East Spring Secondary School

Towards Excellence and Success

Name: …… ( )

Class: …….

Second Semestral Assessment 2019
Secondary 1 Express

Science

04 October 2019 **2 h 00 min**
Friday **0800 – 1000**

Additional materials:
1 sheet of OTAS

INSTRUCTIONS TO CANDIDATES

Write your name, class and register number in the spaces provided above, and on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
You may assume g = 10 m/s^2 whenever necessary, unless otherwise stated.
Calculators and mathematical sets are allowed.

Section A [30 marks]
Answer all questions on the OTAS.

Section B [30 marks]
Answer all questions.
Write your answers in the spaces provided.

Section C [40 marks]
Answer question **C1** and **any three** of the other four questions.
Write your answers in the spaces provided.

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

Section	Marks
A	/ 30
B	/ 30
C	/ 40
Total:	/ 100

This question paper consists of **24** printed pages including the cover page.

Section A [30 marks]
Answer **all** questions on the OTAS.

A1 The following hazard symbols are found on a bottle containing a chemical in the laboratory. What can be concluded from them?

A The liquid can cause cell damage.
B The liquid can be touched with bare hands.
C The liquid cannot be used near a naked flame.
D The liquid will explode when it is poured out of the container.

A2 A student tried to light up a Bunsen burner and a strikeback occurred. What could be the cause of the strikeback?

A The barrel was not cleaned properly.
B Insufficient gas from the gas tap.
C There was a crack in the collar.
D The air-hole was opened.

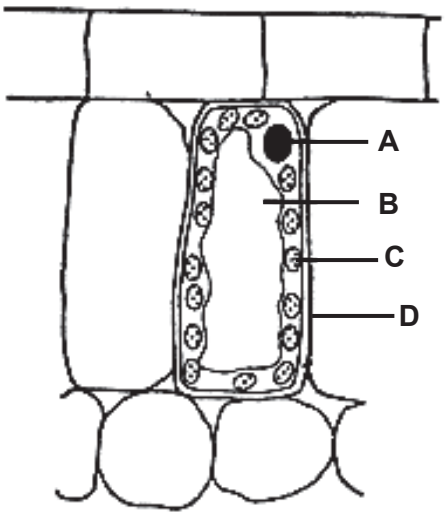
A3 A student carried out an experiment and recorded the statement below:

"When the current increases, the filament in the light bulb turns from orange to bright red."

Which stage of the scientific method is the student carrying out?

A asking a question
B constructing a hypothesis
C drawing a conclusion
D analysing data

A4 The diagram below shows a plant cell.
Which structure is also present in an animal cell?



A5 The human blood consists of red blood cells, white blood cells, platelets and plasma.

Which of the following structure represents the human blood?

A cell
B tissue
C organ
D system

A6 The diagram below shows a specialised plant cell. For what function is this cell modified?

A transport of water
B exchange of gases
C photosynthesis
D storage of food

A7 Which part of the plant cell is responsible for controlling substances entering or leaving the cell?

A cell wall
B cell membrane
C chloroplast
D vacuole

A8 In which situation would diffusion occur fastest?

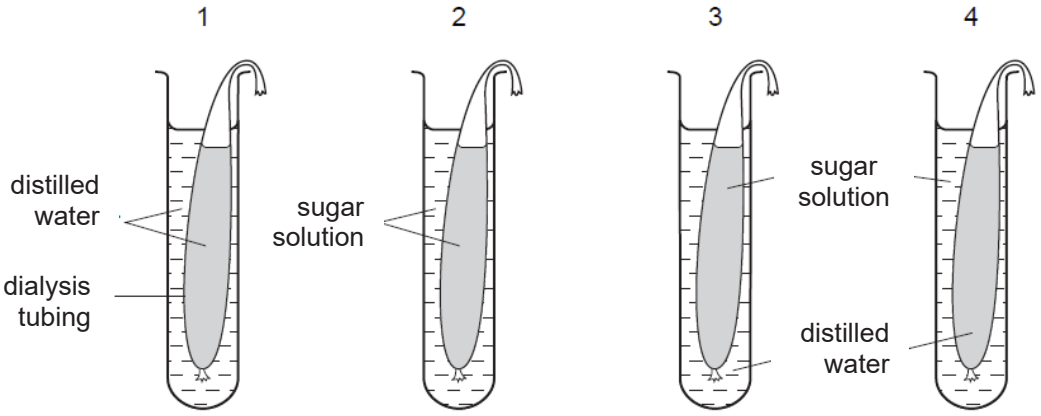
A aroma of freshly cooked food travelling through the air
B coloured dye mixing with a liquid
C food particles entering the living cells
D sugar dissolving in a liquid

A9 Andy extracted a component of blood and observed it under a microscope. He found that the component contained cells with nuclei.

Which blood component was extracted?

A red blood cell
B white blood cell
C platelets
D plasma

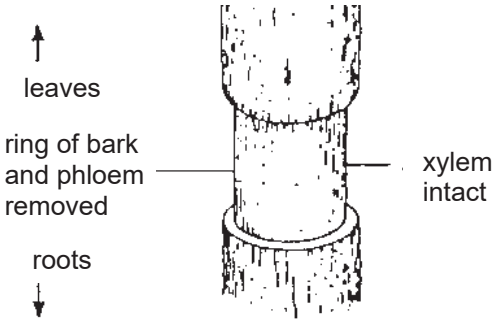
A10 The diagrams below show the apparatus used in an experiment.



In which tubes will osmosis take place?

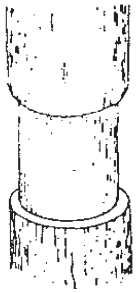
A 1 & 2
B 1 & 4
C 2 & 3
D 3 & 4

A11 A ring of bark was removed from a woody shoot undergoing photosynthesis, leaving only the xylem intact as shown.

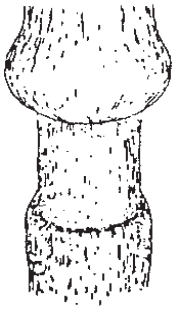


Which of the following diagram represents the appearance of the stem a few weeks later?

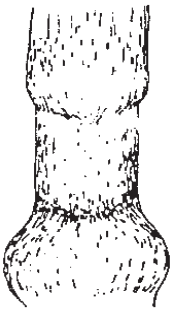
A



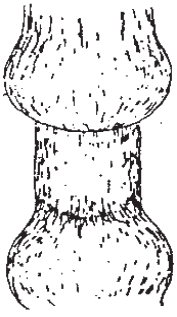
B



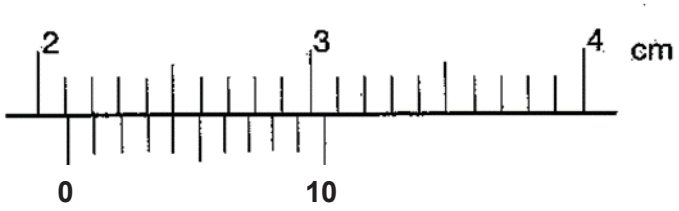
C



D



A12 A student used a pair of vernier calipers to measure the diameter of a test tube. The diagram below shows the enlargement of part of the vernier calipers.



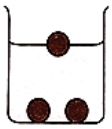
What is the diameter of the test tube?

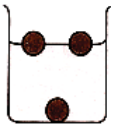
A 2.40 cm
B 2.14 cm
C 3.10 cm
D 2.54 cm

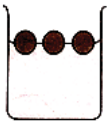
A13 Three balls have densities of 1.8 g/cm^3, 1.9 g/cm^3 and 2.2 g/cm^3 respectively. They are immersed in a beaker containing a liquid with a density of 2.1 g/cm^3.

Which options most accurately shows what you will observe?

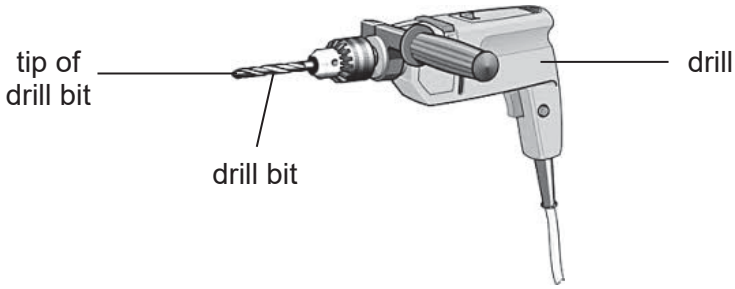
A


B


C


D


A14 The picture below shows a drill, with a diamond on the tip of the drill bit.



Which of the following physical properties explains why diamonds are used in drill bits?

A flexibility
B strength
C hardness
D density

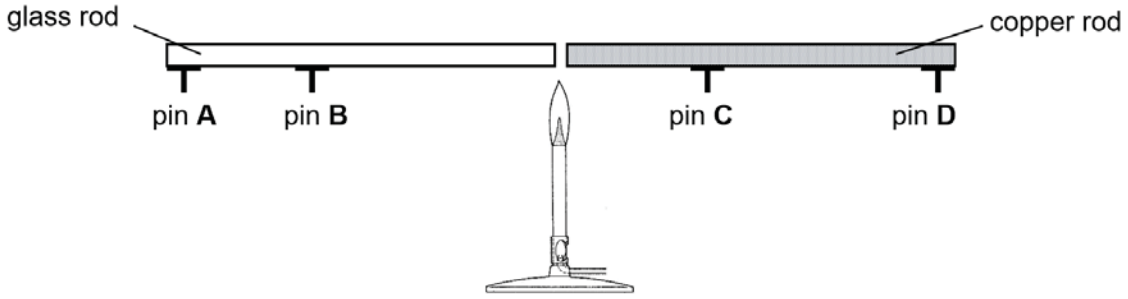
A15 A freshly baked cake is placed on a table.
Which of the following describes the way the cake loses heat?

A conduction only
B convection only
C conduction and convection
D conduction, convection and radiation

A16 Which of the following statements about radiation is incorrect?

A Black surfaces are good emitters of radiation.
B Objects with higher temperature emit radiation at a lower rate.
C Objects with larger surface area absorb radiation at a higher rate.
D Radiation can travel through a vacuum.

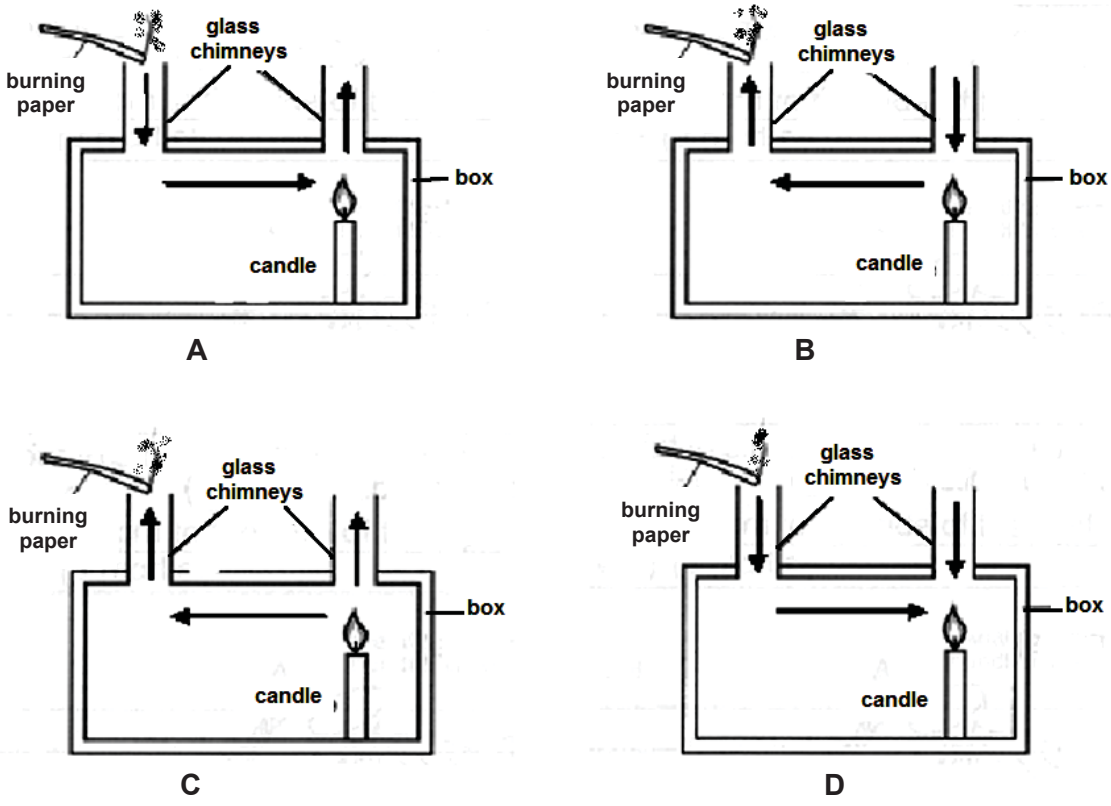
A17 An experimental setup is shown in the diagram below. The glass rod and the copper rod are of equal lengths. Each pin is attached to a rod with an equal amount of wax.



Which pin will drop last?

A pin **A**
B pin **B**
C pin **C**
D pin **D**

A18 Which of the following diagrams shows the correct direction of the convection current set up in the box?



A19 An object is placed on a beam balance and on a compression spring balance on Earth. The same experiment is then repeated on Moon.

Which set of observations is true about the beam balance and the spring balance readings?

	beam balance	compression spring balance
A	reads less on Moon than on Earth	reads less on Moon than on Earth
B	reads less on Moon than on Earth	reads the same on Moon and Earth
C	reads the same on Moon and Earth	reads less on Moon than on Earth
D	reads the same on Moon and Earth	reads the same on Moon and Earth

A20 A student stood on a weighing scale to measure her mass. She first stood on the scale on both feet, then changed to standing on one foot.

Which of the following statements is true?

A The pressure exerted on the scale doubled when she changed to standing on one foot.
B The pressure exerted on the scale halved when she changed to standing on one foot.
C The reading on the weighing scale doubled when she changed to standing on one foot.
D The reading on the weighing scale halved when she changed to standing on one foot.

A21 Forces were applied on a particular box as shown below.

What is the resultant force?

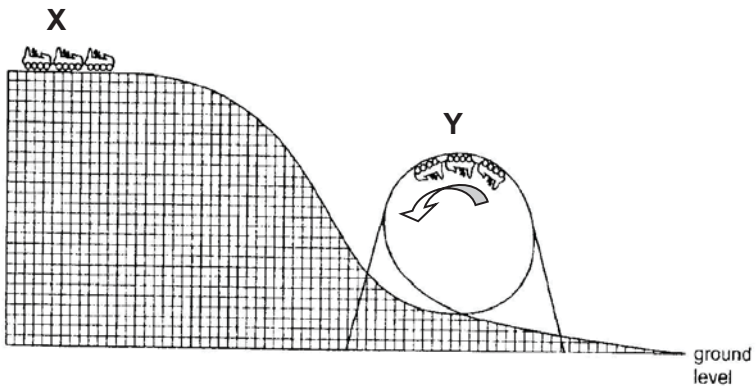
A 13 N to the right
B 1 N to the right
C 12N to the left
D 1 N to the left

A22 A soccer player took a penalty kick from a spot in front of the goalpost.

Which effect of a force was applied?

A stopping a moving object
B moving a stationary object
C changing the shape of an object
D changing the direction of a moving object

A23 In a theme park, passengers in a roller coaster are initially at rest at the top of the track at point **X**. The roller coaster then travels down and round a circular loop in the track at **Y**.



What forms of energy is present at **X** and **Y**?

	X	Y
A	kinetic energy only	gravitational potential energy only
B	kinetic energy and gravitational potential energy	kinetic energy only
C	gravitational potential energy only	kinetic energy and gravitational potential energy
D	gravitational potential energy only	kinetic energy only

A24 An archer pulls a bow before releasing and shooting the arrow.

Which of the following energy conversions is correct of the action above?

A chemical potential energy → elastic potential energy → kinetic energy
B elastic potential energy → chemical potential energy → kinetic energy
C kinetic energy → chemical potential energy → elastic potential energy
D chemical potential energy → kinetic energy → elastic potential energy

A25 Which of the following statements indicate the possible ways to use renewable energy sources?

I Build wind turbines to generate electricity using wind.
II Install solar panels on the roof tops of buildings to capture solar energy.
III Use charcoal instead of liquefied petroleum gas (LPG) for cooking food.

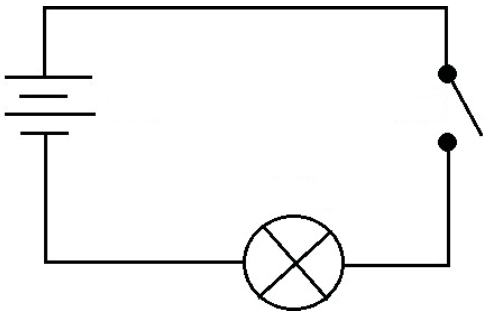
A I & II only
B I & III only
C II & III only
D I, II and III

A26 Singapore is an industrialized small island country with limited land space. Being near the equator, it is sunny all year round.

Suggest which type of renewable energy is suitable to be harvested in Singapore.

A solar energy
B wind energy
C geothermal energy
D biofuel energy

A27 A circuit with one light bulb is set up as shown below.



What happens to the brightness of the light bulb when a second identical light bulb is added in series to the circuit?

A It becomes dimmer.

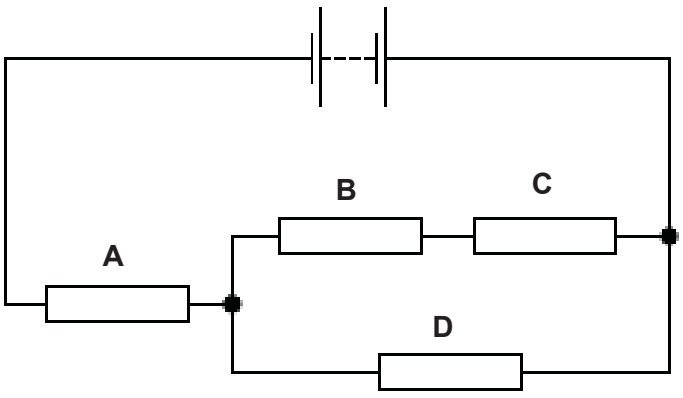
B It becomes brighter.

C The bulbs will not light up.

D There is no change in brightness.

A28 The diagram shows four resistors of equal resistance connected to a battery.

In which resistor does the current have the largest value?



A29 Many electrical equipment should not be plugged into the same socket. Why is this so?

A The fuse will keep “blowing”.

B There is a risk of an electric shock.

C There is a risk of an electrical fire.

D The insulation will become damaged.

A30 Which fuse rating is suitable for a device that requires 8 A to function?

A 7 A

B 8 A

C 9 A

D 10 A

End of Section A

Section B [30 marks]

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

B1 Four rulers made of different material were tested to compare how much their rulers bend when a certain weight was hung on them.

The set-up is shown in Fig. B1.1 below (the figure is not drawn to scale).

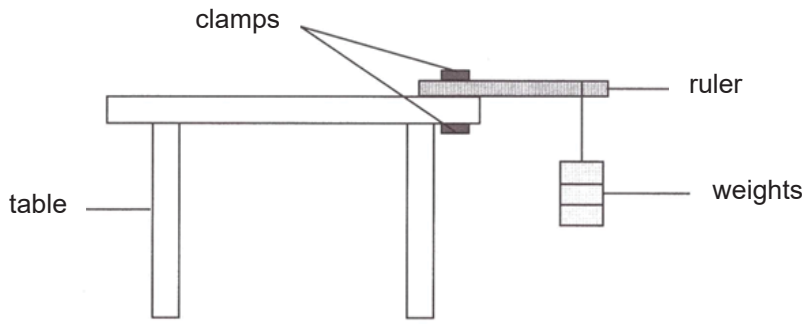


Fig. B1.1

Fig. B1.2 shows the different materials used in each ruler.

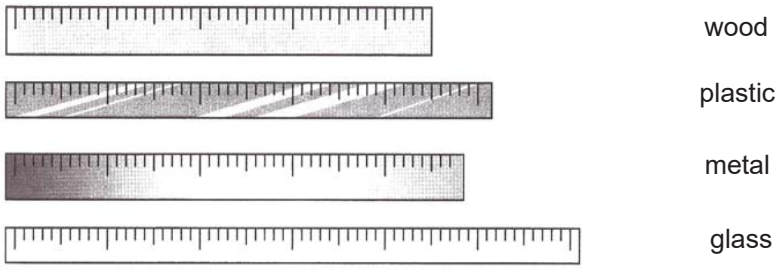


Fig. B1.2

(a) State the independent variable in the experiment conducted.

……**[1]**

(b) State the dependent variable in the experiment conducted.

……**[1]**

(c) Name two other variables that must be kept constant during the experiment.

1. ……

2. ……**[2]**

(d) The students' classmate told them that their experiment was not a fair one.

State one error in the experiment that had caused the experiment to be unfair.

……**[1]**

[Total: 5]

B2 Fig. B2.1 shows a plant cell.

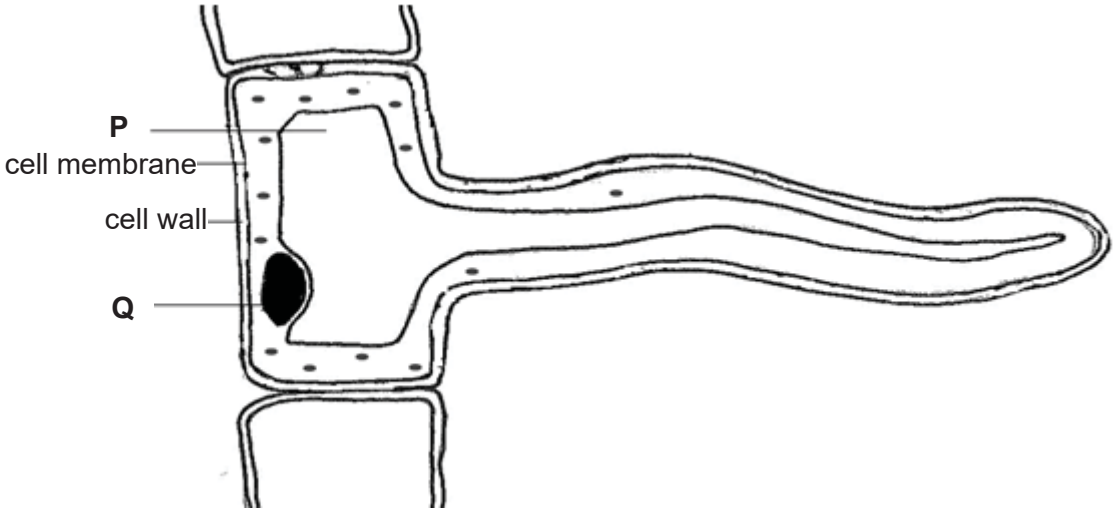


Fig. B2.1

(a) Identify the cell in Fig. B2.1.

……**[1]**

(b) Name structures **P** and **Q**.

P: ……

Q: …… **[2]**

(c) State two differences between the cell in Fig. B2.1 and a typical animal cell.

1……..

……..

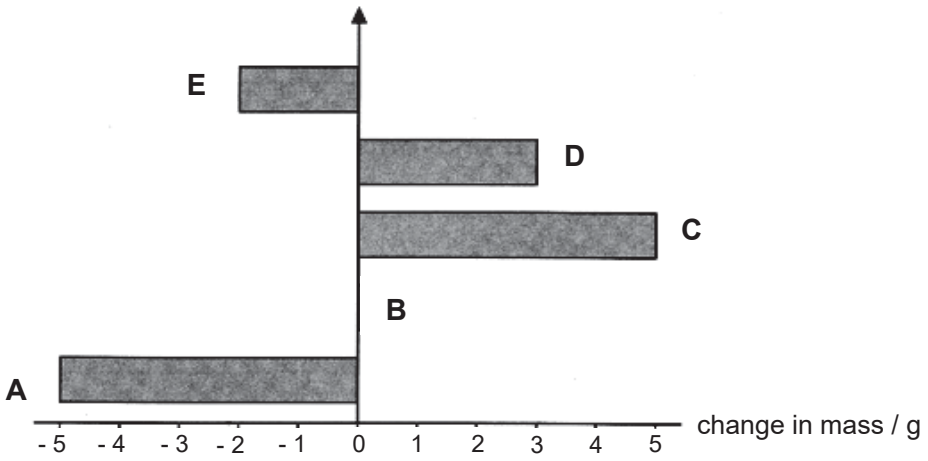
2……..

……**[2]**

[Total: 5]

B3 Five potato strips, **A**, **B**, **C**, **D** and **E**, each weighing 10 g, were immersed in sugar solutions of different concentrations for two hours, then dried and reweighed.

The change in the mass of each potato strip was recorded in Graph B3.1.



Graph B3.1

(a) Name and define the process that caused the change in mass of the potato strips.

……

……

……

……**[2]**

(b) With reference to Graph B3.1,

(i) state which potato strip was placed in distilled water.

…… **[1]**

(ii) state which potato strip was placed in sugar solution of the same concentration as the potato.

…… **[1]**

(c) Explain the change in mass observed in potato strip **A**.

……

……

……

……**[2]**

[Total: 6]

B4 State the material that you will use to make the following objects.
Explain your choice of material based on physical properties of the material.

(a) gloves for working with electrical circuit

……..……..

……..……**[2]**

(b) cutting blade of a knife

……..……..

……..……**[2]**

[Total: 4]

B5 A laboratory is testing the robotic arms of a machine that can lift rock samples on the Moon.

The acceleration due to gravity at the surface of the Moon is 1.6 m/s^2.

(a) The rock samples have a mass of 100 g on Earth.

State the mass of the rock samples (in kg) on the Moon.

mass of rock samples on the moon = …… **[1]**

(b) Calculate the minimum force required to lift up the rock samples on the moon.

force = …… **[1]**

(c) The test shows that the robotic arm can lift up to 0.05 kg rock on the Earth.

State whether the arm be able to lift the 100 g rock samples on the moon? Show your working.

……..……**[2]**

[Total: 4]

B6 Fig. B6.1 shows a circuit made up of five resistors connected to an ammeter and a battery with a voltage of 24 V.

R2 and **R3** are identical resistors and **R4** and **R5** are identical resistors.

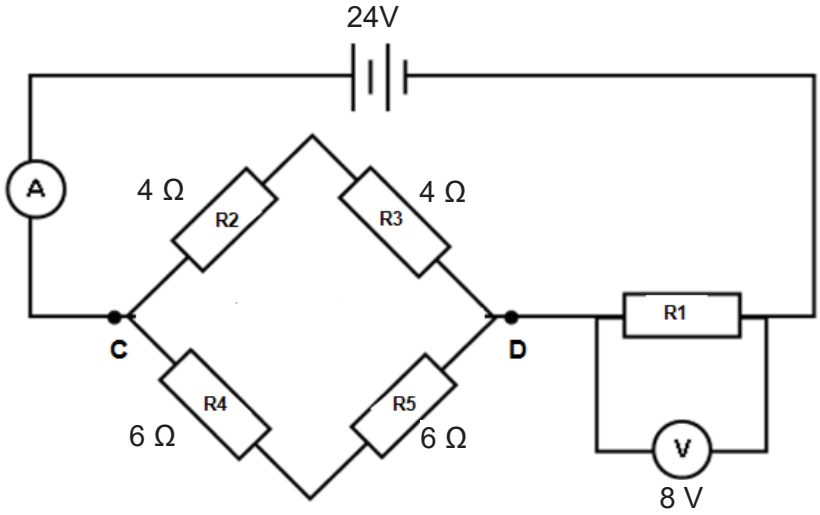


Fig. B6.1

(a) Calculate the potential difference across **C** and **D**.

potential difference = ... **[1]**

(b) **(i)** Calculate the total resistance of **R2** and **R3**.

total resistance = ... **[1]**

(ii) Calculate the total resistance of **R4** and **R5**.

total resistance = ... **[1]**

(iii) Hence, calculate the total resistance of **R2**, **R3**, **R4** and **R5**.

total resistance = ... **[1]**

(c) Calculate the current flowing through the ammeter.

current = …… **[2]**

[Total: 6]

End of Section B

Section C [40 marks]

Answer **C1 and any three other** questions in the spaces provided.

C1 (a) Thermal conductivity is a measure of the ability of a substance to conduct heat.

Fig. C1.1 shows a set-up to investigate the relationship between the thermal conductivity of several metallic plates and the duration at which the cork will fall.

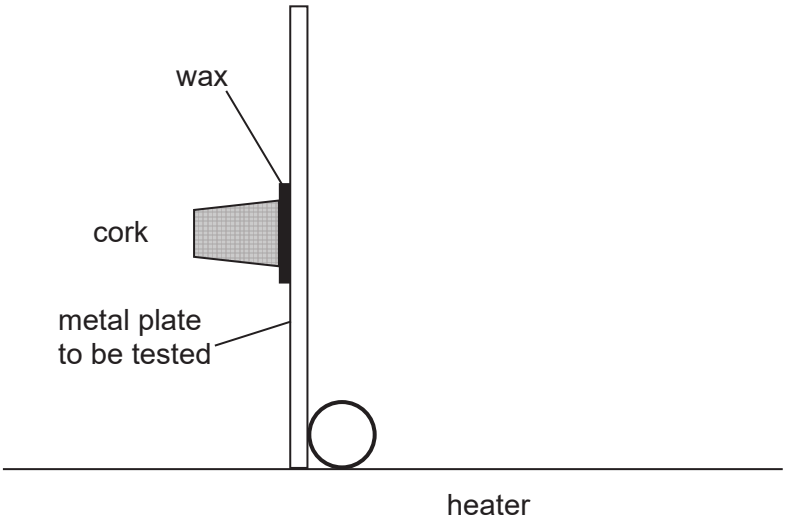


Fig. C1.1

Table C1.2 shows the metal plates used in the experiment and their respective thermal conductivities:

materials	copper	stainless steel	iron	silver	brass
thermal conductivity W/(m.K)	400	16	80	429	109

Table C1.2

(i) Define '*conduction' of heat.*

……..……..**[1]**

The times taken for the cork to fall off when copper and iron plates are used are 20 s and 53 s respectively.

(ii) Describe the relationship between the thermal conductivity of metallic plates with the duration taken for the cork to fall.

……

……..……..**[1]**

(iii) Describe how the thermal conductivity of the materials affects the time taken for the cork to fall.

……

……..……..**[1]**

(b) Fig. C1.3 shows a saucepan containing water placed on a hot plate.

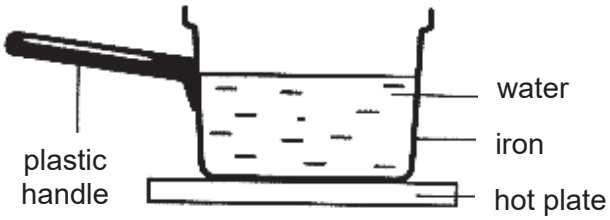


Fig. C1.3

(i) Name and explain the main processes by which heat is transferred from the hot plate to heat up all the water in the saucepan.

……

……

……

……

……

……**[3]**

(ii) The sides of the saucepan are often polished. Explain how this reduces heat loss.

……

……**[1]**

(iii) The plastic handle was broken after the experiment. Suggest another suitable material that can be installed as the handle.

……**[1]**

(c) Residents sometimes complain about floor tiles that pop up due to poor workmanship by the contractor.

Fig. C1.4 shows some floor tiles that have popped up during one month of exceptionally hot weather.

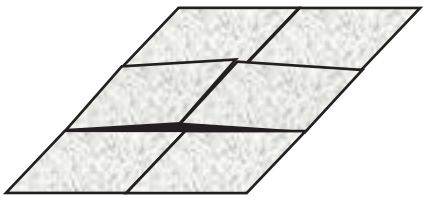


Fig. C1.4

(i) State a reason why the floor tiles pop out during the hot weather.

……..……..**[1]**

(ii) Suggest what could have been done to prevent this from happening.

……..……..**[1]**

[Total: 10]

C2 A student tried to push 2 different boxes.
In Fig. C2.1, she applied a force of 30 N on box **X** but it did not move.
In Fig. C2.2, she applied a force of 30 N on box **Y** and it moved 4m along the ground.

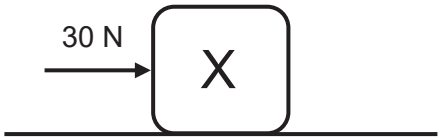


Fig. C2.1

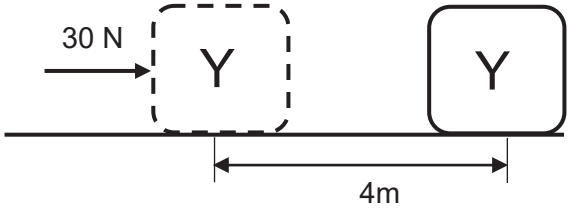


Fig. C2.2

(a) **(i)** State which box had work done on it.

……...…...**[1]**

(ii) Explain your answer for **(a)(i)**.

……..…...

……...……....**[2]**

(iii) Calculate the work done on the box from **(a)(i)**.

work done = …….. **[2]**

(b) **(i)** There is an opposing force that slowed down the movement of box **Y**.

State the name of the force.

……....**[1]**

(ii) On Fig. C2.2, draw an arrow indicating the force in **(b)(i)**. **[1]**

(c) Box **X** has a dimension of 0.2 m by 0.2 m by 0.2 m, and has a mass of 10 kg.

(i) Calculate the weight of the box, assuming that acceleration due to gravity on Earth is 10 m/s^2.

weight = …….. **[1]**

(ii) Calculate the pressure that box **X** is applying on the floor.

pressure = …….. **[2]**

[Total: 10]

C3 **(a)** Sickle celled anaemia is a disease that affects the shape of red blood cell. Fig. C3.1 shows a normal red blood cell while Fig. C3.2 shows a sickled-shaped red blood cell.

Fig. C3.1

Fig. C3.2

(i) State the function of the red blood cell.

……

……**[1]**

(ii) Patients suffering from sickle-celled anaemia usually do not have enough oxygen reaching their cells.

With reference to the shape of the cell in Fig. C3.2, suggest why that is so.

……

……

……**[3]**

(iii) State and explain one other adaptation of the red blood cell that helps it perform its function.

……

……

……**[2]**

(b) Fig C3.3 below shows an insect feeding from the stem of a plant.

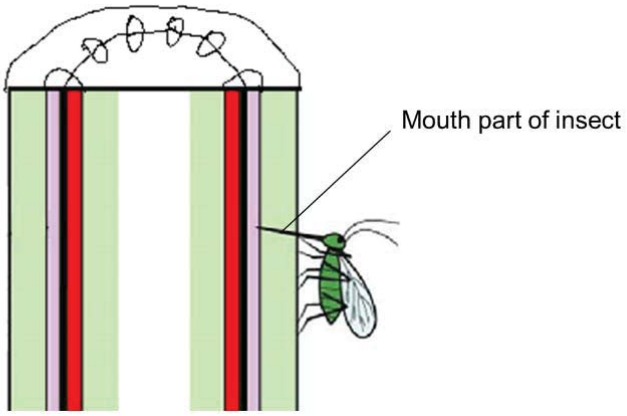


Fig C3.3

(i) Identify which part of the stem is the insect feeding from the plant.

……**[1]**

(ii) State the function of the part in **(b)(i)**.

……**[1]**

(iii) Most insect feeds on plants during the day. Explain why this is so.

……

……**[2]**

[Total: 10]

C4 **(a)** Fig. C4.1 shows a student dropping a ball from a height to investigate the Law of Conservation of Energy.

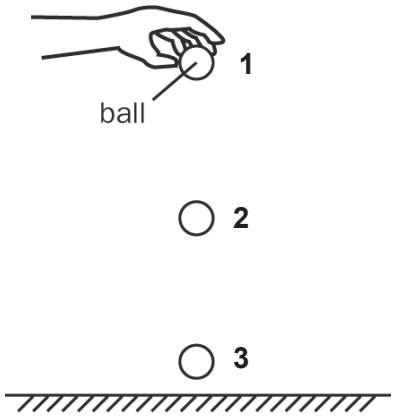


Fig. C4.1

The student expected the ball to drop from position **1** to **3**, and then bounce back up to his hand at position **1**.

(i) State the *Law of Conservation of Energy.*

……

……**[2]**

(ii) Will the ball reach back to position **1**? Explain your answer.

……

……

……**[2]**

(iii) Identify at which position (**1 to 3**) is there

maximum kinetic energy,

……**[1]**

the amount kinetic energy and gravitational potential energy is equal.

……**[1]**

(b) Biofuel is a type of renewable energy that is gaining popularity. It is derived from plants and animal matter such as sugar cane. It has many uses and can even be converted to biodiesel to power cars.

However, despite this, environmentalists are urging governments and people to look out for other sources of renewable energy.

(i) Define *renewable energy.*

……**[1]**

(ii) Explain why countries are not encouraged to use biofuel as a source of energy.

……

……

……**[2]**

(iii) Suggest an alternative renewable energy source that has no negative environmental effect.

……**[1]**

[Total: 10]

C5 (a) Design a circuit diagram in the box below based on the information provided.
The electric circuit should include:

- a battery,
- two light bulbs connected in series,
- a switch that is capable of turning off the two light bulbs,
- an ammeter that measures the current passing through both light bulbs,
- a fixed resistor that is connected in parallel to the two light bulbs,
- a voltmeter that measures the voltage across the fixed resistor.

[4]

(b) A man installed a water heater in his house. Upon switching it on, his whole house went into a blackout.

He later fixed the water heater, and it worked perfectly. The heater has a power rating of 3.5 kW.

(i) State the safety device that is responsible for the blackout.

……..**[1]**

(ii) While fixing the water heater, the man needed to change a component in the plug.

State the component the he needed to change.

……..**[1]**

(iii) Given that the cost of 1.0 kWh of electricity is $0.25, calculate the cost of using the heater for 12 hours.

cost = …….. **[2]**

(iv) Due to wear and tear, the switch is consistently wet due to leaky pipes.

State one hazard that arises if the heater is used, and explain the danger that this hazard poses to the people in the house.

……

……..**[2]**

[Total: 10]

End of Paper