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**ASSUMPTION ENGLISH SCHOOL
END OF YEAR EXAMINATION 2019**

LOWER SECONDARY SCIENCE



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LEVEL: Sec 2 Normal (Technical)

DATE: 8 October 2019

CLASS: Sec 2/5

DURATION: 2 hours

Additional Materials provided: 1 piece of OAS paper

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your NAME and INDEX NUMBER at the top of this page.

Section A - Multiple Choice Questions (40 marks)

There are 10 questions in this section. Answer **ALL** questions. For each question, there are four possible answers A, B, C and D. Choose the correct answer and record your choice in soft or 2B pencil on the OAS paper provided.

Section B – Short Structured Questions (60 marks)

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

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

For Examiner's use:	
Section A	/ 40
Section B	/ 60
Total	/ 100

At the end of the examination, hand in your OAS paper and question booklet separately.

Section A – Multiple Choice Questions (40 marks)

Answer **all** questions. For each question, there are four possible answers **A**, **B**, **C**, and **D**. Choose the correct answer and record your choice in soft or 2B pencil on the **OAS** paper provided.

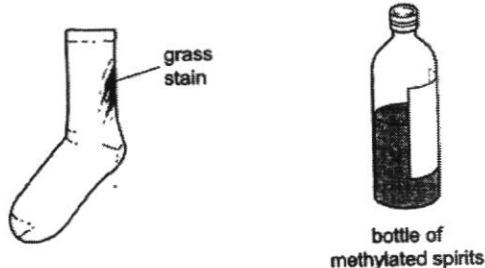
1 Which substance when mixed with water, can form a solution?

- | | |
|-----------------|----------------|
| A dust | B honey |
| C pepper | D sand |

2 Which sentence best describes solubility?

- A** It is the greatest amount of substance that can be dissolved in a given volume of liquid.
- B** It is the greatest amount of substance that can be dissolved in any volume of liquid.
- C** It is the least amount of substance that can be dissolved in a given volume of liquid.
- D** It is the least amount of substance that can be dissolved in any volume of liquid.

3 During football games, socks worn by players can get grass stains. They are often difficult to remove through soap and water alone. Instead, methylated spirits can be used to remove the grass stains away.



Which option best describes the relationship between the grass stain and methylated spirits?

	grass stain	methylated spirits
A	solute	solvent
B	solvent	solute
C	solution	suspension
D	suspension	solution

- 4 Tim was stung by a bee. The sting of the bee is alkaline. Which liquid is able to neutralise the sting?

A detergent (pH = 12) **B** baking soda (pH = 10) **C** vinegar (pH = 4) **D** water (pH = 7)

- 5 Three liquids are tested with litmus paper. The following observations were made:

- Liquid **X** turned blue litmus paper red.
- Liquid **Y** had no effect on both blue and red litmus paper.
- Liquid **Z** turned red litmus paper blue.

What can you deduce about the three liquids?

	X	Y	Z
A	acid	alkali	neutral solution
B	acid	neutral solution	alkali
C	alkali	neutral solution	acid
D	neutral solution	acid	alkali

- 6 Water is a universal solvent because

- A** it can be found everywhere
B it can dissolve many substances
C it is safe to drink
D it makes up 90% of our body mass

- 7 Which process is mainly involved in removing insoluble solid particles in water treatment?

- A** evaporation
B filtration
C UV treatment of water
D water condensation in laboratories

- 8 How does oil spill harm the aquatic environment?
- A It blocks the gills of fishes, preventing them from gaining oxygen.
 - B It can easily catch fire, releasing dust and soot to the atmosphere.
 - C It creates poisonous fumes that is dangerous when inhaled.
 - D Oil sinks to the bottom of the sea and cannot be removed.
- 9 What is the most likely effect when a lot of fertilisers are washed away into lakes and rivers?
- A algae grow rapidly on the surface of the lakes and rivers
 - B fishes and plants become healthier and develop more rapidly
 - C rivers become blocked and prevent water from flowing
 - D water evaporate more rapidly from the rivers and lakes
- 10 Which activity is **not** a likely source of water pollution?
- A chemical factory installed with chemical filters
 - B farmlands using a lot of fertilisers
 - C paint factory disposing its waste to the river
 - D wet market using a river beside it for washing plates
- 11 Which row shows the correct difference between inhaled air and exhaled air?

	inhaled air	exhaled air
A	contains only carbon dioxide	contains only oxygen
B	contains only oxygen	contains only carbon dioxide
C	contains more carbon dioxide than exhaled air	contains more oxygen than inhaled air
D	contains more oxygen than exhaled air	contains more carbon dioxide than inhaled air

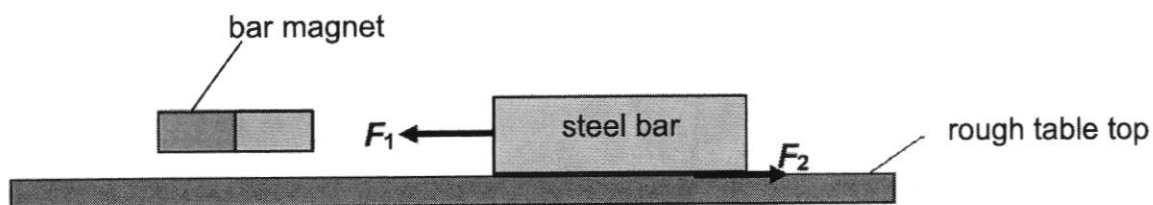
- 12 Which can be used to test for the presence of carbon dioxide?
- A cobalt chloride paper B hydrochloric acid
C limewater D universal indicator
- 13 What is the main air pollutant found in haze that causes severe breathing problems?
- A carbon monoxide B dust and soot
C oxides of nitrogen D sulfur dioxide

For questions 14 and 15, refer to the changes that occurred to a marble statue left exposed in a northern European country.



- 14 What is the effect caused by?
- A acid rain B chemical rusting
C greenhouse gases D neutralisation reaction
- 15 Which gas is most likely the cause of the change to the marble statue?
- A carbon monoxide B nitrogen
C sulfur dioxide D oxygen

- 16 What is a good way to reduce air pollution?
- A burning more fossil fuels such as coal and crude oil
 - B removing waste products and garbage by burning them in landfills
 - C taking public transport instead of driving
 - D turning on air-conditioner and other electrical appliances the whole day
- 17 What is the SI unit for force?
- A kilogram
 - B metres per second
 - C newton
 - D second
- 18 A car is moving. Which property of the car **cannot** be changed by a force?
- A direction
 - B mass
 - C shape
 - D speed
- 19 A bar magnet attracts a steel bar such that the steel bar moves along a rough table top as shown below.



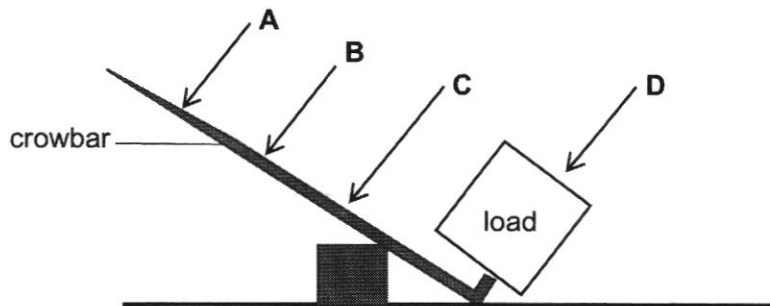
What are the two horizontal forces, F_1 and F_2 , acting on the steel bar?

	force F_1	force F_2
A	frictional force	gravitational force
B	gravitational force	magnetic force
C	magnetic force	magnetic force
D	magnetic force	frictional force

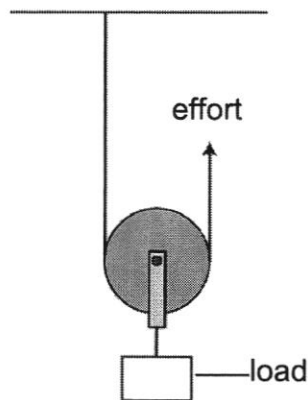
- 20 Susan's mother is having problems opening a coffee tin. Susan suggests that she uses a spoon to help her. What simple machine is Susan suggesting?

A inclined plane B lever
C pulley D spring balance

- 21 The diagram below shows a crow bar used as a simple lever to lift a heavy load. Which position would require the smallest effort to lift the load?



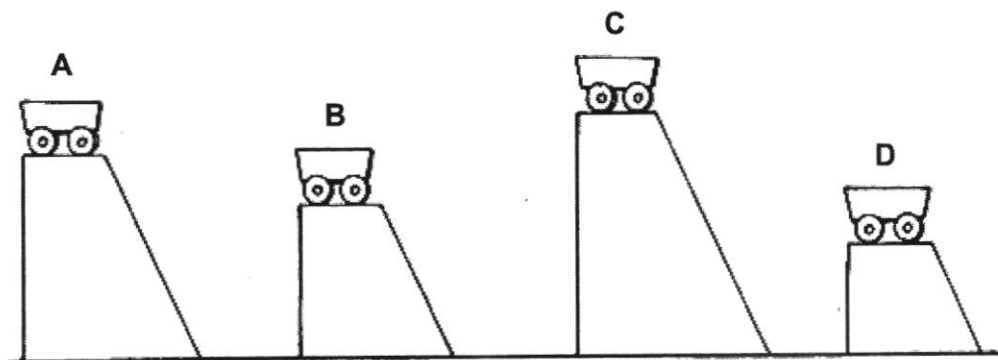
- 22 The diagram below shows a movable pulley system.



What is the advantage of using the movable pulley system?

- A The effort to raise the load is equal to the load.
B The effort to raise the load is less than the load.
C The effort to raise the load is more than the load.
D The effort to raise the load moves in opposite direction to the load.

- 23 The diagram shows identical carts located on hills of different heights. Which cart has the lowest gravitational potential energy?



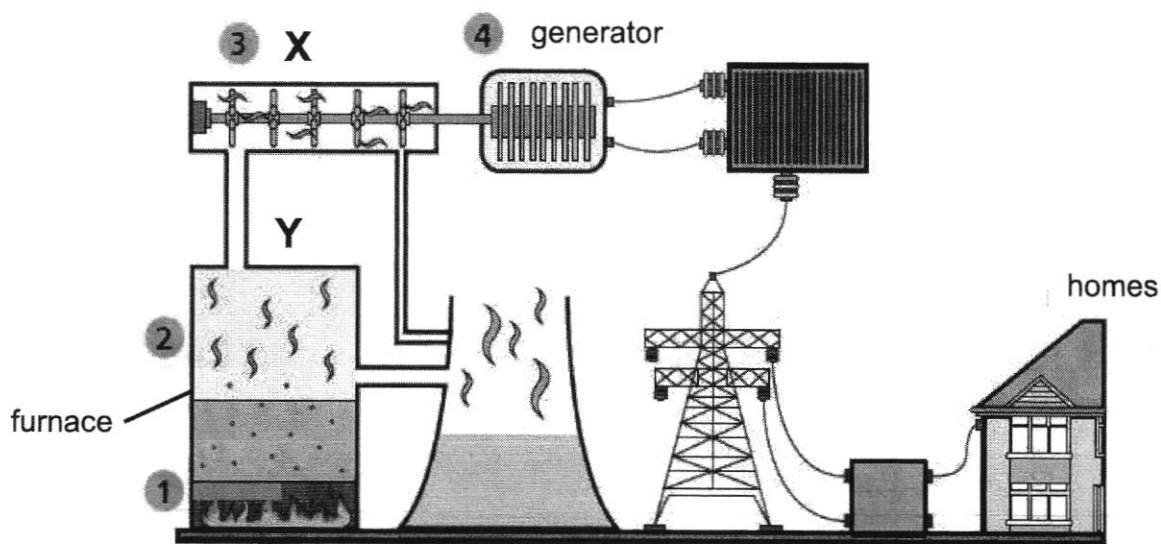
- 24 Which electrical appliance does **not** involve the conversion of electrical energy to mechanical energy?

A blender	B electric kettle
C mixer	D washing machine

- 25 Which of the following energy conversions is harmful?

A Heat produced from fire to keep warm.
B Heat produced from overheated wire.
C Electricity to heat water for cooking.
B Light produced from an electric bulb.

For questions **26** and **27**, refer to the diagram below, which shows how electricity is generated and distributed.



26 What are the names of **X** and **Y**?

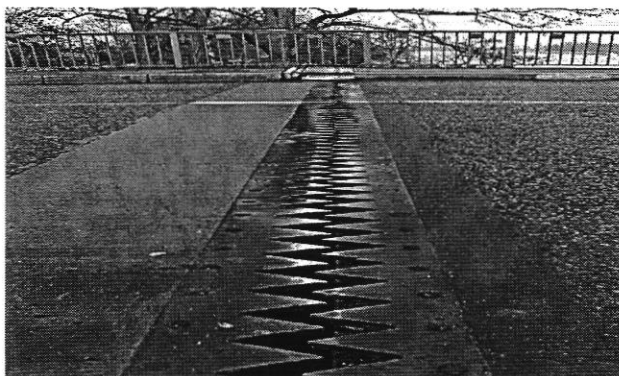
	X	Y
A	condenser	generator
B	generator	condenser
C	steam turbine	boiler
D	boiler	steam turbine

27 In the furnace, fuels are being burnt.
Which shows the **correct** energy conversion of this process?

- A** chemical potential energy → heat energy
- B** heat energy → kinetic energy
- C** heat energy → wind energy
- D** kinetic energy → electrical energy

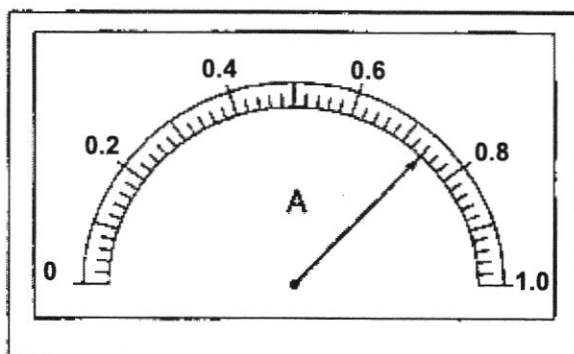
- 28 Which statement describes temperature?
- A It is accurately measured using the sense of touch.
 - B It is always measured in °F in Singapore.
 - C It is the amount of heat energy an object possesses.
 - D It is the measure of hotness and coldness of an object.
- 29 100 cm³ of 50 °C water is added to 100 cm³ of 90 °C tea.
What could the temperature of the mixture be, immediately after mixing?
- A 50 °C
 - B 90 °C
 - C between 50 °C to 90 °C
 - D 140 °C
- 30 A student is unable to open the metal cap of a bottle. What can the student do to help him to unscrew the cap?
- A cool down the cap only
 - B heat up the bottle only
 - C heat up the cap only
 - D heat up both the cap and bottle
- 31 Which instrument is able to keep track of temperature accurately over a period of time?
- A datalogger with temperature sensor
 - B digital oral thermometer
 - C infrared ear thermometer
 - D liquid-in-glass thermometer
- 32 Which is **not** a useful application of expansion?
- A causing overhead wires to become longer during hot days
 - B riveting two metal plates tightly together
 - C using a liquid-in-glass thermometer to measure temperature
 - D bending of bimetallic strip to close and open a circuit

- 33 Gaps are found on a road as shown in the diagram below.



Which statement explains why there are gaps on the road?

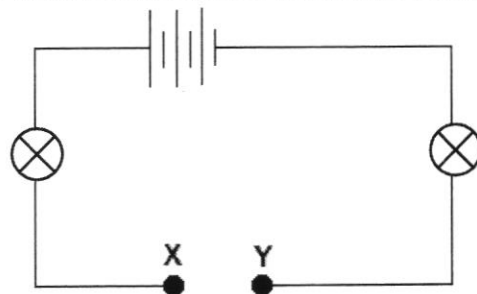
- A The contractor was trying to cut cost.
 - B There was an earthquake.
 - C To allow faster rate of heat loss from the ground.
 - D To allow for expansion and contraction of the road.
- 34 The diagram shows a reading recorded using a type of instrument found in the Science laboratory.



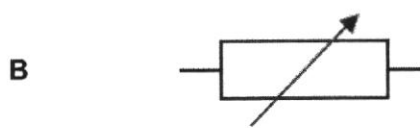
Which option shows the quantity measured by the instrument and the reading on it?

	what the instrument measures	correct reading
A	current	0.67 A
B	current	0.74 A
C	voltage	0.67 A
D	voltage	0.74 A

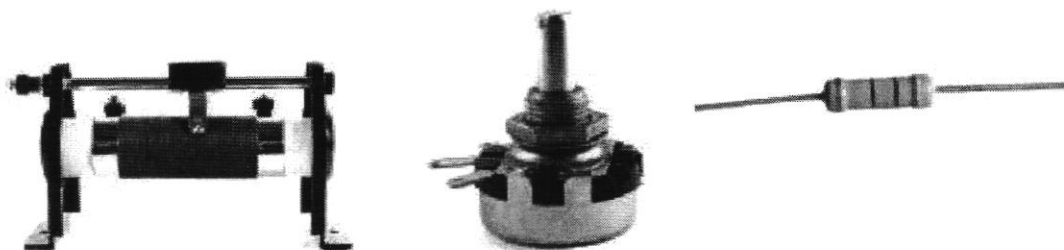
- 35 Marcus sets up an electrical circuit as shown below.



He wants to be able to control the brightness of both bulbs.
Which electrical devices should he connect between **X** and **Y**?



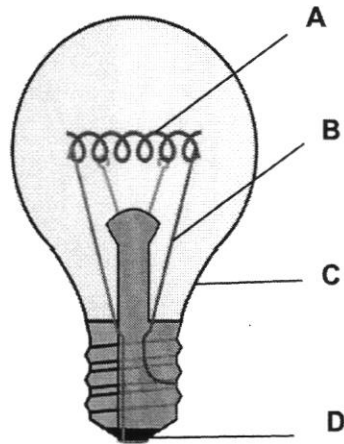
- 36 Below are some examples of resistors.



Why are resistors used in electrical appliances?

- A** to increase the power of the electric appliance
- B** to melt when the current flowing through the appliance is too high
- C** to obtain the current needed for the appliances to work properly
- D** to obtain the voltage needed for the appliances to work properly

- 37 The diagram shows an electric light. Which part **A**, **B**, **C** or **D** is an electrical insulator?



- 38 What might happen when too much current flows through a fused household plug?
- A The fuse will heat up and the current will flow slower.
 - B The fuse will melt and the current will stop flowing.
 - C The insulator will melt and the current will increase.
 - D The plug will crack and the current will stop flowing.
- 39 Which option is correct for electrical conductors and insulators?

	conductor	insulator
A	coin	copper wire
B	copper wire	piece of cloth
C	eraser	coin
D	wooden ruler	eraser

- 40 It is dangerous for electric sockets and wall switches to be fitted in a room with a hot shower. Why is this so?
- A In a steamy atmosphere, you may not be able to see the switch.
 - B The switch contacts might become rusty and not work.
 - C The warmth of the atmosphere might damage the switch insulation.
 - D Water conducts electricity, so a damp switch may be 'live' if touched.

Section B – Short Structured Questions (60 marks)

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

- 1 A student wants to test whether the mixtures in beakers **A** and **B** is a “solution” or a “suspension”. The results of her experiments are shown below.

beaker	mixture	shine a torchlight through the mixture	filtration
A	sugar and water	light can pass through	no residue on filter paper
B	sand and water	light cannot pass through	sand left on filter paper

- (a) State which beaker, **A** or **B**, contains a suspension.

..... [1]

- (b) After some time, the student could not see the sugar in beaker **A**.

Suggest what may have happened to the sugar in the water.

..... [1]

- (c) Suggest why the sand could not pass through the filter paper.

..... [1]

- (d) The mixture in beaker **B** undergoes filtration.

Identify the filtrate and residue during the filtration.

(i) filtrate [1]

(ii) residue [1]

- 2 Jill is conducting an experiment on the solubility of solids **J**, **K** and **L** in water. The results of the experiment are recorded in the following table. She used 30 cm³ of water for all experiments.

solid	amount dissolved in water at 10 °C (g)	amount dissolved in water at 80 °C (g)
J	21	72
K	44	55
L	35	61

- (a) Based on the results of the experiment, state:

- (i) which solid is the most soluble at 10 °C.

..... [1]

- (ii) which solid is the least soluble at 80 °C.

..... [1]

- (iii) which solid has the **largest change** in solubility from 10 °C to 80 °C.

..... [1]

- (b) Based on the experiment results, how does an increase in temperature of solvent affects the solubility of solids **J**, **K** and **L** in water?

..... [1]

- (c) Explain why Jill should keep the amount of water constant at 30 cm³.

..... [1]

- 3 (a) Match these common water pollutants to their sources.

pollutant			source
sewage	•	•	accident spills
oil spills	•	•	household waste
plastics	•	•	toilet wastes
pesticides	•	•	industrial activities
chemical waste	•	•	runoff from farms

[5]

- (b) Although Singapore started off with no natural supply of fresh water, we have created our own sources of fresh water over the years. These sources of drinking water are known as our “Four National Taps”.

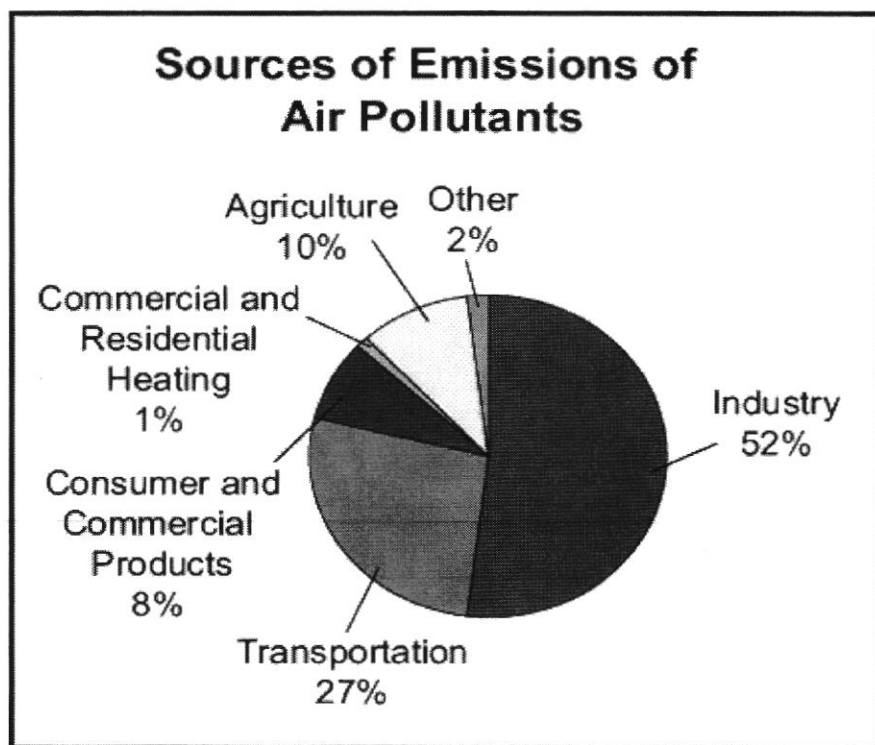
Complete the table with correct information about our national taps using the words provided.

reservoirs seawater waste water Malaysia

national tap	source of water
NEWater	water obtained from
imported water	water bought from
desalinated water	water obtained from
local catchment water	rain water from the

[4]

- 4 Below is a pie chart showing the sources of emissions of air pollutants in country X. Study the pie chart carefully and answer the following questions.

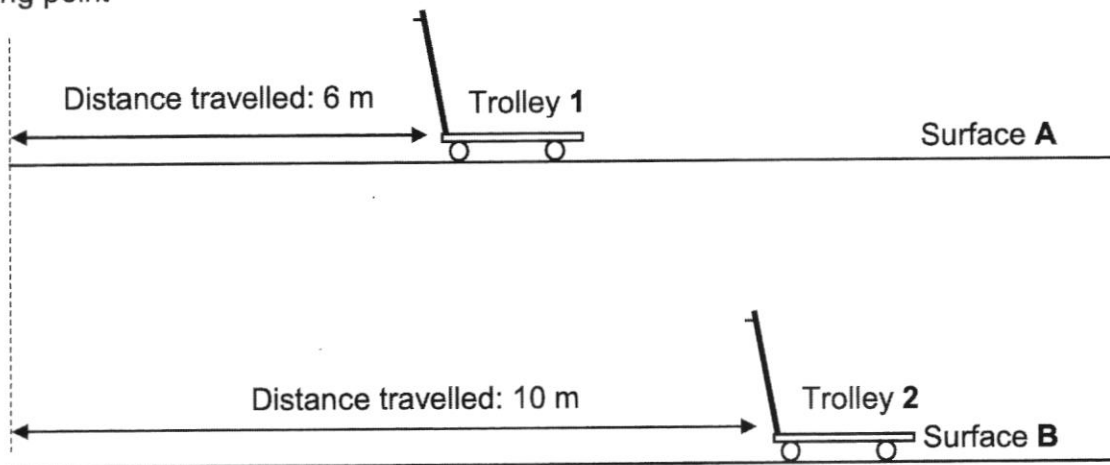


- (a) Which two sectors emit the most air pollutants?
 [2]
- (b) Many industries in country X use non-renewable fuels which cause air pollution. Suggest a type of non-renewable fuel.
 [1]
- (c) Name one air pollutant produced by the non-renewable fuel stated in (b).
 [1]
- (d) State two ways residents in country X can do to reduce air pollution.

 [2]

- 5 Two identical trolleys with the same speed travelled along two different surfaces. Trolley 1 on surface **A** travelled 6 m before stopping completely while trolley 2 on surface **B** travelled 10 m before stopping completely.

Starting point



- (a) Which surface is smoother?

..... [1]

- (b) Some books are placed on trolley 1, how will the friction between trolley 1 and surface **A** change?

The friction between trolley 1 and surface **A** will (remain the same / decrease / increase). [1]

- (c) If water is poured onto surface 2, how will friction between trolley 2 and surface **B** change? Explain your answer.

.....

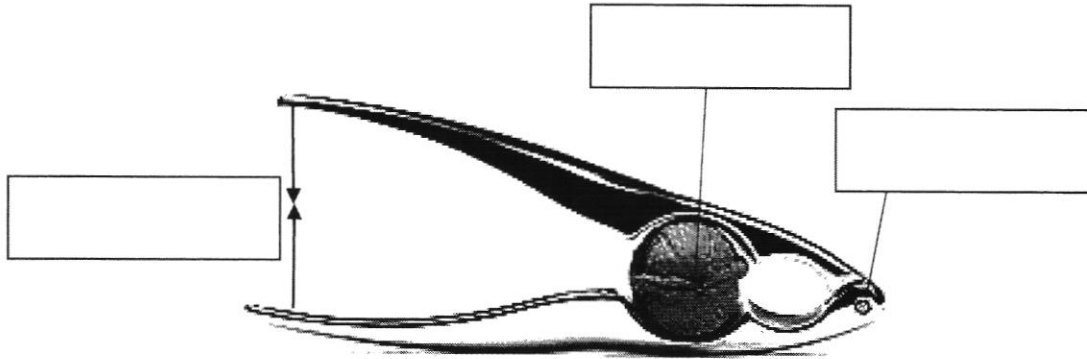
 [2]

- (d) Describe one situation where friction is

(i) useful:

(ii) nuisance: [2]

- 6 The figure below shows a lever at work.

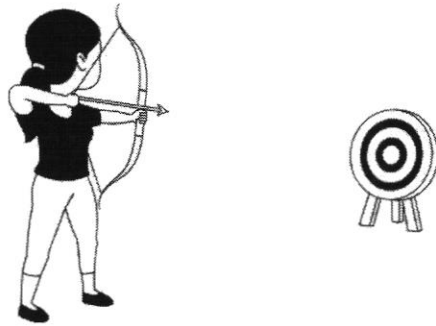


- (a) On the figure above, label the effort, fulcrum and load in the spaces provided. [3]

- (b) State whether the lever is a first class, second class or third class lever.

..... [1]

- 7 The figure below shows an archer aiming at a target with her bow and arrow. Energy conversions take place when the arrow is shot.



- (a) The archer uses energy from her breakfast. Name the type of energy stored in food.

..... [1]

- (b) State the main conversion of energy that takes place in the bow and arrow when the arrow is shot.

..... [2]

- (c) The figure below shows a type of renewable energy source.



- (i) What does '*renewable energy source*' mean?

..... [1]

- (ii) Name the type of energy source shown in the figure above.

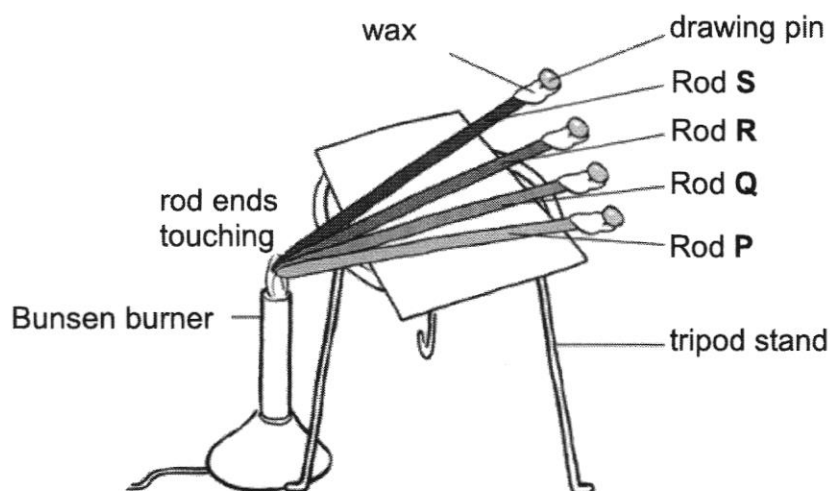
..... [1]

- (iii) Do you think the energy source stated in (c)(ii) is suitable for Singapore? Explain your answer.

.....

..... [2]

- 8 To investigate which material has the highest thermal conductivity, Evan sets up an experiment as shown in the figure below.



Thermal energy will move from the flame to the wax through the rods. When the wax melts, the pin will fall off from the rod. The time taken for the pin to fall off is recorded in the table below.

rod	time taken for the wax to start melting / s
P	200
Q	90
R	290
S	300

- (a) Arrange the rods in terms of their thermal conductivities, starting from the lowest.

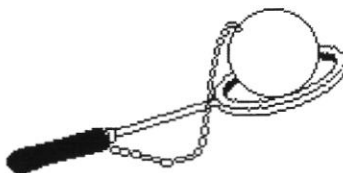
..... [1]

- (b) The materials for **P**, **Q**, **R** and **S** could be copper, wood, rubber or glass. Which rod is likely to be made of copper? Explain your answer.

.....

 [2]

- 9 (a) The diagram below shows the apparatus used in the metal ball and ring experiment. At room temperature, the ball is able to pass through the ring.



A student heats up the ball with a Bunsen burner for one minute.

- (i) Will the ball pass through the ring after heating? Why?

.....
 [1]

- (ii) State what can the student do to allow the ball to pass through the ring again.

.....
 [1]

- (b) Matter can exist in three different states, solid, liquid and gas. In which state does the matter expand the most?

..... [1]

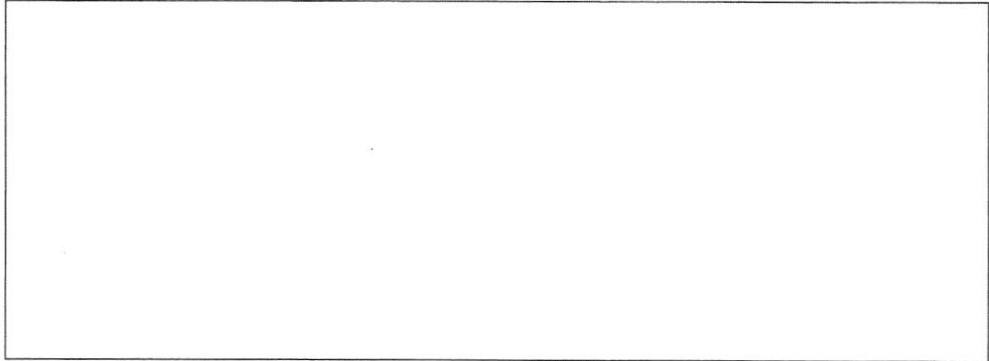
- (c) Bimetallic strips are used as thermostats in some home electrical appliances.

The diagram below shows a bimetallic strip made of metals **W** and **X**. Metal **X** expands more than metal **W** when heated.



- (i) In the box below, draw what the bimetallic strip looks like after being heated.

Label metal **W** and metal **X** in the diagram drawn.



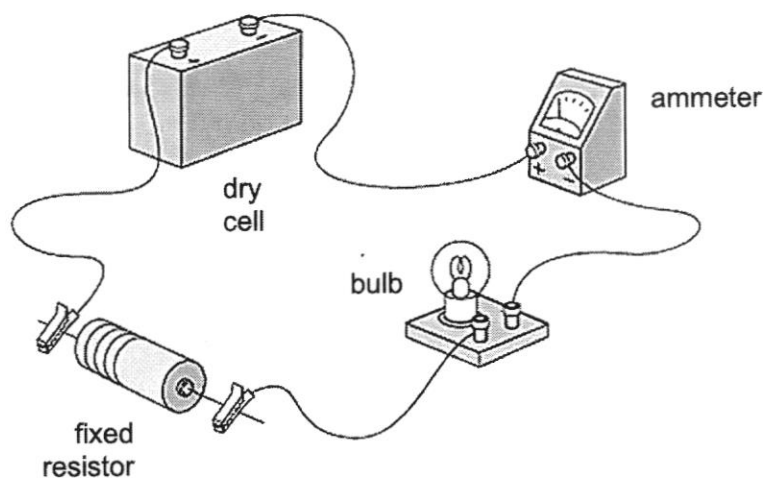
[2]

- (ii) What is the function of the thermostat in an electrical appliance?

.....

..... [1]

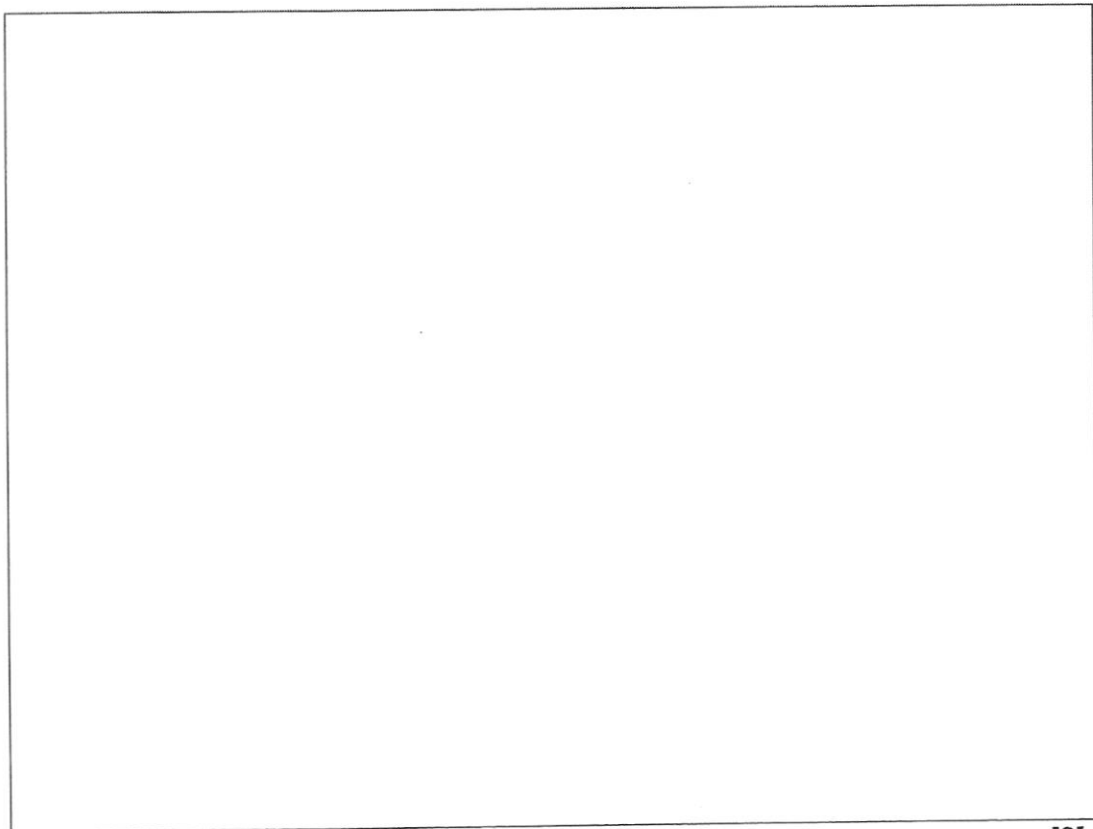
- 10 The diagram shows a closed circuit with one light bulb, a dry cell, a fixed resistor and an ammeter connected by copper wires.



- (a) Is the ammeter connected correctly? Explain your answer.

.....
..... [1]

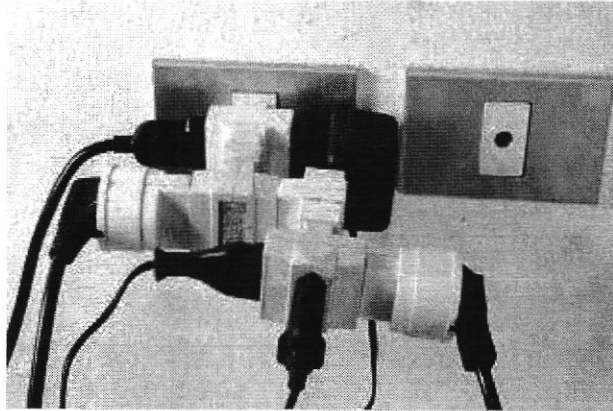
- (b) (i) Redraw the circuit in the space below using the appropriate symbols to represent the electrical components.



- (ii) On the same diagram in (b)(i), draw and show how a voltmeter should be connected to measure the voltage of the dry cell.

[1]

- (c) Electricity can cause harm to its users if not used properly. One such electrical hazard is shown in the figure below.



- (i) State the electrical hazard.

..... [1]

- (ii) State **one** problem caused by the electrical hazard in (c)(i).

.....
 [1]

- (iii) State how a circuit breaker can protect a family from the problem stated in (c)(ii).

.....
 [2]

ASSUMPTION ENGLISH SCHOOL
Sec 2NT Science Marking Scheme
End of Year Examinations 2019

Section A (40 m)

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
B	A	A	C	B	B	B	A	A	A
Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
D	C	B	A	C	C	C	B	D	B
Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
A	B	D	B	B	C	A	D	C	C
Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40
A	A	D	B	B	C	C	B	B	D

Section B (60 m)

1	(a)	B	1
	(b)	Sugar has dissolved in water.	1
	(c)	Sand is too large to pass through the pores of filter paper. <i>accept sand cannot dissolve in water</i>	1
	(d)	Filtrate: water Residue: sand	1 1
2	(a)(i)	K	1
	(ii)	K	1
	(iii)	J	1
	(b)	Solubility increases	1
	(c)	Ensure experiment is fair	1

3	(a)		5
	(b)	Waste water Malaysia Seawater reservoirs	4
4	(a)	Industry and transportation	2
	(b)	Coal / petroleum / natural gas	1
	(c)	Sulfur dioxide / nitrogen dioxide	1
	(d)	Take public transport (develop habits of saving energy) Turn off electrical appliances when not in use (using only the amount of energy required) Share the message of energy conservation with family and friends <i>Any 2</i>	2
5	(a)	B	1
	(b)	increase	1
	(c)	Friction decrease Water act as a lubricant to reduce friction	1 1
	(d)	Eg holding pencil, sand paper to polish wood, walking etc Eg wear and tear of shoe soles etc <i>Any relevant answer</i>	1 1
6	(a)	Effort Load Fulcrum <i>One mark each</i>	3
	(b)	Second class lever	1
7	(a)	Chemical potential energy	1
	(b)	Elastic potential energy to kinetic energy	1,1

	(c)(i)	Energy sources that <u>can be used again.</u>	1
	(ii)	Wind / kinetic energy	1
	(iii)	No because Wind in singapore is (too) <u>gentle or</u> Singapore <u>lacks large unobstructed spaces</u> to construct windmills	1 1
8	(a)	S, R, P, Q <i>Award marks when all correct</i>	1
	(b)	Q. It has the highest conductivity as it conduct heat the fastest / in the shortest time OR copper is the best conductor	1 1
9	(a)(i)	No as ball has expanded	1
	(ii)	Cool the ball by putting it in the cold water / heat up the ring	1
	(b)	gas	1
	(c)(i)	bimetallic strip bends upwards. With W on top and X below.	1 1
	(ii)	To control the temperature of the electrical appliance	1
10	(a)	<u>No</u> , the positive side of the ammeter must be connected to the positive terminal of the battery.	1
	(b)(i)	1 mark for light bulb and dry cell drawn correctly ; 1 mark for ammeter drawn correctly in series ; 1 mark for fixed resistor drawn correctly ;	3
	(b)(ii)	Voltmeter parallel to dry cell	1
	(c)(i)	Overloaded circuits	1
	(ii)	Wires will be overheated / electrical fire may take place <i>(Any 1)</i>	1
	(iii)	circuit breakers cut off electricity to the house when the current becomes too big	1 1