YUHUA SECONDARY SCHOOL
MID-YEAR EXAMINATION 2019
SECONDARY TWO EXPRESS

2E	CANDIDATE NAME			
	CLASS		INDEX NUMBER	

SCIENCE

9 May 2019

1 hour 15 minutes

Additional Materials: Multiple Choice Answer Sheet

Setter: Mdm Nor Aisha Mazlan

READ THESE INSTRUCTIONS FIRST

Write your *name*, *class* and *index* number in the spaces at the top of the page.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A

Read very carefully the instructions on the Multiple Choice Answer Sheet.

There are **fifteen** questions in this section. Answer **all** questions. For each question, there are four possible answers **A**, **B**, **C** and **D**. Choose the most appropriate answer and record your choice in **soft pencil** on the separate Multiple Choice Answer Sheet.
You are advised to spend no more than **20 minutes** on **Section A** (Questions 1-15).
The total marks for **Section A** is **15.**

Section B

Answer **all** questions.
Write in dark blue or black pen. You may use a soft pencil for any diagrams or graphs.
Write your answers in the spaces provided on the question paper.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total marks for **Section B** is **45**.

A copy of Periodic Table can be found on page **20**.

The use of an approved scientific calculator is expected, where appropriate.

For Examiner's Use	
Section A	
Section B	
Total	

Section A (15 Marks)

1 Silver bromide is used in photography to develop a photographic image. When exposed to light, silver bromide decomposes and as a result, it preserves an image.

Which of the following word equations represents the formation of a photographic image?

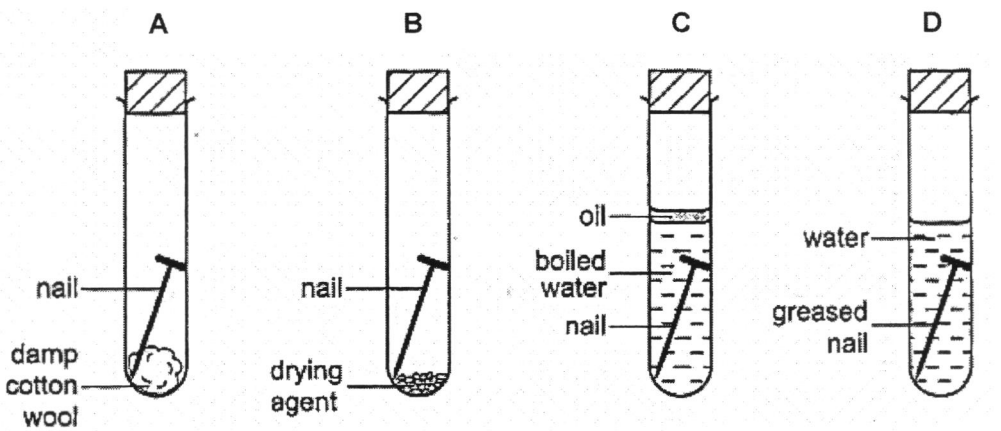
A silver bromide $\xrightarrow{\text{light}}$ silver + bromine

B silver bromide $\xrightarrow{\text{heat}}$ silver + bromine + light

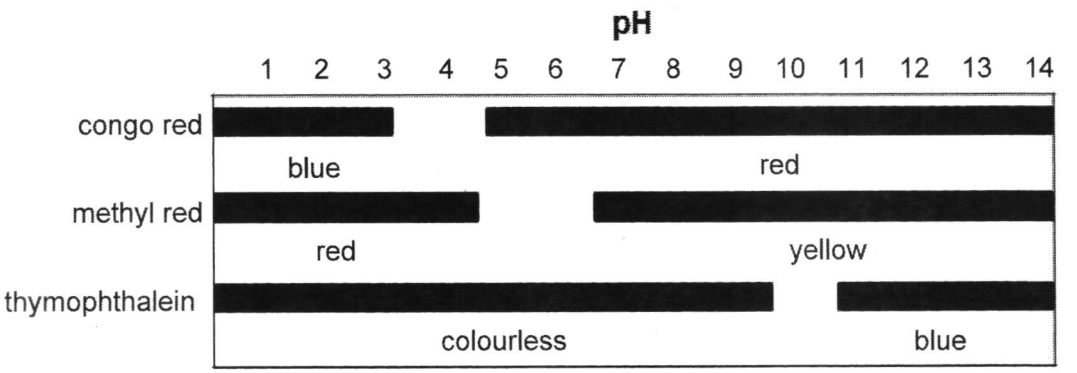
C silver bromide + oxygen $\xrightarrow{\text{heat}}$ silver(I) oxide + bromide + light

D silver bromide + oxygen $\xrightarrow{\text{light}}$ silver(I) oxide + bromine + water

2 In which of the following test-tube is the iron most likely to rust?



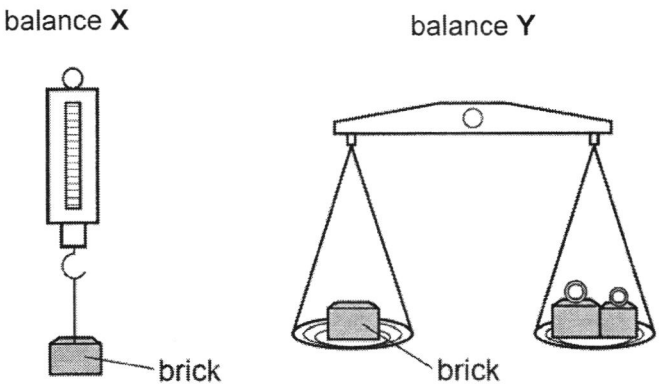
3 The graph shows the colour ranges of the acid–base indicators congo red, methyl red and thymophthalein.



A solution is red in congo red, yellow in methyl red and colourless in thymophthalein. What is the pH range of the solution?

A 4.5 – 6.5
B 6.5 – 9.5
C 9.5 – 10.5
D 10.5 – 14.0

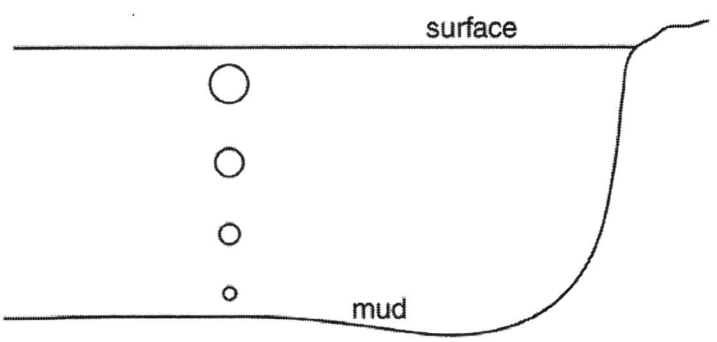
4 A brick is placed on balance **X** and then on balance **Y**.



What is being measured by each balance?

	balance X	balance Y
A	mass	mass
B	mass	weight
C	weight	mass
D	weight	weight

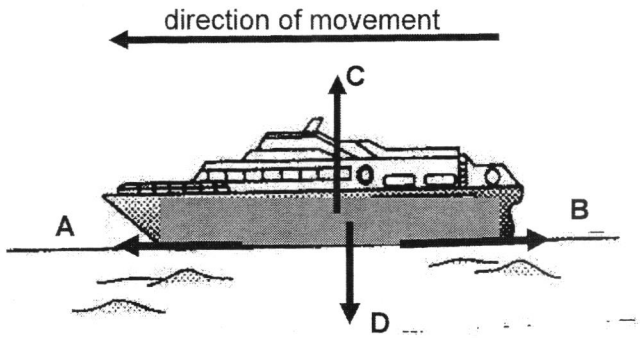
5 Bubbles of gas, escaping from the mud at the bottom of a deep lake, rise to the surface. As the bubbles rise they get larger.



Which of the following explains the above observations?

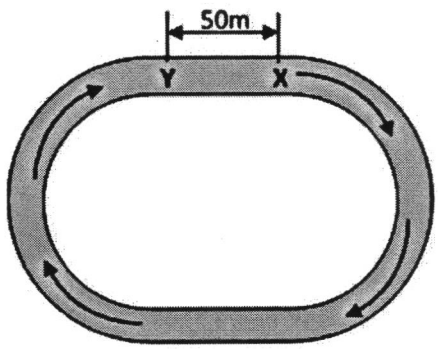
A Atmospheric pressure on the bubbles decreases.
B Atmospheric pressure on the bubbles increases.
C Water pressure on the bubbles decreases.
D Water pressure on the bubbles increases.

6 The diagram shows a ship sailing in the sea.



In which of the directions labelled **A**, **B**, **C** and **D**, is friction acting?

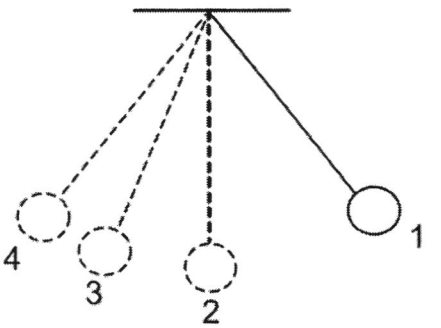
7 A student jogs round the running track of a stadium. The running track is 400 m long. He starts from point **X** and stops at point **Y**. The distance between **X** and **Y** is 50 m. He takes a time of 300 s to jog from **X** to **Y** in the direction shown.



Which of the following choices correctly shows how the jogger's average speed can be calculated?

A 50 m ÷ 300 s
B 50 m × 300 s
C 350 m ÷ 300 s
D 350 m × 300 s

For Questions 8 and 9, refer to the diagram of a swinging pendulum below.



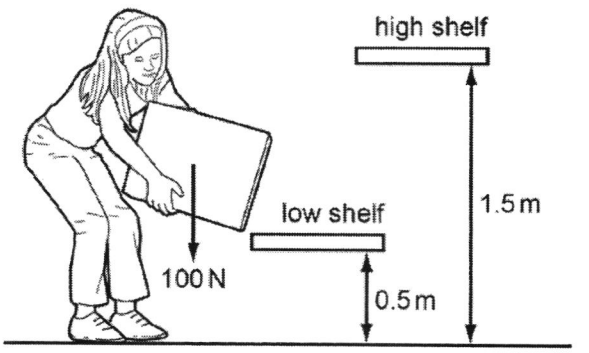
8 At which position does the pendulum bob has the greatest amount of kinetic energy?

A 1
B 2
C 3
D 4

9 At which two positions does the pendulum bob have the same amount of gravitational potential energy?

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

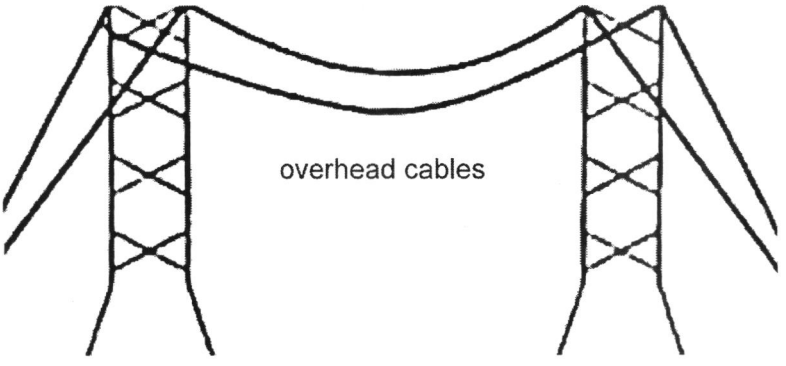
10 The diagram shows a girl lifting a box of weight 100 N from a low shelf to a high shelf.



How much work is done by the girl?

A 50 J
B 100 J
C 150 J
D 200 J

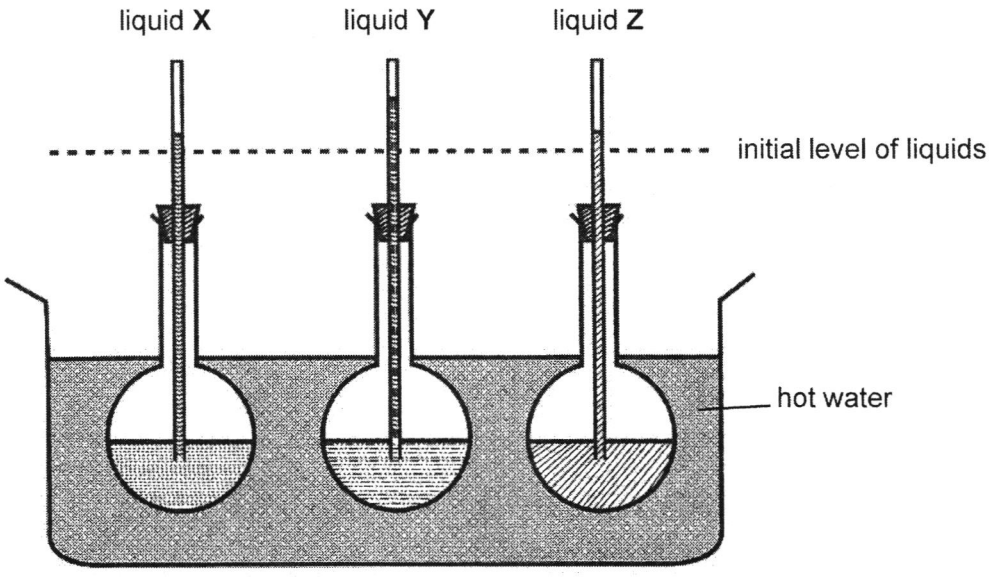
11 An electrician is setting up some overhead cables, similar to the diagram below.



Which of the following shows the best timing and method for this task?

A Lay the wires out loosely under a hot afternoon sun.
B Stretch the wires out tightly under a hot afternoon sun.
C Lay the wires out loosely during the night when it is usually the coldest temperature.
D Stretch the wires out tightly during the night when it is usually the coldest temperature.

12 The diagram below shows liquids **X**, **Y** and **Z** placed in a container of hot water. The dotted line shows the initial level of the liquids.



Which of the following statements regarding the liquids is true?

I Liquid **Y** expanded more than liquid **X**.

II Liquid **Y** and liquid **Z** are the same liquid.

III All the liquids expanded by the same amount.

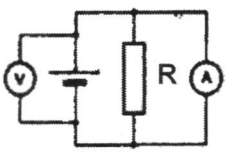
A **I** only
B **I** and **II** only
C **II** and **III** only
D **I**, **II** and **III**

13 A tiled floor normally feels colder to the touch than a carpeted one because the tiles are _____.

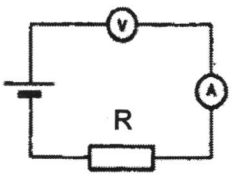
A better conductors of heat than the carpet.
B better insulators of heat than the carpet.
C better radiators of heat than the carpet.
D better reflectors of heat than the carpet.

14 Which of the following circuits can be used to find the resistance of resistor **R**?

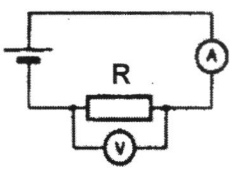
A



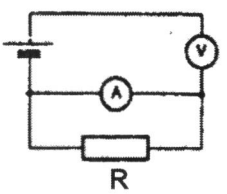
B



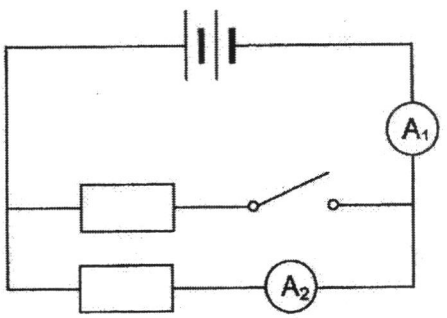
C



D



15 Two identical resistors are connected as shown in the circuit below.



If the switch is closed, how will the readings of ammeters A_1 and A_2 change?

	reading of A_1	reading of A_2
A	increases	decreases
B	increases	no change
C	no change	no change
D	no change	increases

Section B (45 marks)

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

16 Mr Tan, a security guard at HSBC building, rides a bicycle up a gentle slope during one of his night guard duties at Raffles Place.

(a) (i) State the energy conversion that occurs when Mr Tan cycles uphill.

..... [1]

(ii) He uses a dynamo shown in **Fig. 16.1** to power the electric lamp on his bicycle.

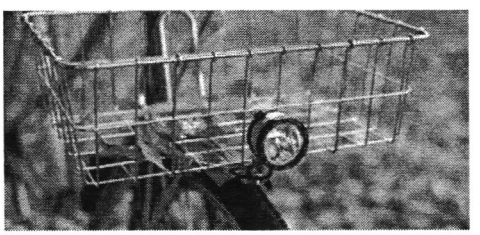


Fig. 16.1

When the bicycle wheel turns, the dynamo connected to the wheel, also turns. This generates electricity that flows in the wires connecting the dynamo to the lamp. Hence, write down the energy conversion that occurs in the dynamo.

..... [1]

(b) (i) Mr Tan often cycles to OCBC centre to deliver documents. After parking his bicycle, he walks to the lobby. **Fig. 16.2** shows Mr Tan walking and holding the documents at a constant height above the ground. The documents weigh 30 N and is moving at a constant speed.

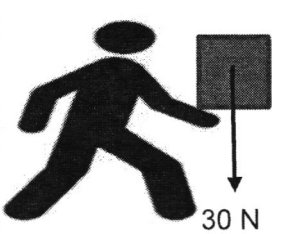


Fig. 16.2

Draw, on **Fig. 16.2** above, the force that Mr Tan acts on the documents. Label this force **F**.

[1]

(ii) Mr Tan walks 10 m to the right to hand over the documents. Explain why there is no work done.

.....

..... [1]

17 Adam cycles 7.5 km from his home to his tuition centre. **Fig. 17.1** shows Adam going downhill after reaching the peak of a slope. During this time, he does not pedal. At **A**, the bicycle's speed is 10 km/h. At the bottom of the slope, **B**, the bicycle's speed is 15 km/h. The distance between **B** and **C** is 500 m.

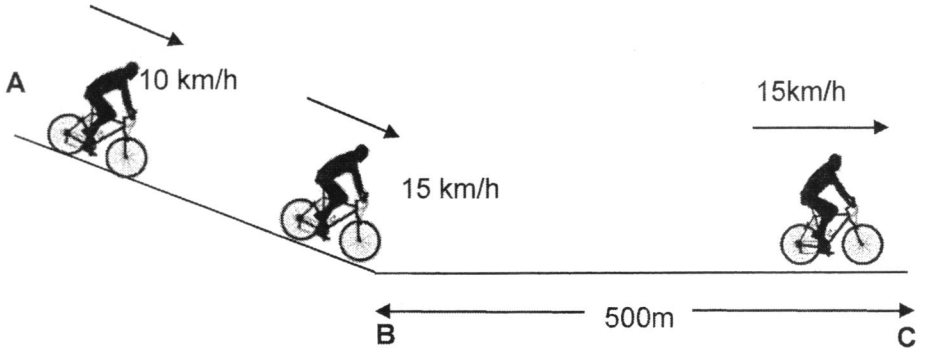


Fig. 17.1

(a) State the effect of the gravitational force acting on the bicycle when it rolls from **A** to **B**.

.....

..... [1]

(b) Between **B** and **C**, Adam maintains a horizontal constant speed of 15 km/h. The distance between points **B** and **C** is 500 m.

Calculate the time taken, in minutes, for Adam to travel from **B** to **C**.

Time: ..... minutes [2]

(c) Adam carries a bag pack on his shoulder to hold his books while cycling as shown in **Fig. 17.2**. His bag has a wide shoulder pad. Explain how the wide shoulder pads allow the bag to be carried easily on the shoulder.

Fig. 17.2
Photo source: Osprey Daylite bag packs

.....

..... [2]

18 A mother wants to pack some porridge for her baby to bring to the park. Hence, she used an insulated vacuum food jar as shown below in **Fig 18.1**. The food jar is able to keep the porridge warm for long hours.

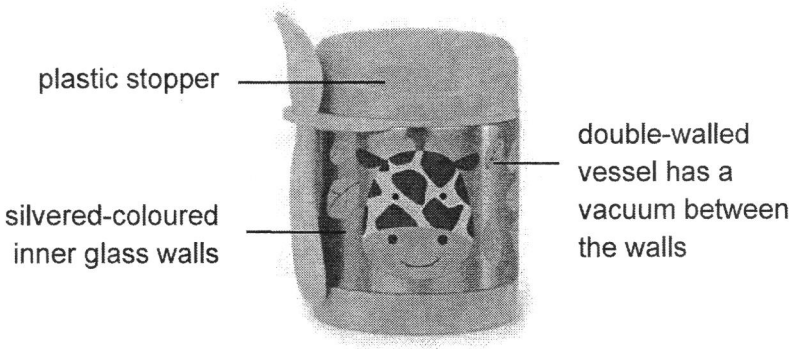


Fig. 18.1

Photo source: Skip Hop Zoo Insulated Food Jar.

Explain how the different parts of the food jar mentioned in **Fig. 18** help to prevent heat transmission and to keep the food warm for long hours.

(a) feature: plastic stopper

explanation: .....

.....

..... [1]

(b) feature: silvered-coloured inner glass walls

explanation: .....

.....

..... [1]

(c) feature: vacuum between the walls

explanation: .....

.....

..... [1]

19 Mr Tan bought an electric iron with operational voltage 240 V and power 1000 W. When he plugged it into the mains, it did not work. **Fig. 19.1** shows how the inside of the three-pin plug looks like when the cover was removed.

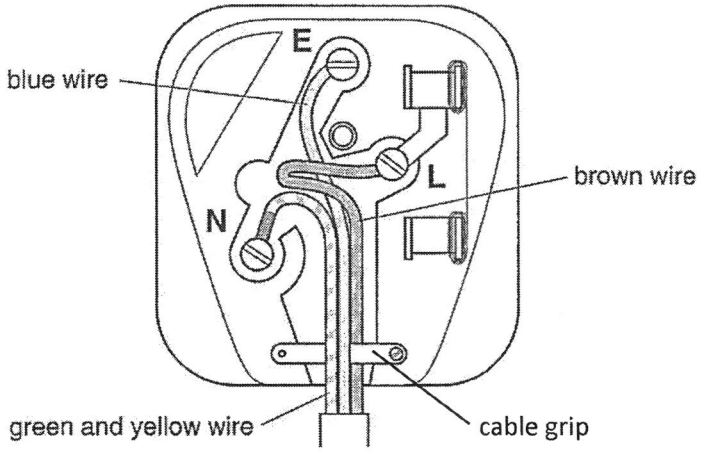


Fig. 19.1

(a) Mr Tan realised that component **X** is missing from the three-pin plug. State what component **X** is and describe its purpose.

component **X**: .....

purpose of component **X**: .....

..... [2]

(b) State another two mistakes made by the person who wired the above plug.

mistake 1: .....

.....

mistake 2: .....

..... [2]

(c) Name the green and yellow wire and explain how it protects the user when a fault occurs in the electric iron.

name of wire: .....

explanation: .....

..... [2]

20 As part of the movement to increase the use of renewable energy, the Housing and Development Board (HDB) has installed solar panels on the roofs of many blocks. By 2020, a total of 5,500 blocks will be fitted with solar panels. A picture of a rooftop with solar panels is shown in **Fig. 20.1**.

Fig. 20.1

(a) Define 'renewable source of energy'.

.....

..... [1]

(b) State one possible disadvantage of using solar energy in Singapore.

.....

..... [1]

(c) In Singapore, we have limited renewable energy options. State another form of renewable energy and explain why it is not feasible in Singapore.

renewable energy: .....

explanation: ..... [1]

21 A student has to construct a thermostat for a refrigerator as shown in **Fig. 21.1** for his Science project. He was asked to choose from five different metals **A, B, C, D** and **E** to form the bimetallic strip. The rates of expansion of the five metals are shown in **Table 21.2** with 4 being the metal that expands the most and 1 being the metal that expands the least.

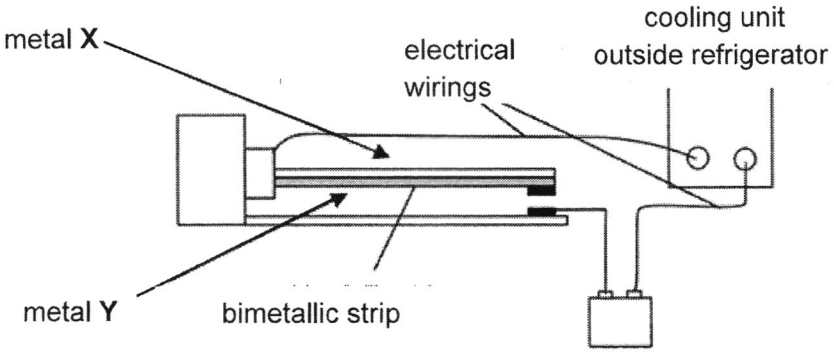


Fig. 21.1

metal	rates of expansion
A	2
B	1
C	3
D	4
E	3

Table 21.2

(a) What is a thermostat used for?

..... [1]

(b) **(i)** State whether the refrigerator in **Fig. 21.1** is at a 'warm state' or 'cold state'.

..... [1]

(ii) Describe what happens to the bimetallic strip as the refrigerator warms up.

.....

.....

.....

..... [2]

(c) Suggest two metals from **Table 21.2** that the student can use as metal **X** and metal **Y** to make the thermostat most responsive. Explain your answer.

metal **X**: ..... metal **Y**: .....

explanation: ..... [2]

22 In an accident that occurred on 12 August 2017, a tanker lorry carrying hydrochloric acid collided with a car at the highway near the entrance of Senawang toll, Malaysia as shown in **Fig. 22.1**.

Fig. 22.1

Powdered calcium carbonate was used to treat and remove the acid, which soaked the pavement and penetrated the soil around the area.

(a) Give two properties of hydrochloric acid.

property 1: .....

property 2: ..... [2]

(b) **(i)** Write the word equation for the reaction between hydrochloric acid and calcium carbonate.

..... [1]

(ii) Describe a chemical test and its observations for the gas evolved from reaction in **(b)(i)**.

test: .....

observation: ..... [2]

(c) "Litmus paper can be used to determine the specific pH value of the soil after it is treated with calcium carbonate." Do you agree with this statement? Explain your answer.

.....

..... [1]

(d) Our stomach also contains hydrochloric acid. Milk of magnesia, magnesium hydroxide, can be taken to relieve gastric pain caused by excess acidity in the stomach.

(i) Write the word equation for the reaction between hydrochloric acid and magnesium hydroxide.

..... [1]

(ii) What is the name of the reaction stated in **(d)(i)**?

..... [1]

23 (a) **Fig. 23.1** shows an electric circuit with three bulbs **X**, **Y** and **Z** each, connected in parallel to a 12 V battery.

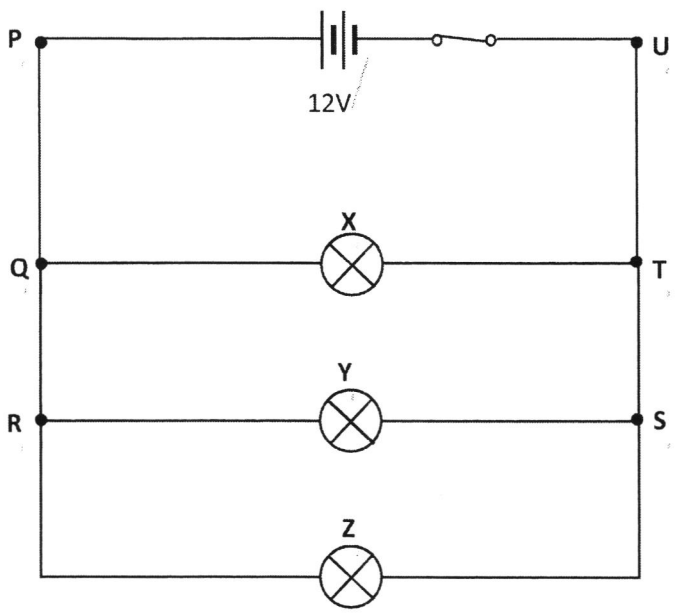


Fig. 23.1

Using "o—o' as a switch symbol, draw and label in the circuit above, the position of switch

(i) **S1**, which controls bulb **X** only,

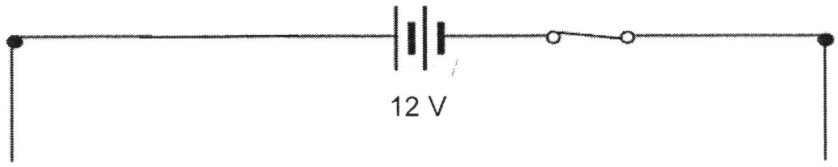
(ii) **S2**, which controls bulb **Y** and **Z** only. [2]

(b) The filament of bulb **X** melts after some time. State and explain what happens to bulbs **Y** and **Z**, given that all the switches in the circuit are closed.

.....

..... [1]

(c) Draw a new circuit diagram when the three bulbs **X**, **Y** and **Z** are connected in a series circuit with the given 12 V battery and switch below. Label the bulbs in your diagram.



[1]

24 A 1400 W oven was used for 150 minutes to thaw a Christmas turkey.

(a) Calculate the amount of electrical energy used in kWh.

electrical energy used = ... kWh [1]

(b) Given that electrical energy costs \$0.30 per kWh, calculate the cost of energy used in thawing the Christmas turkey.

cost = \$..... [1]

(c) Mr Low buys an oven that is rated 1.0 kW for \$750, instead of one that is rated 0.8 kW for \$800. Suggest why Mr Low's decision is more expensive in the long run.

.....

.....

..... [1]

(d) **Fig. 24.1** shows an electric oven.

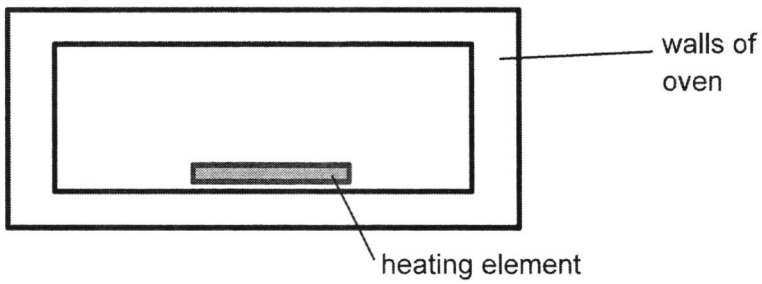


Fig. 24.1

When the oven is turned on, the heating element becomes red hot, heating the air around it. Describe how this causes all the air in the oven to become hot.

.....

.....

.....

..... [3]

END OF PAPER

Yuhua Secondary School
2019 2E Science Mid-Year Examinations Marking Scheme

Section A (15 Marks)

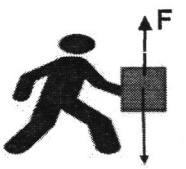
1. A	2. A	3. B	4. C	5. C	6. B	7. C	8. B	9. B	10. B
11. D	12. A	13. A	14. C	15. B					

Section B (45 Marks)

16 (a)(i) chemical potential energy → gravitational potential energy 1

(ii) kinetic energy → electrical energy / heat and light energy 1

(b)(i)



1

(ii) The movement is not in the same direction as **F** [1]. 1

17 (a) The speed of the bicycle changes from **A** to **B**. 1

(b) Time taken = (500/1000) / 15 = 0.0333h. [1] = 2 minutes [1] 2

(c) When the pad handle is wide, the area of the handle is large, pressure 1
exerted on the shoulder is small/ reduced and the shoulder can carry the 1
bag easily.

18 (a) Plastic is a good insulator / bad conductor of heat / prevent heat loss by conduction. / By closing the food jar, heat loss is minimised through convection. 1

(b) The inner walls are silvered so that they can reflect heat and reduce heat absorption by radiation. 1

(c) A vacuum is a good insulator of heat / prevents heat loss by conduction and convection. 1

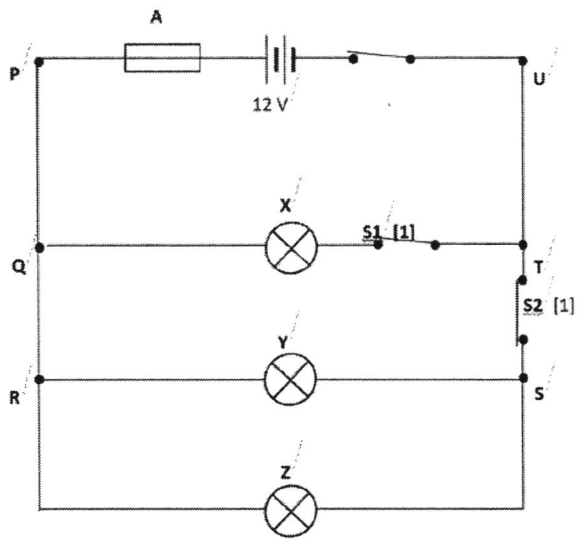
19 (a) Component **X**: Fuse 1

Purpose: A safety device consisting of a strip of wire that melts and breaks an electric circuit if the current exceeds a safe level. / The fuse melts when the current flowing through is larger than expected and this stops current flow. 1

	(b)	The neutral wire (blue) should be connected to the neutral (N) pin instead of the earth (E) pin. /	1
		The earth wire (green and yellow) should be connected to the earth (E) pin instead of the neutral (N) pin. /	1
		The cord grip holds only the live (brown) wire instead of all three. [any 2]	
	(c)	Name of wire: Earth Wire	1
		Explanation: Earth wire provides a path of low electrical resistance / should the live wire breaks and touches the metal casing, the earth wire carries the large current flows directly from the live wire into the ground or earth. /	1
20	**(a)**	Renewable source of energy is energy that can be sustained/ renewed indefinitely/ unlimited/ infinite.	1
	(b)	Expensive to install / does not work or ineffective at night or on cloudy days	1
	(c)	Wind energy: The wind speed in Singapore is very low due to obstructions by buildings. Hence, it is not possible to convert the moving air into electricity by rotating turbines. Or	1
		Geothermal energy: It is not possible because it is not economically viable.	1
21	**(a)**	A thermostat keeps the temperature constant in an appliance.	1
	(b)(i)	Cold state	1
	(ii)	When the refrigerator warms up, it causes metal to expand more than metal **Y**. Bimetallic strip bends downwards, with metal touching / in contact with energy source and switches on the cooling unit again.	1 1
	(c)	Metal **X** is **D** and metal **Y**	1
		These two metals have the greatest difference in expansion, leading to better response to warm/ cold air.	1
22	**(a)**	Sour taste [1] & Turn blue litmus paper red [1]	2
	(b)(i)	calcium carbonate + hydrochloric acid → calcium chloride + carbon dioxide gas + water	1
	(ii)	Test: Pass gas through limewater	1
		Observations: White precipitate will be formed.	1
	(c)	No;	1
		Litmus paper can only indicate if a solution is acidic or alkaline but cannot tell the exact pH of the soil.	1
	(d)(i)	magnesium hydroxide + hydrochloric acid → magnesium chloride + water.	1
	(ii)	Neutralisation	1

23 (a)(i) 1

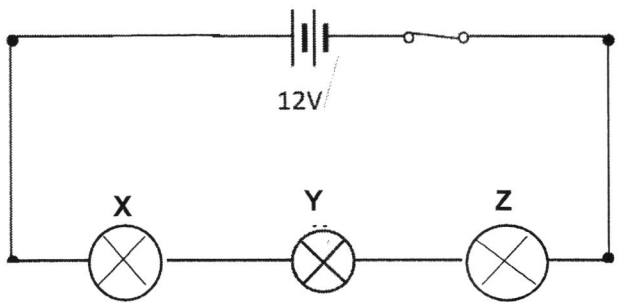
(ii)



1

(b) Bulbs **Y** and **Z** will <u>continue to be lit up</u>. 1

(c)



1

24 (a) Time used = **150 / 60 = 2.5h** [1] 2
Energy = **1.4 X 2.5 = 3.5 kWh** [1]

(b) Costs = **3.5 X 0.30 = $1.05** [1] 1

(c) The <u>1.0 kW oven uses **more energy**</u> than the other one and the operation cost will be much higher in the long run. 1

(d) The air in contact with the heating element gets heated up.

This <u>heated air expands, and its density decreases</u>. The <u>heated air rises up</u>. [1]

The <u>surrounding cooler air</u>, which is <u>denser, sinks</u> [1] to replace this heated air, and also becomes heated by the heating element.

This process repeats itself, <u>setting up convection currents in the oven until all the air becomes hot</u>. [1] 3