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BEDOK SOUTH SECONDARY SCHOOL
MID-YEAR EXAMINATION 2017

2EXP

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

LOWER SECONDARY SCIENCE

9 May 2017

2 hours

Candidates answer on the Question Paper.
 No Additional Materials are required

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name on the work you hand in.
 Write in dark blue or black ink on both sides of the paper.
 Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions in Sections A and B.
 Use soft pencil on the OAS paper provided for Section A.
 Answer **only four** out of five questions in Section C.
 Write your answers in the spaces provided in the Question Booklet.
 A copy of the Periodic Table is printed on page 28.

The number of marks is given in brackets [] at the end of each question or part question.

Setter: Ms Surimah Selamat

This document consists of 28 printed pages

Section A (30 marks)

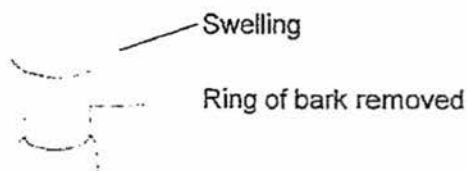
- 1 10 cm³ of a 10 % glucose solution is added to 5 cm³ of 5 % glucose solution to form a new mixture.

Which statement(s) is/are true about the new mixture?

- I The mixture has higher water potential than the 10 % glucose solution.
- II The mixture has more glucose molecules than the 10 % glucose solution.
- III The 10 % glucose solution has no water molecules before mixing.
- IV The mixture has lower concentration of glucose compared to 5 % glucose solution.

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

- 2 The diagram below shows a part of a branch where a ring of bark was removed.



What causes the swelling seen?

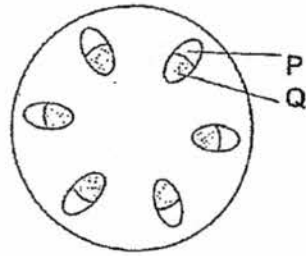
- A Accumulation of salts and water due to removal of the phloem tissue.
B Accumulation of salts and water due to removal of the xylem tissue.
C Accumulation of food materials due to removal of the phloem tissue.
D Entry of bacteria from the atmosphere due to removal of the bark.
- 3 A human red blood cell is placed in a concentrated glucose solution.
In which direction will the water molecules move and what is the effect on the cell?

	water molecules	effect on cell
A	move into the cell	cell increases in size
B	move into the cell	cell undergo lysis
C	move out of the cell	becomes crenated
D	move out of the cell	no change in cell volume

3

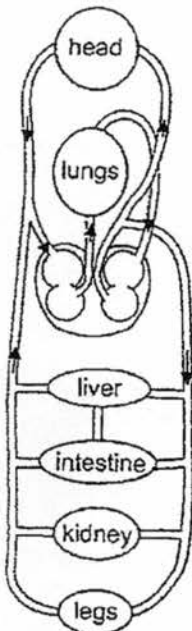
- 4 The diagram below shows a section through the stem of a plant.

What is the main substance transported by the tissues P and Q respectively?

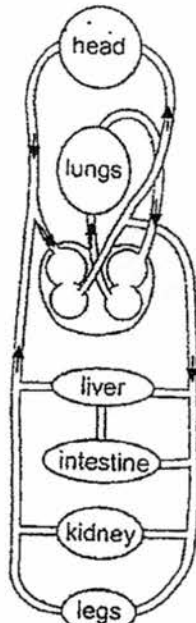


	substance in P	substance in Q
A	water	sucrose
B	sucrose	water
C	water	starch
D	starch	water

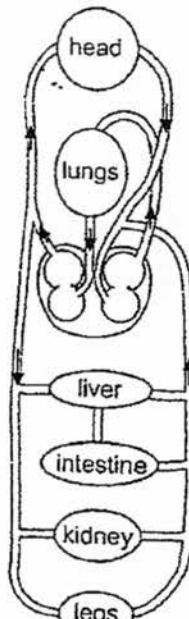
- 5 Which of the following diagrams shows the correct representation of an adult human blood circulatory system?



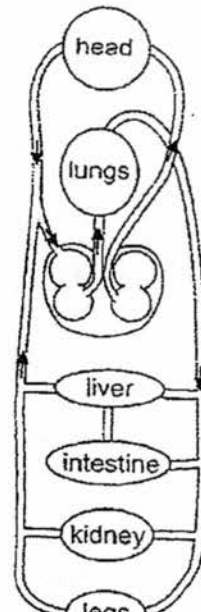
A



B



C



D

- 6 Which of the following represents the pulmonary artery?

	muscle layer	lumen	blood	direction of blood flow
A	thick	narrow	deoxygenated	away from the heart
B	thick	wide	oxygenated	away from the heart
C	thin	narrow	oxygenated	towards the heart
D	thin	wide	deoxygenated	towards the heart

- 7 Which of the changes are associated with a girl when she reaches puberty?

- I developed shoulder muscle
- II growth of pubic hair
- III becoming sexually active
- IV widening of hips

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

- 8 The various stages in human reproduction are listed below.

- I contraction of the muscles of the uterus to push the baby out
- II development of the embryo into a foetus in the uterus
- III the fertilised egg moves along the fallopian tube
- IV fusion of the nuclei of an ovum and a sperm
- V implantation of the embryo to the thickened lining of uterus

Which is the correct sequence of stages in human reproduction?

- A III, I, II, IV, V B III, IV, II, I, V
C IV, III, V, II, I D IV, V, II, III, I

- 9 Which of the chemical substances is responsible for changes in the lining of uterus in a woman's menstrual cycle?

- I progesterone
- II testosterone
- III oestrogen

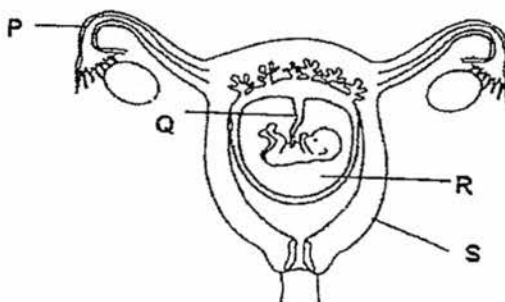
- A I and II only B II and III only
C I and III only D I, II and III

5

10 Which is the path taken by the sperm as ejaculation occurs?

- A penis → testis → urethra B testis → urethra → sperm duct
C testis → sperm duct → urethra D scrotum → urethra → sperm duct

11 Which of the following protects the foetus from physical damage?



- A structure P B structure Q
C structure R D structure S

12 Which of the following events can still take place in a woman when she undergoes a permanent method of birth control?

- I ovulation
II menstruation
III fertilisation
IV implantation

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

13 Birth control methods may be classified as chemical, mechanical or surgical. Which of the following is correct?

	chemical	mechanical	surgical
A	condom	spermicide	rhythm
B	intra-uterine device	rhythm	condom
C	pill	Intra uterine device	vasectomy
D	spermicide	condom	vasectomy

- 14 Which of the following is **not** a social problem when young people engage in premarital sex with different partners?

A abortions

B increase in the use of birth control

C unwanted pregnancies

D spread of sexually transmitted infections

- 15 Which row correctly shows the organisms which cause AIDS, gonorrhoea and syphilis?

	AIDS	gonorrhoea	syphilis
A	bacterium	bacterium	virus
B	virus	bacterium	bacterium
C	virus	virus	bacterium
D	bacterium	virus	virus

- 16 What is one of the first signs of syphilis?

A a painless sore on the skin

B purplish lumps on the skin

C heavy bleeding from the vagina

D feeling pain when passing urine

- 17 90 C of charge flows through a battery in 1 minute. Assuming the rate of flow of charges is constant, the current that flows through the battery is

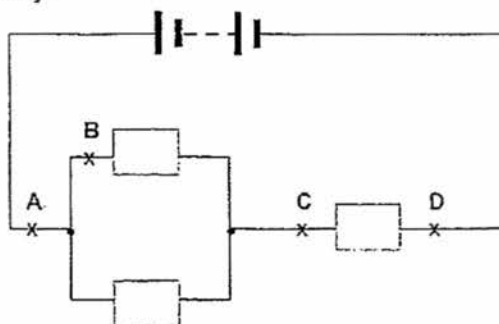
A 0.67 A

B 1.5 A

C 90 A

D 0.01 A

- 18 At which two points in the circuit shown below would the potential difference be equal to the e.m.f of the battery?



A A and C

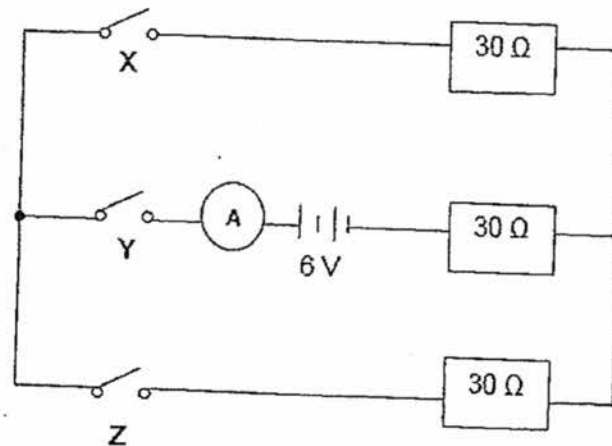
B A and D

C B and C

D C and D

7

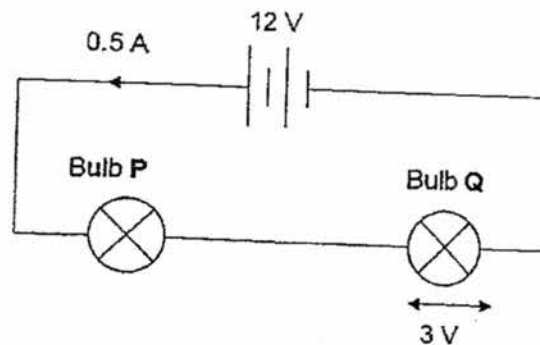
- 19 The circuit below has three switches.



Which correctly identifies the state of the switches when the ammeter reads 0.1 A?

	switch X	switch Y	switch Z
A	closed	closed	closed
B	closed	open	closed
C	open	closed	closed
D	open	open	open

- 20 The diagram below shows a circuit diagram.

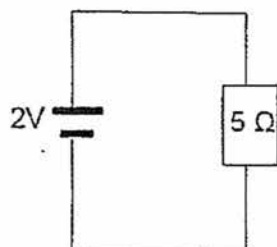


Which of the following is the potential difference across bulb P in the circuit above?

- A 3 V B 6 V
C 9 V D 12 V

8

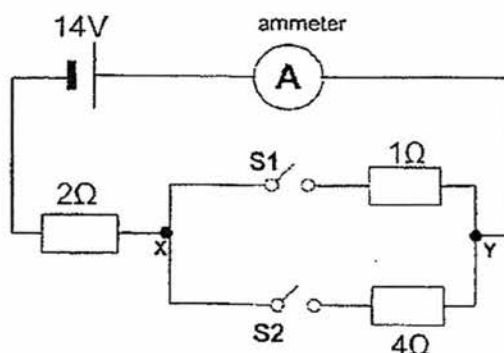
- 21 The diagram below shows a resistor connected to a cell of e.m.f. 2 V.



The current that flows through the resistor 5Ω is

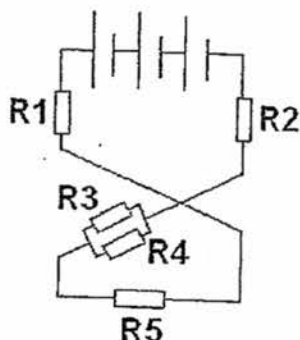
- | | |
|---------|---------|
| A 0.4 A | B 2.5 A |
| C 7 A | D 10 A |

Use the circuit diagram below to answer Questions 22 and 23.



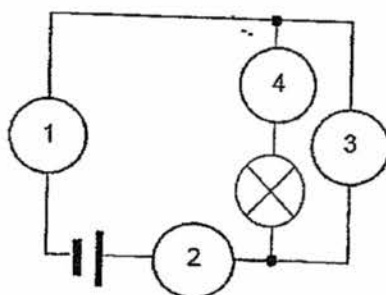
- 22 When S_1 is closed, the effective resistance for the circuit is
- | | |
|---------------|----------------|
| A 0.8Ω | B 1.25Ω |
| C 3.0Ω | D 7.0Ω |
- 23 When S_1 and S_2 are closed, the potential difference across the 2Ω resistor is
- | | |
|----------|----------|
| A 2.5 V | B 5.0 V |
| C 10.0 V | D 15.0 V |

- 24 The resistors in this diagram all have the same resistance.



Which statement is true?

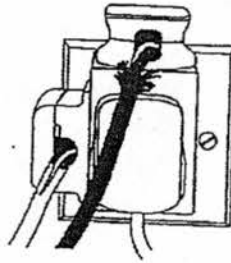
- A Resistance of R_2 is equal to the total resistance of R_3 and R_4 .
 - B Resistor R_5 has the highest resistance of all the resistors.
 - C The current flowing through resistor R_5 is less than that flowing through R_3 and R_4 combined.
 - D The effective resistance contributed by R_1 and R_5 is greater than that of R_3 and R_4 as arranged in the circuit above.
- 25 The diagram below shows a circuit with a bulb attached.



Where should an ammeter and a voltmeter be placed to determine the resistance of the light bulb?

	ammeter	voltmeter
A	1	2
B	2	3
C	3	4
D	4	1

- 30 The diagram below shows some plugs connected to a socket.



Which hazard(s) can be seen from the figure above?

- I damp conditions
 - II damaged insulation of the wires
 - III overloading of socket
- A III only
- B I and II only
- C II and III only
- D I, II and III

- End of Section A -

2017 SEC TWO EXPRESS SA1 LOWER SEC SCIENCE

Class	Register Number	Name
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For Examiner's Use	
Section A	
Section B	
Section C	
Total	

SECTION B: Structured Questions (30 marks)

Answer all questions in the spaces provided.

- B1** A dialysis machine can help to remove impurities via diffusion from the blood of patients with kidney failure. A needle is inserted into the vein of the patient for dialysis treatment. **Fig. B1** shows how impurities are removed when blood passes through a membrane immersed in a bath of salt solution found in the dialysis machine.

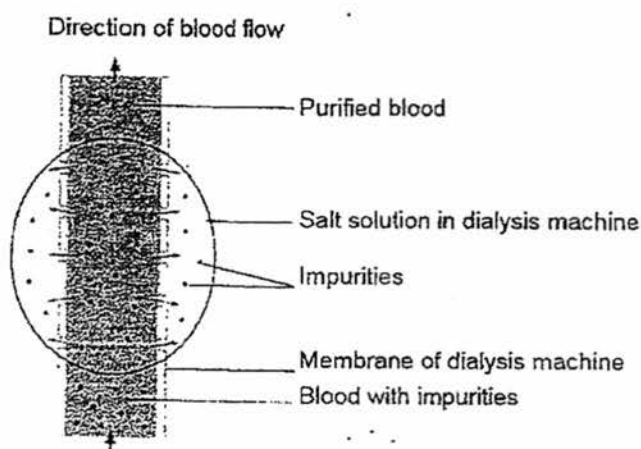


Fig. B1

- (a) Define diffusion.

.....
 [1]

- (b) Explain how the impurities are removed using the dialysis machine.

.....
 [1]

- (c) Explain why cells in the blood are not removed.

.....
 [1]

- (d) Explain why the bleeding stops when the needle was taken out after dialysis.

.....
 [1]

- B2 (a) Complete Table C2 with the correct blood components.

[2]



blood component	appearance not to scale
A	pale yellow fluid
B	
C	
D	

Table C2

- (b) State one difference between blood components B and D in Table C2.

[1]

- (c) The crime scene investigation department, which relies on DNA material, was unable to identify the potential crime suspects using a blood sample containing only A and D. Explain why this is so.

[1]

- B3 Fig. B3 shows the human male reproductive system.

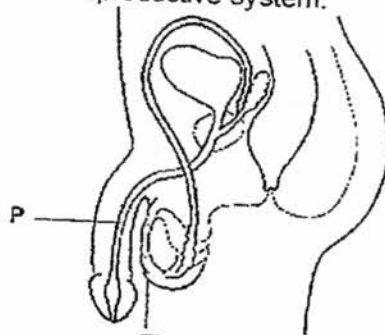


Fig. B3

In a medical school discussion, a student mistakenly suggested that tube P be cut and tied to sterilise a male patient.

- (a) Describe what will happen to the male patient in doing so.

[1]

- (b) Explain how the permanent sterilisation should be performed for males.

.....
 [1]

- (c) On Fig. B3, mark out the part of the male reproductive system that is suggested in B3 (b) with an "X". [1]

B4 A woman had a typical 28-day menstrual cycle. On 2nd April, she started to menstruate.

April						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

- (a) In the above calendar, circle all the dates which the woman menstruate in the month of April. [1]

- (b) In the above calendar, underline all the dates which fall on the woman's fertile period. [1]

- (c) Explain why the fertile period of the woman is longer than her ovulation.

.....
 [2]

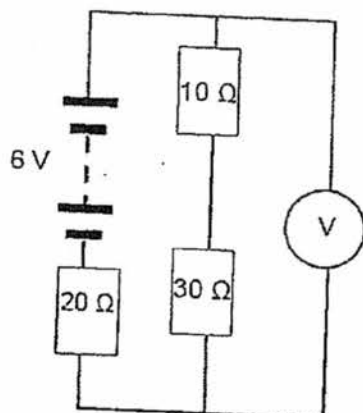
B5 (a) Draw a complete circuit diagram which shows the following characteristics.

- 3 dry cells in series
- 3 light bulbs parallel to the dry cells, where 2 light bulbs are in the same branch and 1 light bulb is in the other branch,
- 1 ammeter measuring the total current of the circuit, and
- 1 voltmeter to measure the potential difference of 1 of the 2 light bulbs in the same branch.

[2]

15

- (b) In the circuit shown below, a battery of e.m.f 6 V is connected to three resistors.



- (i) Calculate the total resistance of the circuit.

Ans: [1]

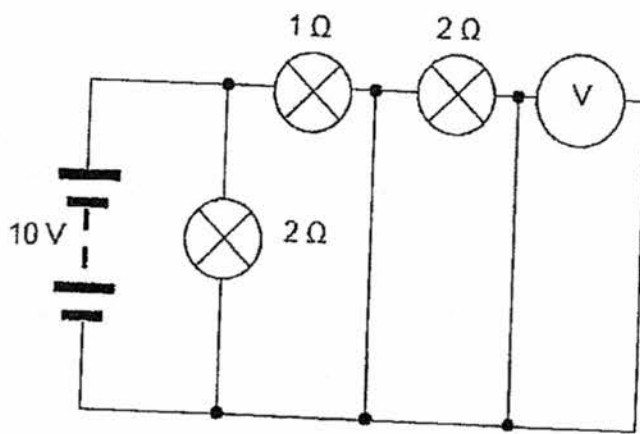
- (ii) Calculate the current that enters the battery.

Ans: [1]

- (iii) Calculate the reading in the voltmeter.

Ans: [1]

B6 Fig. B6a shows a combination of three bulbs connected to a 10 V battery.



16

- (a) Calculate the total resistance of the circuit.

Ans: [1]

- (b) Calculate the current that enters the battery.

Ans: [1]

- (c) Determine the reading in the voltmeter.

Ans: [1]

- B7 A 1.5 kW air-conditioner is connected to the 240 V mains.
It was switched on for 8 hours per day.

- (a) Calculate the total cost of using the air-conditioner for 30 days if the cost of electricity is 20 cents per unit.

Ans: [1]

- (b) If a 500 W fan is used instead of the air-conditioner for the same length of time, how much can the consumer save in one month?

Ans: [2]

B8 (a) The relationship between resistance of a wire with respect to wire length and cross-sectional area are as follows:

- The longer the wire length, the higher the resistance.
- The greater the wire cross-sectional area, the smaller the resistance.

Complete the Table B8 for wires B, C and D made from the same material.

Wire A has been done for you.

wire	length / cm	cross-sectional area / cm ²	resistance / Ω
A	5.0	10.0	2.0
B	2.5	10.0	..
C	5.0		8.0
D		5.0	12.0

Table B8

(b) Suggest the best material for wiring a household circuit. [3]

..... [1]

-End of Section B-

Section C (40 marks)

Answer only four questions.

- C1 (a) Four Visking tubings are put into a beaker containing distilled water. Table C1a(i) shows the masses of the Visking tubing before and after the experiment.

- (i) Calculate the change in mass of each of the Visking tubing and record it in the table below.

Visking tubing with liquid	mass of Visking tubing at the start /g	mass of Visking tubing at the end /g	change in mass of Visking tubing /g
A	20.0	21.2	
B	20.0	20.0	
C	20.0	24.9	
D	20.0	23.1	

Table C1a(i)

[1]

- (ii) Using the above information, match the Visking tubings A, B, C and D with the contents given below.

contents in Visking tubing at the start of the experiment	Visking tubing
distilled water	
5 % sucrose solution	
25 % sucrose solution	
60 % sucrose solution	

Table C1a(ii)

[2]

- (iii) Explain how you arrived at your answers for the Visking tubing containing

distilled water :

[1]

60 % sucrose solution :

[1]

- (b) Fig. C1b shows the structure of a human heart.

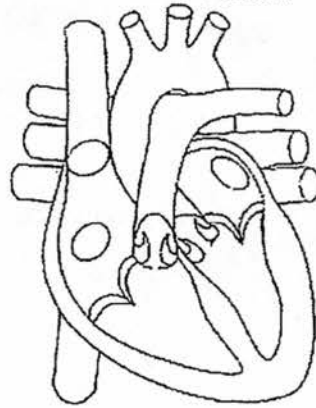


Fig. C1b

- (i) Explain why the walls of the left ventricle is thicker than the walls of all other chambers in the heart.

.....
.....

[2]

- (ii) Describe one difference between blood entering from the right and left atria of the heart.

.....
.....

[2]

- (iii) State one function of the capillaries in the human circulatory system.

.....
.....

[1]

- C2 (a) Fig. C2a shows a chart of abnormal sperms taken from a gynaecologist clinic.

Part of sperm	Diagrams of defective sperms
Head	

Fig. C2a

Suggest how defects in the head of the sperm will affect fertilisation.

.....
 [1]

- (b) Fig. C2b shows how fertilisation occurs to form a structure X.

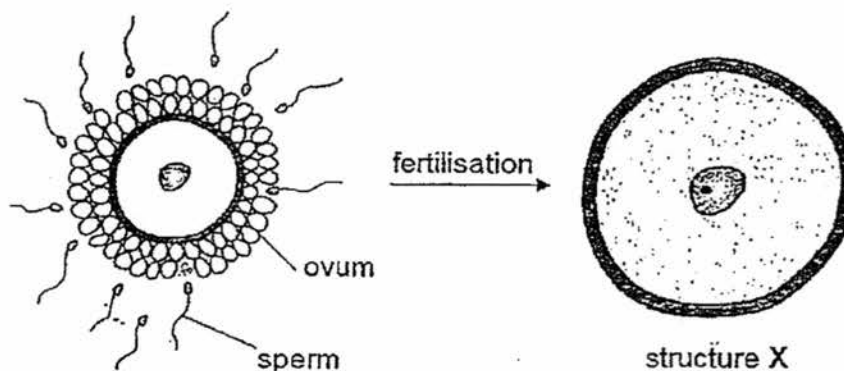


Fig. C2b

- (i) Identify structure X.
 [1]
- (ii) Describe what must happen to structure X before a woman is considered pregnant.

 [1]
- (iii) State one medical reason why a woman might abort the foetus developed from structure X.

 [1]

- (c) Raja and Anita were recently married. They opted for birth control as Anita has two more years to complete her university studies. They are considering either intra-uterine device or contraceptive pills. Anita and Raja are both very busy with their work and tend to be forgetful when under a lot of stress.

- (i) State and explain which birth control is best suited for them.

.....

.....

.....

[2]

- (ii) State one side effect if Anita were to take the contraceptive pills.

.....

.....

[1]

- (d) Study the following excerpt.

Sexual intercourse remains the main mode of HIV transmission. 97% (440 out of 455) of the cases acquired the infection through sexual intercourse, of which 38% were from heterosexual transmission, 51% from homosexual transmission and 8% from bisexual transmission. For the remaining cases, four had acquired HIV through intravenous drug use. The cause of infection for the remaining 11 cases could not be determined.

(extracted from Ministry of Health (Singapore) website,
https://www.moh.gov.sg/content/moh_web/home/statistics/infectiousDiseasesStatistics/HIV_Stats/update-on-the-hiv-aids-situation-in-singapore-20141.html)

- (i) State the name of the sexually transmitted infection caused by HIV.

.....

[1]

- (ii) Suggest what could be the reason for the 11 unrecorded cases.

.....

[1]

- (iii) State the birth control method that can prevent the transmission of HIV. Explain how it prevents the transmission of HIV.

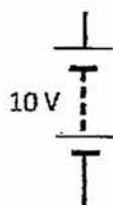
.....

[1]

- C3 (a)** A toy car has four headlights. All four headlights are connected in parallel with each other across a 10 V battery as shown.

Complete the circuit diagram to include :

- the four headlights connected to the battery,
- one switch which will control all four headlights.
- an electrical component that can control the brightness of all 4 headlights.



[2]

- (b)** Fig. C3b shows three identical light bulbs, X, Y and Z connected in a circuit to a 10 V cell. The ammeter measures a current of 0.20 A.

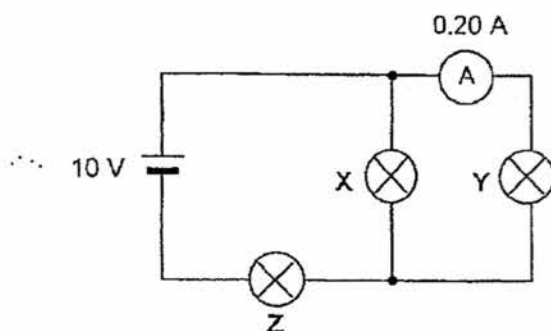


Fig. C3b

- (i)** Calculate the total current leaving the battery.

Current = [1]

- (ii)** Determine the resistance of light bulb X.

Resistance = [2]

- (iii) A low resistance copper wire PQ, is then connected to circuit as shown.

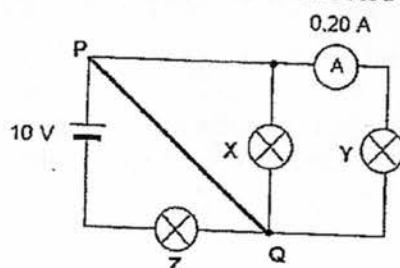


Fig. C3c

It was observed that bulb Z became brighter at first but blows out later. Explain the observation.

[1]

- (c) A main cable has three wires in it: the live (L), the neutral (N) and the earth (E). The cable is to be connected to an electrical heater which is enclosed in a metal case.

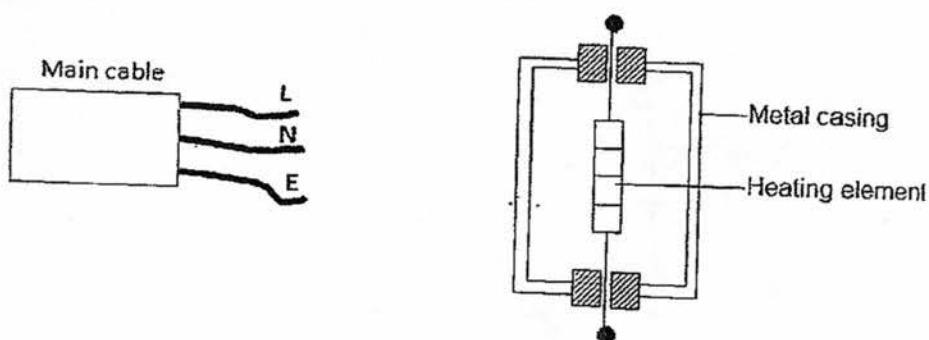


Fig. C3d

- (i) On the Fig. C3d, complete the circuit diagram by connecting the live, the neutral and the earth wires to the electrical heater correctly. [1]
- (ii) Draw the symbols of the fuse and switch at the correct positions on Fig. C3d. [2]
- (iii) State the colour of the wire in each conductor in the table below.

conductor / wire	colour
live	
neutral	
earth	

[1]

- C4** Fig. C4a and Fig. C4b show two possible lighting circuits containing switches S_1 and S_2 and two identical lamps L_1 and L_2 which enable two rooms in a house to be lit.

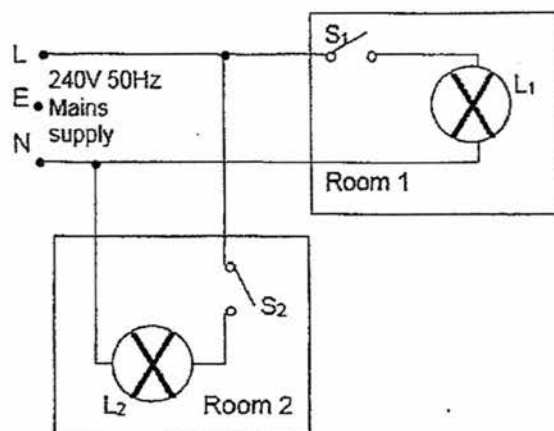


Fig. C4a

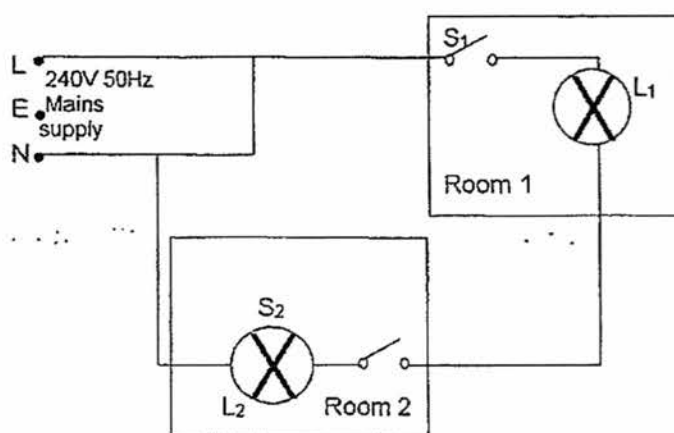


Fig. C4b

- (a) Describe and explain the effect on the lamps by closing:

Switch S_1 in Fig. C4a:

..... [1]

Switch S_1 in Fig. C4b:

..... [1]

- (b) If the voltage of the mains supply is 240 V and the resistance of each lamp is $1000\ \Omega$, find the current in **each circuit** when both switches S_1 and S_2 are closed.

Working for Fig. C4a	Working for Fig. C4b

Ans: Current in Fig. C4a : [2]
 Current in Fig. C4b: [2]

- (c) State and explain which of the two circuits is more suitable for use in our homes.

.....

 [2]

- (d) Suggest a suitable fuse rating for both circuits.

..... [1]

- (e) State one example of the chemical effect of electricity.

.....
 [1]

- C5 (a) From 7 pm to 9 pm, the occupants of an office switch on the following electrical appliances:

a 2kW air conditioner
 a 200 W TV
 a 400 W computer
 3 light bulbs of 250 W each,

The occupants only occupy the office on weekday nights.

- (i) If the cost of 1 kWh is 35 cents, how much is the electricity bill for four weeks?

Ans: [2]

- (ii) Explain what is meant by the '250 W' label on a light bulb.

.....
 [1]

- (b) Ms Ng bought an oven made in Singapore with a power rating of 1200 W. The main voltage in Singapore is 230 V.

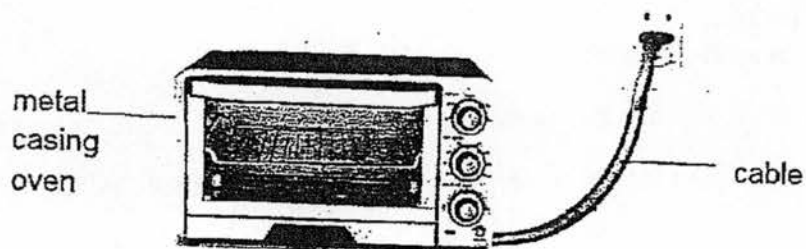
- (i) Calculate the current flowing through the oven when it is switched on.

Ans: [1]

- (ii) The total energy consumed to bake a fruit cake in that oven is 5.0 kWh.
 Calculate the time taken to bake that fruit cake.

Ans: [1]

The casing of the oven is made of metal. Ms Ng was not aware that the cable from the oven contains only two wires.



- (iii) Name the **missing** wire.

..... [1]

- (iv) Explain why it is dangerous to use this oven.

..... [2]

- (v) Explain why nichrome is chosen to make the heating coil in the oven.

..... [2]

-END OF PAPER-

The Periodic Table of Elements

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3 Li lithium 7	4 Be beryllium 9	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulphur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids -	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids -	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Ts tennessine -	117 Uu unseptennium -	118 Og oganesson -	119 Uuhc unbinilium -	120 Uuht untridecium -	121 Uuhv unquadrivium -	122 Uuhs unhexastennium -	123 Uuhp unheptastennium -	124 Uuhk unoktettium -	125 Uuhl unnonium -	126 Uufl unflaviium -	127 Uuhg unhectium -	128 Uuhl unhunnium -	129 Uuhq unqunium -	130 Uuhw unwinnium -	131 Uuol unbinilium -	132 Uuob unbinilium -	133 Uuol unbinilium -	134 Uuob unbinilium -	135 Uuol unbinilium -	136 Uuob unbinilium -	137 Uuol unbinilium -	138 Uuob unbinilium 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Do NOT print the answer key for the pupils

2017 LOWER SECONDARY SCIENCE SECONDARY Two Express SA1 ANSWER KEY

Setter: Surimah bte Selamat

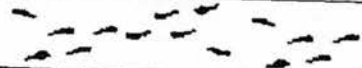
1st Vetter: Mrs Djie (HOD) 2nd Vettters : Ms Denise Wong, Ms Corrina Teo Ms Jacquelyn Wan

Section A (30 marks)

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

Section B (30 marks)

No	Marks	Suggested answers	Remarks
B1 (a)	1	Diffusion is the movement of molecules/ particles from a region of high concentration to a region of lower concentration	
(b)	1	The impurities diffuse from high concentration (blood) to low concentration (salt solution) through the membrane.	
(c)	1	The cells are too large to pass through the membrane.	
(d)	1	Platelets in the blood help the blood to clot at the needle removal site.	
$U = C/A = P =$ U: A: P:			

No		Marks	Suggested answers		Remarks
B2	(a)	2	Blood component	Appearance not to scale	
			A plasma	pale yellow fluid	
			B White Blood cell		
			C Platelets		

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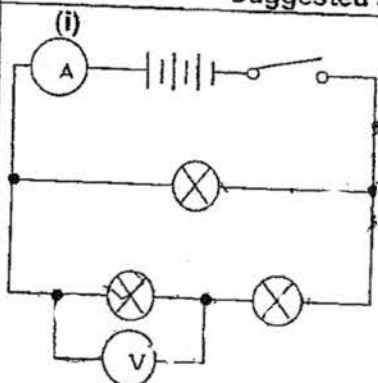
		D Red blood cells			
Table C2					
(b)	1		Red blood cell	White blood cell	Award mark for any difference chosen from the table shown here
		Number	More	Less	
		Size	Bigger	Smaller	
		Shape	Circular, Biconcave	Round/irregular	
		Nucleus	No	Yes	
		Life span	120 days	1 day or less	
		Function	Transport oxygen	Produce antibodies, fight microbes	
(c)	1	Both A and D does not contain any nucleus which explains absence of DNA material for tracking.			
U= C/A= P= U: A: P:					

No	Marks	Suggested answers	Remarks
(a)	1	He is unable to urinate.	
(b)	1	Both sperm duct is cut.	
(c)	1		Award mark if X is placed anywhere along the sperm duct.
U= C/A= P= U: A: P:			

No		Marks	Suggested answers						Remarks
B4			April						
			Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1	(2)	(3)	(4)
			(5)	(6)	7	8	9	10	11
			12	13	14	15	16	17	18
			19	20	21	22	23	24	25

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		26	27	28	29	30	31		
(a)	1	correct circled dates for 2-6 Apr, 30-31 Apr							
(b)	1	correct underlined dates for 12-17 Apr { 6 days ovulation }							
(c)	2	Sperms can survive 2 to 3 days in the fallopian tube before ovulation. [1] Ovum can survive 2 to 3 days in the fallopian tube after ovulation. [1]							
U= C/A= P=									
U:									
A:									
P:									

No	Marks	Suggested answers	Remarks
B5 (a)	2	(i)  3 dry cells in series 3 light bulbs parallel to the dry cells, where 2 light bulbs are in the same branch and 1 light bulb is in the other branch {no marks if no connecting wires} - 1 ammeter measuring the total current of the circuit - 1 voltmeter to measure the potential difference of 1 of the 2 light bulbs in the same branch {no marks if no connecting wires}	
(b)	1	[2] - {1 mark for every 2 correct points} (i) $R_{\text{eff}} = (10 + 20 + 30) \Omega = 60 \Omega$	
	1	(ii) $I = V/R = 6 \text{ V} / 60 \Omega = 0.1 \text{ A}$	
	1	(iii) $V = I \times R = 0.1 \text{ A} \times 40 \Omega = 4 \text{ V}$	
U= C/A= P=			
U:			
A:			
P:			

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No	Marks	Suggested answers	Remarks
B6	(a)	1 $1/R_{\text{eff}} = 1/2 + 1/1 + 1/2 = 2$ $R_{\text{eff}} = 0.5 \Omega$	
	(b)	1 $I = V/R = 10 \text{ V} / 0.5 = \underline{20 \text{ A}}$	
	(c)	1 $V = \text{E.M.F} = 10 \text{ V}$	
	U= C/A= P= U: A: P:		

No	Marks	Suggested answers	Remarks
B7	(a)	1	cost= 1.5 x 8 X \$0.20 X 30 days= \$72
	(b)	2	cost= 0.5 x 8 X \$0.20 X 30 days= \$24 [1] Savings = 72-24= \$48 [1]
	U= C/A= P=		
	U: A: P:		

No	Marks	Suggested answers				Remarks
B8	(a)	3				

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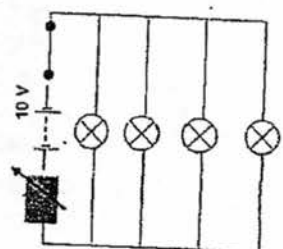
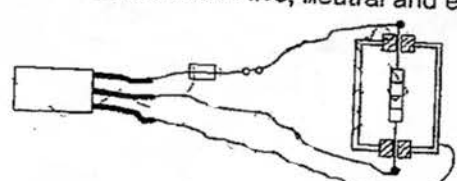
Section C (40 marks)

No	Marks	Suggested answers		Remarks	
C1	(a)	1	(i)	Change in mass of Visking Tubing/g 1.2 0.0 4.9 3.1	Award [½] for any 2 correct answers
		2	(ii)	Visking Tubing B A D C	Award [1] for any 2 correct answers
		2	(iii)	Distilled water : <u>There is an equal water potential so no osmosis, no change in mass. [1]</u> 60% sucrose solution: <u>Least water potential so water enters the Visking tubing, largest increase in mass [1]</u>	
				U= C/A= P=	
				U: A: P:	
	(b)	2	(i)	Reason: <u>The left ventricle needs to generate more force [1] to pump blood at higher pressure over a longer distance [1]</u>	
		2	(ii)	<u>The blood from the right atrium is deoxygenated. [1]</u> <u>Whereas the left atrium is oxygenated. [1]</u> or <u>The blood from the right atrium has more CO₂ content. [1]</u> <u>Whereas the left atrium has less CO₂ content. [1]</u>	
		1	(iii)	<u>Allows exchange of gases (oxygen and carbon dioxide) from the blood to the tissues [1] / Allows exchange of nutrients from the blood to the tissues [1]</u> <u>/ connects arteries to veins [1]</u>	
				U= C/A= P=	Award [1] for any correct answer
				U: A: P:	Students attempt=

BEDOK SOUTH SECONDARY SCHOOL

No	Marks	Suggested answers	Remarks
C2	(a)	1	Number of chromosomes may not be 23 lack of an acrosome / Egg membranes cannot be broken down
	(b)	1	(i) Zygote
		1	(ii) Zygote will divide itself into an embryo which will implant itself into the uterine lining
		1	(iii) The baby may be born physically or mentally handicapped / The life of the mother and/or fetus are in danger.
	(c)	2	(iv) Intra-Uterine Device [1] because it is temporary and implantation of IUD takes place only once/ Anita may forget to take the pills as they are forgetful when busy [1]
		1	(v) Side effects: nausea, weight gain, mood changes, abdominal pains
	(d)	1	(i) Acquired Immune Deficiency Syndrome [1]
		1	(ii) Patient's open wound [1/2] could have come into contact with the body fluids of an HIV-positive person unknowingly. [1/2]
		1	(iii) Condom [1/2] is made of rubber and is impermeable to sperm, bacteria and viruses [1/2].
	U= C/A= P=		Students attempt=

BEDOK SOUTH SECONDARY SCHOOL

No	Marks	Suggested answers	Remarks								
C3	(a) 2	(i)  [½ m] all 4 bulbs drawn in parallel [½ m] switch [1m] variable resistor at correct position No marks awarded if bulbs arranged in series									
	(b) 1	(i) $I_{\text{tot}} = 0.20 \text{ A} \times 2 = 0.40 \text{ A}$									
	2	(ii) $R_{\text{tot}} = 10 \text{ V} / 0.4 \text{ A} = 25 \Omega \quad [1]$ $R + (1/R + 1/R)^{-1} = 25 \Omega \quad [½]$ $3R/2 = 25 \Omega$ $R = 16.7 \Omega \quad [½]$									
	1	(iii) Wire PQ creates a less resistance route for the current to flow [½] resulting in short circuit [½].									
	(d) 1	(i) for correct connection of live, neutral and earth wires 									
	1	(ii) correct position of the fuse and switch									
	2	(iii) <table border="1" data-bbox="547 1274 1158 1453"> <thead> <tr> <th>Conductor/Wire</th><th>Colour</th></tr> </thead> <tbody> <tr> <td>Live</td><td>Brown</td></tr> <tr> <td>Neutral</td><td>Blue</td></tr> <tr> <td>Earth</td><td>Green and yellow</td></tr> </tbody> </table>	Conductor/Wire	Colour	Live	Brown	Neutral	Blue	Earth	Green and yellow	[2] – {1 mark for 2 correct boxes}
Conductor/Wire	Colour										
Live	Brown										
Neutral	Blue										
Earth	Green and yellow										
	U = C/A $\neq$ p										
	U: A: P:		Students attempt=								

BEDOK SOUTH SECONDARY SCHOOL

No	Marks	Suggested answers	Remarks																		
C4	(a) 2	Fig. C4a: L1 will light up; but not L2 [1] Fig. C4b: Both L1 and L2 will not light up [1]																			
	(b) 4	<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Fig. C4a</th><th style="width: 50%;">Fig. C4b</th></tr> </thead> <tbody> <tr> <td>1/Total resistance:</td><td>Total resistance</td></tr> <tr> <td>$1/1000 + 1/1000$</td><td>$1000 + 1000 = 2000 \text{ ohms [1]}$</td></tr> <tr> <td>$= 2/1000$</td><td>$I = V/R$</td></tr> <tr> <td>Total resistance =</td><td>$= 240 / 2000$</td></tr> <tr> <td>500ohms.[1]</td><td>$= 0.12 \text{ A [1]}$</td></tr> <tr> <td>$I = V/R$</td><td></td></tr> <tr> <td>$= 240/500$</td><td></td></tr> <tr> <td>$= 0.48 \text{ A [1]}$</td><td></td></tr> </tbody> </table>	Fig. C4a	Fig. C4b	1/Total resistance:	Total resistance	$1/1000 + 1/1000$	$1000 + 1000 = 2000 \text{ ohms [1]}$	$= 2/1000$	$I = V/R$	Total resistance =	$= 240 / 2000$	500ohms.[1]	$= 0.12 \text{ A [1]}$	$I = V/R$		$= 240/500$		$= 0.48 \text{ A [1]}$		
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	(c) 2	Fig. C4a is more suitable as the connections are in parallel. [1] Each lamp can be turned on or off separately and if one lamp blows, the other will not be affected.[1]																			
	(d) 1	A 0.5 A / 1 A fuse will be suitable for both circuits as their current flow is less than 0.5 A.																			
	(e) 1	electrolysis or extraction of metals / electroplating																			
		U= C/A= P= U: A: P:	Students attempt=																		

BEDOK SOUTH SECONDARY SCHOOL

No	Marks	Suggested answers	Remarks
C5	(a)	2	(i) Power used = $2 + 0.2 + 0.4 + 0.75 = 3.35 \text{ kW}$ [$\frac{1}{2}$] Energy used = $3.35 \times 3 \text{ hours} = 10.05 \text{ kWh}$ [$\frac{1}{2}$] $10.05 \text{ kWh} \times 20 \text{ days} = 201 \text{ kWh}$ [$\frac{1}{2}$] Costs = $201 \text{ kWh} \times \$0.35 = \70.35 [$\frac{1}{2}$]
		1	(ii) Bulb converts 250 J of electrical energy into light and heat every second.
			U= C/A= P= U: A: P:
	(b)	1	(i) $P=IV$ $I=P/V=1200\text{W}/230=5.22 \text{ A}$
		1	(ii) $Pt=E$ $t=E/P=5 \text{ kWh} / 1.2 \text{ kW} = 4.17 \text{ hour}$
		2	(iii) Earth Wire
		1	(iv) When the live wire trips [1/2] and touches metal casing, the oven metal casing becomes 'live' / 240V [1/2]; if a person touches oven metal casing, current will flow through him / electrocuted / electric shock [1]
		2	(v) Due to its high resistance [1] Nichrome metal oppose flow of current; hence a lot of electrical energy is converted to heat energy [1]
			U= C/A= P= U: A: P:
			Students attempt=