

GAN ENG SENG SCHOOL
End-of-Year Examination 2014

CANDIDATE NAME			
CLASS		**INDEX NUMBER**	

SCIENCE
Paper 1 Multiple Choice

7 Oct 2014
Papers 1 & 2: 2 hours

Sec 2 Express

Additional Materials: OTAS

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, class and index number on the OTAS.

There are **thirty** questions in Section A. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the answer you consider correct and record your choice in soft pencil on the separate OTAS.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Read the instructions on the OTAS very carefully.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

Any rough working should be done in this booklet.

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

Total marks
30

Downloaded from SingaKids.com

Answer **all** the questions with the most suitable option **A**, **B**, **C** or **D**.

1 The table shows the physical states of a substance **X** at 20 ^{o}C, 110 ^{o}C and 200 ^{o}C.

Temperature (^{o}C)	**Physical State**
20	Solid
200	Gas
110	Liquid

Which set of readings shows the possible melting point and boiling point of substance **X**?

	Melting Point (^{o}C)	**Boiling Point (^{o}C)**
A	15	112
B	108	150
C	112	145
D	110	210

2 There are four balloons, each containing 200 cm^3 of one of the following gases:

- carbon dioxide
- neon
- nitrogen
- oxygen

The boiling points of four gases are given in the table below.

Gas	carbon dioxide	neon	nitrogen	oxygen
Boiling point / °C	-57	-246	-196	-183

Which of the balloons will **not** show a significant decrease in size when it is cooled to -200 °C?

A The balloon containing carbon dioxide.
B The balloon containing neon.
C The balloon containing nitrogen.
D The balloon containing oxygen.

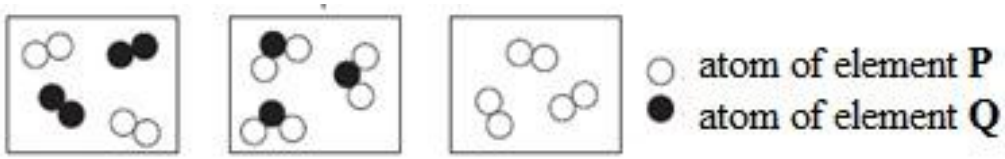
Downloaded from SingaKids.com

3 A small balloon will expand if placed in a large beaker of warm water. This is because the higher temperature causes the gas particles in the balloon to ……..

I increase in number.
II expand in size.
III become further apart.

A **III** only.
B **I** and **II** only.
C **II** and **III** only.
D All of the above.

4 Diagrams **X**, **Y** and **Z** represent three different substances.



Which row in the table correctly describes **X**, **Y** and **Z**?

	X	**Y**	**Z**
A	compound	element	mixture
B	compound	mixture	element
C	mixture	element	compound
D	mixture	compound	element

5 The ion $\mathbf{X}^{3+}$ contains 52 particles in the nucleus and 21 electrons. How many protons and neutrons are there in the nucleus of $\mathbf{X}^{3+}$?

	Number of protons	**Number of neutrons**
A	18	34
B	21	31
C	24	28
D	52	73

6 One subatomic particle is added to an atom of an element **Y**. Which particle is responsible for the corresponding change?

	Particle	**Corresponding change**
A	electron	an isotope of element **Y** is formed
B	proton	the element on the left of **Y** in the Periodic Table is formed
C	neutron	an isotope of element **Y** is formed
D	neutron	the element on the left of **Y** in the Periodic Table is formed

Downloaded from SingaKids.com

7 Which of the following consists of the most number of occupied electron shells?

A I^-
B Li^+
C Mg^{2+}
D S^{2-}

8 When a white solid, **X**, was heated, it turned black and at the same time produced a brown gas of nitrogen dioxide (NO_2). What can you deduce from the observations?

A The composition of solid **X** is 1 part of nitrogen to 2 parts of oxygen.
B Solid **X** is a mixture of black and brown substances.
C Solid **X** is a compound containing nitrogen and oxygen elements.
D Solid **X** is an element but changes into a compound upon heating.

9 Which of the following reactions involves an exothermic reaction?

(1) Photosynthesis
(2) Respiration
(3) Combustion
(4) Thermal decomposition
(5) Electrolysis

A (1) and (4)
B (2) and (3)
C (1), (4) and (5)
D (2), (3) and (4)

10 Consider the following reactions.

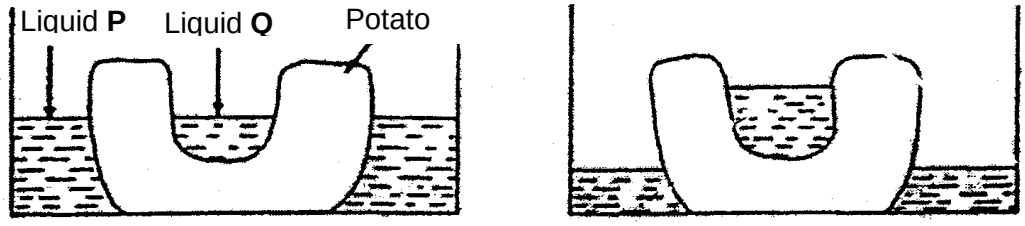
I calcium carbonate $\rightarrow$ calcium oxide + carbon dioxide
II carbon + water $\rightarrow$ carbon dioxide
III sugar $\rightarrow$ carbon + water
IV carbon + oxygen $\rightarrow$ carbon dioxide

Which of the above are examples of decomposition?

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

Downloaded from SingaKids.com

11 An experiment was set up as shown below using a peeled potato shaped into a cup.



After 4 hours

Which of the following can be deduced based on the results after four hours?

A Liquid **P** is a dilute sucrose solution and **Q** is a concentrated sucrose solution.

B Liquid **P** is a dilute sucrose solution and **Q** is distilled water.

C Liquid **P** is a concentrated sucrose solution and **Q** is distilled water.

D Liquid **P** is a concentrated sucrose solution and **Q** is a dilute sucrose solution.

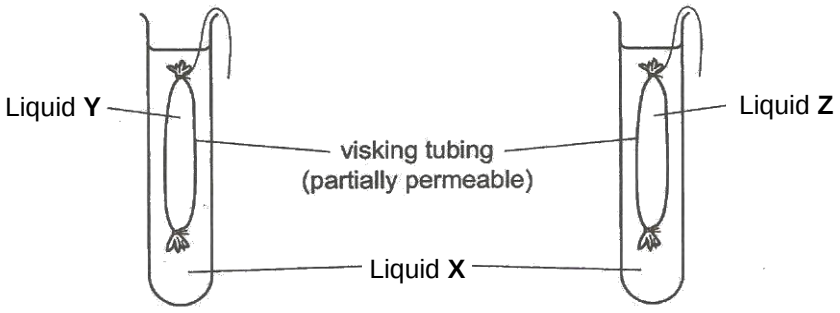
12 Two tubes, **X** and **Y**, contain 2 cm^3 of sheep's blood. Tube **X** had 12 cm^3 of distilled water added to it, while tube **Y** had 12 cm^3 of concentrated salt solution added to it. An anti-clotting agent was added to both tubes. The two tubes are then spun at high speed to make the blood cells sink to the bottom of the tube.

Which of the following shows the results correctly?

	Tube X	**Tube Y**
A	A homogeneous solution with no solids at the bottom	A homogeneous solution with no solids at the bottom
B	Blood cells have collected at the bottom of the tube	A homogeneous solution with no solids at the bottom
C	A homogeneous solution with no solids at the bottom	Blood cells have collected at the bottom of the tube
D	Blood cells have collected at the bottom of the tube	Blood cells have collected at the bottom of the tube

Downloaded from SingaKids.com

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

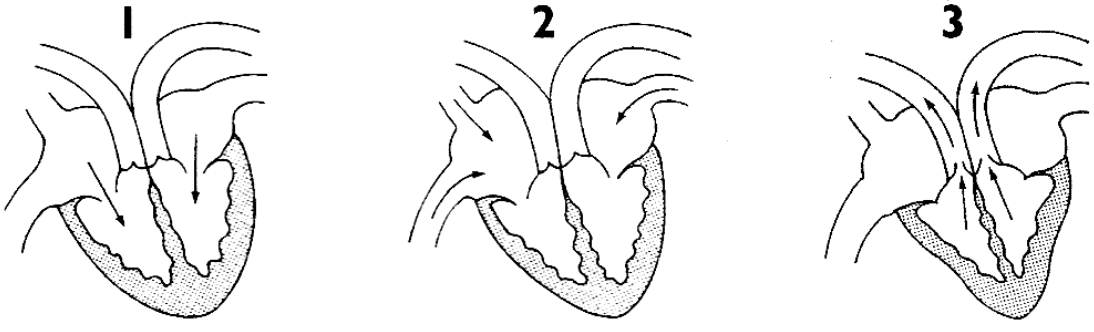


After 30 minutes had elapsed, the partially permeable tubing containing Liquid **Y** had collapsed while the tubing containing Liquid **Z** was firm.

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	Water	25 % sucrose solution
B	25 % sucrose solution	10 % sucrose solution	Water
C	Water	25 % sucrose solution	10 % sucrose solution
D	10 % sucrose solution	25 % sucrose solution	Water

14 The diagram below shows three stages in the cardiac cycle.

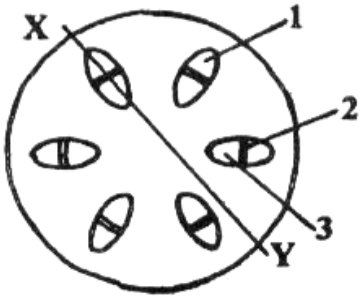


Which of the following sequences is correct?

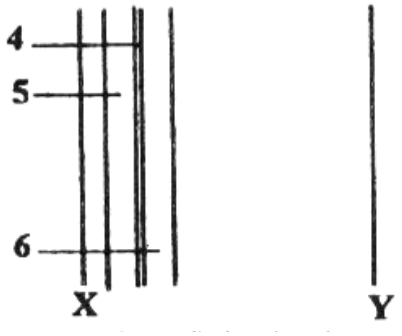
A 2, 3, 1
B 1, 2, 3
C 2, 1, 3
D 3, 1, 2

Downloaded from SingaKids.com

15 The diagrams below show sections through the stem of a dicotyledonous plant.



Transverse section



Longitudinal section taken through line XY

Which parts transport water and mineral salts?

A 1 and 5

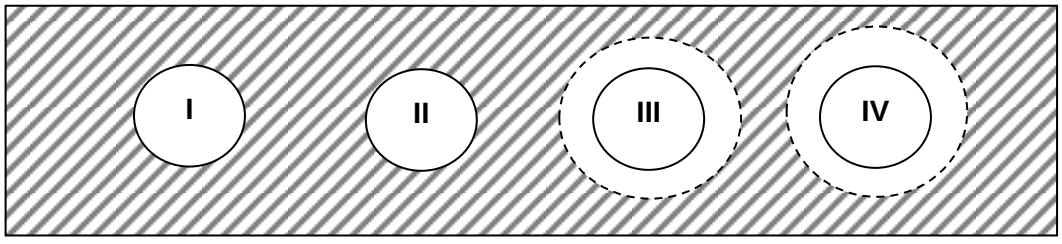
B 2 and 4

C 3 and 5

D 3 and 6

16 A cloudy white jelly was prepared by mixing milk proteins with agar powder. The mixture was poured into a petri dish and allowed to set. Four cavities were dug and filled with different solutions: gastric juice, saliva, biological detergent, bile.

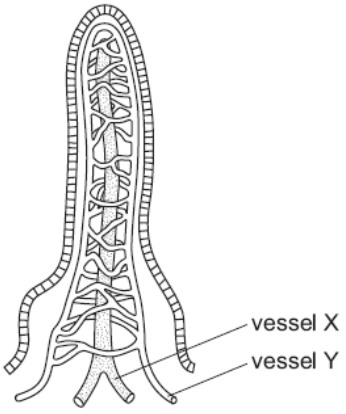
After 24 hours, clear zones were found in cavities III and IV. What are the solutions that were found in the cavities?



	Cavity 1	Cavity 2	Cavity 3	Cavity 4
A	saliva	biological detergent	gastric juice	bile
B	bile	saliva	gastric juice	biological detergent
C	gastric juice	saliva	biological detergent	bile
D	biological detergent	bile	saliva	gastric juice

Downloaded from SingaKids.com

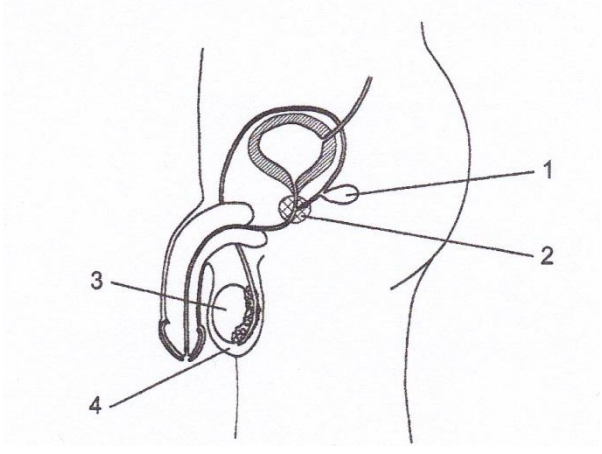
17 The diagram shows a villus.



After a meal containing starch and oil, which substance is absorbed mainly into vessel **X** and which substance is absorbed mainly into vessel **Y**?

	vessel X	**vessel Y**
A	glucose	amino acids
B	fats	glucose
C	glucose	fats
D	amino acids	glucose

18 The diagram shows the side view of the male reproductive system.

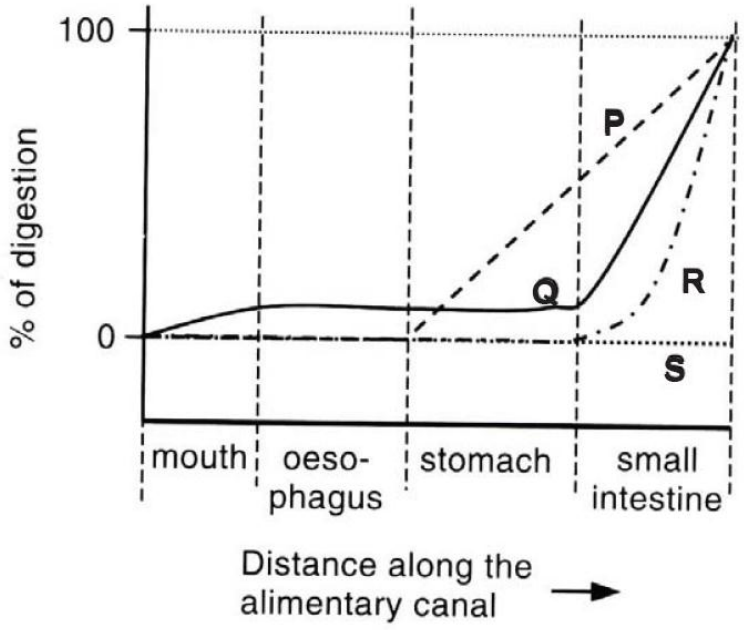


What are the functions of the labelled parts?

	Hormone production	**Seminal fluid production**	**Sperm production**
A	1 and 3	2 and 3	3 and 4
B	2 and 3	1 and 2	3 and 4
C	3 only	1 and 2	3 only
D	4 only	1 and 3	3 only

Downloaded from SingaKids.com

19 The graph shows the percentage of digestion of four types of nutrients as they move along the human alimentary canal. What type of nutrients are **P**, **Q**, **R** and **S**?



	P	Q	R	S
A	starch	cellulose	protein	fat
B	fat	starch	cellulose	protein
C	protein	fat	starch	cellulose
D	protein	starch	fat	cellulose

20 Which of the following shows the correct match between the sexually transmitted infection and one of its harmful effects?

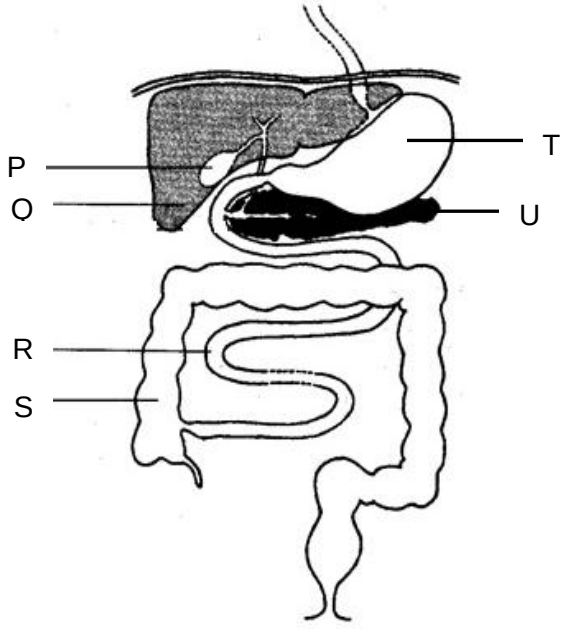
	Sexually transmitted infection	Harmful effect
A	Gonorrhoea	Insanity
B	Syphilis	Sterility
C	Syphilis	Paralysis
D	AIDS	Baby of the infected mother is born blind

21 Which of the following statements about AIDS is incorrect?

A It can be spread through blood transfusion.
B It can be transmitted from infected mother to the foetus.
C The infected person will have a lowered resistance to disease.
D It is curable by antibiotics if detected early enough.

Downloaded from SingaKids.com

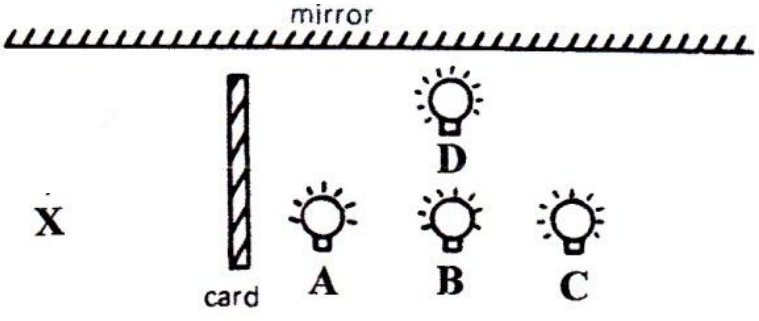
22 The diagram below shows part of the human digestive system.



Which of the organs produce alkaline digestive juices?

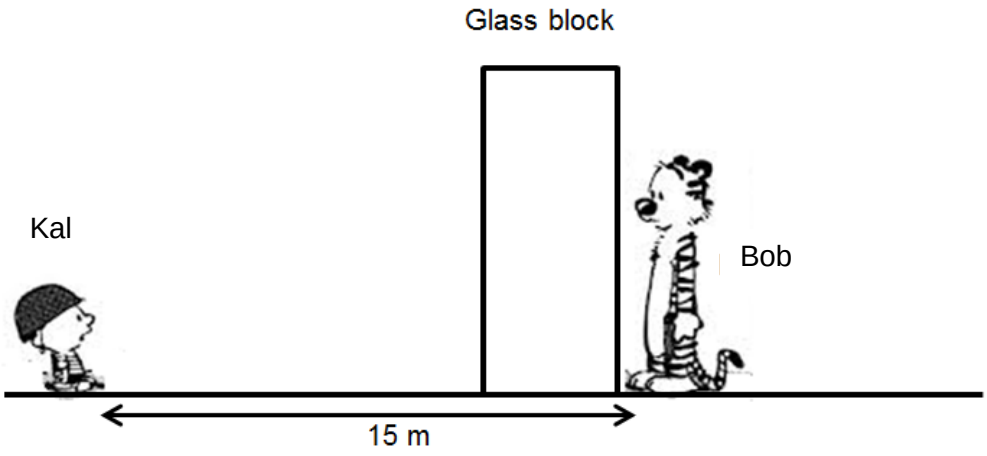
A Q, R and U
B P, Q, R, and U
C Q, R, S and T
D Q, R, S U and T

23 Four light bulbs are placed in front of a mirror, as shown in the diagram below. An observer is prevented from seeing the light bulbs directly by a card. Which of the bulb's image can the observer (X) see?



Downloaded from SingaKids.com

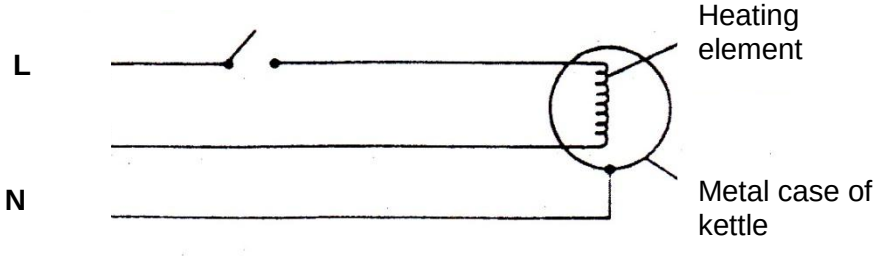
24 Kal saw Bob through a thick glass block as shown in the figure below. The actual distance between them is 15 m.



Which of the following distances below is a possible distance which Bob will **appear to be** to Kal?

A 10 m **B** 15 m **C** 20 m **D** 25 m

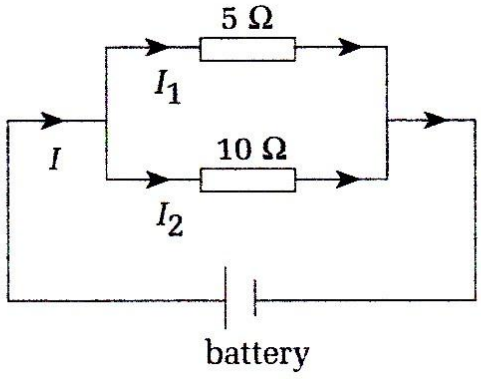
25 The diagram below shows a 240 V mains supply socket with a 750 W electric kettle attached to it by a three-pin plug. If two fuses, a 5 A fuse and a 13 A fuse are available, which fuse should be used and where should it be connected?



A 5 A, connected in the live wire
B 5 A, connected in the earth wire
C 5 A, connected in the neutral wire
D 13 A, connected in the live wire

Downloaded from SingaKids.com

26 The figure below shows two resistors connected to a battery. The currents in the circuit are indicated on the figure.



Which of the following statement(s) is/are **not** correct?

(1) The potential difference across the 5 Ω resistor is equal to the potential difference across the 10 Ω resistor.
(2) The effective resistance of the circuit is more than 10 Ω.
(3) $I_2 = 2I_1$
(4) $I = I_1 + I_2$

A (1) only
B (2) only
C (1) and (4) only
D (2) and (3) only

27 A 400 W electric iron is switched on for 30 minutes. How long does a 2 kW heater take to use the same amount of energy as the electric iron?

A 6 minutes
B 60 minutes
C 100 minutes
D 360 minutes

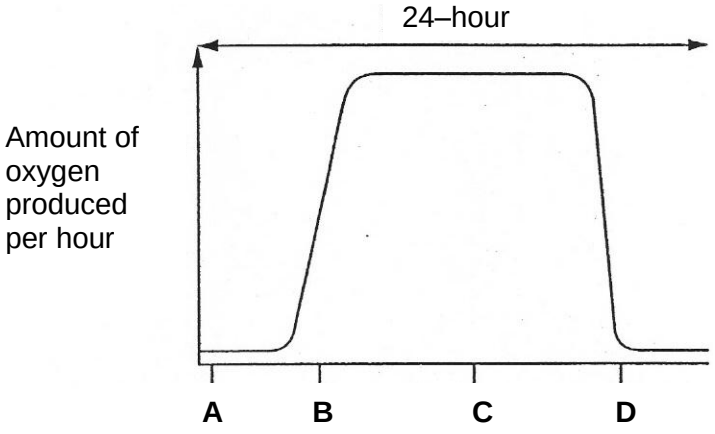
Downloaded from SingaKids.com

28 The cable to an electric fan becomes so worn out that the live wire makes electrical contact with the metal case. The metal case is earthed. The plug to the fan contains a 5 A fuse. There is a current of 4 A when the fan works normally.

What will happen?

A The current will run to the earth and the fuse will not be affected.
B The fuse will melt and switch off the circuit.
C The metal case will become live and dangerous.
D The metal case will become very hot.

29 The graph below shows the amount of oxygen produced by a green plant during a 24-hour period. Which letter represents midnight?



30 Why does blowing into a trumpet make sound?

A The trumpet heats the air.
B The trumpet reflects the air.
C The air in the trumpet is cooled.
D The trumplet causes the air to vibrate.

END OF PAPER

Downloaded from SingaKids.com

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	226 Ra Radium 88	227 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.).

Downloaded from SingaKids.com

E

GAN ENG SENG SCHOOL
End-of-Year Examination 2014

CANDIDATE NAME			
CLASS		**INDEX NUMBER**	

SCIENCE
Paper 2

7 Oct 2014
Papers 1 & 2: 2 hours

Sec 2 Express

Candidates answer on the Question Paper.

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

Section A
Answer **all** questions.

Section B
Answer question **8** and **three other** questions.
In calculations, you should show all the steps in your working, giving your answer at each stage.
Enter the numbers of the Section B questions you have answered on the dotted lines in the grid below.

At the end of the examination, hand in your answers to Paper 1 and Paper 2 separately.
The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic table is inserted on page **18**.

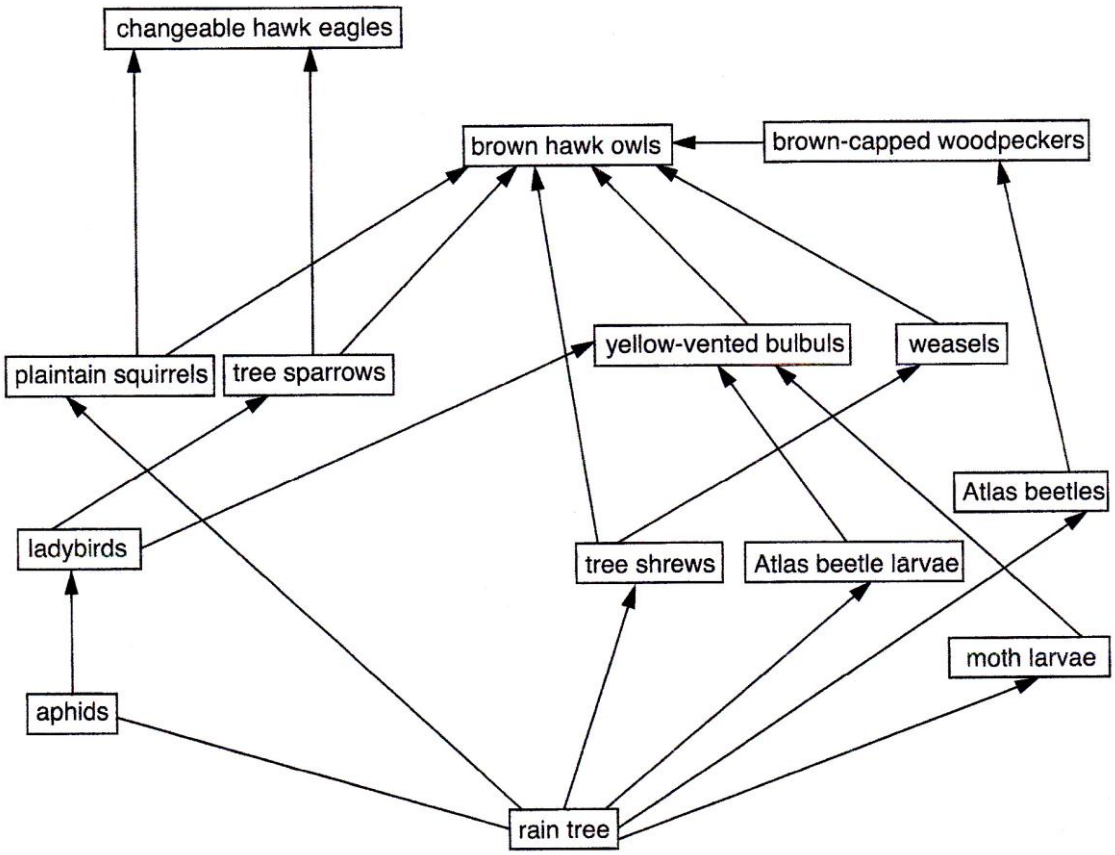
For Examiner's Use	
Section A	30
Section B	40
Q8	
.....	
.....	
.....	
Total	70

This paper consists of **18** printed pages including of the cover page

Downloaded from SingaKids.com

SECTION A (30 marks)
Answer **all** the questions in this section.

1 The diagram below shows part of a food web in a forest.



(a) Caterpillars are primary consumers and are preyed on by spiders. Spiders are a source of energy for the tree sparrows. [1]

Add this information on the food web above.

(b) During one particular year, most of the Atlas beetle larvae are killed by a disease. [2]

Explain how this could affect the brown-capped woodpecker population.

……

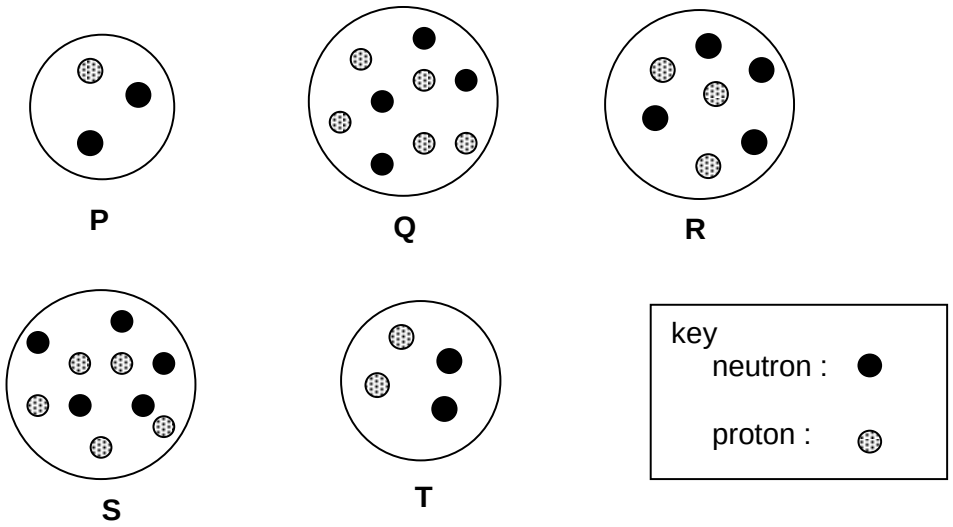
……

……

……

Downloaded from SingaKids.com

2 The diagrams below show the nuclei of five different atoms, **P**, **Q**, **R**, **S** and **T**.



(a) Which of the atoms, **P**, **Q**, **R**, **S** and **T** [2]

(i) has a nucleon number of 4, ……..

(ii) are isotopes of the same element? ……..

(b) **(i)** A compound is formed between the element of proton number 20 and another of proton number 9. [2]

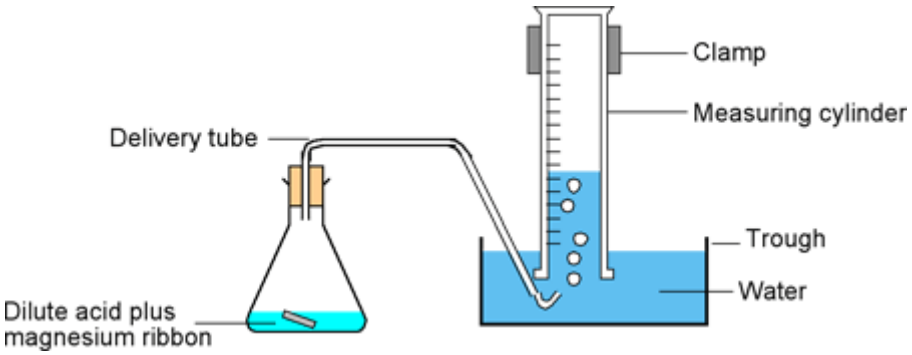
Give the chemical formulae of the two different types of ions formed.

……...

(ii) Draw the “dot and cross” diagram of the compound formed between them. [2]

Downloaded from SingaKids.com

3 A student set up the following apparatus as he reacted some magnesium ribbons with dilute nitric acid.



(a) Describe a test for the gas that is collected in the measuring cylinder. [2]

……

……

(b) Write a balanced chemical equation for the reaction in the conical flask. [2]

……

4 Fig. 4.1 shows the absorption of potassium ions by young cereal plant root hairs which were kept in aerated solutions maintained at two different temperatures. After 70 minutes, potassium cyanide, a poison which inhibits enzymes involved in respiration, was added to the solutions at each temperature.

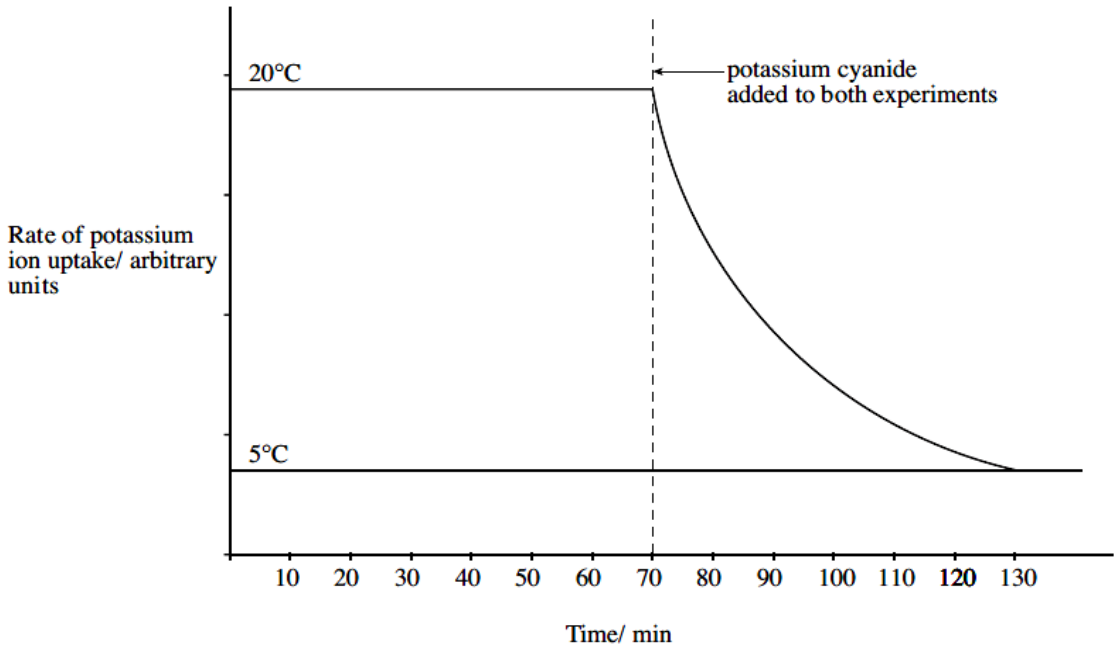


Fig. 4.1

Downloaded from SingaKids.com

(a) How does the information given show that the root hairs take up the ions by active transport? [2]

……

……

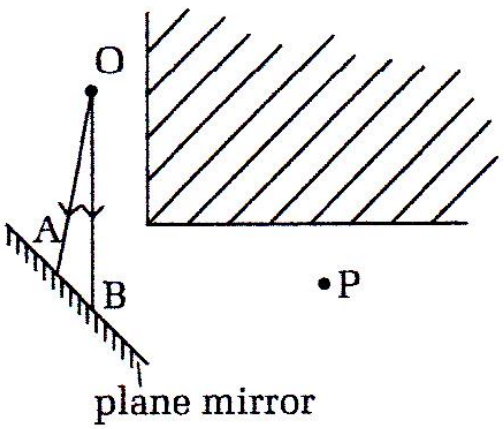
……

(b) It has been proven that enzymes are denatured at low temperatures. Explain why, at low temperatures, potassium uptake continues after the addition of potassium cyanide. [1]

……

……

5 The diagram below shows a plane mirror placed at a street corner. It enables a driver at position '**P**' to see an on-coming vehicle approaching from '**O**'.



The rays **OA** and **OB** from the vehicle are incident on the plane mirror. Complete the ray diagram to show how the driver at **P** is able to see the image of the on-coming vehicle in the mirror. Indicate the position of the image with the letter **'I**'. [3]

Downloaded from SingaKids.com

6 The melting and boiling points of three substances, **A**, **B** and **C**, are shown in

substance	melting point/ °C	boiling point/ °C
A	17	118
B	1083	2595
C	-138	-0.5

The three substances are placed at room temperature of 28°C.

(a) Name the process that takes place when substance **A** is cooled from 120°C to room temperature. [1]

……

(b) Use the kinetic particle theory to explain what happens to the particles if **B** is heated from 1082°C to 1084°C. [3]

……

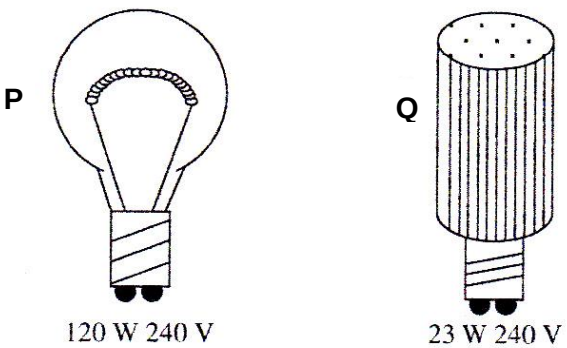
……

……

……

……

7 The figure below shows a tungsten filament lamp, **P**, and an energy-saving lamp, **Q**. The manufacturers of the energy-saving lamp claim that it is as bright as a 120 W filament lamp.



Downloaded from SingaKids.com

(a) Calculate the resistance of the filament lamp, **P**. [2]

(b) If 60% of the power consumed by lamp **Q** is given out as light, calculate the power given out as light. [1]

(c) The power produced as light from lamp **P** is the same as that of lamp **Q.** [1]

What is the other form of energy emitted from lamp **P**?

……

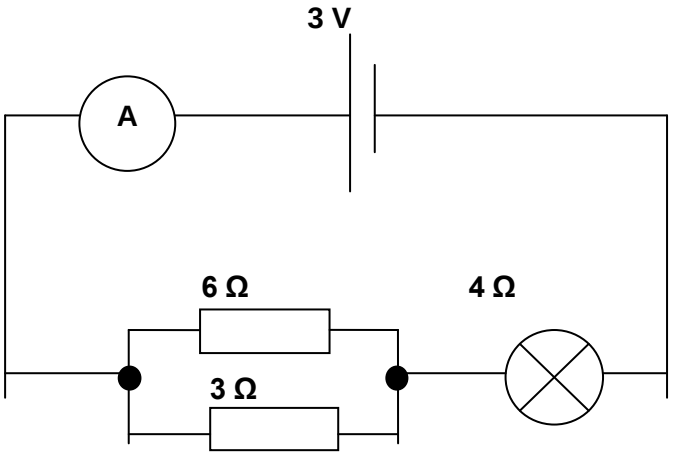
(d) Calculate the amount of money a consumer will save if she uses bulb **Q** instead of bulb **P**, if on average, the bulb is used for 10 hours every day for the whole month of September. [3]
(September has 30 days and the cost of electricity is $0.20 per kWh).

Downloaded from SingaKids.com

SECTION B (40 marks)

Answer **Q8** and any 3 other questions in this section.

8 An electric circuit is set up as shown below.



(a) Calculate the effective resistance of the whole circuit. [2]

(b) Find the reading of the ammeter. [2]

(c) Calculate the potential difference across

(i) the light bulb [1]

(ii) the 6 Ω resistor [1]

(iii) the 3 Ω resistor [1]

Downloaded from SingaKids.com

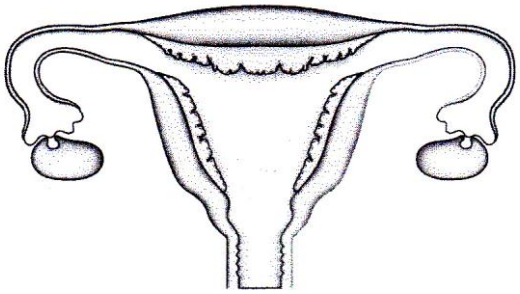
(d) **(i)** If the 3 ohm resistor is replaced with a piece of copper wire, what will the new reading of the ammeter be? [2]

(ii) How will this affect the brightness of the bulb? [1]

……..

Downloaded from SingaKids.com

9 **(a)** The figure below shows part of the female reproductive system.



(i) On the figure, indicate with the letter '**D**' the site where a diaphragm could be inserted. [1]

(ii) Explain how the placement of a diaphragm can prevent the formation of an embryo, but does not prevent the spread of sexually transmitted infections. [2]

……..

……..

……..

(iii) State one advantage for a woman to use tubal ligation as a form of contraception as compared to using a diaphragm. [1]

……..

(iv) Suggest reasons why a woman will not likely to get pregnant if she has sexual intercourse three days after her menstruation. [2]

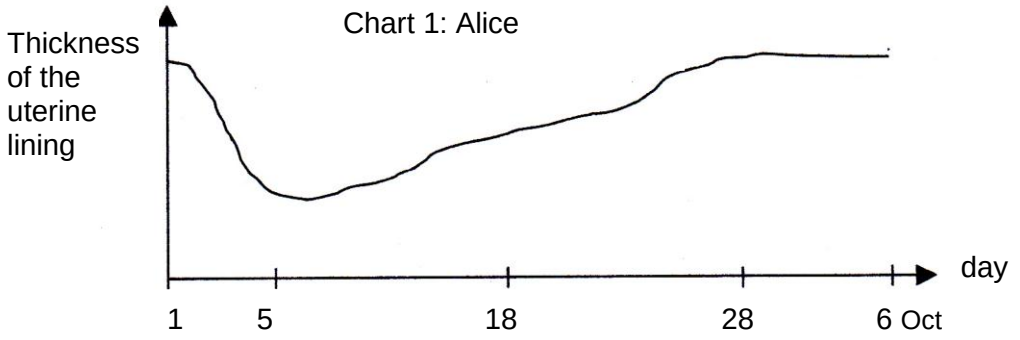
……..

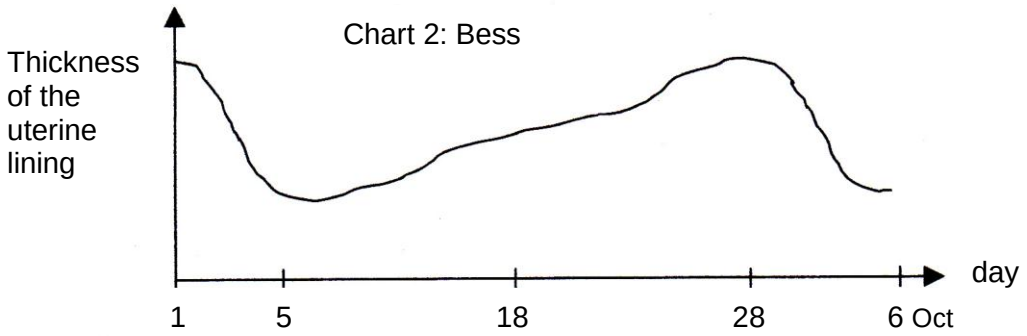
……..

……..

Downloaded from SingaKids.com

(b) The charts below show how the thickness of the uterine lining of two women change from day to day during the months of September and October.





(i) One of the charts shows that fertilisation has taken place. Identify the woman who has conceived and explain your answer. [2]

……..

……..

Both Alice and Bess have a 28-day menstrual cycle and ovulated on 14 September.

(ii) When will the first day of the ***next*** menstrual cycle be for the woman who did not conceive? [1]

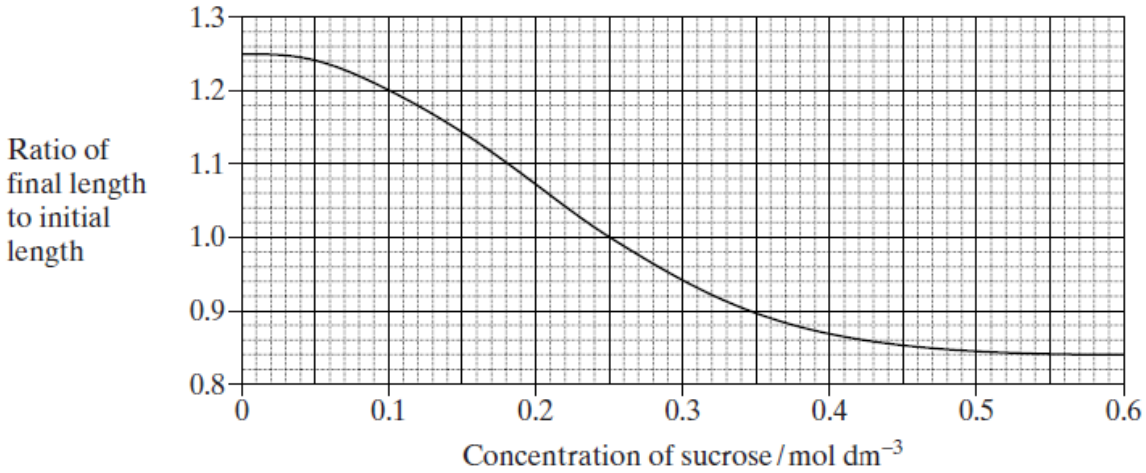
……..

(iii) If the woman in **b(ii)** also wants to conceive, she needs be aware of her fertile period. Calculate the fertile period in October of this woman using the charts above. [1]

……..

Downloaded from SingaKids.com

10 **(a)** Cylinders of potato were cut. Their initial lengths were measured. Each cylinder was then placed in a different concentration of sucrose solution for 2 hours. The graph below shows the changes in length of the potato cylinders in the different sugar solutions.



(i) State the concentration of the cell sap of potato. [1]

……..

(ii) The initial length of the potato cylinder immersed in 0.6 mol dm^{-3} was 7.5 cm. Calculate the final length of the potato cylinder. Show your workings clearly. [1]

(iii) Explain how the length of the potato cylinder that was placed in 0.1 mol dm^{-3} sucrose solution changes. [3]

……..

……..

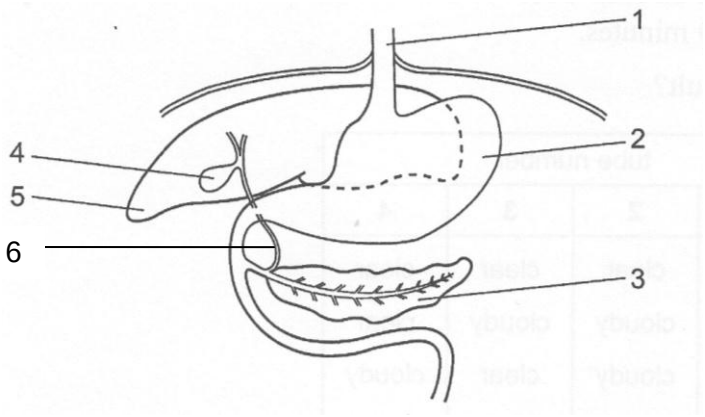
……..

……..

……..

Downloaded from SingaKids.com

(b) The diagram shows a section of the digestion system in man.



(i) Give the label of the organ in which bile is produced. [1]

……..

(ii) Explain clearly how bile helps in digestion. [2]

……..

……..

(iii) Some people develop a condition in which the part labelled **6** becomes gradually blocked by deposits. Describe the effect of this condition on digestive function and suggest how the patient's lifestyle has to change. [2]

……..

……..

……..

Downloaded from SingaKids.com

11 **(a)** Fig 11.1 shows an experiment set up to investigate any change in the mass of plants potted in damp soil over a period of time.

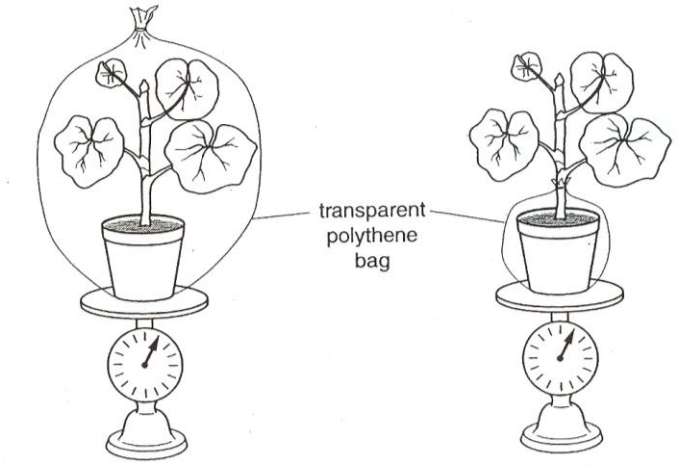


Fig 11.1

Fig 11.2 is a graph showing the loss in mass of the plants over the next five days.

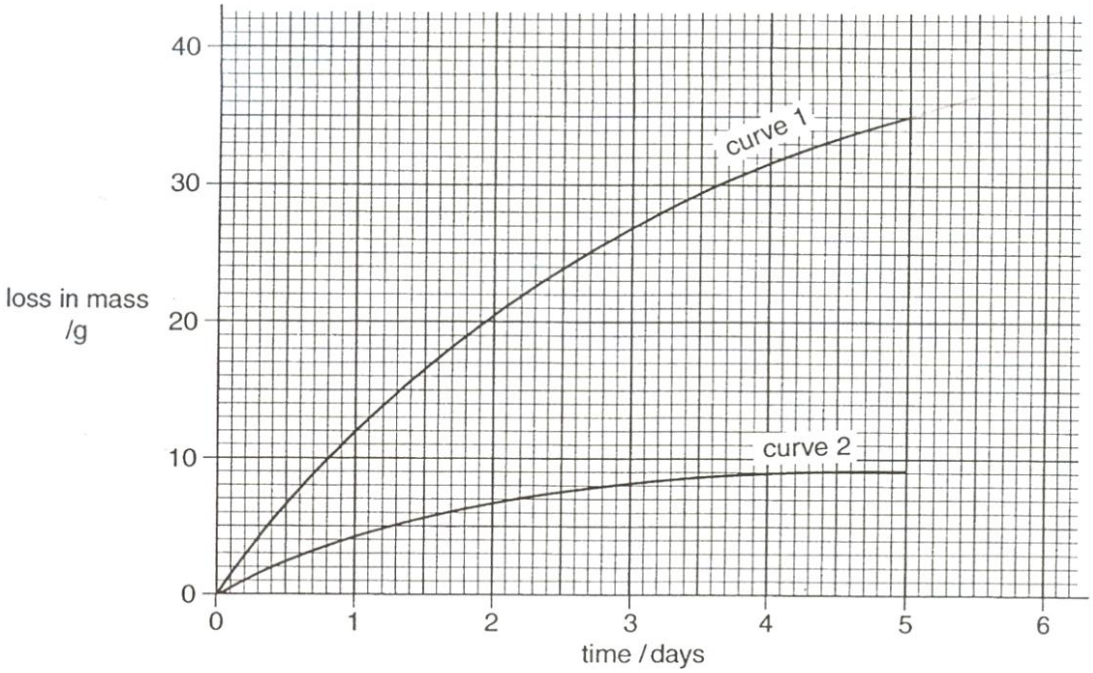


Fig 11.2

(i) Which plant gives the result shown by curve **1**? [1]

……

(ii) Name the process responsible for this loss in mass. [1]

……

Downloaded from SingaKids.com

(iii) Explain how this process is affected by the polythene bag around plant **J**. [2]

……

……

……

……

(b) Fig 11.3 below shows a cross section of a healthy human heart.

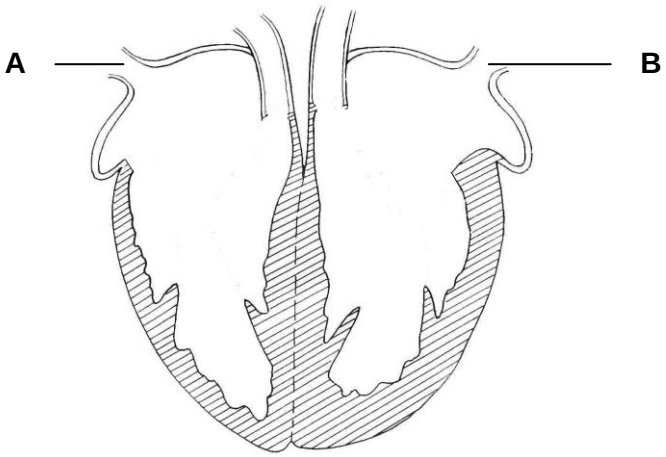


Fig 11.3

(i) Name the blood vessels labelled **A** and **B**. [2]

A: …….. **B**: ……..

(ii) Using arrows, draw on Fig 11.3, the flow of deoxygenated blood into and out of the heart. [1]

(iii) Hypertrophic cardiomyopathy is a genetic disease of the heart muscles. a condition in which the heart muscle becomes thick. Often, only one part of the heart is thicker than the other parts. Most people with this condition have few, if any symptoms. It is one of the leading causes of sudden death in young athletes as the condition often goes undiagnosed. [3]

Predict and explain the consequences of hypertrophic cardiomyopathy.

……..

……..

……..

……..

Downloaded from SingaKids.com

12 **(a)** Ariel, standing at point **A** in Fig 12.1, sees the reflection of Ben on a shop window. Ben is standing at point **B**.

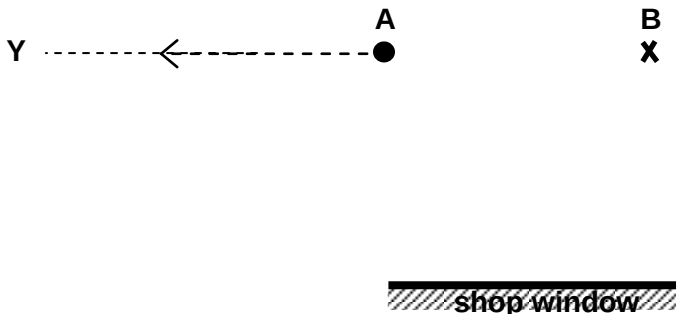


Fig 12.1

(i) On Fig 12.1, draw a one-ray diagram to show how Ariel at **A** sees Ben at **B**. Consider the shop window to be a thin piece of glass acting as a mirror. [1]

(ii) Ariel then moves further away from Ben towards Y in the direction of the arrow shown in Fig 12.1. Mark with a letter **X** the furthest position along **AY** to which Ariel can move so that Ariel and Ben will still be able to see each other by reflection through the shop window. You are to show your working by drawing a ray of light clearly on Fig 12.1. [2]

(b) In white light, a skirt appears white with blue spots. Explain how the skirt would appear under cyan light. [4]

……..

……..

……..

……..

Downloaded from SingaKids.com

……..

(c) Fig 12.2 shows a semi-circular glass block. The refractive index of the glass block is 1.5.

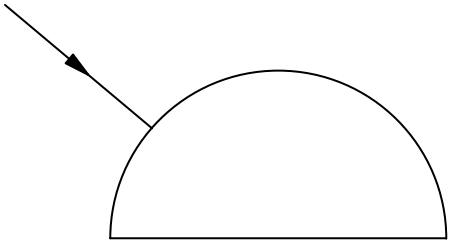


Fig 12.2

(i) Calculate the critical angle of the glass block. [1]

(ii) Complete the light ray till it emerges out of the glass block. [2]

END OF PAPER

Downloaded from SingaKids.com

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	226 Ra Radium 88	227 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.).

Downloaded from SingaKids.com

2Exp Science EOY Answers 2014

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

1 **a** shows the following food chain added to given food web: 1
rain tree → caterpillar → spider → tree sparrow

b If most of the Atlas beetle larvae are killed by a disease, there will be a **decrease in the population of Atlas beetle**.(1) This will lead to a **decrease in the brown capped woodpecker population** (0.5) as they have **lost their only source of food**.(0.5) 2

2 **ai** T 1

aii Q and S 1

bi Ca^{2+}, 1
F^- 1

bii 1- One correct Ca^{2+} ions drawn 2
1- Two correct F^- ion drawn

3 **a** Insert a lighted splint into gas; 1
flame extinguished with a 'pop' sound; 1

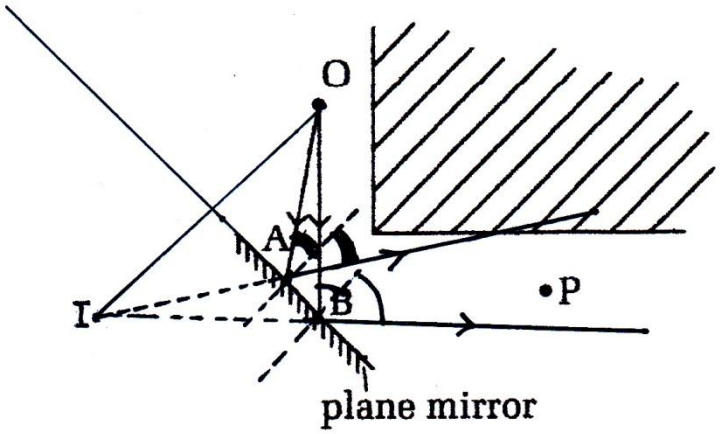
b $Mg + 2HNO_3 \rightarrow Mg(NO_3)_2 + H_2$ 2
1 – correct formula; 1 – correct balancing

Downloaded from SingaKids.com

4 **a** When potassium cyanide is added, respiration ceases, no energy released for active transport to take place; 1
Hence rate of absorption of ions decreases steeply. 1

b Potassium ions also move by diffusion without the expense of energy from respiration; 1

5



1- Correct position of **I** [1]
2-Correct direction of reflected rays from A & B with rays extended backwards to the image [2]

6 **a** Condensation 1

b The particles gain heat/ kinetic energy; [1] 3
particles move faster;[1]
and further apart; [1]
the forces of attraction between the particles weaken; [1]
the particles slides over one another in a liquid; [1]
the spaces between particles are quite closely packed; [1]
{any three}

7 **a** P = VI

I = P/V
= 120 W/ 240 V
= 0.5 A 1

Resistance, R= V/I
= 240 V/ 0.5 A
= **480 Ω** 1

No unit or wrong unit: minus 1;
working must be shown

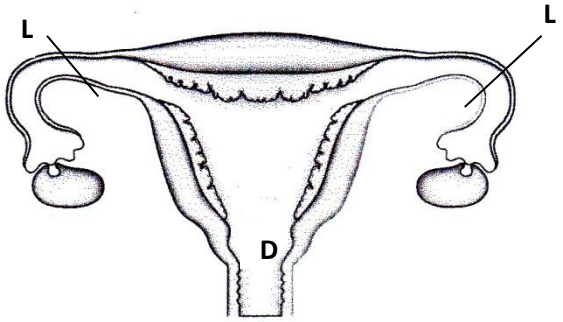
b Power of light energy given out by lamp Q 1
= 60/100 x 23 W
= **13.8 W**

No unit or wrong unit: minus 1;
working must be shown

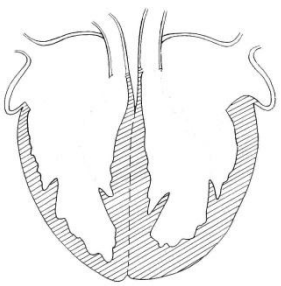
Downloaded from SingaKids.com

	c	Thermal energy / Heat energy	1	
	d	Cost saved		No unit or
		= (120 – 23)/ 1000 kW x 10 h x 30 days x \$0.20	2	wrong unit:
		= **\$5.82**	1	minus 1;
		Alternative method		working must
		Cost of using lamp P = 120/1000 kW x 10 h x 30 days x \$0.20 = \$7.20	1	be shown
		Cost of using lamp Q = 23/1000 kW x 10 h x 30 days x \$0.20 = \$1.38	1	
		Cost save by using lamp Q = \$(7.20 – 1.38) = \$5.82	1	
8	**a**	For the resistors connected in **parallel**		No unit or
		$1/R_p = 1/6 + 1/3$		wrong unit:
		$= 1/2$		minus 1
		$R_p = 2\ \Omega$	1	
		Effective resistance		
		$R_t = 2 + 4$	1	
		$= 6\ \Omega$	1	
	b	Reading on the ammeter		No unit or
		I = V/R		wrong unit:
		= 3V/ 6Ω	1	minus 1
		= **0.5 A**	1	
	ci	p.d across the light bulb, $V_{bulb} = IR$		No unit or
		= 0.5 A x 4 Ω	1	wrong unit:
		= **2 V**		minus 1 (deduct once for 8c)
	cii	**p**.d across the 6Ω resistor = p.d of 3 Ω resistor		
		p.d across 6Ω resistor = (3 – 2) V	1	
		= **1 V**		
	ciii	p.d across 3Ω resistor = **1 V**	1	

Downloaded from SingaKids.com

	di	If the 3 Ω resistor is replaced by a piece of copper wire, there will be a short circuit. Resistance of the circuit, R_t = 4 Ω Current in circuit, $I_t = V/R_t$ = 3V / 4 Ω = **<u>0.75 A</u>**	1 1	No unit or wrong unit: minus 1 (deduct once for 8(b) and (d))
	dii	The bulb will be **<u>brighter</u>**.	1	
9	**ai**		1	Correct site of D
	aii	The diaphragm blocks the cervix and **prevents sperms from entering the uterus** (1); However, the diaphragm **does not prevent contact** between the **penis** and **vagina/ sexual fluid can still be exchanged** (1)	2	
	aiii	Tubal ligation is **more reliable / more effective** than using a diaphragm in preventing pregnancy**.**	1	
	aiv	The egg will only be released during **ovulation on day 14 [1]**. There will not be any mature egg released before this day **[1]**. The time of sexual intercourse falls outside of fertile period (day 11-17) **[1]** {any 2}	2	
	bi	This means that **Alice** has conceived. (1) The chart shows that the **thickness of the uterine lining remained constant after 28 September** (1)	2	
	bii	29 Sep	1	
	biii	9 Oct to 15 Oct	1	
10	**ai**	0.25 mol dm^{-3}	1	
	aii	Final/ 7.5 = 0.84 Final = 6.3 cm {no mark if working not shown}	1	

Downloaded from SingaKids.com

	aiii	Cell sap has lower water potential than surrounding sucrose solution[1] **Water moves into the cells** by **osmosis** through the **partially permeable cell membrane** [1] Cells become turgid/ increase in size/ length of potato cylinder increases [1]	3	
	bi	5	1	
	bii	Bile is required to <u>emulsify fats/</u> break down large fat droplets into smaller fat droplets. Hence increases the <u>surface area to volume ratio of fat droplets exposed to lipase</u> and speeds up digestion of fats	1 1	R: break down fat molecules
	biii	The <u>rate of digestion of fats</u> will decrease. So the diet of such a patient needs to <u>contain less fats</u> otherwise the patient will suffer from indigestion.	1 1	
11	**ai**	Plant K	1	
	aii	Transpiration	1	
	aiii	Polythene bag traps the water vapour lost through the leaves [0.5] which create an environment of air that is saturated with water vapour/ high humidity [0.5]; less water vapour moves out of the leaves through diffusion [0.5] since there is a reduced concentration gradient of water vapour between inside the leaf and the surrounding air [0.5]	1 1	
	bi	A: vena cava B: pulmonary vein	1 1	
	bii		1	
	biii	Ventricular <u>volume decreases</u> [0.5], hence <u>less blood</u>/ less oxygenated blood sent out of the heart/ harder for blood to leave the heart [0.5]; <u>less oxygen delivered to body</u> cells, [0.5] forcing the <u>heart to work harder</u> to pump blood/ heart pumps faster [0.5]; so person may experience fatigue [1] **<u>OR</u>** shortness of breath [1]	3	
12	**ai**	correct diagram (no need normal)	1	

Downloaded from SingaKids.com

aii Mark **X** on **AY**. 1
Use one reflected light ray to prove answer 1

b the skirt will appear cyan with blue spots; 1
Cyan is made up of blue and green light; 1
The white portion reflects blue and green light, hence appears cyan; 1
The blue spots reflect blue light and absorbs green light, hence appears blue; 1

ci 1 correct working must be shown

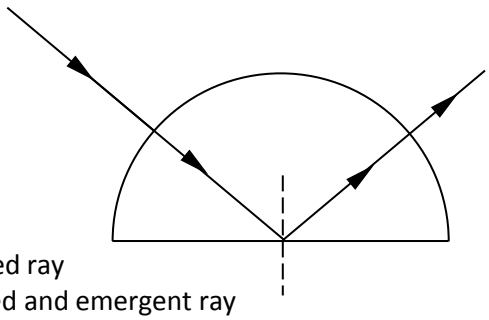
$$n = \frac{1}{\sin c}$$

$$1.5 = \frac{1}{\sin c}$$

$$c = \sin^{-1}(\frac{1}{1.5})$$

$$c = 41.8^{o}$$

cii 2



[1] – Correct refracted ray
[1] – Correct reflected and emergent ray

Downloaded from SingaKids.com