Class	Register Number	Name

BARTLEY SECONDARY SCHOOL

END-OF-YEAR EXAMINATION

SCIENCE

Sec 1 Express

10 Oct 2019

1 hour 30 mins

Candidates answer on the Question Paper.
Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

Section A (20 marks)
There are twenty questions in this section. Answer **all** questions. For each question there are four possible answers**, A, B, C** and **D**.
Choose the **one** you consider correct and shade your choice in soft pencil on the separate Answer Sheet.

Section B (30 marks)
Answer **all** questions in the spaces provided.

Section C (20 marks)
Answer **all** questions in the spaces provided.

A copy of the Periodic Table is printed on page 22.

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

For Examiner's Use	
Section A	
Section B	
Section C	
Total	**70**

Section A (20 marks)

Answer **all** questions.
For each question, there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in soft pencil on the Answer Sheet.

1 Which row describes the colour of luminous flame and the state of the corresponding air hole of a Bunsen burner?

	colour of luminous flame	air hole of Bunsen burner
A	blue	closed
B	blue	open
C	orange	closed
D	orange	open

2 Vitamins A and E are soluble in fats.

What does fat act as when it is used to dissolve Vitamins A and E?

A solute

B solution

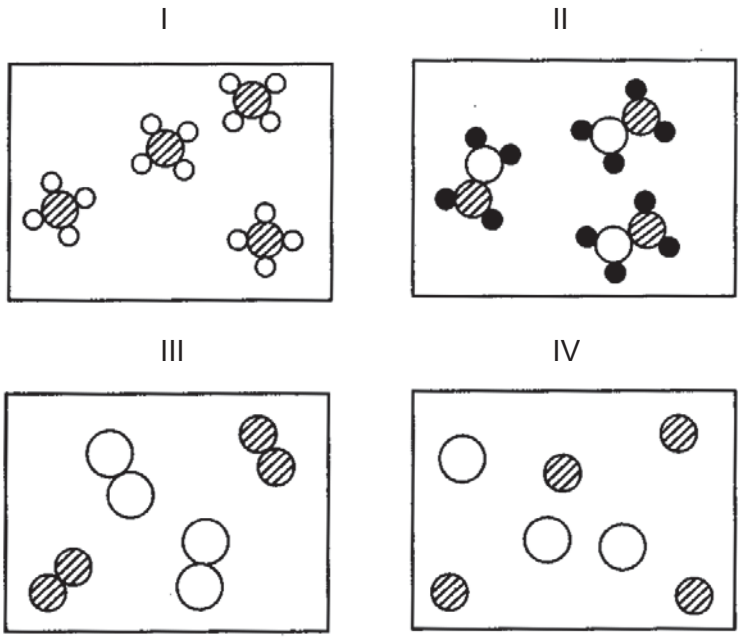
C solvent

D suspension

3 Which description shows the change in the movement of the particles and the distance between each particle during freezing?

	movement of particles	distance between particles
A	faster	closer together
B	faster	further apart
C	slower	closer together
D	slower	further apart

4 Which diagrams show a mixture of two elements?



A I and II only

B II and III only

C III and IV only

D all of the above

5 The diagram below shows 200 cm^3 of liquid in two different containers.

Which property of liquids is shown in the diagram above?

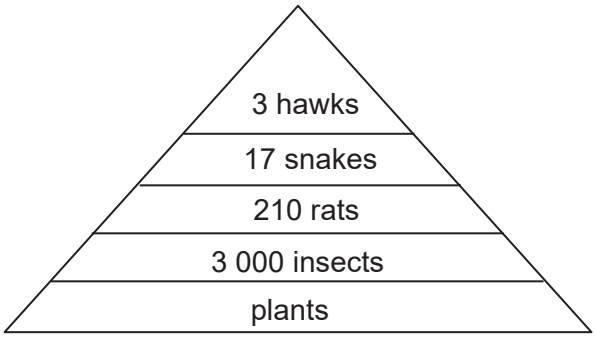
A Liquids can flow.

B Liquids cannot be compressed.

C Liquids do not have fixed shapes.

D Liquids have high densities.

6 The diagram shows the energy pyramid of a food chain.



What is the estimated amount of energy which the snakes will receive, if the plants can provide 100 000 J of energy?

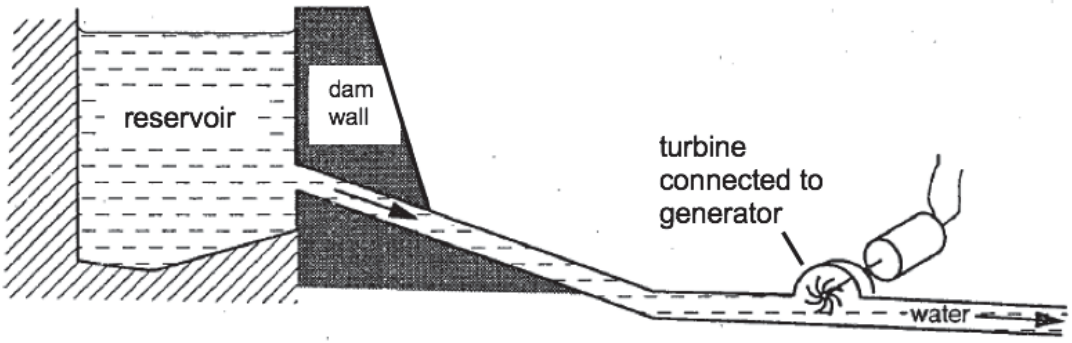
A 10 J

B 100 J

C 1 000 J

D 100 000 J

7 The diagram shows the main parts of a hydroelectric power station.



Which energy change occurs in the generator?

A chemical to kinetic

B electrical to heat

C heat to chemical

D kinetic to electrical

8 How does a wool sweater keep a person warm?

A Air is trapped in the wool.

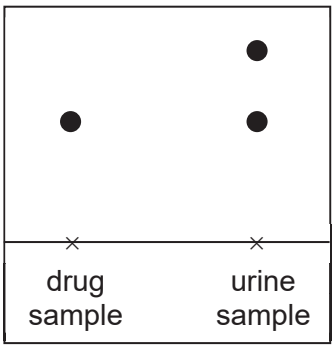
B Air passes easily through the wool.

C Wool heats up easily.

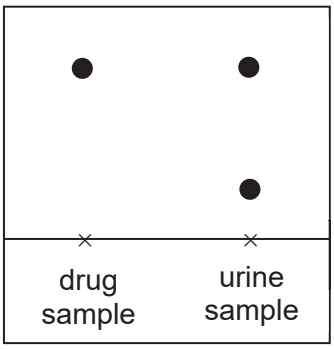
D Wool is warm.

9 A swimmer is suspected to have consumed a banned drug to improve his performance in a swimming competition. His urine sample was taken and sent for testing in the laboratory using paper chromatography.

The chromatograms of the pure drug and his urine sample are tested with two different solvents, alcohol and water and are shown below.



alcohol as solvent



water as solvent

Which statement about the results is true?

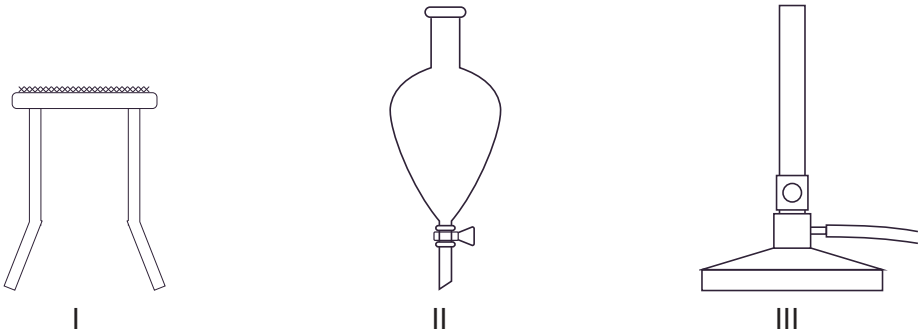
A Both tests show that he consumed the banned drug.

B Both tests show that he did not consume the banned drug.

C The test using alcohol as solvent shows that he consumed the banned drug, but not the test using water as solvent.

D The test using water as solvent shows that he consumed the banned drug, but not the test using alcohol as solvent.

10 Which apparatus are needed for evaporation of salt solution?



I II III

A I and II only

B I and III only

C II and III only

D all of the above

11 Potassium permanganate is a disinfectant and has a chemical formula of $KMnO_4$.

How many elements does potassium permanganate have?

A 3

B 4

C 6

D 7

12 Which organism is **not** a decomposer?

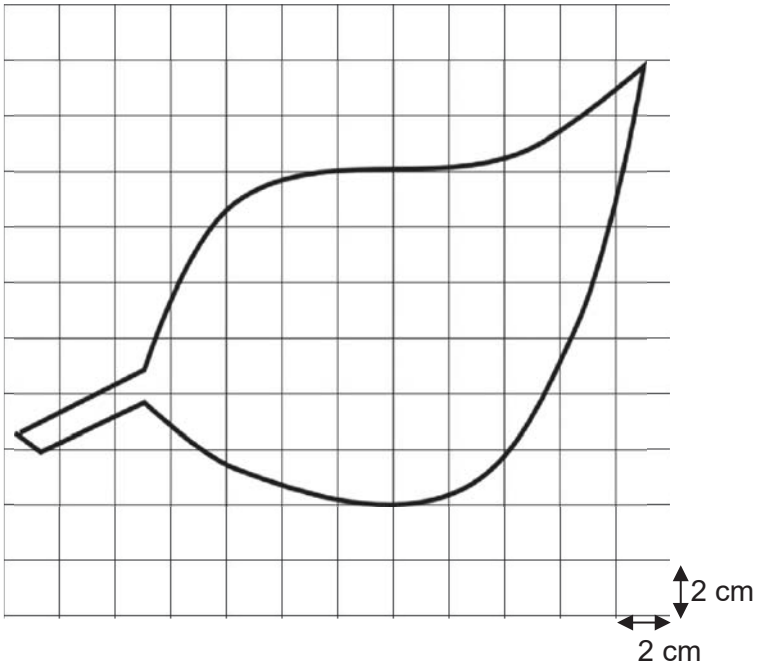
A bacteria

B earthworm

C fungi

D virus

13 Given that each small square has a side of 2 cm, what is the approximate area of the leaf below?



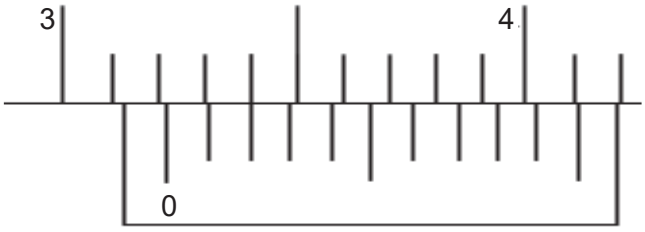
A 27 cm^2

B 41 cm^2

C 82 cm^2

D 164 cm^2

14 A boy wants to measure the internal diameter of a beaker and decides to use a Vernier calipers. The figure below shows the reading of the Vernier calipers.



What is the appropriate jaws to use and the correct reading of the Vernier calipers?

	jaws	reading
A	inside jaws	3.14 cm
B	inside jaws	3.22 cm
C	outside jaws	3.14 cm
D	outside jaws	3.22 cm

Refer to the text below to answer questions 15 and 16.

Corals need sunlight to survive as they have a symbiotic relationship with photosynthetic algae. These algae provide the corals with oxygen and in turn, the corals provide the algae with shelter and raw materials for photosynthesis.

In recent years, corals are being threatened by warming of the sea due to global warming. In addition, increased soil erosion has resulted in high amount of suspended particles causing waters to be cloudy. These threats have resulted in mass destruction of coral reefs.

15 What type of symbiotic relationship do the corals have with the photosynthetic algae?

A commensalism

B mutualism

C parasitism

D predation

16 Which abiotic factor is responsible for the mass destruction of the coral reefs?

A air

B humidity

C soil

D water

17 Fig. 17.1 is a cuboid of length 2 cm by 3 cm by 4 cm that is placed in a measuring cylinder filled initially with some water as shown in Fig. 17.2 below.

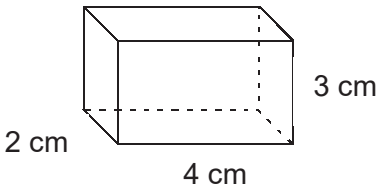
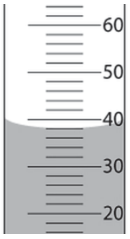


Fig. 17.1



initial water level

Fig. 17.2

What will be the final water level in the measuring cylinder after the cuboid is placed inside?

A 38 cm^3

B 42 cm^3

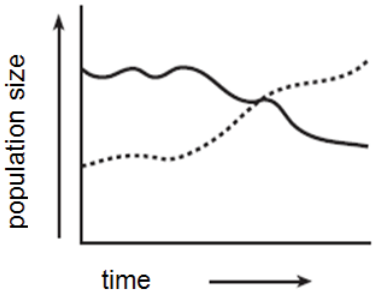
C 62 cm^3

D 66 cm^3

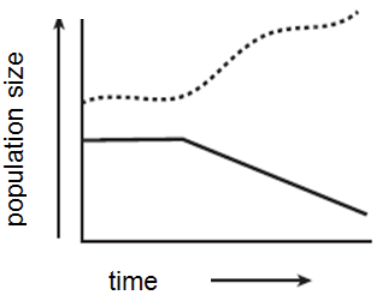
18 In a particular ecosystem, squirrels make up a large portion of the diet of coyotes. As a result of a fatal disease, the squirrel population begins to reduce over a period of months.

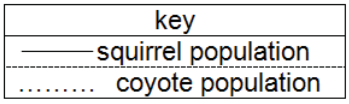
Which graph best represents the expected changes in population size of the coyotes and the squirrels?

A

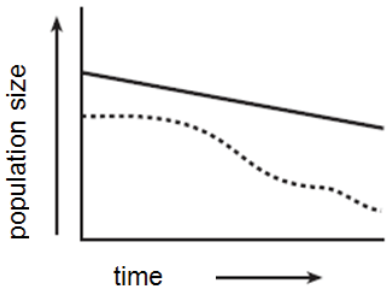


B

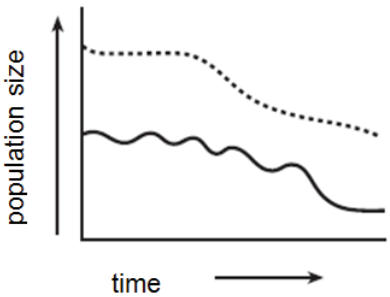




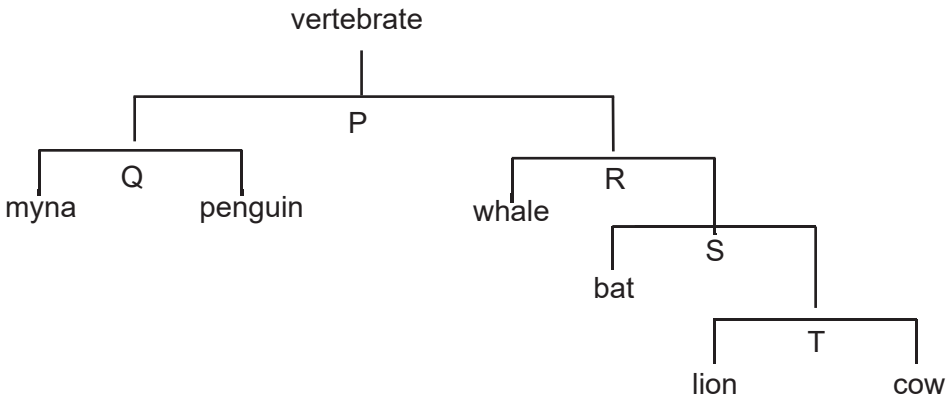
C



D



Refer to the following classification key for questions 19 and 20.



19 At which interval does division of vertebrates into mammals and birds occur?

A P

B Q

C S

D T

20 Which description shows the correct division at interval R?

A Those that are big in size and those that are small in size.

B Those that fly and those that do not fly.

C Those that lay eggs and those that give birth to their young alive.

D Those that live in water and those that live on land.

Section B (30 marks)

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

1 The picture below shows two boys performing an experiment in a Science laboratory.

State **two** safety rules they should have observed.

1 ……

……

2 ……

……

[2]

2 Fig. 2.1 shows part of the Periodic Table.

I	II		III	IV	V	VI	VII	0
		Z						
J				**X**				
							M	
	L							**Q**
							R	

Fig. 2.1

Use the letters **J**, **L**, **M**, **Q**, **R**, **X** and **Z** to answer the following questions.

(a) Which elements are metals?

[1]

……

(b) State the group and period number of element **X**.

Group ……

Period …… [2]

3 Lesti picked up some leaves during a nature walk at Bidadari Park. Upon reaching school, he set out to investigate the density of a leaf he found.

He measured the mass of a dish and the mass of the dish with the leaf on it using the electronic balance as shown in Fig. 3.1 and Fig. 3.2 respectively.

He then measured the volume of the leaf to be 0.50 cm^3.

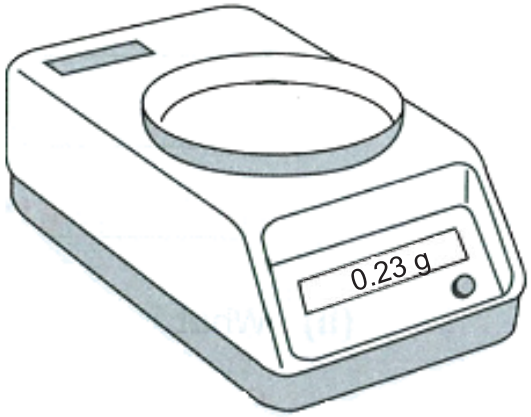


Fig. 3.1

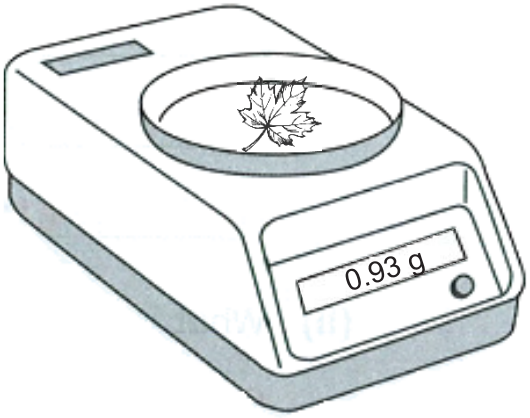
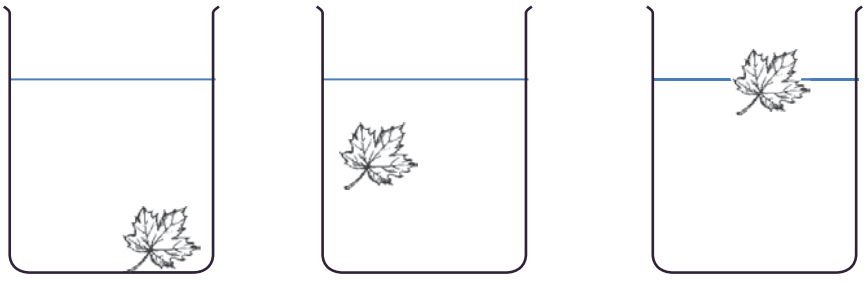


Fig. 3.2

(a) Calculate the density of the leaf.

density =……..... g/cm^3 [2]

(b) Lesti took three leaves of the same size and placed each of them in three beakers of salt solutions, **P**, **Q** and **R**, as shown in Fig. 3.3.



solution **P** solution **Q** solution **R**

Fig. 3.3

(i) Which solution had a density value closest to that of the leaf?

Explain your answer based on Fig. 3.3.

……

…… [2]

(ii) Lesti added three teaspoonful of salt to solution **Q** and stirred it. After the salt was dissolved, the leaf started to rise to the same level as shown in the beaker for solution **R**.

Explain what has happened.

.....

..... [2]

4 Fig. 4.1 shows a cell of a newly discovered organism by a biologist.

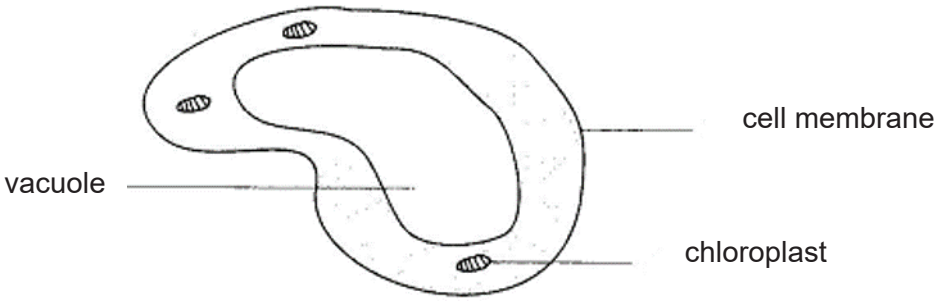


Fig. 4.1

Under the microscope, the biologist observes that this cell cannot be classified completely as an animal cell or a plant cell.

(a) Based on the labelled structures, explain why this cell **cannot** be classified as an animal cell.

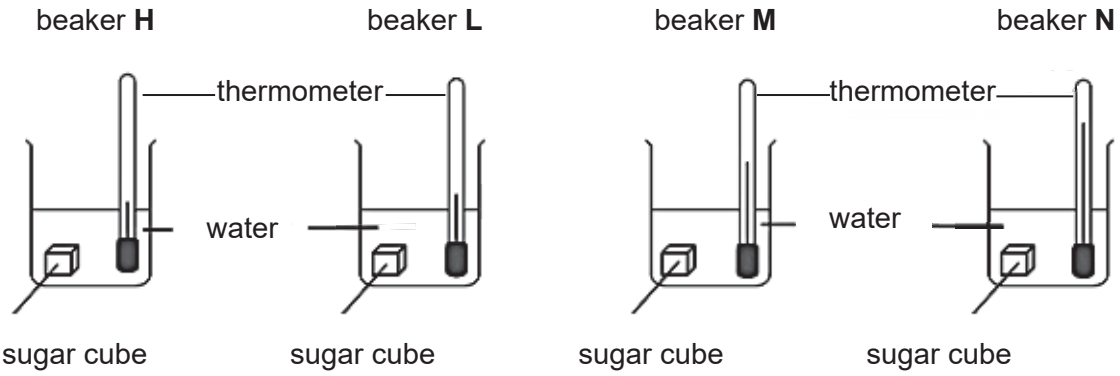
.....

..... [2]

(b) State one reason why this cell **cannot** be considered as a plant cell.

..... [1]

5 Merlin set up an experiment as shown below. In each of the beakers, she placed an identical sugar cube and poured equal volumes of water but at various temperatures into each beaker. She then measured the time taken for each sugar cube to dissolve completely in the water.



(a) Suggest a possible hypothesis for this experiment.

……

…… [1]

(b) Identify **two** controlled variables.

1 ……

2 …… [2]

(c) Identify the independent variable of the experiment.

…… [1]

(d) Predict in which beaker the sugar cube would dissolve the fastest.

…… [1]

(e) Suggest **two** other ways you can do to shorten the time of dissolving the sugar cube in the same volume of water in all the four beakers.

1 ……

2 …… [2]

6 A picture of a kettle is shown below.

Suggest a suitable material for the handle and body of the kettle and give a reason for your choice.

(a) material for handle:……..

reason:……..……..

……..……..

material for body of kettle:..……..……..

reason:……..……..

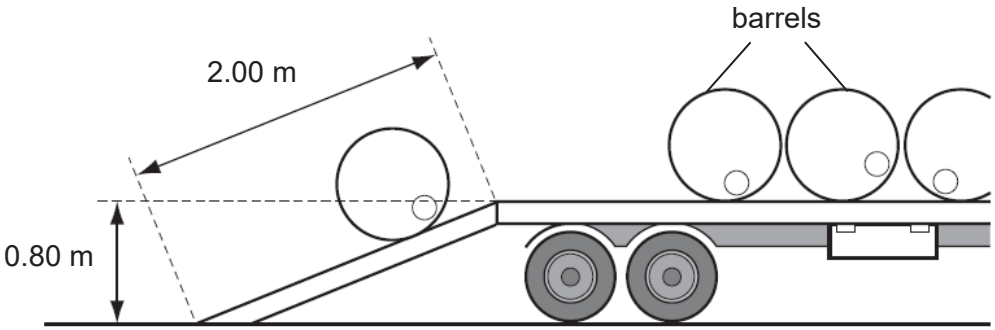
……..…….. [2]

(b) Using the Kinetic Particle Theory, describe the arrangement and movement of the water particles found in the kettle at room temperature.

……..……..

……..…….. [2]

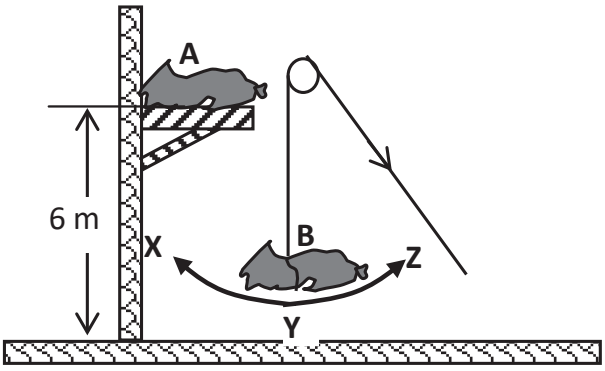
7 **(a)** A workman rolls a barrel of weight 2000 N up a plank of length 2.00 m and on to a lorry. The back of the lorry is 0.80 m above the horizontal surface of the road.



Calculate the work done on the barrel against gravity.

work done = …….. J [2]

(b) A farmer uses a pulley to lift bags of corn onto the storage shelf of a barn as shown in the figure below. The shelf is 6 m from the ground.



(i) Name the type of energy that bag **A** has on the shelf.

…… [1]

(ii) Bag **B** is allowed to swing from side to side. State the energy conversion between **X**, **Y** and **Z**.

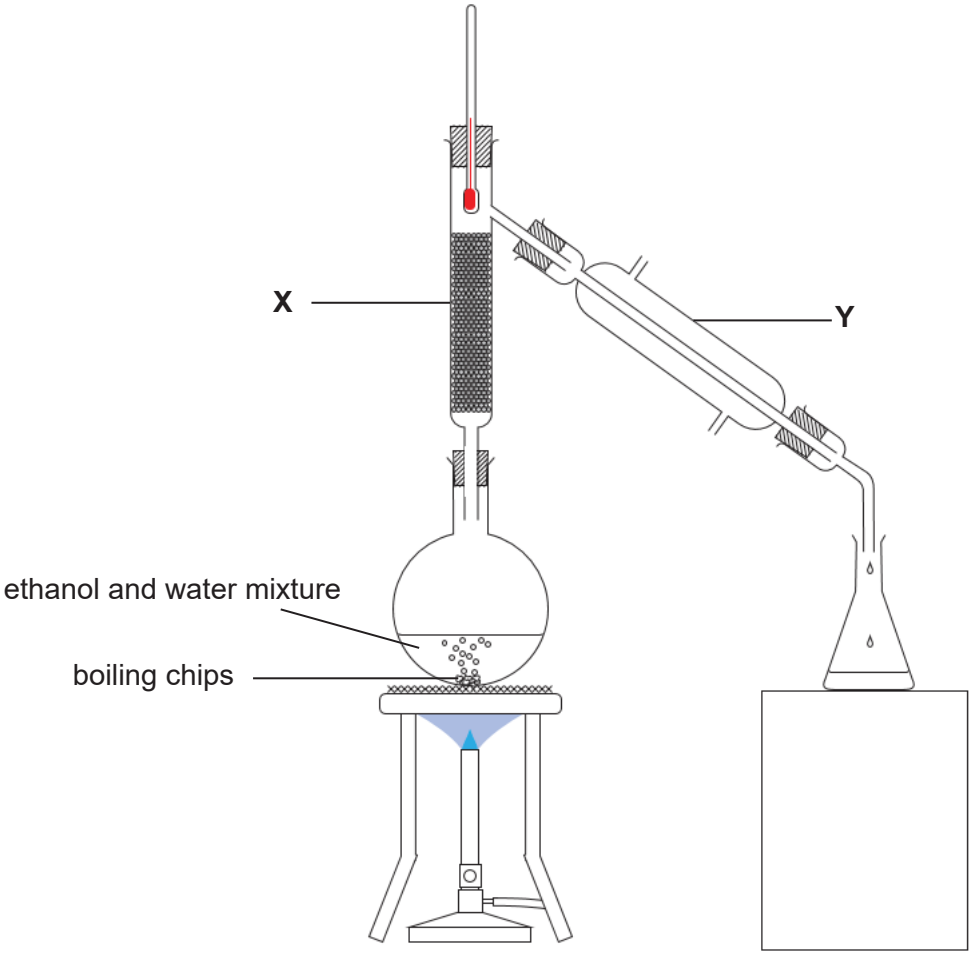
X :……→ **Y**: …… → **Z**: …… [2]

Section C (20 marks)

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

8 The diagram below shows a fractional distillation set-up that is used to separate a mixture of ethanol and water.

The boiling point of ethanol is 78 °C and that of water is 100 °C.



(a) Name the apparatus labelled **X**.

…… [1]

(b) Why is the bulb of the thermometer placed at the tube entering apparatus **Y**?

…… [1]

(c) State the function of apparatus **Y**.

…… [1]

(d) **(i)** State the liquid that will distil over first.

…… [1]

(ii) Give a reason for your answer in **(i)**.

…… [1]

(iii) Draw the particle model of the boiling chips.

[1]

9 Ms Tan is a school laboratory technician. She has three containers filled with iron filings, chalk powder and sugar respectively. In an act of mischief, some students mix the contents of the containers.

Design an experiment to help Ms Tan separate the mixture of iron filings, chalk powder and sugar. State clearly the separation techniques that are used and what substance(s) is/are separated.

.....

.....

.....

.....

..... [4]

10 **(a)** Fig. 10.1 shows a hydraulic device that is used to compress paper in a waste disposal site.

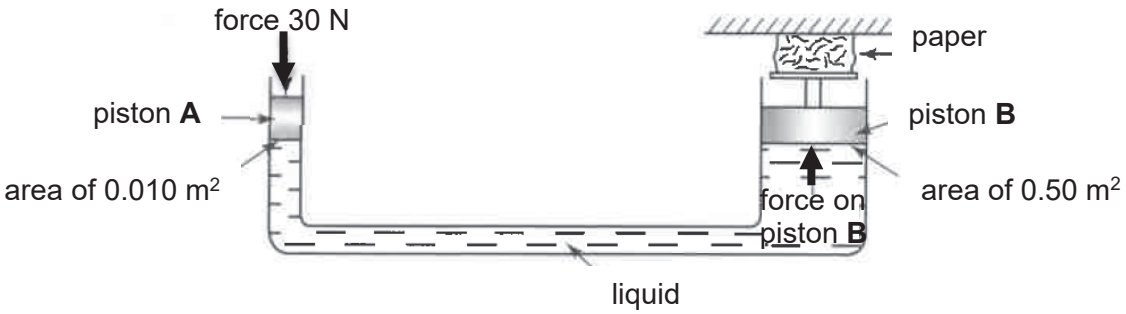


Fig. 10.1

A force applied at piston **A** causes a pressure. The liquid transmits this pressure to piston **B** which then causes a force to be exerted on the paper. A force of 30 N is exerted on piston **A**. The area of piston **A** is 0.010 m^2. The area of piston **B** is 0.50 m^2.

(i) Calculate the pressure produced by piston **A**.

pressure = ... N/m^2 [2]

(ii) The pressure produced by piston **A** is the same as the pressure exerted by piston **B**.

Calculate the force exerted on piston **B**.

force = ... N [2]

(b) Fig. 10.2 shows a hot water tank with an immersion heater at the bottom.
Convection current allows the water to be heated evenly throughout the water tank.

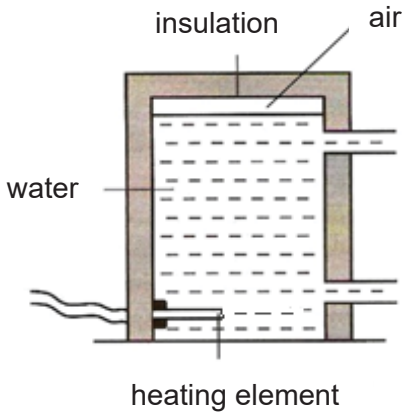


Fig. 10.2

(i) Indicate with arrows in Fig. 10.2 to show the directions of water entering and leaving the hot water tank. [1]

(ii) Draw arrows in Fig. 10.2 to show the convection current in the water tank. [1]

iii) Explain how convection current allows the water to be heated evenly throughout the water tank.

.....

.....

..... [2]

(c) Computer chips used in computers generate a lot of heat. They are usually fitted with a heat sink with black metal fins as shown in Fig. 10.3.

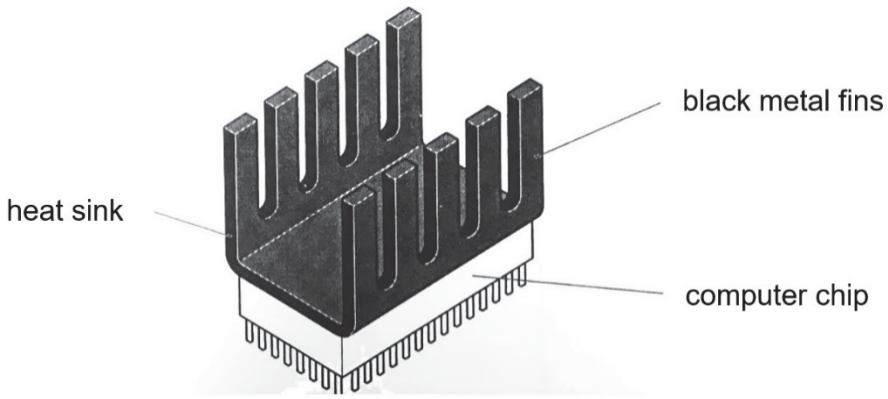


Fig. 10.3

The heat sink keeps the computer chip cool by transferring heat away from the computer chip via conduction and radiation.

Explain how the features of the heat sink allows heat to be transferred away from the computer chip efficiently.

……

……

……

…… [2]

END OF PAPER

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		Key proton (atomic) number atomic symbol name relative atomic mass									5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57 – 71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89 – 103 actinoids	104 Rf Rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).