



Geylang Methodist School (Secondary)

End-of-Year Examination 2025

Candidate Name			
Class		Index Number	

LOWER SECONDARY SCIENCE

Sec 2 G3

Additional materials: Optical Answer Sheet

1 hour 30 minutes

Setter: Mr Kelvin Tay

1 October 2025

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A

There are **twenty** questions in this section. Answer **all** questions. For each question, there are four possible answers, **A, B, C** or **D**. Choose the **one** you consider correct and record your choice in soft pencil on the separate optical answer sheet.

Section B

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

Section C

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

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

All numerical answers are to be rounded off to 3 significant figures.

For Examiner's Use	
Section A	20
Section B	30
Section C	20
Total	70

This question paper consists of **18** printed pages and **2** blank pages

[Turn over

Section A

1 Which of the following are non-contact forces?

- I Frictional force
- II Normal reaction
- III Gravitational force
- IV Magnetic force

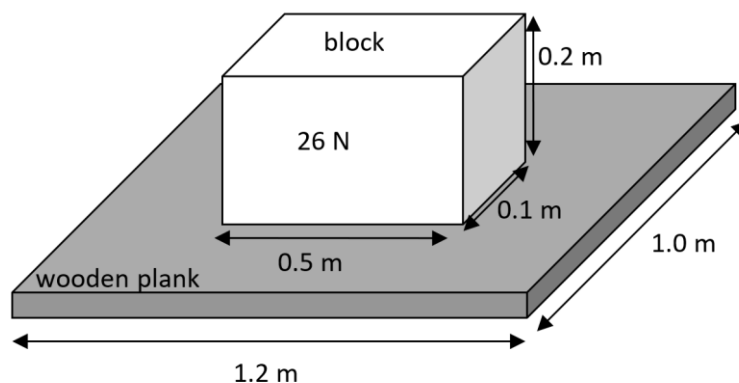
- A I and II only
- B I and III only
- C II and III only
- D III and IV only

2 A rock on the Moon has a mass of 3.0 kg. It is brought back to the Earth where the gravitational field strength is stronger.

What is true about its mass and weight on the Earth?

	mass	weight
A	less	same
B	less	less
C	same	same
D	same	more

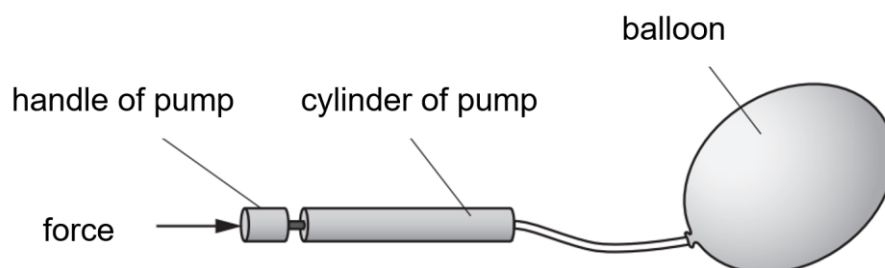
3 A rectangular block of dimensions 0.5 m by 0.1 m by 0.2 m is placed on a wooden plank of dimensions 1.2 m by 1.0 m. The block has a weight of 26 N.



What is the pressure exerted by the block on the wooden plank?

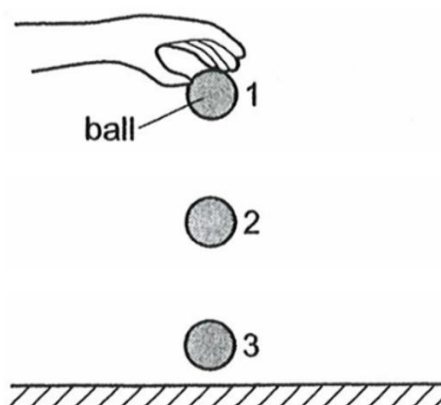
- A 21.7 Pa
- B 52 Pa
- C 520 Pa
- D 2600 Pa

- 4 A pump is used to push air into a balloon.



What is the work done if a force of 12.0 N is applied to push the handle of the pump by a distance of 15 cm in order to cause air in the cylinder to move into the balloon?

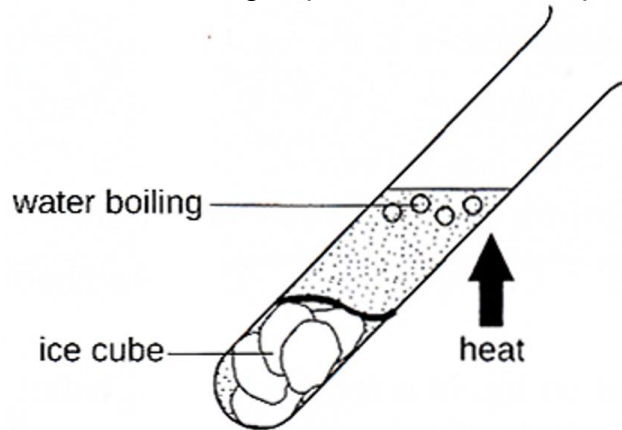
- A 0.8 J
 - B 1.8 J
 - C 80 J
 - D 180 J
- 5 A ball is dropped from a height as shown.



Ignoring the effects of air resistance, the total energy is

- A greatest at point 1.
- B greatest at point 2.
- C greatest at point 3.
- D the same at all points.

- 6 The diagram below shows the boiling of pure water at the top of a test tube.



The ice cubes do not melt even when water boils at the top.

Which of the following statements best explains this observation?

- A Conduction can only take place at the surface of boiling water.
 - B Heat energy is lost to the surroundings when boiling takes place.
 - C Water cannot conduct heat fast enough to the bottom of the test tube.
 - D Water contains impurities which affect its boiling point.
- 7 The diagram below shows two different bimetallic strips 1 and 2, made of metals X, Y and Z, being heated to the same temperature.



bimetallic strip 1



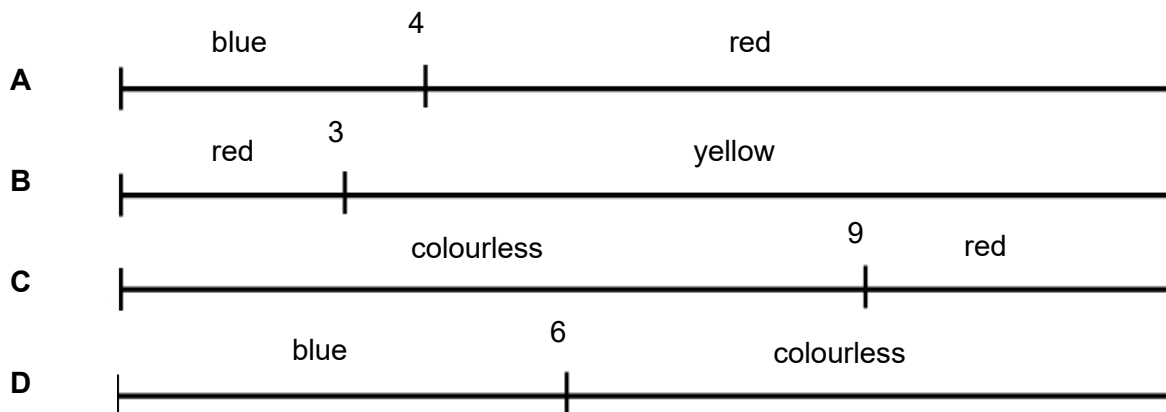
bimetallic strip 2

From the results shown above, arrange the rate of expansion of the three different metals in increasing order.

- A X, Y, Z
 - B X, Z, Y
 - C Y, Z, X
 - D Z, X, Y
- 8 What is the purpose of leaving small gaps in between slabs of concrete on sidewalks?
- A It is to allow for contraction of the concrete.
 - B It is to allow the expansion of the concrete.
 - C It is to provide connection between slabs.
 - D It is to replace the slabs.

- 9 The figure below shows four different types of indicators, **A**, **B**, **C** and **D**, with their respective colour changes across a pH scale of 1 to 14.

Which of the following indicators, **A**, **B**, **C** or **D**, would **not** be able to differentiate between pure water and nitric acid?



- 10 Ray wants to use an indicator to differentiate between solution X of pH 2 and solution Y of pH 5.

Which of the following indicators can he use?

indicator	pH at which colour change occurs	colour in low pH	colour in high pH
A	1	red	brown
B	3	yellow	red
C	7	red	yellow
D	10	colourless	pink

- 11 What important role do decomposers play in ecosystems?

- A** to break down the dead remains of plants and animals for animals to eat
- B** to break down the dead remains of plants and animals which are returned to the environment
- C** to cause the plants and animals in a food chain to die
- D** to recycle the nutrients back into the soil for plants to use

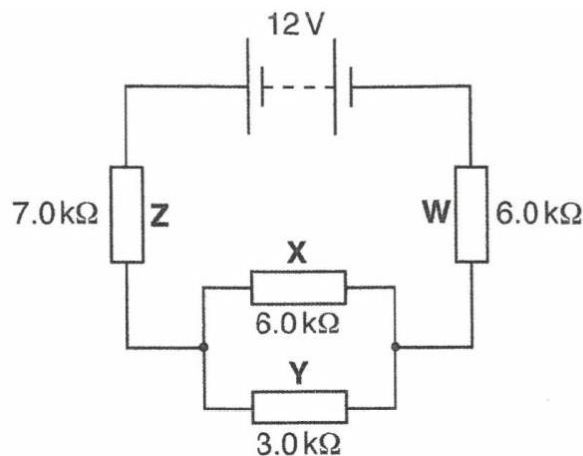
- 12 Fig. 12.1 shows a *Rafflesia* plant. The *Rafflesia* plant grows on plant vines. It takes water and nutrients from the vines but does nothing to help the vines live.



Fig. 12.1

Rafflesia is a

- A decomposer
 B parasite
 C predator
 D scavenger
- 13 The current passing through an electrical component is
- A the energy required to move a unit charge across the circuit.
 B the energy required to move a unit charge across the component.
 C the rate of flow of charge through the component.
 D the rate of flow of energy through the component.
- 14 The circuit shows how four resistors are connected in a circuit.

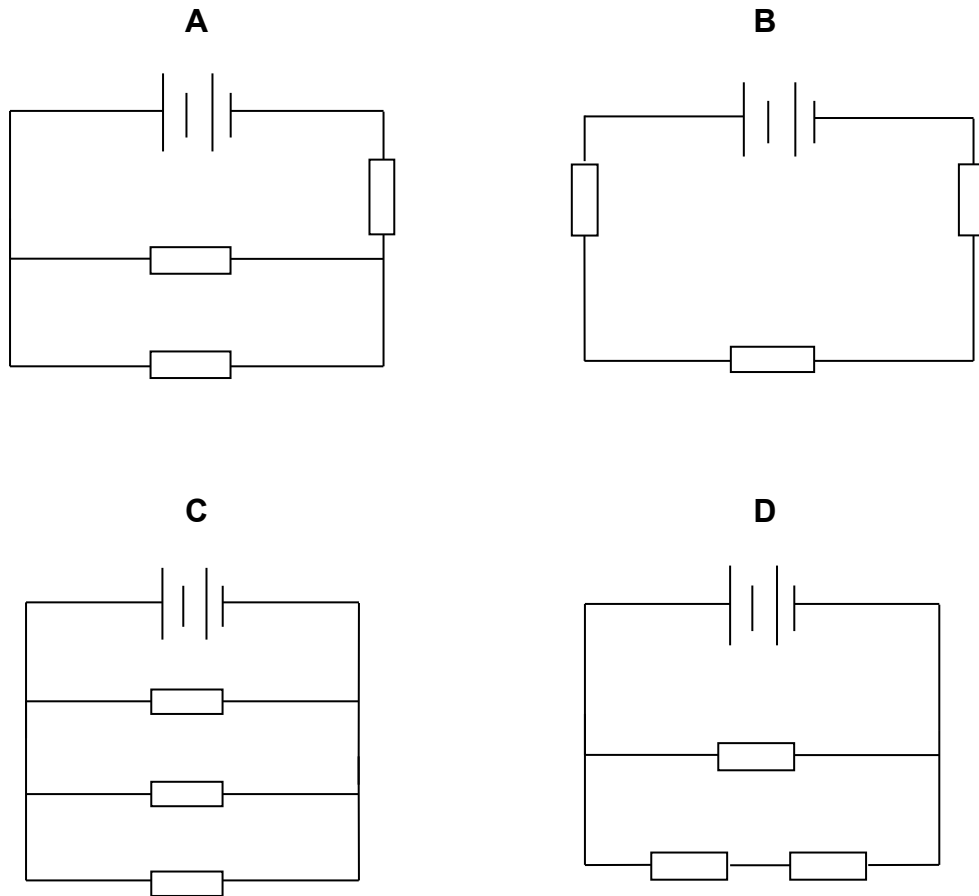


Which of the following choices shows the correct pair of resistors that has the same current or potential difference across it?

	same amount of current flowing through	same potential difference across
A	X and Y	X and Y
B	X and Y	W and Z
C	W and Z	X and Y
D	W and Z	W and Z

- 15** Three identical resistors are used in four different electric circuits.

Which electric circuit has the lowest total resistance?



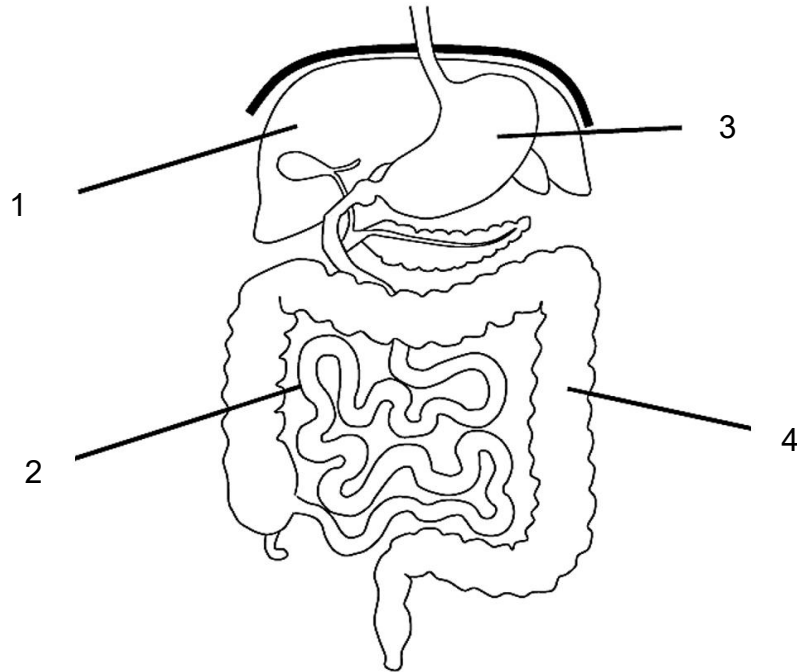
- 16** The table shows the protein, fat and carbohydrate contents in 10 g of rice and white fish.

food	protein / g	fat / g	carbohydrate / g
rice	0.6	0.1	8.7
white fish	3.6	0.005	0.0

What would be the main end products of digestion of a meal of rice and white fish?

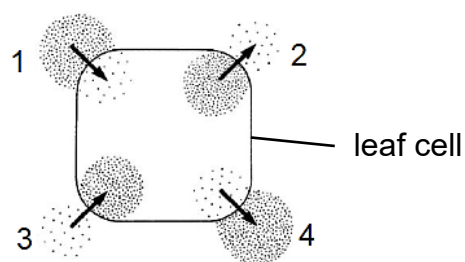
- A** amino acids and glycerol
- B** amino acids and simple sugars
- C** fatty acids and simple sugars
- D** simple sugars and glycerol

- 17 The diagram shows parts of the human digestive system.



Which of the following statements is correct?

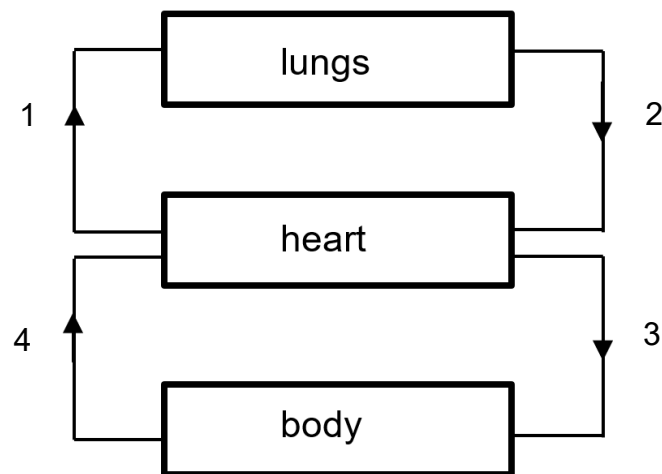
- A Emulsification of fats occurs at 1.
 - B Digestion of starch begins and completes at 2.
 - C Chemical digestion of proteins begins at 3.
 - D Absorption of digested food occurs at 4.
- 18 The diagram shows ways in which molecules, represented by the dots, may move into and out of a leaf cell.



Which of these demonstrates the diffusion of carbon dioxide molecules and oxygen molecules into or out of leaf cells during the day?

	carbon dioxide molecules	oxygen molecules
A	1	2
B	1	4
C	4	3
D	4	1

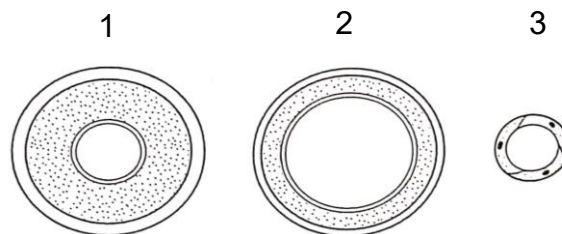
- 19 The diagram shows a simplified model of the human circulatory system.



Which row best describes the oxygen levels of the blood in the sites labelled 1 to 4?

	1	2	3	4
A	high	high	low	low
B	high	low	high	low
C	low	low	high	high
D	low	high	high	low

- 20 The diagram shows three types of blood vessels, 1, 2 and 3. The diagrams are not drawn to scale.



Which row correctly describes the feature of each blood vessel?

	has the largest lumen	has thick muscular wall	has a wall that is one cell thick
A	1	2	3
B	2	3	1
C	2	1	3
D	3	1	2

End of Section A

Section B

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

- 21** There are several effects of forces on the motion of an object. Fig. 21.1 shows a game of badminton. Player X hits the shuttlecock towards player Y and player Y returns the shuttlecock to player X.

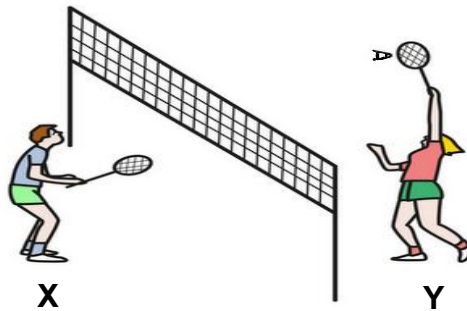


Fig. 21.1

- (a) State the effect of the force displayed as player Y returned the shuttlecock back to player X.

.....

[1]

- (b) During a match, a player executed a smash, as shown in Fig. 22.2

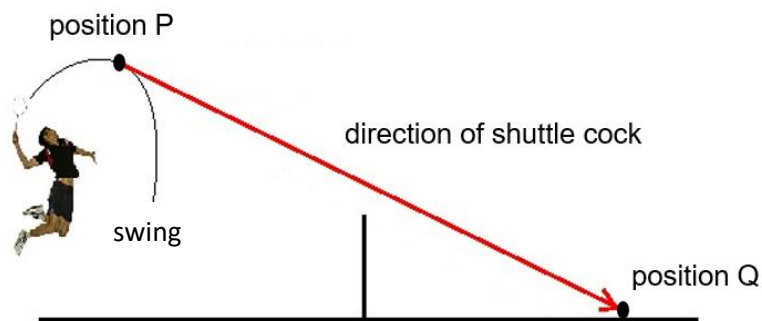


Fig. 22.2

The distance between positions P and Q is 9 m. The average speed of the shuttlecock is 45 m/s.

- (i) Calculate the time taken for the shuttlecock to travel from P to Q.

time = s [2]

- (ii) State the energy transformation that occurs when the player swings the racket to hit the shuttlecock.

..... [1]

- 22** A fossil fuel power station is a thermal power station which burns fossil fuel, such as coal or natural gas, to produce electricity. Fossil fuels contain sulfur. When they are burnt, sulfur is converted to sulfur dioxide.

Fig. 22.1 shows how air pollution is caused by the release of sulfur dioxide gas into the atmosphere.

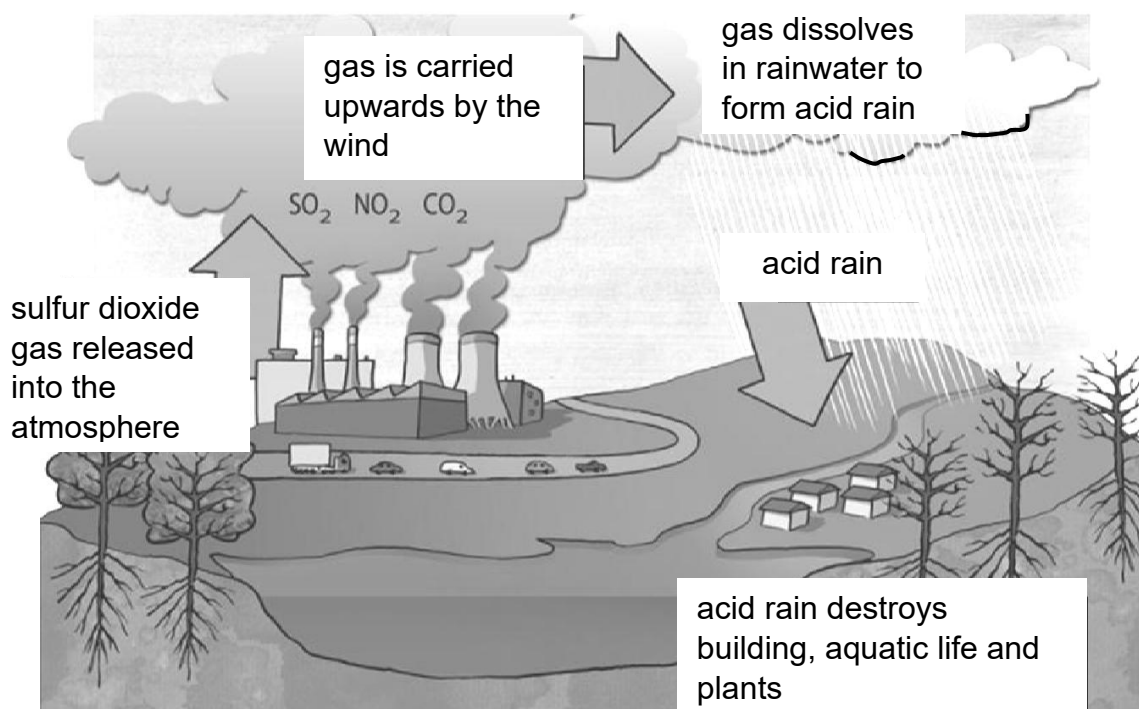


Fig. 22.1

- (a)** Write the word equation for production of sulfur dioxide.

..... [1]

- (b)** State the type of chemical change involved in the production of sulfur dioxide.

..... [1]

- (c)** Give one reason why the production of sulfur dioxide is a chemical change.

..... [1]

- (d)** Some buildings are made of marble and limestone, which both consist of calcium carbonate.

Explain the possible impact on these buildings if they are situated near fossil fuel power stations.

..... [2]

23 Fig. 23.1 shows a food web within a certain community near a volcano.

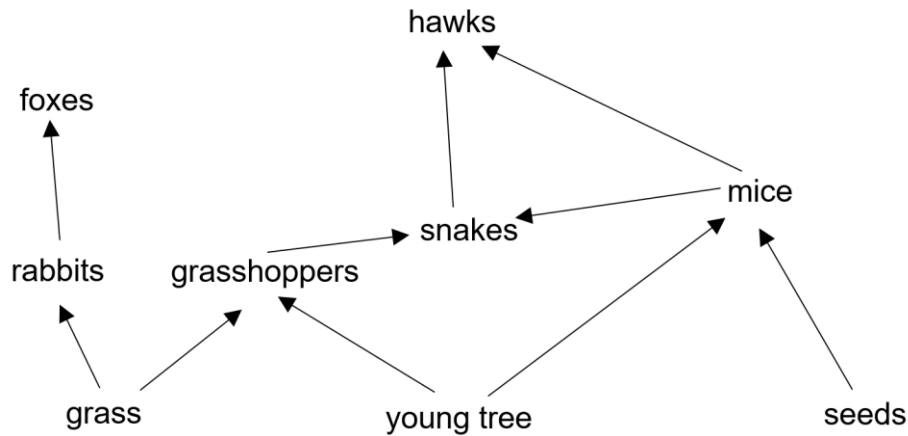


Fig. 23.1

(a) Name all the primary consumers in the food web.

..... [1]

(b) If there was a disease outbreak on the foxes, predict and explain how it will affect the rabbits population.

.....

 [2]

(c) A volcano erupted and covered the sky with dark ashes for 2 months. Very little light was able to shine through the sky to the ground.

State and explain how the hawks' population size will change.

.....

 [3]

- 24** You are given a 1.5 V dry cell, 2 bulbs, a switch, an ammeter and a voltmeter. You are asked to set up a circuit with the 2 bulbs arranged in parallel with a closed switch, with the ammeter to measure the current flowing the whole circuit and a voltmeter to measure the potential difference across the dry cell.

(a) Draw a circuit diagram in the space below to represent this electric circuit.

[2]

(b) The switch is now closed. What happens to the brightness of the bulb if

(i) the ammeter is damaged and explain why it is so,

.....
.....
.....

[2]

(ii) the voltmeter is damaged instead of the ammeter. Explain your observation.

.....
.....
.....

[2]

- 25 (a)** A water heater has a power rating of 3.3 kW. The cost of electricity is 30 cents per kilowatt-hour (kWh).

Calculate cost in cents for operating the water heater for 30 minutes.

cost = cents [2]

- (b)** Fig. 25.1 shows the electrical system of a hot water heater.

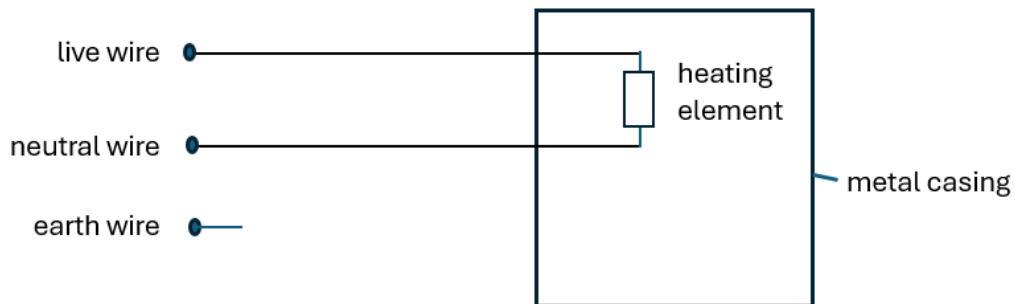


Fig. 25.1

Complete the electrical system on Fig. 25.1 by doing the following:

- (i)** mark with a letter "X" on the wire where the switch should be located, [1]
- (ii)** draw how the earth wire should be connected correctly to the water heater. [1]

- 26** Three different concentrations of sugar solutions, 5%, 15% and 50% sugar solutions, were used in the experiment shown in Fig. 26.1.

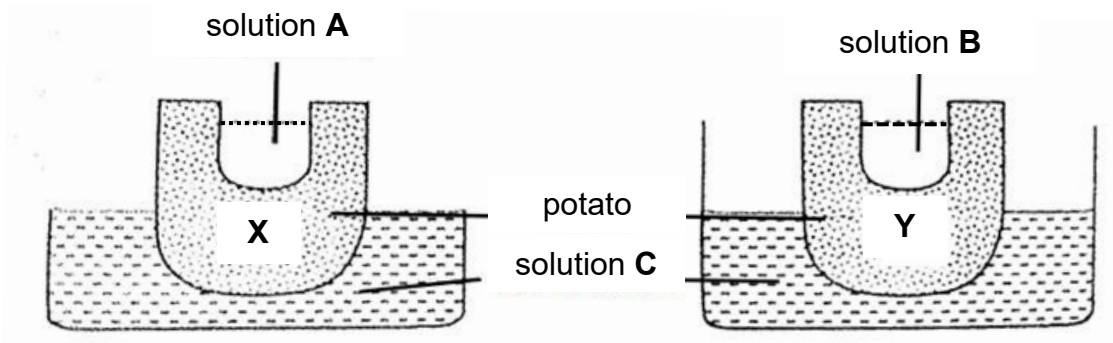


Fig. 26.1

Two potato halves **X** and **Y** with the centre removed were filled with sugar solutions of unknown concentration. After a few hours, the level of sugar solution in **X** rose, while the sugar solution level in **Y** dropped.

- (a)** State the concentrations of sugar solutions **B** and **C**?

sugar solution **B** = %

sugar solution **C** = % [1]

- (b)** Explain why the level of sugar solution in **X** rose after a few hours.

.....

 [2]

- (c)** High heat affects the stability of cell membranes. This causes the pores to change their shape and size, thus making the cell membranes more “leaky”.

Hence describe and explain why the results for both solutions **A** and **B** would have been different if potatoes **X** and **Y** were boiled before the start of the experiment.

.....

 [2]

Section C

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

- 27** Fig. 27.1 below shows a section of the solar heating system which helps to provide hot water for a house.

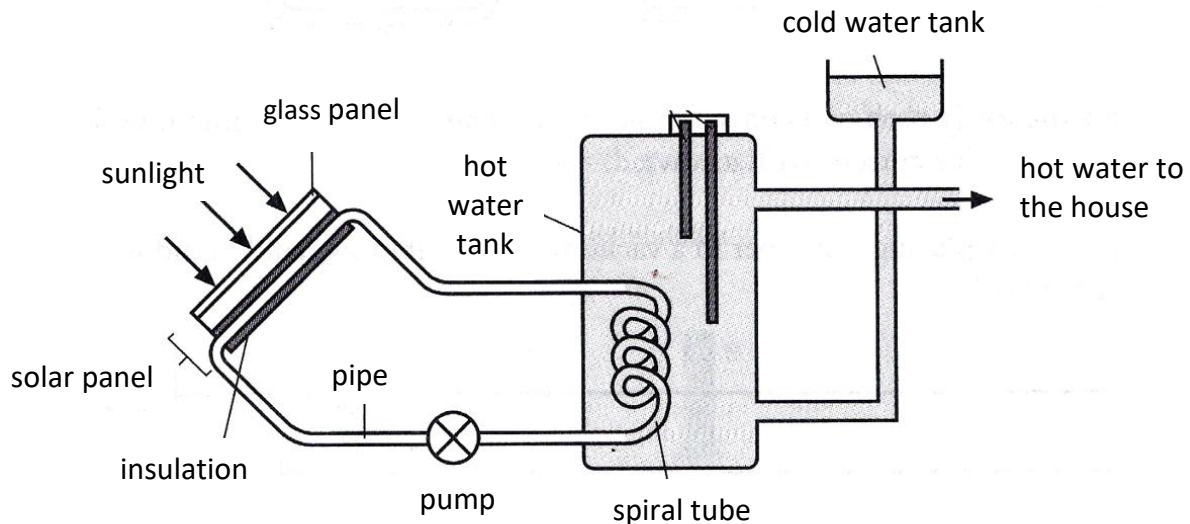


Fig. 27.1

- (a) Name the process by which energy is transferred from the sun to the pipe.

..... [1]

- (b) Does the process mentioned in (a) require a medium for it to take place?

..... [1]

- (c) You are to design the water pipe in solar panel based on two categories given in the table below. Select the **best choice** for colour and material and **justify your choice**.

categories	colour	white, black, silver
	material	iron, wood, plastic, glass, copper

- (i) choice of colour:

reason:

..... [2]

- (ii) choice of material:

reason:

..... [2]

(d) Explain why there is a layer of insulation behind the solar panel.

.....
 [1]

(e) Using your understanding of convection, explain how water is heated up in the hot water tank.

.....

 [3]

- 28** A mixture of carbohydrase and starch solution was sealed in a Visking tubing and placed in a beaker of water at 37°C, as shown in Fig. 28.1. At regular time intervals, samples of water in the beaker were taken and tested for the presence of starch and simple sugar.

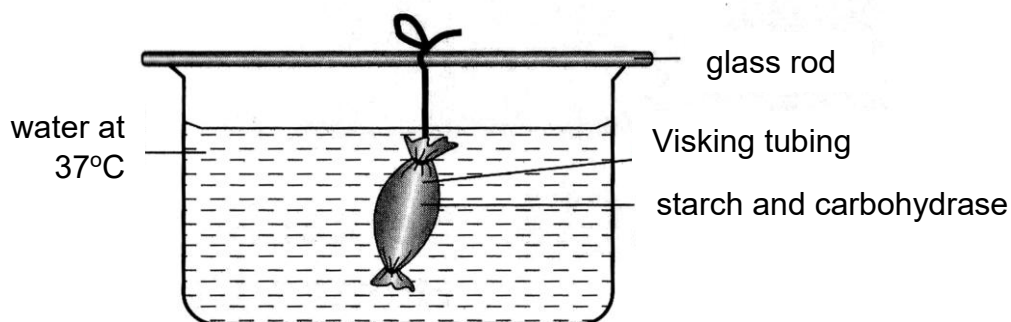


Fig. 28.1

The results were then recorded as shown in Table 28.2.

Table 28.2

time/min	starch	simple sugar
0	absent	absent
10	absent	absent
20	absent	present
30	absent	present

- (a) (i) What was the effect of the carbohydrases on starch?

..... [1]

- (ii) Suggest why the water was kept at 37°C.

..... [1]

- (b) Suggest why simple sugar was present in the beaker after 20 minutes but not starch.

.....
.....
..... [2]

- (c) If the above experiment is carried out to show the absorption of digestion in the small intestine, what does the Visking tubing represent?

..... [1]

- (d) Describe how and where starch is chemically digested in the human digestive system.

.....
.....
.....
.....
..... [3]

- (e) A person had most of his stomach removed.

What changes in diet does this person require? Explain why.

.....
.....
.....
..... [2]

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The Periodic Table Of Element

Group																							
1	2											13	14	15	16	17	18						
Key proton (atomic) number atomic symbol name relative atomic mass							1 H hydrogen 1										2 He helium 4						
							3 Li lithium 7	4 Be beryllium 9										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
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 —

actinoids