Candidate Number	Candidate Name

JUNIOR SECONDARY CERTIFICATE

PHYSICAL SCIENCE 1210/1

PAPER − Written 2 hour 30 minutes

Marks 130 **2019**

Additional Materials: Non-programmable calculator
Soft pencil (HB type is recommended)

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Make sure that you receive the multiple choice answer sheet with your Candidate Number on it to answer section **A**.
- For section **B**, candidates answer on the Question Paper in the spaces provided.
- Write your Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.

- Answer **all** questions.

- The number of marks for section **B** is given in brackets [ ] at the end of each question or part question.
- The Periodic Table is printed on page 25.

For Examiner's Use

Marker	
Checker	

This document consists of **25** printed pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

SECTION A: MULTIPLE CHOICE QUESTIONS

- Answer this section on the multiple choice answer sheet provided.
- For each question there are four possible answers **A, B, C** and **D**.
- Choose the **one** you consider correct and mark your choice in **soft** pencil.
- If you want to change an answer, erase the one you wish to delete completely.
- Each question counts **one** mark.

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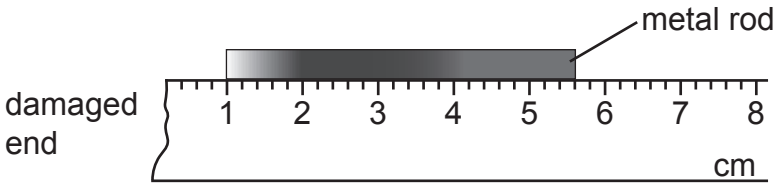
1 A learner uses a broken end ruler to measure the length of a rod. She placed the rod as shown in the diagram.



How long is the rod?

A 4.3 cm

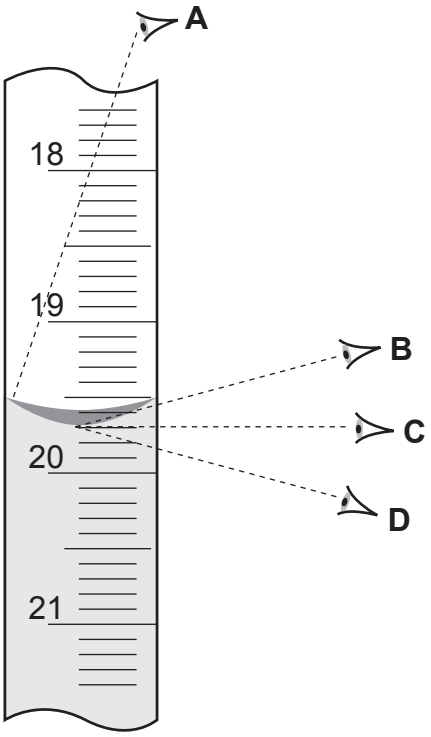
B 4.6 cm

C 5.3 cm

D 5.6 cm

2 A measuring cylinder is used to measure the volume of water.

Which position gives the accurate volume?



3 Cooling a liquid causes it to become a solid.
What happens to the molecules of the liquid during this process?

	molecules become smaller	**molecules move closer**
A	✓	✓
B	✓	x
C	x	✓
D	x	x

4 An air freshener is placed at the window of a room.

When someone enters the room, she will smell the air freshener from the door.

How does the smell spread throughout the room?

A by diffusion

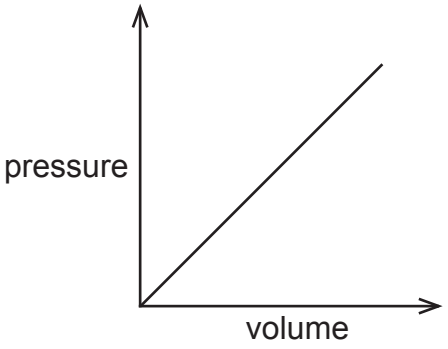
B by evaporation

C by expansion

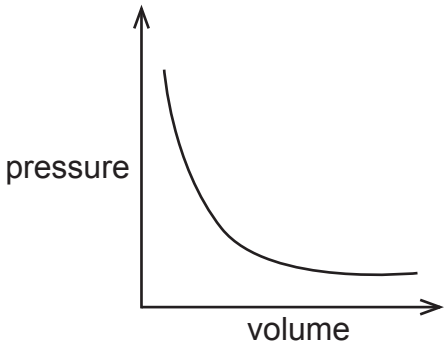
D by sublimation

5 Which graph shows relationship between volume and pressure of a gas at constant temperature?

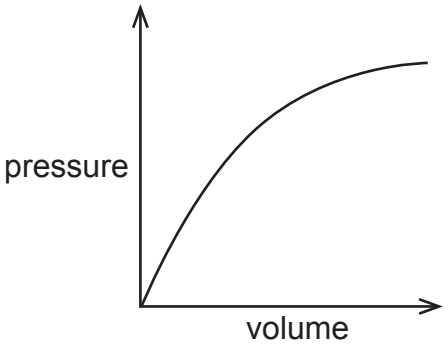
A



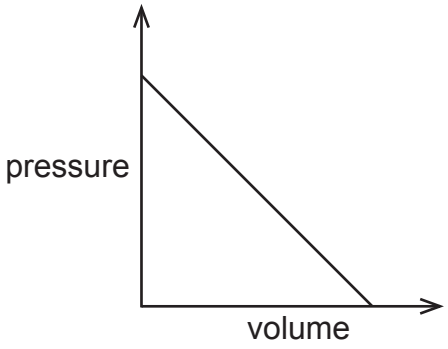
B



C



D



6 What does the nucleus of an atom contain?

A electrons only

B electrons and protons only

C neutrons and protons only

D electrons, neutrons and protons

7 An ionic compound has a formula Ga_2S_3.

What are the formulas of the ions?

A Ga^{2-} and S^{3+}

B Ga^{3-} and S^{2+}

C Ga^{2+} and S^{3-}

D Ga^{3+} and S^{2-}

8 Which row shows the trend down Group VII in the Periodic Table?

	color	reactivity
A	become darker	increases
B	become darker	decreases
C	become lighter	increases
D	become lighter	deceases

9 A school laboratory bench surface should be hard and tough, stain resistant and easy to clean.

Which material is the best for this surface?

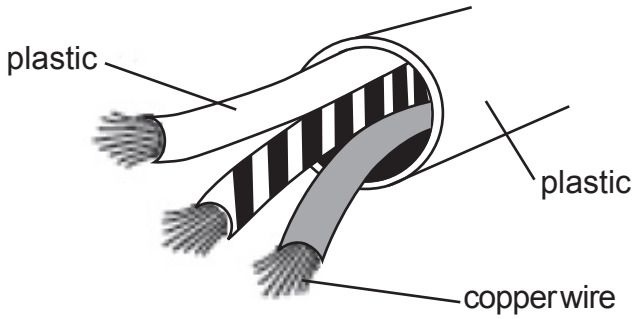
A cotton

B iron

C melamine

D wood

10 Copper wires in an electric cable are covered in plastic.



Why is plastic used?

A It is a conductor.

B It is an insulator.

C It is a polymer.

D It is hard.

11 A learner writes the following statements.

1. Aluminium is used in the manufacturing of aircraft bodies.
2. Aluminium is used to make bronze.
3. Stainless steel is used to make cutleries.

Which statements are correct?

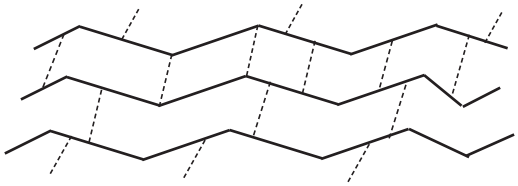
A 1 and 2 only

B 1 and 3 only

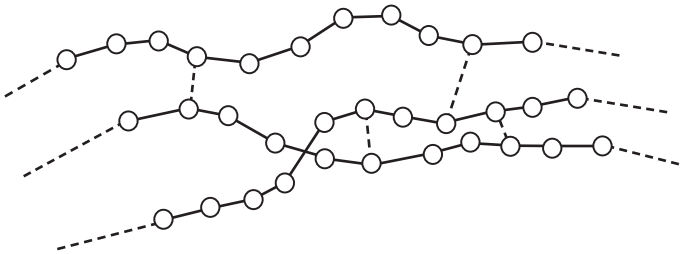
C 2 and 3 only

D 1, 2, and 3

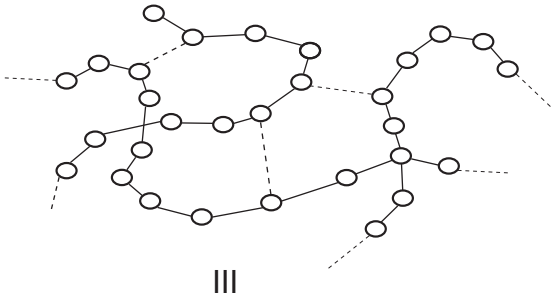
12 The diagrams show structures of four polymers.



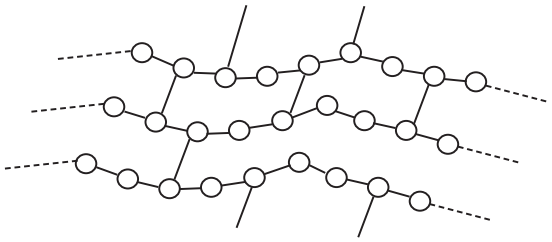
I



II



III



IV

Which is a structure of a natural polymer?

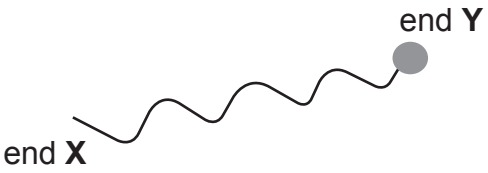
A I only

B I and II

C II and IV

D IV only

13 The diagram shows a structure of a soap molecule.



Which row in the table explains how the soap removes oily stains during the washing?

	end X	**end Y**
A	hydrophobic and soluble in water	hydrophilic and soluble in oily stain
B	hydrophobic and soluble in oily stain	hydrophilic and soluble in water
C	hydrophilic and soluble in oily stain	hydrophobic and soluble in water
D	hydrophobic and soluble in oily stain	hydrophilic and soluble in oily stain

14 The chart shows the colours of Universal Indicator at different pH values.

colour	red			orange			green				blue			violet
pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14

A solution of vinegar is slightly acidic.

Which colour does the Universal indicator give with this solution?

A blue

B orange

C red

D violet

15 Which gas makes up approximately 21% of clean air?

A argon

B carbon dioxide

C oxygen

D nitrogen

16 In order to reduce air pollution due to car emission, cars are fitted with catalytic converters.

Which gas is a product of the reactions in a catalytic converters?

A carbon monoxide

B nitrogen

C nitrogen dioxide

D unburned hydrocarbon

17 Which of the following statements is correct?

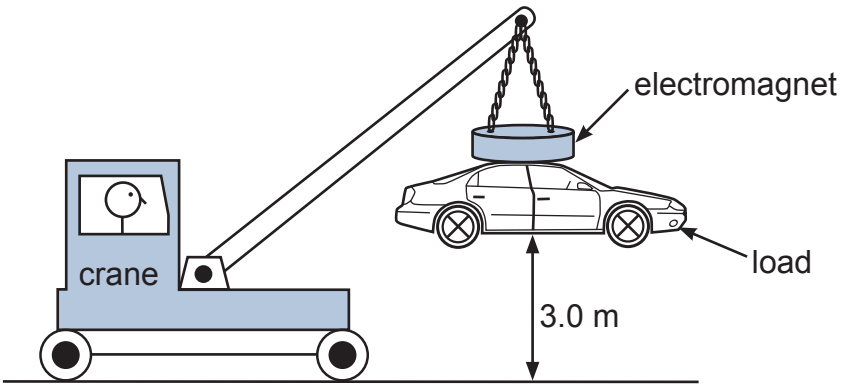
A Mass and weight are different names for the same thing

B The mass of an object is same if the object is taken to the Moon.

C The weight of a car is one of the force acting on the car and act upward.

D The weight of a chocolate bar is measured in kilogram.

18 The diagram shows a crane lifting a load through a height of 3.0 m. The input power of the crane is 500W and the output power is 300 W.



What is the efficiency of the crane?

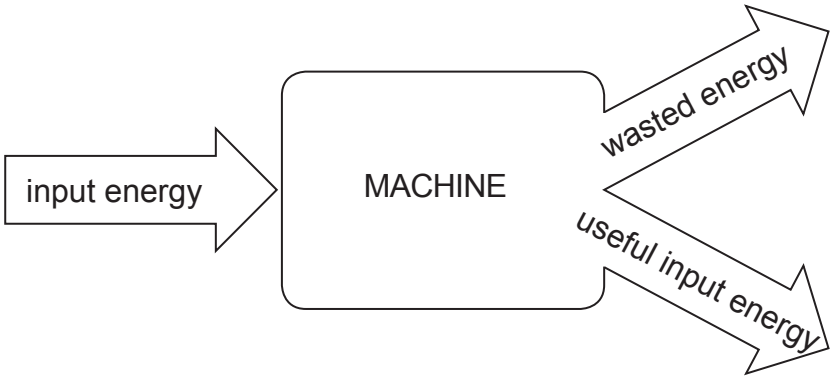
A 0.60%

B 1.80%

C 60.0%

D 167%

19 The diagram shows energy transfer through a machine.



What is the efficiency of the machine?

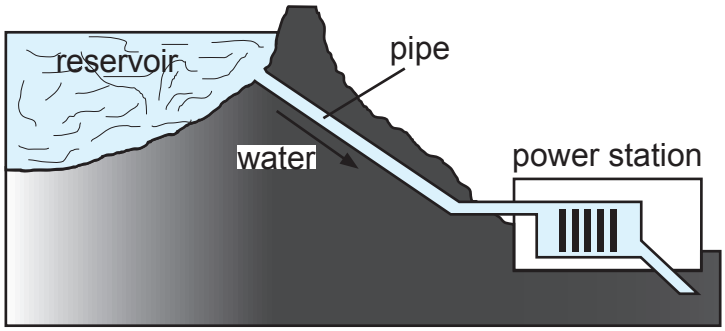
A $\frac{\text{input energy}}{\text{useful output energy}} \times 100\%$

B $\frac{\text{useful output energy}}{\text{input energy}} \times 100\%$

C $\frac{\text{useful output energy}}{\text{wasted energy}} \times 100\%$

D $\frac{\text{wasted energy}}{\text{input energy}} \times 100\%$

20 The diagram shows a hydroelectric system.



What is the main energy change taking place from the reservoir to the power station?

A Chemical energy ⟶ kinetic energy ⟶ electric energy

B Electrical energy ⟶ potential energy ⟶ kinetic energy

C Potential energy ⟶ kinetic energy ⟶ electrical energy

D Kinetic energy ⟶ electrical energy ⟶ potential energy

21 A small table weighing 40 N stands on four legs, each having an area of 0.001 m^2.
What is the pressure of the table on the floor?

A 400 N/m^2

B 1000 N/m^2

C 10 000 N/m^2

D 40 000 N/m^2

22 A boy of weight 600 N runs up a staircase of total height 6 m in 6 seconds.
What is the average power developed by the boy?

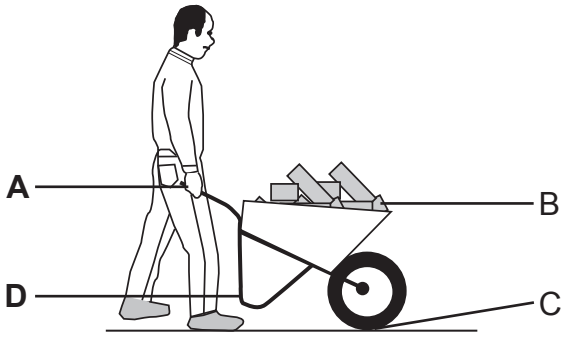
A 450 W

B 600 W

C 800 W

D 3600 W

23 The diagram shows a man pushing a wheelbarrow.



Which letter shows an effort?

24 Speed is a scalar quantity while velocity is a vector quantity.

Which statement about scalar and vector is correct?

A A scalar has both size and direction.

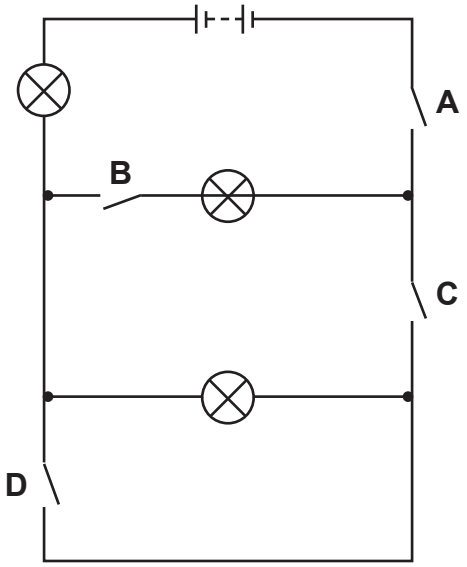
B A scalar has size but no direction.

C A vector has direction only.

D A vector has size but no direction.

25 The circuit diagram shows four bulbs and four switches.

Which switch can be used to switch on all the bulbs at the same time?



26 Four wires are made from copper. The table shows the length and cross section area of the wires.

wire	Length/cm	cross section area/mm^2
A	20	3.0
B	30	2.0
C	40	6.0
D	40	1.5

Which two wires have the same resistance?

A 1 and 2

B 1 and 3

C 2 and 3

D 3 and 4

27 Why is electrical energy transmitted at a high alternating voltage?

A At high voltage, a.c. is safer than d.c.

B Electrical energy transmission is faster at high voltage.

C There is a smaller power loss at higher voltage and lower current.

D Transmission lines can be thicker with lower current.

28 Which of the actions can lead to danger when handling electricity?

A touching appliance with dry hands

B using cables with damaged insulation

C using a three-pin plug

D using an appliance with double insulation

29 One of the effect of passing a ray of light through a prism is to split light into different colours

What is the name given to this effect?

A deviation

B dispersion

C reflection

D refraction

30 Mirage is a natural phenomenon.

Which of the following leads to the formation of mirage?

A Reflection of light

B Refraction of light

C Reflection and refraction of light

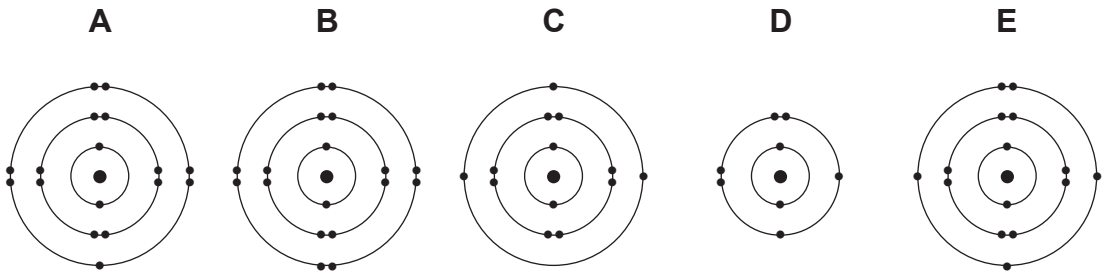
D Refraction and dispersion of light

SECTION B: STRUCTURED QUESTIONS

For Examiner's Use

- Write your answers in the spaces provided on the question paper.
- Legible handwriting and **neat drawings in pencil**, where required, are essential.
- Answers to numerical calculations **must have the correct unit**.
- Symbols must be written/drawn correctly.
- Incorrect spelling of element names and scientific terminology will be penalised.

1 The diagrams show the electronic structures of five atoms, **A**, **B**, **C**, **D** and **E**.



(a) State which structure, **A**, **B**, **C**, **D** and **E** represents:

(i) an atom of a metallic element …….. [1]

(ii) an atom with a proton number of 15……. [1]

(iii) an atom of chlorine…… [1]

(iv) an atom which forms a stable ion with a charge of two negative…… [1]

(v) an atom of an element in Group VII…….. [1]

(b) Atom **B** is unreactive. Use the information on the diagram to explain why.

.....

.....

.....

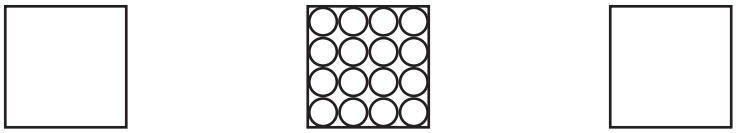
..... [2]

[7]

For Examiner's Use

2 A Grade 10 learner draws diagrams that represent three states of matter, as shown in the diagram. Box **B** shows the arrangement of particles in a solid.

box **A** box **B** box **C**



(a) In box **A**, draw the arrangement of particles in a liquid. [1]

In box **C**, draw the arrangement of particles in a gas. [1]

(b) Write the correct term for each change of state below each arrow.

Liquid ⟶ Solid Gas ⟶ Solid

....

[2]

(c) When matter is heated it expands. In terms of kinetic particles theory explain why gas expands more than solid.

.....

.....

.....

..... [2]

[6]

For Examiner's Use

3 Aluminium is a metal in Group III of the Periodic Table.

(a) Describe the bonding in aluminium. You may use a diagram to help your answer.

.....

.....

[3]

(b) Aluminium reacts with oxygen to form aluminium oxide.

Write a balanced equation for the reaction.

..... [2]

(c) Carbon reacts with oxygen to form carbon dioxide.

Draw a dot and cross diagram to show the bonds in carbon dioxide.

[3]

(d) State and explain the difference in electrical conductivity of aluminium oxide and carbon dioxide.

.....

.....

.....

..... [4]

(e) Carbon–14, $^{14}_{6}C$, is an unstable isotope of carbon. Unstable isotopes undergo radioactive decay.

(i) State what is meant by *radioactive decay*.

.....

..... [2]

(ii) Outline **one** use of carbon isotope.

.....

..... [2]

(iii) State **one** danger of radioactivity.

.....

..... [1]

[17]

For Examiner's Use

4 Most metals are found in earth crust combined with other elements in ores.

(a) The table shows metals and their ores. Complete the table by filling in the missing information.

Metal	**Common ore**	**Chemical name of ore**	**Method of extraction**
iron	haematite	**(i)**	reduction with carbon
aluminium	**(ii)**	aluminium oxide	**(ii)** .....
zinc	**(iv)**	zinc sulphate	reduction with carbon

[4]

(b) During the extraction of zinc from its ore, sulfur dioxide gas is released while the reduction of iron ore releases carbon dioxide.

(i) Explain the effect of sulfur dioxide on the environment.

.....

.....

.....

..... [2]

(ii) Describe the test to confirm that a gas is carbon dioxide.

.....

.....

.....

..... [2]

(c) Brass and steel are alloys of copper and iron respectively.

(i) Define the term *alloy*.

.....

..... [1]

(ii) Most steels contain carbon.
Explain how the amount of carbon in steel affects the properties of steel.

.....

.....

.....

..... [2]

[11]

5 Acids are classified as strong and weak acids.

(a) Distinguish between a weak acid and a strong acid.

.....

.....

.....

..... [2]

(b) Acids react with alkalis to form salt and water.

(i) State the name given to this type of reaction.

..... [1]

(ii) Write a word equation for the reaction between sulfuric acid and sodium hydroxide.

.....

..... [2]

(iii) After the reaction the beaker used feels warmer. State with a reason whether the reaction is endothermic or exothermic.

.....

.....

.....

..... [2]

[7]

6 Some samples of water are tested to determine how they lather with soap. 15 drops of soap solution are added to same volume of water. The results are shown in the table.

Sample	Lather formed after shaken with soap	
	unboiled water	boiled water
A	poor	good
B	good	good
C	poor	poor

(a) Explain why 15 drops of the soap solution was added to the same volume of the water samples.

..... [1]

(b) Sample **A** was found to contain temporary hardness.

(i) Use the result to explain why sample **A** contains temporary hardness.

.....

..... [1]

(ii) Name a chemical which could be responsible for temporary hardness.

..... [1]

(c) Temporary hardness cause scales to form in kettles and hot water pipes.

(i) Give the chemical name of the scales formed.

..... [1]

(ii) Explain how these scales can be removed

.....

.....

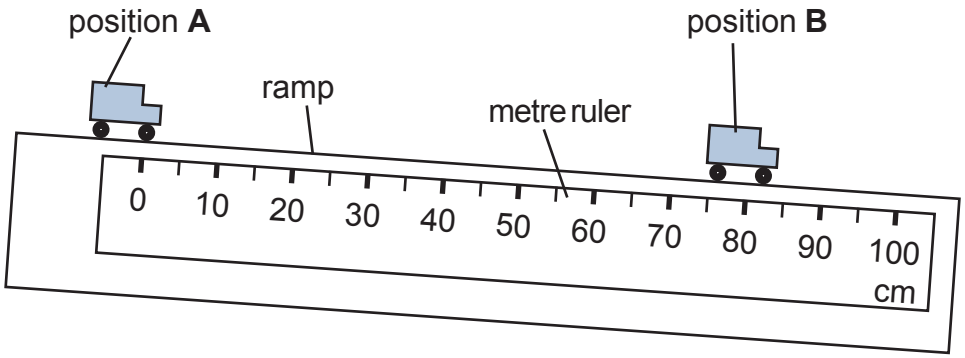
.....

..... [2]

[6]

For Examiner's Use

7 The diagram shows a toy car in two positions on a ramp.



The car is released from position **A** and move to position **B** in 2.5 s. A metre ruler is used to measure the distance it has travelled.

(a) **(i)** Use the diagram to determine the distance the toy car travels from position **A** to position **B**.

..... [1]

(ii) Calculate the average speed of the car. Give the formula you use.

Average speed = ...cm/s [3]

(b) The mass of the toy car is 30 g.

(i) Convert 30 g into kg.

Mass = ...kg [1]

(ii) Calculate the weight of the toy car.

Weight = ...N [2]

[7]

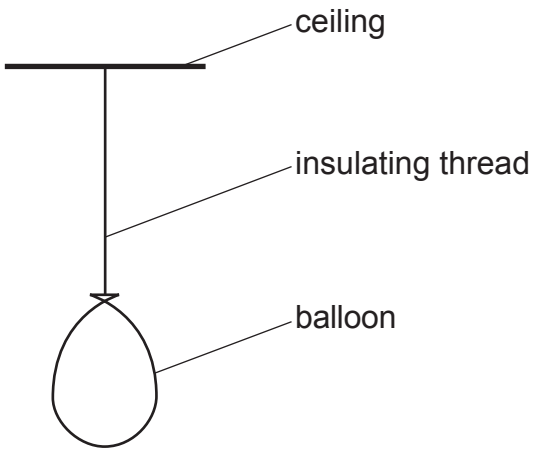
8 A learner uses a dry cloth to rub a plastic rod. The rod becomes negatively charged.

(a) Explain how a rod becomes charged by rubbing.

.....

..... [2]

(b) The learner suspends a balloon from the ceiling using a thread. The balloon is positively charged.



Explain how the learner can use the negatively charged rod to prove that the balloon is positively charged.

.....

.....

.....

..... [3]

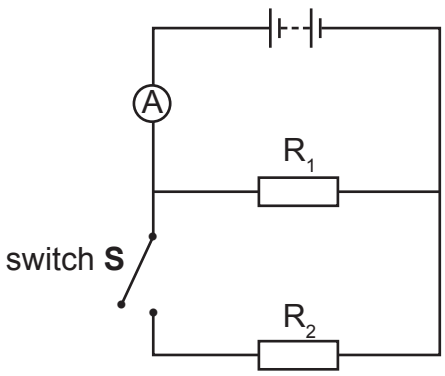
(c) State the name of the instrument used to detect electric charge.

..... [1]

[6]

For Examiner's Use

9 The diagram shows a circuit with two resistors, R_1 and R_2 and a 6 V battery.



(a) Resistor R_1 has a resistance of 5.0 Ω.

Calculate the current through the ammeter when switch **S** is open. Show your working.

Current = ... A [2]

(b) When switch **S** is closed, the current through the ammeter is 3.0 A.

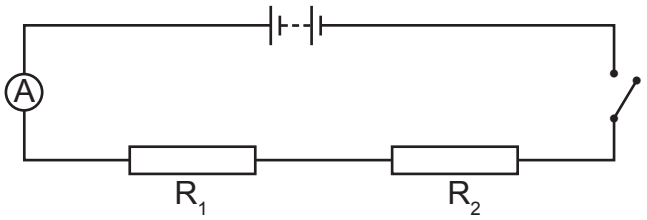
Calculate the resistance of resistor R_2.

Resistance = ...Ω [2]

(c) Calculate the electric power output from the battery when switch **S** is closed. Give the unit.

Power = ... unit ……. [3]

(d) The resistors are rearranged such that they are now in series as shown in the diagram.



(i) Explain how the total resistance in the circuit compares when the resistors are in series and when they are in parallel.

.....

..... [1]

(ii) On the diagram, draw a circuit symbol of the voltmeter to show how it can be connected to measure the voltage across the resistor R_1. [2]

[10]

For Examiner's Use

10 A learner is provided with three metal bars, **A**, **B** and **C**. The bars are copper, a magnet and steel. She uses a second magnet to test each bar.

- The magnet attracts both ends of bar **A**.
- There is no force between the magnet and bar **B**.
- The magnet attracts one end of bar **C** and repels the other end.

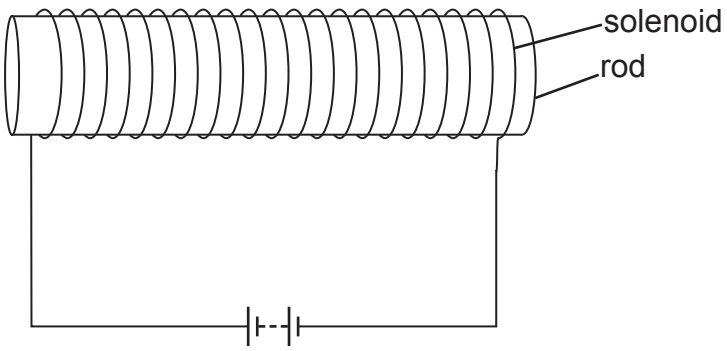
(a) Identify which bar **A**, **B** and **C** is

copper, …….

a magnet, …….

steel, …… [2]

(b) The diagram shows an electromagnet.



(i) Suggest with a reason the suitable material of the rod.

.....

.....

.....

..... [2]

(ii) On the diagram, draw **six** field lines (**three** on each side) with arrows to show the direction of the magnetic field around the solenoid. [2]

(iii) State **two** ways to increase the strength of the electromagnet.

1 .....

2 ..... [2]

[8]

11 A vibrating tuning fork produces longitudinal wave and water in a pond produces transverse wave.

(a) Distinguish between longitudinal waves and transverse waves.

longitudinal waves.....

.....

transverse waves.....

..... [2]

(b) A tuning fork produces a sound of a frequency of 512 Hz.

State and explain whether a human ear can hear this frequency of sound.

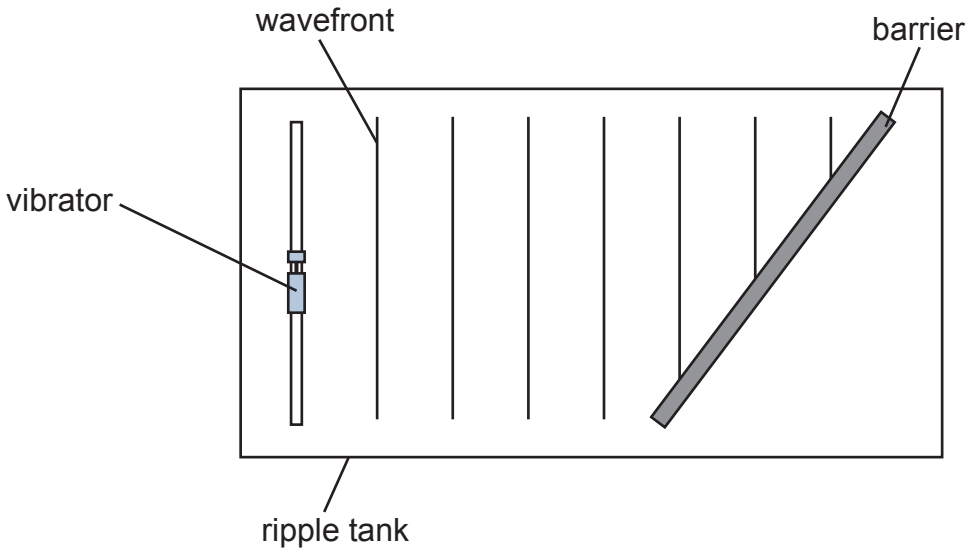
Answer.....

Explanation .....

.....

..... [2]

(c) The diagram shows a view of water wavefronts from above the ripple tank. The vibrator produces a series of waves of the same frequency.



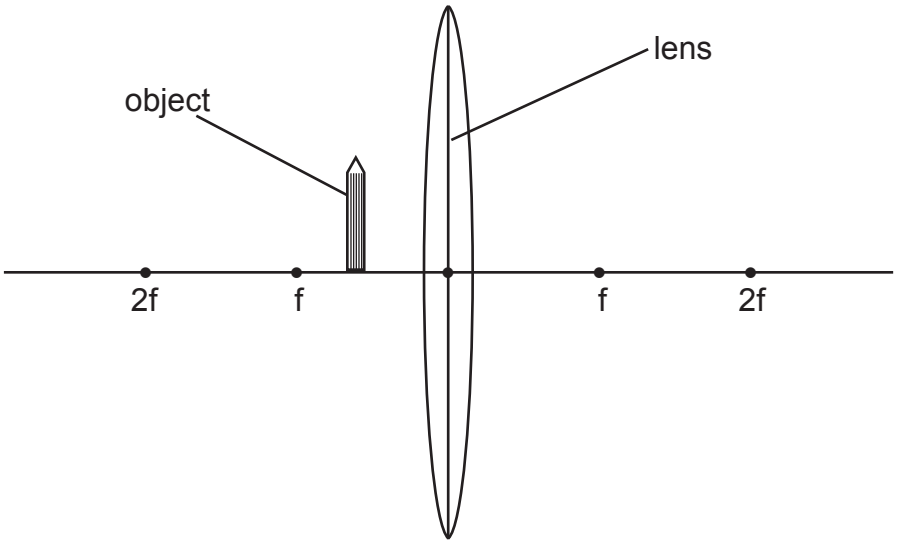
(i) On the diagram, draw an arrow (↔) to show one wavelength. [1]

(ii) On the diagram, draw three wavefronts after they hit the barrier. [3]

[8]

For Examiner's Use

12 The diagram shows an object placed between the focal point and a lens.



(a) Name the type of lens in the diagram.

..... [1]

(b) On the diagram, draw

(i) **two** rays from the top of the object to locate the position of the image formed. [3]

(ii) the image formed. [1]

(c) Another object is placed in front of a plane mirror and an image is seen in the mirror.

(i) Name the effect on light that leads to the formation of image in a mirror.

..... [1]

(ii) State **two** properties of image formed by the plane mirror

1 .....

2 ..... [2]

[8]

DATA SHEET
The Periodic Table of the Elements

Group I	Group II						Group III	Group IV	Group V	Group VI	Group VII	Group 0
					1 **H** Hydrogen 1							4 **He** Helium 2
7 **Li** Lithium 3	9 **Be** Beryllium 4						11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12						27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35,5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 ***I*** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

***58 - 71 Lanthanoid series**
†90 - 103 Actinoid series

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

Key

a
X
b

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

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