



Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2017

SCIENCE – ORDINARY LEVEL

MONDAY, 12 JUNE – AFTERNOON, 2.00 – 4.00

INSTRUCTIONS

1. Write your examination number in the box provided on this page.
2. Answer all questions.
3. Answer the questions in the spaces provided in this booklet. If you require extra space, there is a blank page provided at the back of this booklet.
4. The use of the *Formulae and Tables* booklet approved for use in the State Examinations is permitted. A copy may be obtained from the examination superintendent.

Centre Number

Examination Number
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For examiner use only	
Section / Question	Mark
Biology	
Q.1 (52)	
Q.2 (39)	
Q.3 (39)	
Chemistry	
Q.4 (52)	
Q.5 (39)	
Q.6 (39)	
Physics	
Q.7 (52)	
Q.8 (39)	
Q.9 (39)	
Total (Paper)	
Bonus for Irish	
Grand Total (Paper) (390)	
Coursework A (60)	
Coursework B (150)	
Grand Total (600)	

Biology

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Question 1

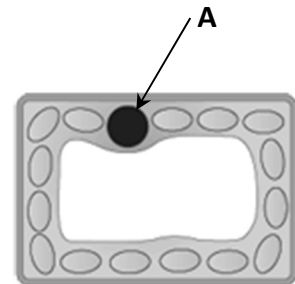
(52)

(1) (2)

(a) The diagram shows a cell as seen under a microscope.

(i) Is the cell shown an animal cell *or* a plant cell?

(ii) Name the part labelled **A** in the diagram.



(b) (i) Choose the correct word from the box to complete the sentence below.

Inheritable characteristics are controlled by _____.

Genes
Bones

(ii) The picture is of identical twin babies.

Name one inheritable characteristic that identical twins have in common.



(c) Viruses cause many illnesses.

Name two common illnesses caused by viruses.

1. _____

2. _____

(d) The table shows information on a food label.

(i) Name the nutrient that provides most of the energy. _____

(ii) Is this food label taken from bread *or* fish?

Nutrients	per 100 g
Fat	1.4 g
Carbohydrate	45.6 g
Protein	7.3 g
Energy	983 kJ / 235 kcal

- (e) Competition occurs between organisms in a habitat for resources they need.
- (i) Name a resource for which animals compete. _____
- (ii) Name a resource for which plants compete. _____

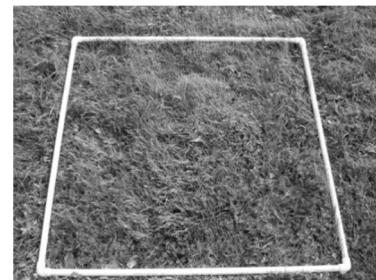
(f) The photograph shows the dispersal of dandelion seeds by wind.



- (i) Name one other method of seed dispersal.

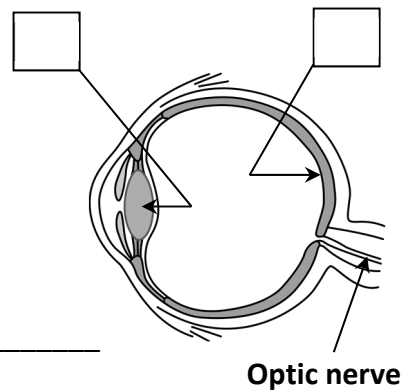
- (ii) Explain the term "seed dispersal".

(g) Describe how to use a quadrat during the study of a habitat.



(h) The diagram shows the internal structure of the eye.

- (i) Write the letter **L** in the correct box to show the location of the lens.
- (ii) Write the letter **R** in the correct box to show the location of the retina.
- (iii) What is the function of the optic nerve?



(7 × 6 + 1 × 10)

Question 2

(39)

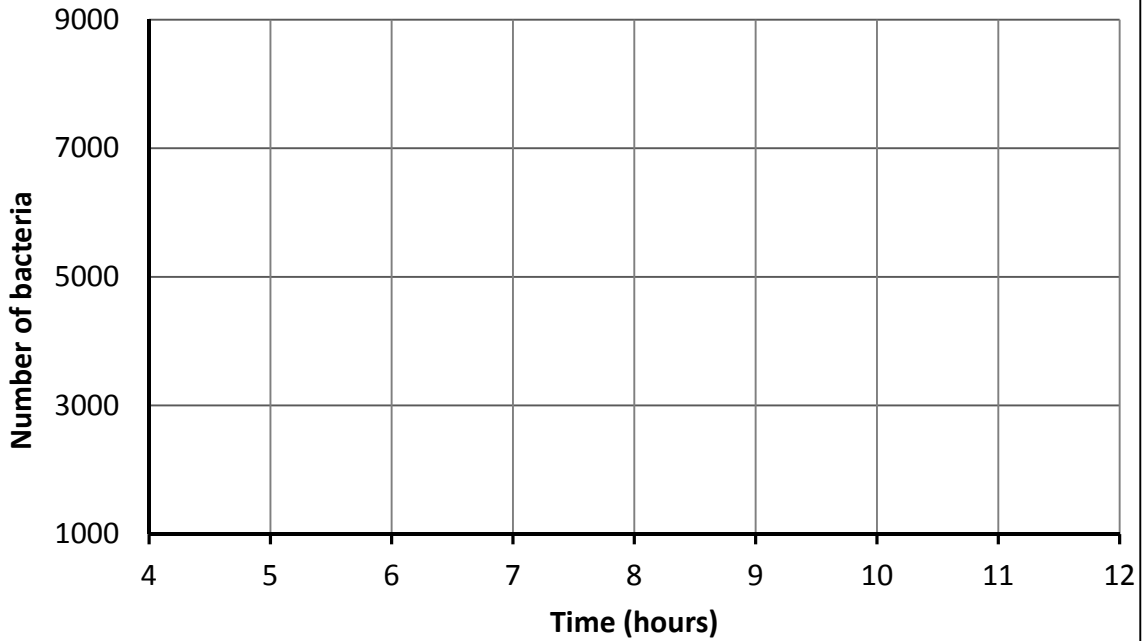
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- (a) A scientist set up an agar plate to grow micro-organisms from an air sample. Starting 4 hours after the plate was exposed to the air, the total number of bacteria present was counted every 2 hours. The data collected is shown in the table below. (21)

(1) (2)

Time (hours)	4	6	8	10	12
Number of bacteria	1000	3000	5000	7000	9000

- (i) Use the data in the table to draw a graph of the number of bacteria (*y*-axis) against time (*x*-axis) using the grid below.



- (ii) Using your graph, estimate the number of bacteria present after 7 hours.

- (iii) Name two factors that micro-organisms need in order to grow in agar plates.

1. _____

2. _____

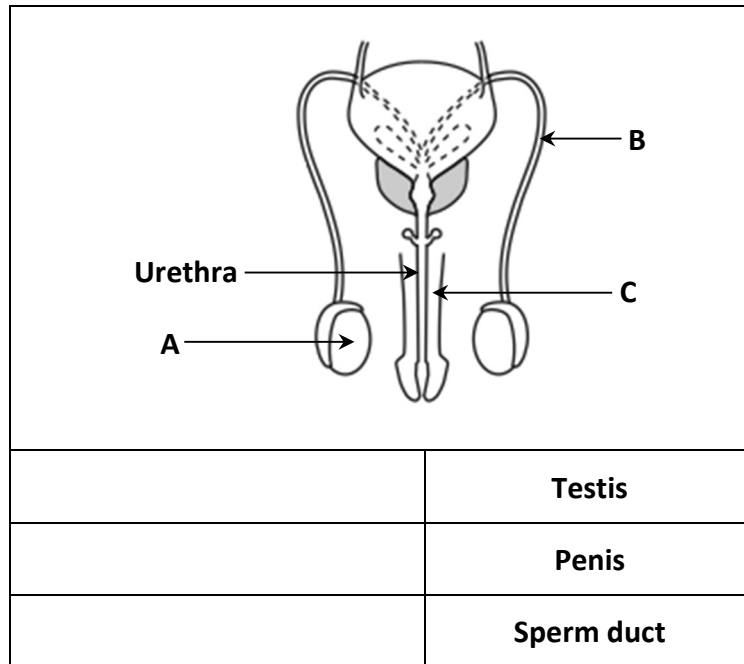
(b) The diagram shows the human male reproductive system.

(18)

- (i) In the table, write the letter **A** beside the name of the part labelled **A**.
- (ii) Write the letter **B** beside the name of the part labelled **B**.
- (iii) Write the letter **C** beside the name of the part labelled **C**.

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(1) (2)



(iv) Name the male gamete (sex cell). _____

(v) Name one substance that leaves the male body through the urethra.

Question 3

(39)

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(a) A plant makes its food by a process called photosynthesis. (15)

(i) Name one thing that a plant must get from its surroundings so that it can carry out photosynthesis.

(ii) Name the green chemical found inside the cells of a leaf that is used during photosynthesis.

(iii) Name the type of food a plant makes during photosynthesis.

(iv) People often grow plants inside their homes and in their gardens.

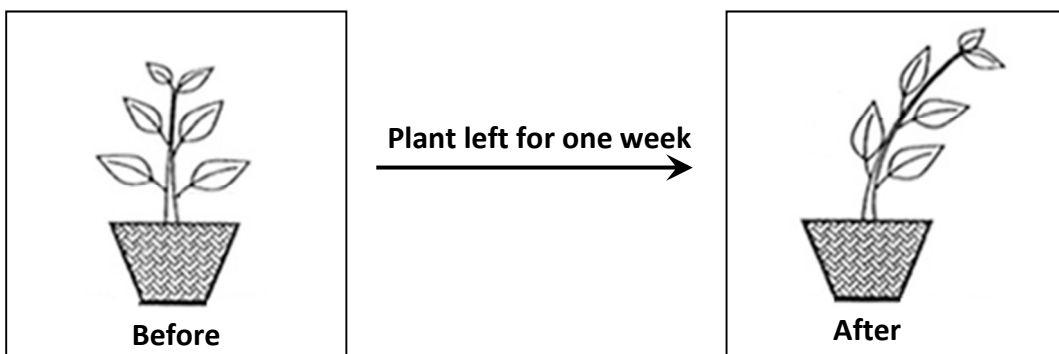
Explain one benefit of having plants in the home or garden.



(b) A plant was placed in a box that had a hole cut in it to let light in.

The plant was left in the box for one week.

(9)



(i) Place the letter **X** on either box to show where the hole was cut to let light in.

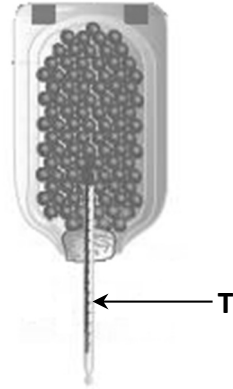
(ii) Is the process shown called phototropism *or* fertilisation?

(iii) Name a characteristic of living things shown by the plant during this investigation.

(c) Two experiments were set up to investigate aerobic respiration. (15)

(i) Which gas is needed for aerobic respiration, oxygen or helium? _____

In the first experiment, germinating seeds were placed in a vacuum flask, as shown in the diagram, and left for a few days.



(ii) Name the piece of equipment labelled T.

(iii) What is T used to measure?

(iv) What would you notice about the reading on T after a few days?

In the second experiment, germinating seeds were placed in a test tube above limewater and left for a few days.



(v) The limewater turns cloudy (milky) after a few days.
What does this tell us?

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(1) (2)

Chemistry

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Question 4

(52)

(1) (2)

(a) (i) Is rusting a chemical process *or* a physical process?

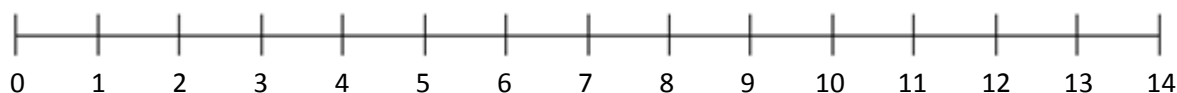
(ii) Name one way that rusting can be prevented.



(b) The diagram shows the pH scale.

(i) On the scale write the letter **A** below the pH of an acid.

(ii) On the scale write the letter **B** below the pH of a base.



(c) (i) In the table, write the letter **O** beside the approximate fraction of the air that is oxygen.

	One fifth ($\frac{1}{5}$)
	Two thirds ($\frac{2}{3}$)

(ii) State one use of oxygen gas.

(d) Circle the two non-metallic elements in the list below.

Fe

C

Zn

N

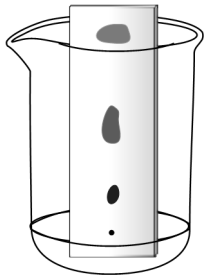
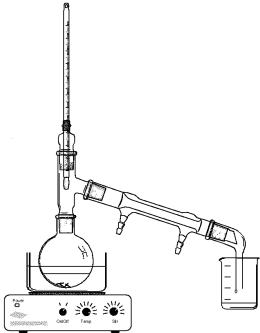
(e) Choose the correct words from the box on the right to complete the sentences below.

(i) Air is a _____ of gases.

(ii) Carbon dioxide is a _____.

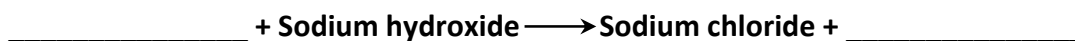
Compound
Mixture
Element

- (f) Both sets of equipment shown below are used to separate mixtures.
From the list, write the name of each separation process in the space provided.

Filtration	Evaporation	Distillation	Chromatography
			
1.		2.	

- (g) Select the correct words from the box on the right to complete the equation below.

Water
Hydrochloric acid



- (h) Humans burn fossil fuels to create heat.
Some of the waste produced causes acid rain.
We also use crude oil, a fossil fuel, to make plastics.
Many plastics are non-biodegradable.

(i) Crude oil is a fossil fuel. Name another fossil fuel. _____

(ii) Describe the effect of acid rain on limestone *or* on plants.

(iii) Describe the effect of non-biodegradable plastics on the environment.

(7 × 6 + 1 × 10)

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(1) (2)

Question 5

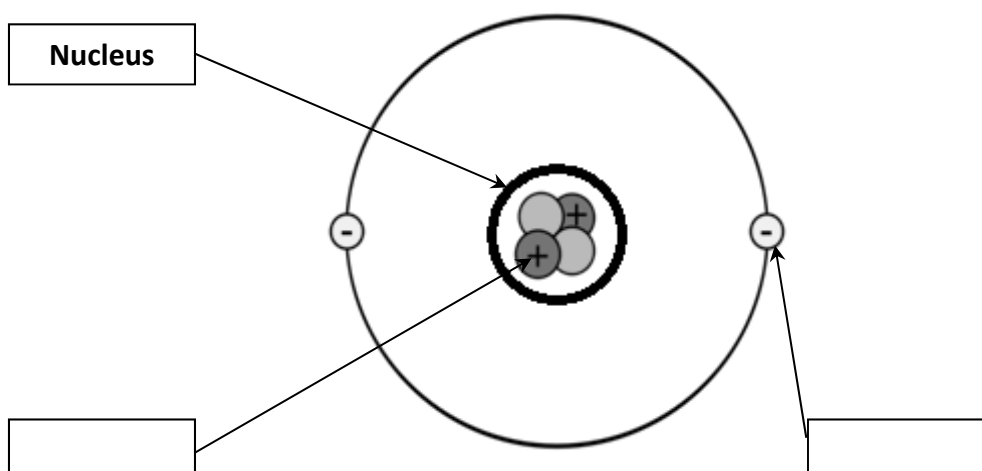
(39)

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- (a) Read the sentences below and indicate whether each sentence is true *or* false by writing the word “True” *or* “False” in the spaces provided. (12)

	True <i>or</i> False
Sodium chloride is a compound.	
Water is an element.	
Ionic bonding involves sharing pairs of electrons.	
Ionic bonding involves charged particles.	

- (b) This is a diagram of a helium atom. (6)



- (i) Write the word **proton** in the correct box to label a proton in the helium atom.
 (ii) Write the word **electron** in the correct box to label an electron in the helium atom.

- (c) Gold, silver and aluminium are metals. The information below is found on page 79 of the *Formulae and Tables* booklet. (21)

13 Al 26.98	47 Ag 107.9	79 Au 197.0
--------------------------	--------------------------	--------------------------

- (i) What is the chemical symbol for aluminium?

- (ii) What is the chemical symbol for gold?

- (iii) State one use of gold.

- (iv) The following are some of the objects that aluminium metal is used to make:

- foil to cover food
- saucepans to cook food
- cans to hold drinks
- airplane bodies

Describe two properties of aluminium that make it suitable to use in making any of the objects above.

1. _____

2. _____

- (v) Each of these metals has its own place in the Periodic Table.

Does the Periodic Table list elements *or* compounds?

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(1) (2)

Question 6

(39)

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(a) Water hardness is caused by certain compounds dissolved in water.

(21)

(1) (2)

A student has two samples of water from different sources.

One sample is rainwater and the other is tap water.

(i) Describe, with the aid of a labelled diagram, how the student could find out which of the water samples contains hardness.

Labelled diagram

(ii) In the table write the letter **X** beside the element whose compounds could cause hardness in water.

	Calcium
	Sodium

(iii) State one way that hardness can be removed from water.

(b) To grow crystals in a laboratory, a student first dissolved a solid in water to make a solution. (12)

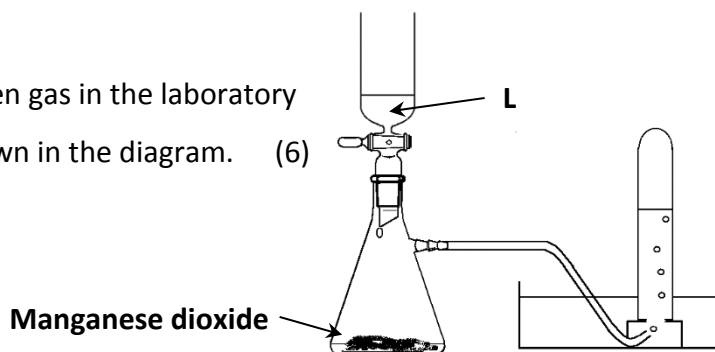
(i) In the table write the letter **Y** beside the name of the solid used to grow crystals in a laboratory.

	Alum
	Iron
	Copper sulfate

(ii) Describe how to help this solid dissolve in water.

(iii) What must happen to the solution so that crystals will grow?

(c) A student prepared oxygen gas in the laboratory using the equipment shown in the diagram. (6)



(i) In the table write the letter **L** beside the name of the liquid that is used to prepare oxygen gas.

	Hydrogen peroxide
	Limewater

(ii) Manganese dioxide is a catalyst. What is a catalyst?

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(1) (2)

Physics

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Question 7

(52)

(1) | (2)

(a) Copper is an electrical conductor. Plastic is an electrical insulator.

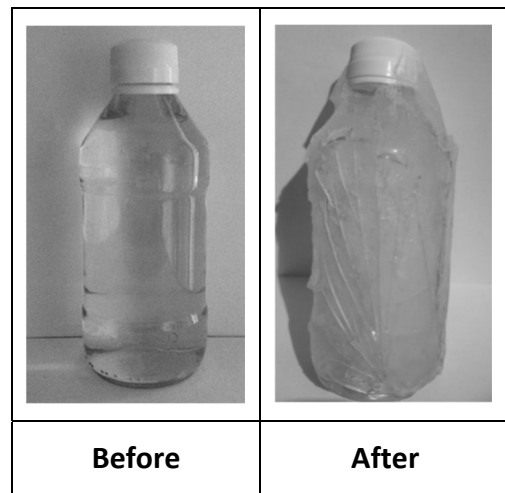
(i) Name another electrical conductor. _____

(ii) Name another electrical insulator. _____

(b) A glass bottle filled with water was placed into a freezer until the water froze.

When the bottle was removed from the freezer, the glass had cracked.

Explain why this happened.



(c) (i) In the table write the letter **M** beside the instrument used to measure the mass of a stone.

(ii) Write the letter **L** beside the instrument used to measure the length of a curved line on a map.

	Opisometer
	Electronic balance
	Stopwatch

(d) A car increases its speed from 10 m/s to 40 m/s.

(i) Calculate the increase in the speed of the car.

Calculation



(ii) It takes 5 seconds for the car to increase its speed. Calculate the acceleration of the car.

Calculation

(e) Select the correct words from the box on the right to complete the sentences below.

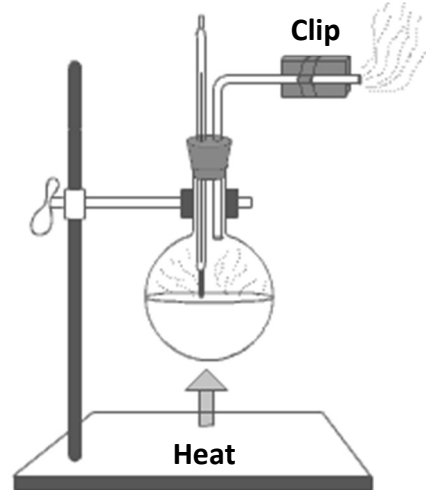
<p>Luminous</p> <p>Non-luminous</p> <p>Radiation</p> <p>Conduction</p>
--

- (i) The Sun is a _____ object.
- (ii) Heat from the Sun reaches the Earth by _____.

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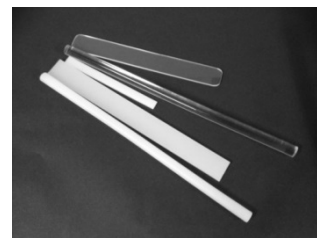
(1) (2)

(f) The diagram shows the apparatus used to investigate the effect of increasing pressure on the boiling point of water.

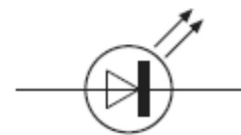


- (i) What is the boiling point of water? _____ °C
- (ii) Does the boiling point of water increase *or* decrease when the pressure is increased?

(g) Describe how a static charge could be generated on a plastic rod, for example perspex or polythene.



(h) The diagram and the photo show an LED.



- (i) What do the letters LED stand for?
- (ii) Does an LED require more *or* less current than a bulb?

(iii) State one everyday use of an LED.



(7 × 6 + 1 × 10)

Question 8

(39)

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(a) A person uses an electric sander to make a piece of wood smooth.

(21)

(1) (2)



(i) Name the force that acts between the electric sander and the wood.

(ii) State the unit of force.

(iii) Complete the sentence below about one of the energy conversions that happens when a person uses an electric sander.

When a person uses an electric sander _____ energy is converted into _____ energy.

(iv) Describe one safety precaution that should be taken when using an electrical appliance that is plugged into a socket.

(v) Explain why it is easier to cycle a bicycle when the chain is oiled.



(b) Solids, liquids and gases can all exert pressure.

(18)

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(i) Complete the equation used to calculate pressure using the correct words from the box on the right.

Force
Area
Time

(1) (2)

Pressure = _____ ÷ _____

(ii) Explain why a person should wear boots whose soles have a large surface area when walking on snow or soft ground.



(iii) Is atmospheric pressure bigger *or* smaller at higher altitude? _____



(iv) In the table, write the letter **P** beside the piece of equipment that could be used to measure atmospheric pressure.

	Barometer
	Ohmmeter

Question 9

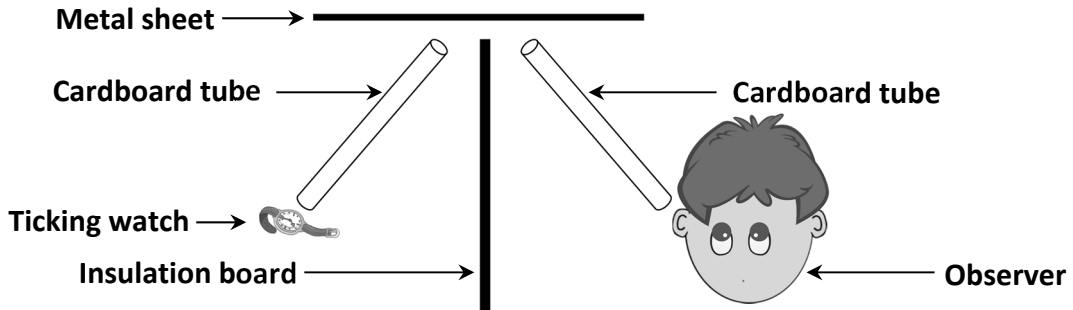
(39)

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(a) The equipment below is used to show that sound can be reflected.

(12)

(1) (2)



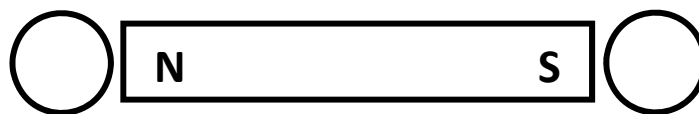
(i) What is the function of the insulation board?

(ii) Describe an everyday example of sound being reflected.

(iii) Name the part of the body that detects sound.

(iv) Is the speed of sound greater *or* less than the speed of light?

(b) A magnetic compass is placed at each end of a bar magnet, as shown below. (15)

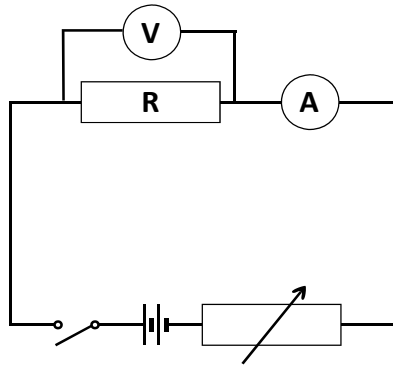


(i) Draw an arrow in each circle to show the direction in which each compass needle points.

(ii) Name a material that can be magnetic. _____

(iii) Explain the term "magnetic field of a magnet".

- (c) The circuit diagram below shows the equipment used to measure the current through and the potential difference (voltage) across the resistor **R**. (12)



- (i) Name the piece of equipment labelled **A** that is used to measure current.

- (ii) Name the piece of equipment labelled **V** that is used to measure voltage.

- (iii) The current is 2 A and the voltage is 6 V.

In the table write the letter **X** beside the value of the resistance of the resistor.

	3
	8

- (iv) In the table write the letter **U** beside the unit of measurement for resistance.

	Ohm (Ω)
	Kilowatt-hour (kW h)

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(1) | (2)

