BEDOK SOUTH SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2021

2EXP

CANDIDATE NAME

CLASS

REGISTER NUMBER

LOWER SECONDARY SCIENCE

4 October 2021

Candidates answer on the OMS and Question Booklet.

2 hours

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name on all the work you hand in.
Write in dark blue or black pen, except for Section A.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue, or correction fluid.

This paper consists of three sections.

SECTION A (30 marks)
There are **30** questions in this section. Answer **ALL** questions.
For each question, there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** that you consider correct and record your choice in **soft pencil** on the separate Optical Mark Sheet (OMS) provided.

SECTION B (30 marks)
Answer **ALL** questions.
Write down your answers in the spaces provided on the question paper.

SECTION C (40 marks)
There are five questions in this section. Answer only **FOUR** questions in this section.
Write down your answers in the spaces provided on the question paper.

The use of an approved scientific calculator is expected, when appropriate.
Omission of essential working will result in loss of marks.
Round off all non-exact answers to 3 significant figures.
You are reminded of the need for ***clear presentation*** in your answers.

The number of marks is given in brackets [ ] at the end of each question or part question.
A copy of the Periodic Table is printed on **page 28**.

For Examiner's Use	
Section A	30
Section B	30
Section C	40
Total	100

Setter: Mr Wong Zi Heng

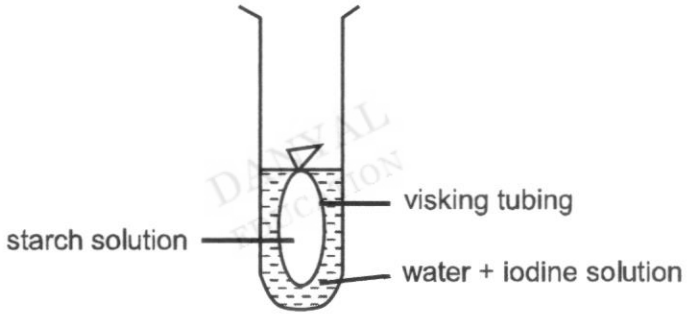
SECTION A: Multiple Choice Questions (30 marks)

Each question below is provided with four answers.
Select the correct answer and shade either **A**, **B**, **C** or **D** in the OMS provided.

1 Which is a correct comparison between diffusion and osmosis?

	diffusion	osmosis
A	does not only involve water molecules	involves only water molecules
B	does not require energy	requires energy
C	faster with higher temperature	same rate regardless of temperature
D	occurs only when there is no partially permeable membrane	occurs only when there is partially permeable membrane

2 An experiment was set up as shown in the diagram below. After 10 minutes, the results of the experiment were recorded.



Which results would be observed after 10 minutes?

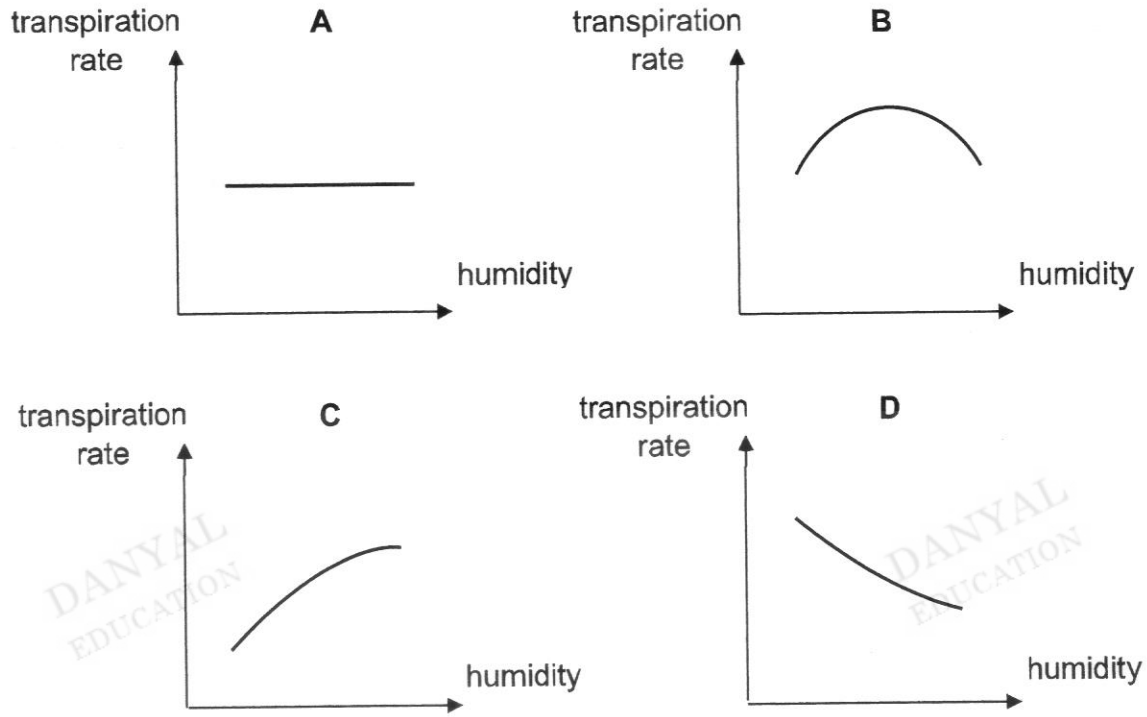
	liquid in boiling tube	starch solution in visking tubing
A	remains yellowish-brown	remains colourless
B	remains yellowish-brown	turns blue-black
C	turns blue-black	turns blue-black
D	turns blue-black	turns yellowish-brown

3 Which components of blood are involved in the transport of substances?

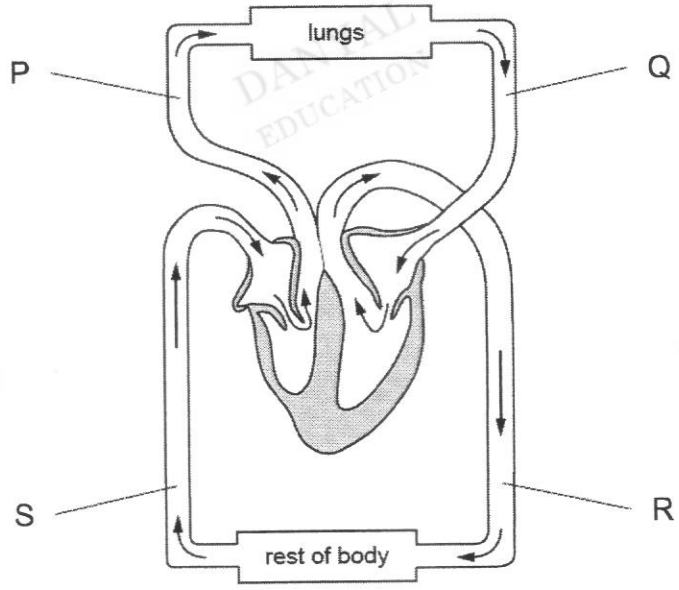
1 plasma
2 platelets
3 red blood cells
4 white blood cells

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 and 4

4 Which graph shows the effect of increased humidity on the transpiration rate of a plant?



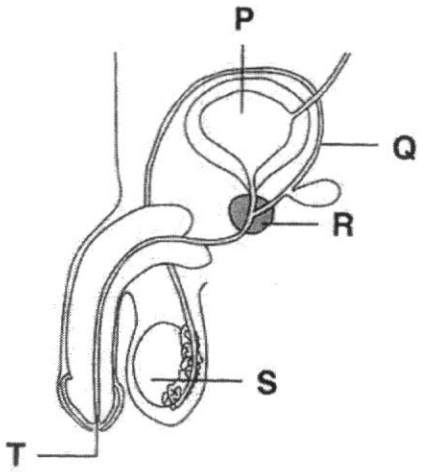
5 The diagram shows the circulatory system.



Which option about the blood vessels is correct?

	deoxygenated blood	wide lumen
A	P and S	P and R
B	P and S	Q and S
C	Q and S	P and R
D	Q and S	Q and S

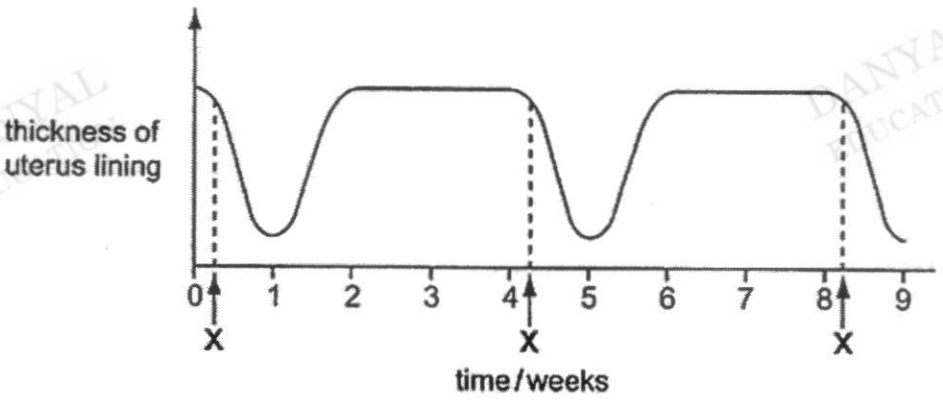
6 The diagram shows the male reproductive system.



Which identifies the correct part for the given functions?

	produce male sex hormones	produce fluid in semen	transport semen and urine
A	R	S	Q
B	R	S	T
C	S	P	Q
D	S	R	T

7 The graph shows changes in the thickness of the uterus lining of a woman over a period of 9 weeks.



What event is likely to occur at X?

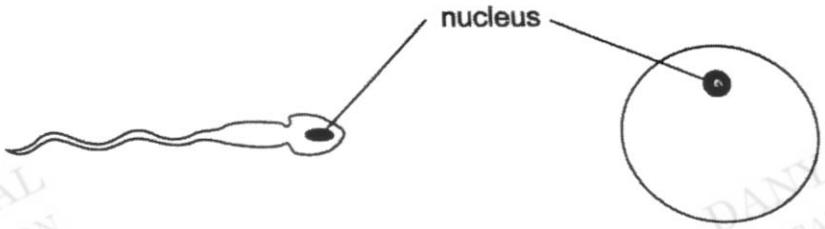
A fertilisation **B** implantation **C** menstruation **D** ovulation

8 Which changes occur in both boys and girls during puberty?

1 growth spurt occurs
2 hair starts to grow in pubic region and armpits
3 hips broaden
4 voice deepens

A 1 and 2 **B** 1 and 3 **C** 1, 2 and 3 **D** all of the above

9 The diagram shows two gametes involved in human reproduction.



What is immediately formed by the fusion of the nucleus of the two gametes?

A embryo **B** foetus **C** ovum **D** zygote

10 How does the contraceptive pill prevents pregnancy?

A It prevents implantation of the fertilised egg.
B It produces and releases a substance that kills sperms.
C It stops menstruation.
D It stops ovulation.

11 Which is correct about gonorrhoea?

	signs and symptoms	harmful effects
A	burning sensation during urination	can cause person to be sterile
B	discharge of pus from reproductive organ	can cause heart failure
C	non-itchy rashes	can cause blindness in babies
D	painless sores	can cause insanity

12 Which of the substance(s) consist(s) of particles which are in constant motion?

1 air at a temperature of – 15 °C
2 copper at a temperature of 350 °C
3 water at 25 °C

A 1 only **B** 3 only **C** 2 and 3 **D** all of the above

13 In which of the substances are the attractive forces between the particles the weakest?

A a cold gas **B** a cold liquid **C** a hot liquid **D** a hot solid

14 A change in state of matter is shown below.

Which best describes the change in state?

	process	thermal energy
A	boiling	gained
B	boiling	lost
C	melting	gained
D	melting	lost

15 The freezing points of four substances are given below.

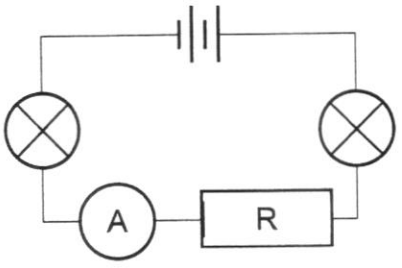
substance	freezing point / °C
ammonia	–78
ethanol	–114
mercury	–39
water	0

The four substances were kept in a very cold freezer. After 2 hours, only one of the substances was found to be still in liquid state, while the other three are frozen solid.

What is the temperature of the freezer?

A 0 °C **B** –30 °C **C** –60 °C **D** –90 °C

16 The circuit shows a 3.0 V battery connected to two 1.0 Ω light bulbs, a resistor R and an ammeter. The ammeter reading is 0.60 A.



What is the resistance of resistor R?

A 0.40 Ω **B** 1.0 Ω **C** 3.0 Ω **D** 5.0 Ω

17 Diagram 1 shows a resistor connected to a battery, an ammeter and a voltmeter.

The ammeter reading is 1.0 A, and the voltmeter reading is 5.0 V.

A second identical resistor is now connected in parallel with the first resistor, as shown in diagram 2.

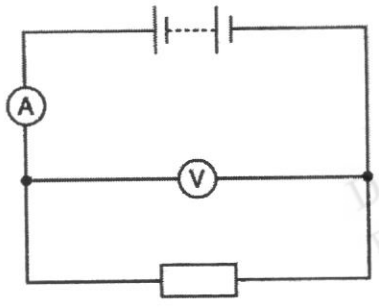


diagram 1

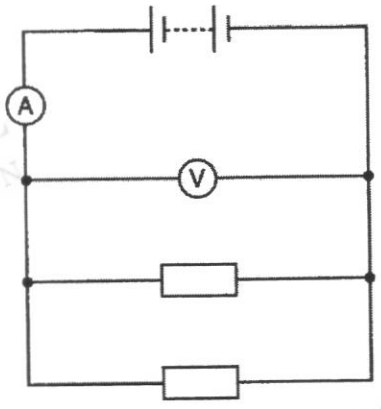
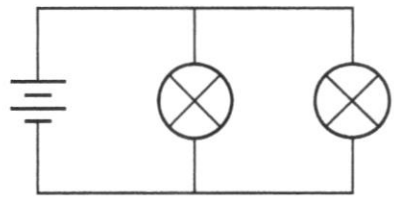


diagram 2

What are the ammeter and voltmeter readings in the circuit shown in diagram 2?

	ammeter reading / A	voltmeter reading / V
A	1.0	2.5
B	1.0	5.0
C	2.0	5.0
D	2.0	10.0

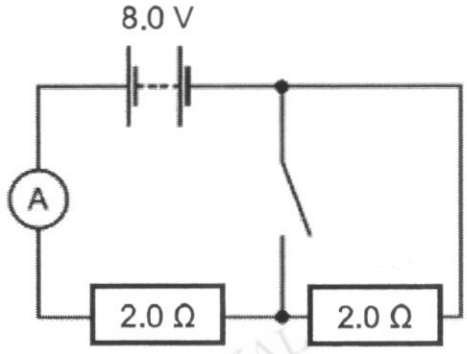
18 The circuit shows a 4.0 V battery connect to two 4.0 Ω light bulbs.



What is the current that flows through the battery?

A 0.50 A **B** 1.0 A **C** 2.0 A **D** 8.0 A

19 The diagram shows an electrical circuit where two 2.0 Ω resistors are connected to a 8.0 V battery, an ammeter and a switch.



What is the reading on the ammeter when the switch is open, and closed respectively?

	ammeter reading when switch is open / A	ammeter reading when switch is closed / A
A	2.0	1.0
B	2.0	4.0
C	4.0	2.0
D	4.0	4.0

20 What is the most appropriate fuse rating for a "240 V, 1200 W" heater?

A 3 A **B** 5 A **C** 10 A **D** 13 A

21 The cost of electrical energy is $0.19 per kWh. A 1500 W hotplate is switched on for 1 hour, and a 2000 W oven for 30 minutes.

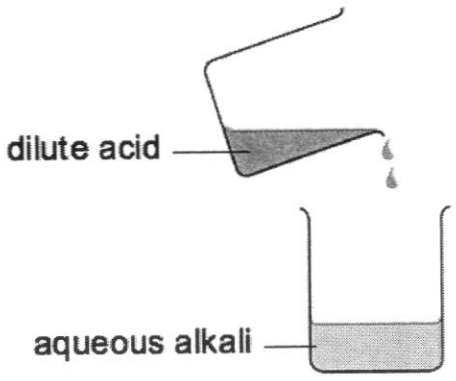
What is the total cost of using both appliances?

A $0.12 **B** $0.48 **C** $1.00 **D** $11.69

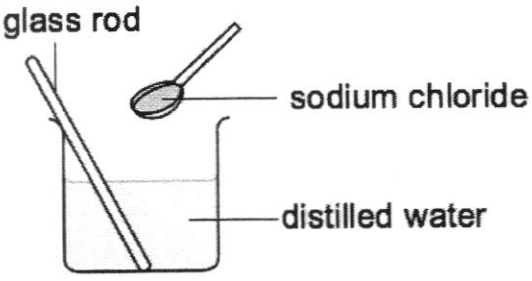
22 The following diagrams show four different experimental set-ups.

Which of the following will not result in a chemical change?

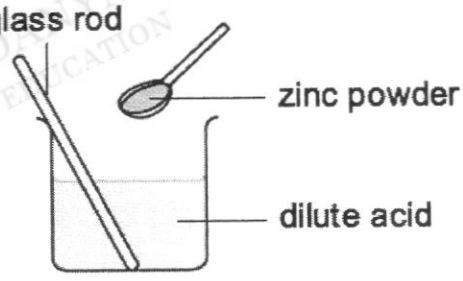
A



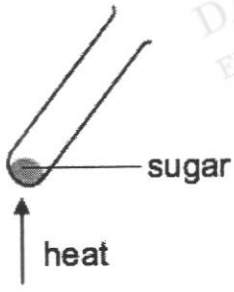
B



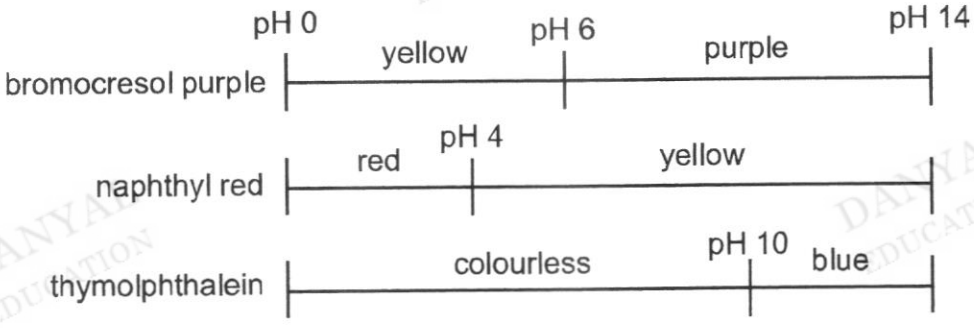
C



D



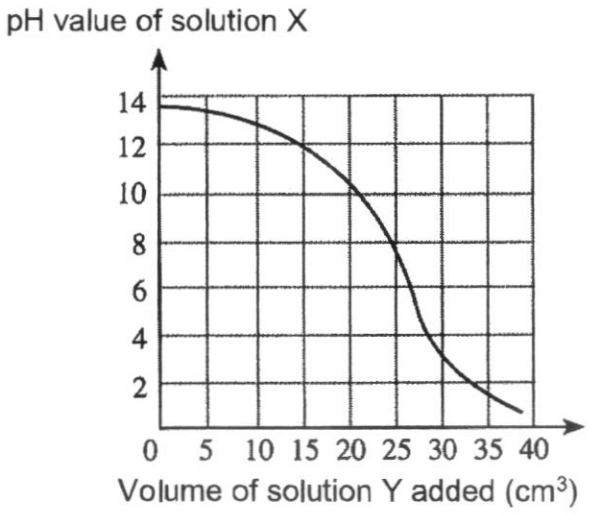
23 The information below gives the colour change of three indicators.



Which colours would be seen when a few drops of each indicator are added into separate test tubes of pure water?

	bromocresol purple	naphthyl red	thymolphthalein
A	purple	yellow	blue
B	purple	yellow	colourless
C	purple	red	blue
D	yellow	red	colourless

24 The graph below shows the pH change of solution X when solution Y is gradually added to it.



What is the volume of solution Y required to neutralize solution X?

A 13 cm^3 **B** 25 cm^3 **C** 28 cm^3 **D** 39 cm^3

25 Which statement is correct?

A A neutron has a relative charge of 0.

B A neutron has a relative mass of 0.

C A neutron orbits around the nucleus.

D Nucleon number is the number of neutrons in an atom.

26 Six elements and their proton numbers are listed below. The letters are not their chemical symbols.

element	P	Q	R	S	T	U
proton number	7	9	11	13	14	19

Which two of these elements would have similar chemical properties?

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

27 C*l*-35 and C*l*-37 are two isotopes of chlorine.

Which statements are correct?

1 Both isotopes have the same chemical properties.
2 Both isotopes have the same electronic configuration.
3 Both isotopes have the same mass number.
4 Both isotopes have the same physical properties.

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

28 The electronic configuration of M^{2-} is 2.8.8. It has 18 neutrons.

What is the mass number of M?

A 20 **B** 34 **C** 36 **D** 38

29 X is a metal. X and sulfur can combine chemically to form an ionic compound XS. X can also combine chemically with nitrogen to form a compound.

What is the chemical formula of this compound?

A XN **B** X_2N_3 **C** X_3N **D** X_3N_2

30 Which substance has a giant ionic lattice structure?

	electrical conductivity at 500 °C	melting point	soluble in water
A	good	3600	no
B	poor	36	no
C	poor	186	yes
D	poor	2200	yes

- End of Section A -

SECTION B: Structured Questions (30 marks)

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

B1 Fig. B1.1 shows the cross-sections of three different types of blood vessels P, Q and R.

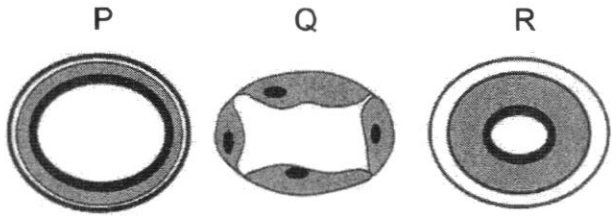


Fig. B1.1

(a) (i) State the blood vessel P, Q or R, which the blood flow is the fastest and at a high pressure.

..... [1]

(ii) Explain how the structure of this blood vessel helps it to withstand the high pressure.

.....

..... [1]

Fig. B1.2 shows a human heart.

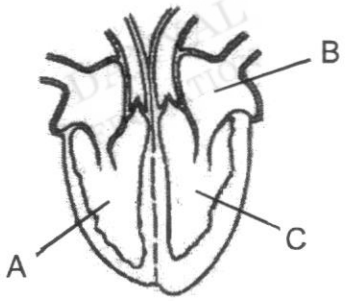


Fig. B1.2

(b) (i) Name structures A and B.

A ..... B ..... [2]

(ii) Explain why structure C has a thicker wall than A.

.....

.....

..... [2]

[Total: 6 marks]

B2 Fig. B2.1 shows the number of people reported to be HIV-positive at a city hospital and the ways by which they were infected over the years.

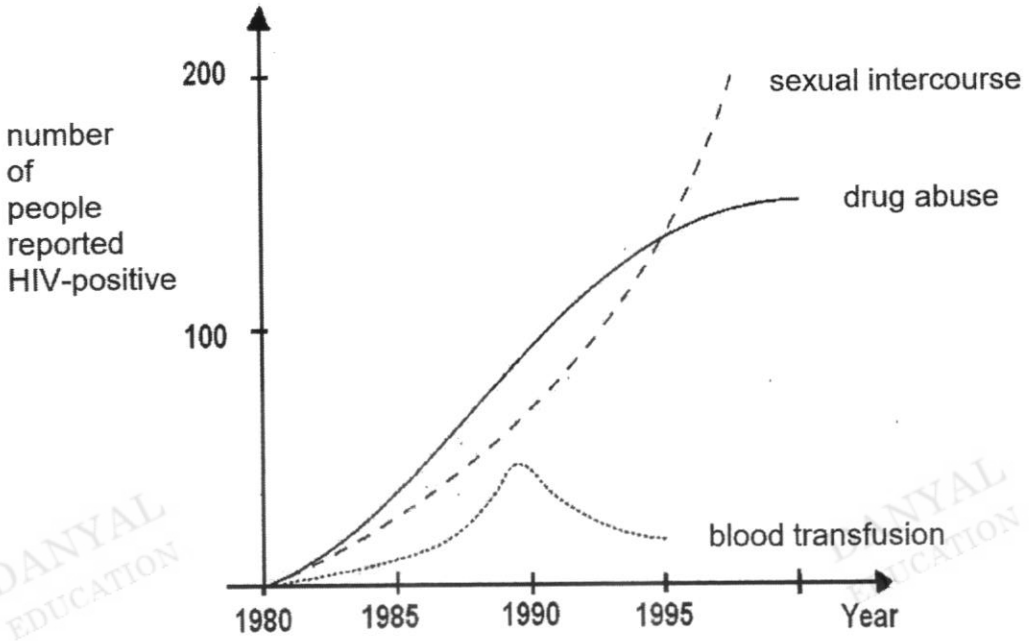


Fig. B2.1

(a) Explain how drug abuse can lead to the transmission of HIV.

.....

..... [1]

(b) State another possible source of HIV infection not shown in Fig. B2.1.

..... [1]

(c) Based on the information from Fig. B2.1 after 1995, suggest the most effective way to control the spread of HIV virus.

..... [1]

(d) In a survey, it was found that the number of people infected with HIV is higher than the number of AIDS patients.

Explain why.

.....

..... [1]

(e) Explain how AIDS is fatal.

.....

..... [1]

[Total: 5 marks]

B3 A pure liquid at 50 °C is allowed to cool in a laboratory. Its temperature is recorded every minute. Fig. B3.1 shows the graph of the temperature changing over time.

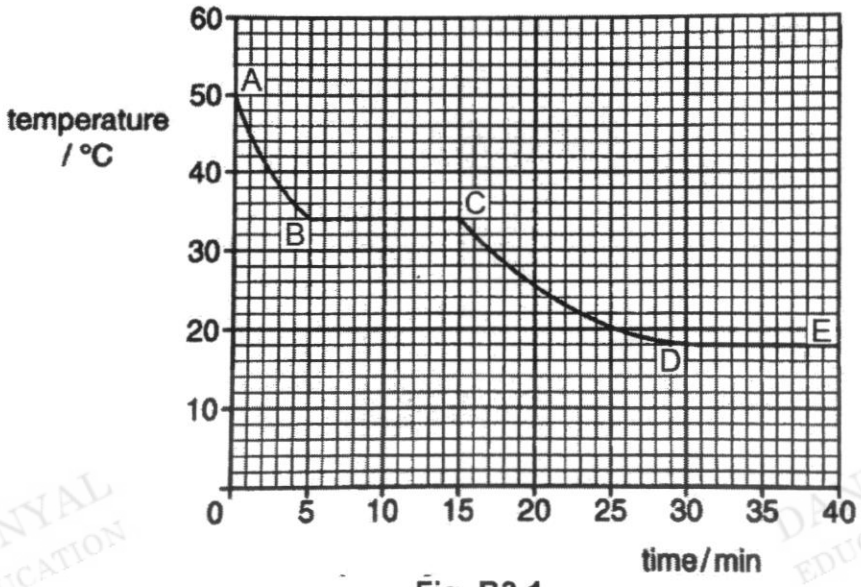


Fig. B3.1

(a) State the portion(s) of the graph, AB, BC, CD, DE, that represents the substance

(i) undergoing freezing,

..... [1]

(ii) purely in solid state.

..... [1]

(b) Using the particulate model of matter, explain why the substance

(i) does not have a fixed shape at point A,

.....

..... [1]

(ii) has a lower density at point C compared to point D.

.....

.....

.....

..... [2]

[Total: 5 marks]

B4 Fig. B4.1 shows the connection of three wires, live, neutral and earth wires to an electric oven.

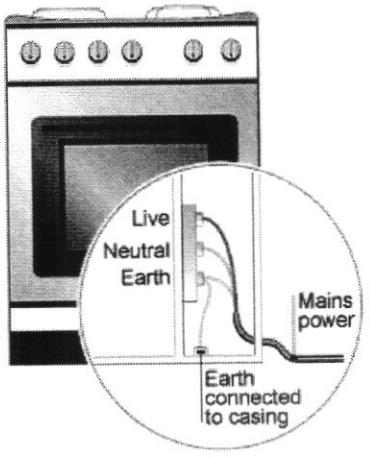


Fig. B4.1

(a) State and explain which wire a switch should be connected to.

.....

.....

..... [2]

(b) **(i)** Explain how the earth wire helps to protect the user in the event that the live wire touches the metal casing of the electric oven.

.....

.....

..... [2]

(ii) The plug of a modern plastic lamp was taken apart to check whether the wiring was similar but the earth wire was not found.

Suggest why the plastic lamp does not require an earth wire to protect the user.

.....

..... [1]

[Total: 5 marks]

B5 To study the effects of heat, a student heated three different substances and recorded the experimental results in Table B5.1.

Table B5.1

substance	appearance before heating	appearance after heating	mass of substance before heating / g	mass of substance after heating / g
calcium carbonate	white	white	3.0	1.7
copper (II) oxide	black	black	3.0	3.0
magnesium	grey	white	3.0	5.0

(a) (i) State which substance did not undergo a chemical change.

..... [1]

(ii) Using the information in Table B5.1, explain your answer in **(a)(i)**.

.....

..... [1]

(b) One of the substance was broken down into simpler substances.

State the type of chemical change that took place.

..... [1]

(c) One of the substance underwent the process of oxidation.

Write a word equation for the reaction.

..... [1]

[Total: 4 marks]

B6 Table B6.1 shows the number of protons, neutrons and electrons for four particles.

Table B6.1

particle	number of protons	number of neutrons	number of electrons
J	4	5	4
K	5	5	5
L	5	6	2
M	5	6	5

(a) State the particle(s) which

(i) has/have mass number of 10,

..... [1]

(ii) is/are electrically neutral,

..... [1]

(iii) has/have 2 valence electrons,

..... [1]

(iv) is/are unreactive.

..... [1]

(b) Draw the electronic structure of particle M.

[1]

[Total: 5 marks]

- End of Section B -

SECTION C: Free Response Questions (40 marks)

Answer any **four** questions in the section in the spaces provided.

C1 Fig. C1.1 shows the movement of water from the soil into the root hair in a plant.

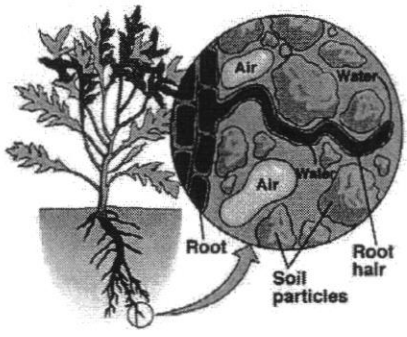


Fig. C1.1

(a) Describe the movement of water from the soil into the root hair cell.

.....

.....

.....

..... [2]

Fig. C1.2 shows three plant cells that is placed in different solutions.

Fig. C1.2

(b) (i) Describe the state of cells B and C.

cell B ..... cell C ..... [2]

Table C1.1 shows the types of solutions the plant cells is placed in.

Table C1.1

	X	Y	Z
solution	distilled water	0.45% sucrose solution	10% sucrose solution
cell			

(ii) Fill in Table C1.1 to identify the cells A, B or C placed in each solution. [2]

One of the leaf of the plant was supplied with carbon dioxide containing radioactive carbon atoms as shown in Fig. C1.3. A small tube was inserted into the stem at point X. Droplets of liquid from tissue B were collected from the tube.

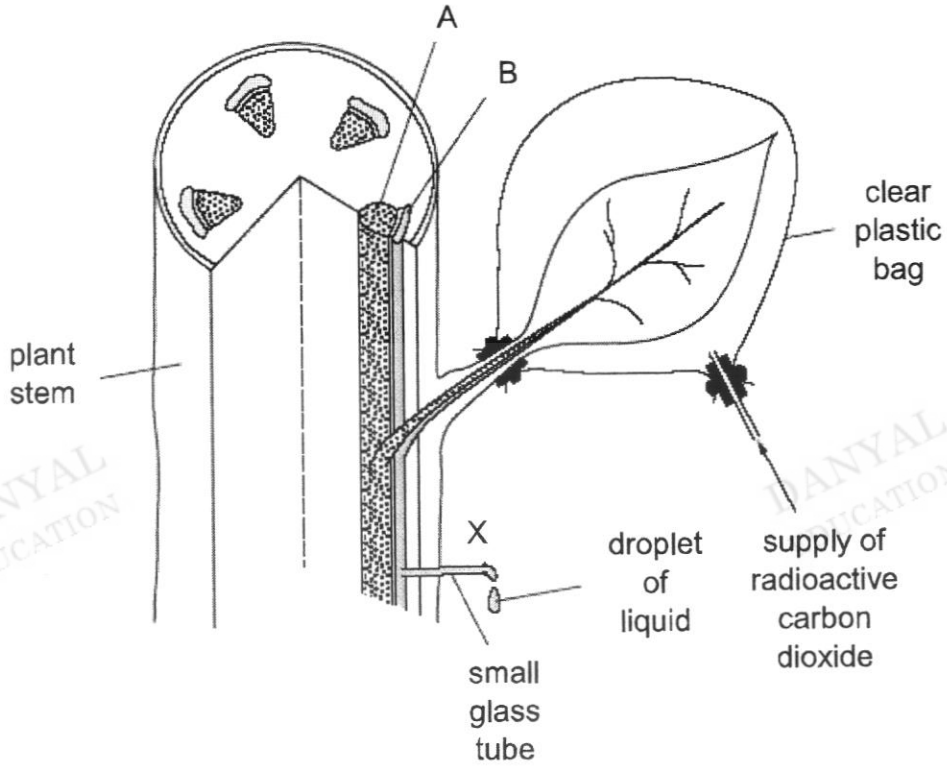


Fig. C1.3

(c) (i) Identify tissue A and state its function.

.....

.....

..... [2]

(ii) When radioactive carbon dioxide was supplied during daylight, the droplets of liquid which appeared at X were radioactive.

Explain these observations.

.....

.....

.....

..... [2]

[Total: 10 marks]

C2 Fig. C2.1 shows the changes in the level of female hormones and the thickness of the uterine lining of a woman during a period from 9th June to 6th July.

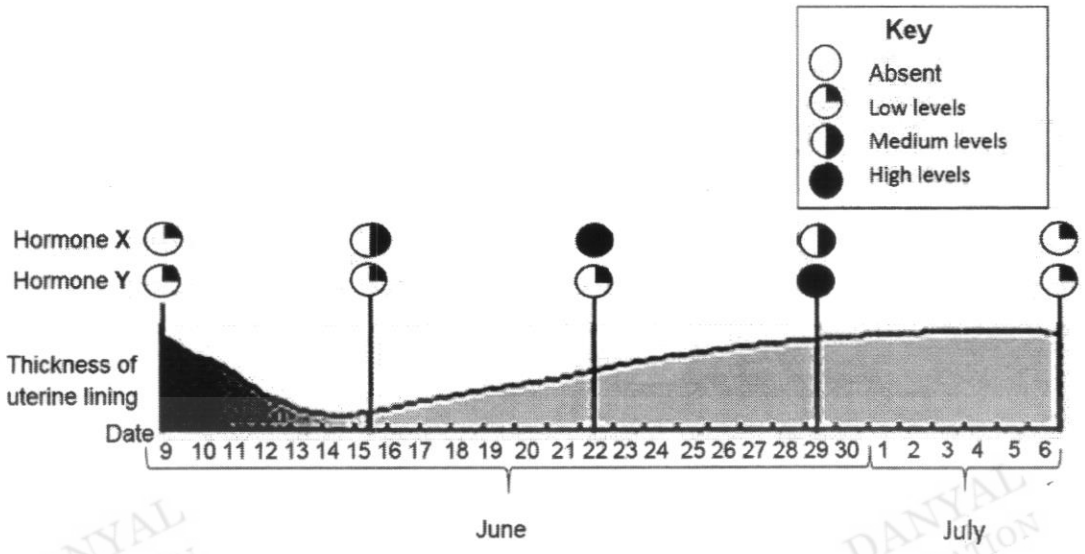


Fig. C2.1

(a) **(i)** State the part of the reproductive system that produces the female hormones.

..... [1]

(ii) The previous menstrual cycle of the woman was not 28 days.

Suggest a reason why.

..... [1]

(b) **(i)** State the name of hormone Y.

..... [1]

(ii) State the functions of hormone X.

.....

..... [2]

(c) The woman uses a temporary birth control method to prevent her from pregnancy by avoiding sexual intercourse during the fertile period.

(i) Name this birth control method.

..... [1]

(ii) State the dates of the woman's fertile period in June.

..... [1]

(iii) Other than keeping track of the dates, explain how else the woman can monitor her fertile period.

.....

..... [1]

(d) Based on Fig. C2.1, state and explain if fertilisation has occurred over the given period.

.....

.....

..... [2]

[Total: 10 marks]

C3 Fig. C3.1 shows two 3.0 Ω resistors and a 2.0 Ω light bulb connected to a battery.

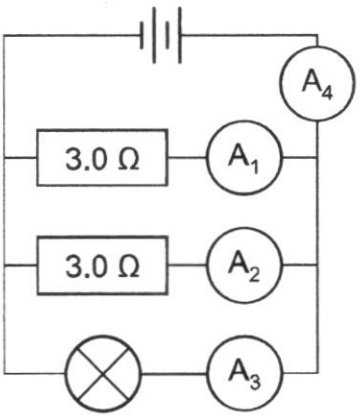


Fig. C3.1

Both ammeter A_1 and A_2 has a reading of 2.0 A.

(a) Calculate the electromotive force (e.m.f.) of the battery.

electromotive force = ... [2]

(b) Calculate the reading of ammeter A_3.

ammeter reading = ... [1]

(c) Calculate the power of the light bulb.

power = ... [2]

(d) Calculate the energy used by the light bulb in 5.0 min, leaving your answer in J.

energy used = ... [2]

(e) Calculate the effective resistance of the circuit.

effective resistance = ... [2]

(f) Calculate the reading of ammeter A_4.

ammeter reading = ... [1]

[Total: 10 marks]

C4 Fig. C4.1 shows some chemical reactions involving dilute sulfuric acid.

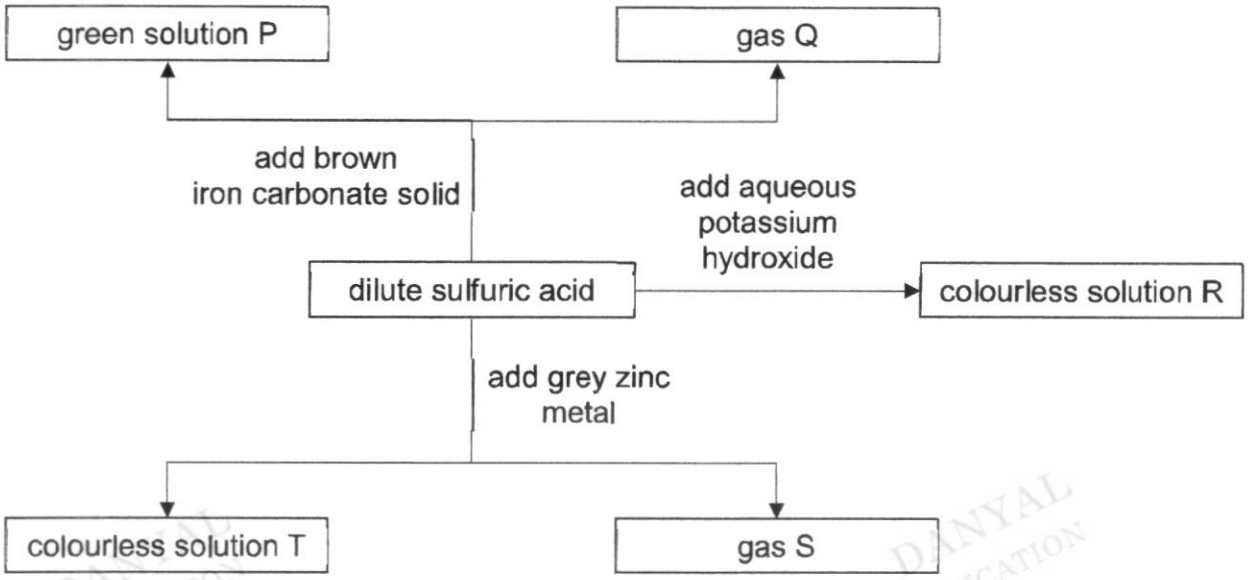


Fig. C4.1

(a) Name

(i) solution P

..... [1]

(ii) gas Q

..... [1]

(iii) solution R

..... [1]

(iv) gas S

..... [1]

(v) solution T

..... [1]

(b) Describe the test to show the presence of gas Q. State the observation for this test.

.....

.....

..... [2]

(c) Write the word equation for the reaction between dilute sulfuric acid and aqueous potassium hydroxide.

..... [1]

(d) **(i)** Ashley put a piece of blue litmus paper into an unknown colourless solution U. The litmus paper remained blue. She concluded that solution U is alkaline in nature.

State and explain whether you agree with Ashley.

.....

..... [1]

(ii) Brittany put a piece of dry blue and a piece of dry red litmus paper into an unknown white powder V. Both litmus papers did not change colour. She concluded that powder V is neutral in nature.

State and explain whether you agree with Brittany.

.....

..... [1]

[Total: 10 marks]

C5 Aluminium fluoride is a white powder formed between the elements aluminium and fluorine.

(a) Complete Table C5.1 by filling in the electronic configurations of aluminium and fluorine atoms and ions.

Table C5.1

element	electronic configuration of atom	electronic configuration of ion
aluminium		
fluorine		

[2]

(b) Describe and explain, in terms of electrons, how aluminium fluoride may be formed.

.....

.....

.....

..... [2]

(c) Draw a dot-and-cross diagram to represent the bonding in aluminium fluoride. Show **all** electrons.

[2]

(d) Using your knowledge of the bonding and structure in aluminium fluoride, explain why aluminium fluoride exists as a solid at room temperature.

.....

.....

.....

..... [2]

Some aluminium fluoride powder is placed in a beaker. It is then connected to a battery and light bulb with wire and electrodes to form a closed circuit as shown in Fig. C5.1.

Fig. C5.1

(e) Using your knowledge of the bonding and structure in aluminium fluoride, explain why the light bulb does not light up.

.....

.....

.....

..... [2]

[Total: 10 marks]

- End of Section C -

BEDOK SOUTH SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2021
SECONDARY 2 EXPRESS LOWER SECONDARY SCIENCE
MARKING SCHEME

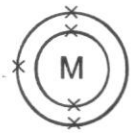
SECTION A (30 marks)

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

1 mark deducted from overall for any of the following:
- ✓ Missing/incorrect units
- ✓ Not leaving calculations to 3 sig. fig. when necessary

SECTION B (30 marks)

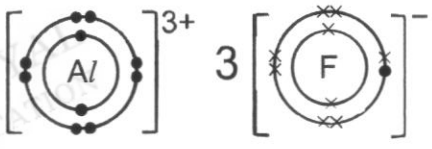
Question			Answer	Remarks
B1	**(a)**	**(i)**	R [1]	
		(ii)	The blood vessel has thick muscular elastic wall to withstand the high pressure of blood flowing through [1]	
	(b)	**(i)**	A: right ventricle [1] B: left atrium [1]	
		(ii)	It is to pump blood at a higher pressure [1] over a greater distance around the body [1]	
B2	**(a)**		Drug abusers share unsterilized/contaminated needles [1]	
	(b)		Passed from infected mother to baby during pregnancy/birth/through breast milk. [1]	
	(c)		Avoid having multiple sex partners Using condoms during sexual intercourse Either one [1]	
	(d)		AIDS is the last stage of HIV infection People who are HIV positive may not have developed AIDS yet. Either one [1]	
	(e)		The immune system is severely damaged/weakened causing the body to be susceptible/vulnerable to common infections. [1]	
B3	**(a)**	**(i)**	BC [1]	
		(ii)	CD and DE [1]	
	(b)	**(i)**	The substance is in a liquid state and the particles are arranged in an irregular pattern and able to slide past one another. [1]	
		(ii)	The substance underwent contraction and the particles move closer together. [1] The volume decreases while the mass remains the same, resulting in the density to increase to be higher at point D. [1]	

B4	**(a)**	Live wire [1] Current is cut off from electric oven when switch is off, making the oven safe to touch [1]	
	(b) (i)	The earth wire provides a path of low resistance for the current to flow to ground/earth. [1] This prevents the user from electrocution/electric shock. [1]	
	(ii)	Lamp is made of plastic, an electrical insulator/poor electrical conductor. Lamp may be double insulated. Either one [1]	
B5	**(a) (i)**	Copper (II) oxide [1]	
	(ii)	The mass before and after heating remained to be the same at 3.0 g and no new substance is formed. [1]	
	(b)	Thermal decomposition [1]	
	(c)	Magnesium + oxygen gas → magnesium oxide [1]	
B6	**(a) (i)**	K [1]	
	(ii)	J, K, M [1]	
	(iii)	J [1]	
	(iv)	L [1]	
	(b)	 [1]	

SECTION C (40 marks)

Question		Answer	Remarks
C1	**(a)**	The soil has higher water potential than the root hair cell sap. [1] There is a net movement of water molecules from the soil to the root hair cell sap by osmosis. [1]	
	(b) (i)	Cell B: Turgid [1] Cell C: Plasmolysed/flaccid [1]	
	(ii)	<table><tr><td></td><td>X</td><td>Y</td><td>Z</td></tr><tr><td>solution</td><td>distilled water</td><td>0.45% sucrose solution</td><td>10% sucrose solution</td></tr><tr><td>cell</td><td>B</td><td>A</td><td>C</td></tr></table>1m: 1 correct 2m: 3 correct	
	(c) (i)	Xylem [1] It transports water and mineral salts from the roots to other parts of the plant. [1]	
	(ii)	Radioactive carbon dioxide was used in manufacturing of food/converted to glucose during the daytime in the leaf by photosynthesis.[1] The manufactured food is then being transported via tissue B, which is the phloem, to other parts of the plant.[1]	

C2	(a) (i)	Ovaries [1]	
	(ii)	Emotional problem/mental fatigue/stress/strenuous physical activities/malnutrition/unbalanced diet Either one [1]	
	(b) (i)	Progesterone [1]	
	(ii)	Stimulates repair and growth of uterine lining [1] and stimulates ovulation [1].	
	(c) (i)	Rhythm method [1]	
	(ii)	19th to 24th June [1]	
	(iii)	She can monitor her daily body temperature as it will rise/be slightly higher during ovulation. [1]	
	(d)	No. [1] Progesterone level drops to low which triggers mensuration as uterine lining thickness is not maintained for implantation in the event of fertilisation. [1]	
C3	(a)	$V = IR$ [1] $V = (2.0)(3.0)$ $V = 6.0V$ [1]	
	(b)	$I = \frac{V}{R}$ $I = \frac{6.0}{2.0}$ $I = 3.0A$ [1]	ecf
	(c)	$P = VI$ [1] $P = (6.0)(3.0)$ $P = 18.0W$ [1]	ecf
	(d)	$E = Pt$ [1] $E = (18.0)(5.0 \times 60)$ $E = 5400J$ [1]	ecf
	(e)	$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ [1] $\frac{1}{R_{eff}} = \frac{1}{3.0} + \frac{1}{3.0} + \frac{1}{2.0}$ $\frac{1}{R_{eff}} = \frac{7}{6}$ $R_{eff} = \frac{6}{7} = 0.857\Omega$ [1]	
	(f)	$I = \frac{V}{R}$ $I = \frac{6.0}{\frac{6}{7}}$ $I = 7.0A$ $I_t = I_1 + I_2 + I_3$ $I = 2.0 + 2.0 + 3.0$ $I = 7.0A$ Either one [1]	ecf
C4	(a) (i)	Iron sulfate [1]	

	(ii)	Carbon dioxide gas [1]	
	(iii)	Potassium sulfate [1]	
	(iv)	Hydrogen gas [1]	
	(v)	Zinc sulfate [1]	
	(b)	Bubble the gas through limewater/calcium hydroxide solution. [1] A white precipitate forms in limewater if carbon dioxide gas is present. [1] Mark based on answer in (a)(ii), if answer was hydrogen gas then answer should be test for hydrogen	
	(c)	Sulfuric acid + potassium hydroxide → potassium sulfate + water [1] ecf from (a)(iii) for potassium sulfate, main marking point is water	
	(d) (i)	Disagree. Solution U could be neutral. [1]	
	(ii)	Disagree. Powder V is not dissolved in water to produce hydrogen or hydroxide ions if any. [1]	
C5	(a)	<table><tr><th>element</th><th>electronic configuration of atom</th><th>electronic configuration of ion</th></tr><tr><td>aluminium</td><td>2.8.3</td><td>2.8</td></tr><tr><td>fluorine</td><td>2.7</td><td>2.8</td></tr></table> 1m: 2 to 3 correct 2m: 4 correct	
	(b)	Each aluminium atom loses three electrons to form Al^{3+}. Each fluorine atom gains one electron to form F^-. [1] The oppositely charged ions are attracted to each other by strong electrostatic forces of attraction to form aluminium fluoride. [1]	
	(c)	 Key Electron of Al - ● Electron of F - × 1m: 1 ion drawn correctly 2m: all ions drawn correctly, number of ions correct	
	(d)	The ions of aluminium fluoride are held together by strong electrostatic forces of attraction. [1] Large amount of energy is required to overcome the strong electrostatic forces of attraction to melt aluminium fluoride, resulting in a high melting point. Thus aluminium fluoride exists as a solid at room temperature.[1]	
	(e)	The ions of aluminium fluoride are held together in a giant ionic lattice structure in solid state. [1] The ions are not mobile to conduct electricity. Thus the light bulb does not light up. [1]	