Candidate Name	School Name

JUNIOR SECONDARY SEMI-EXTERNAL EXAMINATION

PHYSICAL SCIENCE

2210/1

PAPER − Written

2 hour 30 minutes

Marks 130

2019

Additional Materials: HB pencil
                      Non-programmable calculator

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write your Candidate Name and School Name in the spaces on top of this page.
- Write your answers on the Question Paper.
- 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.
- You may use a non-programmable calculator.
- 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 24.

For Examiner's Use
Marker	
Checker	

This document consists of **24** printed pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

SECTION A: MULTIPLE CHOICE QUESTIONS

- For each question there are four possible answers **A, B, C** and **D**.
- Each question counts **one** mark.
- Choose the **one** you consider correct and draw a circle around your choice in **soft** pencil on this question paper as shown in the example below.
 **Example**

  Which of the following is the unit of force?

  A Joule

  (B) Newton

  C Seconds

  D Watt

- If you want to change an answer, erase the one you wish to delete completely.

---

1 An irregular shaped stone is inserted into a measuring cylinder with water.
Before the stone was inserted the level of the water in the measuring cylinder was 56 cm^3.
After the stone was inserted the level of water in the measuring cylinder was 100 cm^3.

What is the volume of the stone?

A 5 600 cm^3

B 156 cm^3

C 44 cm^3

D 1.79 cm^3

2 A relationship between two variables in which if one change, the other changes at the same rate is called ...

A a dependent variable

B an independent variable

C a direct proportion

D an inverse proportion

3 Which of the following determines the mass (nucleon) number of an atom?

A number of electrons only

B number of neutrons only

C number of protons and electrons

D number of protons and neutrons

4   The diagram shows the electron structure of element **X**.
What is the atomic number of element **X**?

10p
10n
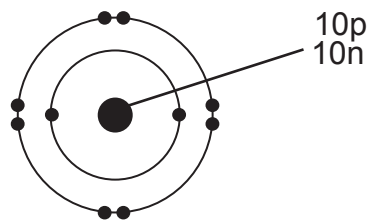
element **X**

A   10

B   7

C   5

D   3

5   Which compound contains atoms bonded covalently?

A CaF_2

B   MgO

C   NaCl

D NH_3

6   The diagram shows an ion of element **Q**.

9p
10n
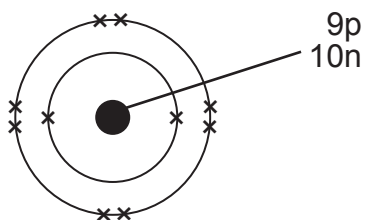
ion of element **Q**

What is the charge on the ion?

A   +1

B   -1

C   +3

D   -3

7 Which diagram below illustrates the covalent bond in chlorine gas Cl_2?

A

B

C

D
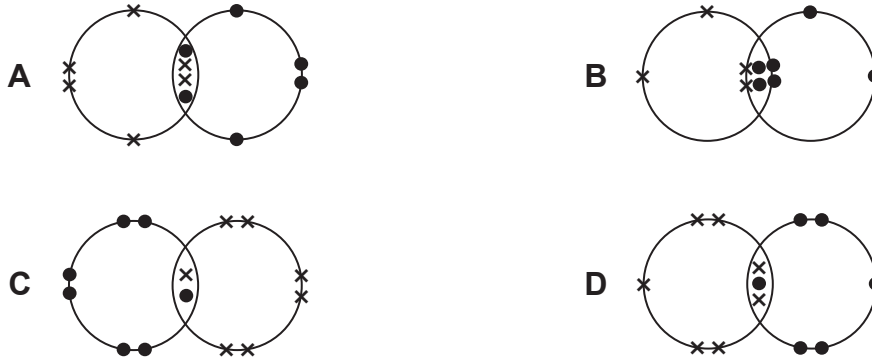
8 Which of the following is a physical change?

  A baking a cake

  B burning wood

  C cooking an egg

  D melting ice

9 Which of the following is a word equation for the combustion of magnesium?

  A magnesium + oxygen ⟶ magnesium oxide

  B magnesium + carbon ⟶ carbon dioxide

  C magnesium ⟶ magnesium dioxide

  D magnesium oxide ⟶ magnesium

10 Which of the following compounds is an alkali?

  A sodium hydroxide

  B sulfuric acid

  C sulfur dioxide

  D water

11 The diagram shows different pH ranges.

  Which pH range represents the pH of weak acids?
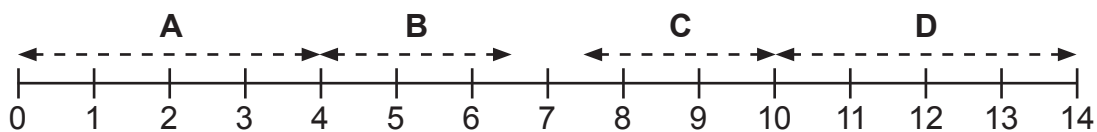
12 Which of the following shows the products of the reaction between sodium hydroxide and hydrochloric acid?

    A $NaCl$ and H_2O

    B $NaCl$ and O_2

    C $NaCl$ and H_2

    D $NaCl$ only

13 The diagram shows a test for gas **X**.

                    Before   After
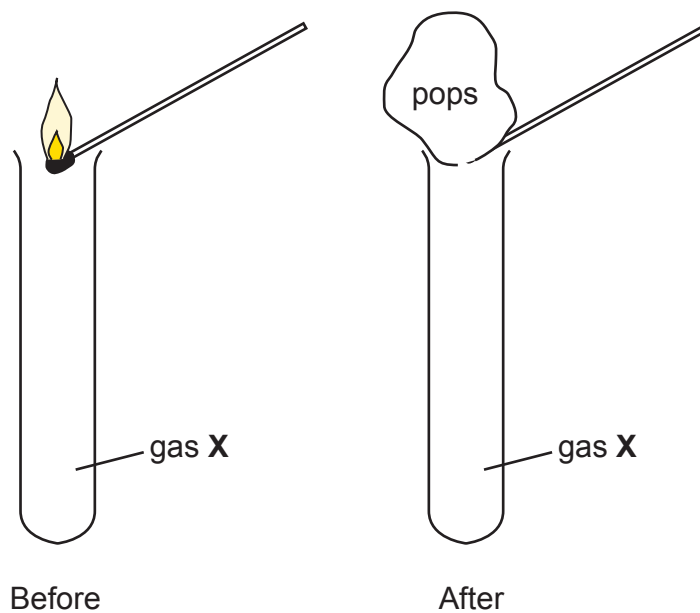
What is gas **X**?

    A   ammonia

    B   carbon dioxide

    C   hydrogen

    D   oxygen

14 Which statement is correct for all metals?

    A   They are soluble in water.

    B   They are dull.

    C   They conduct electricity.

    D   They have lower melting points.

15 What is the product of an incomplete combustion of pure carbon?

    A   carbon dioxide

    B   carbon monoxide

    C   nitrogen oxide

    D   sulphur dioxide

16 Which substances is responsible for the formation of acid rain?

   A   non metal oxide

   B   metal oxide

   C   metal hydroxide

   D   non-metal hydroxide

17 Which metal is present in every kind of steel?

   A   copper

   B   iron

   C   nickel

   D   zinc

18 Which quantity has the same unit as energy?

   A   force

   B   mass

   C   weight

   D   work

19 The diagram shows an ice cube left on a warm table.
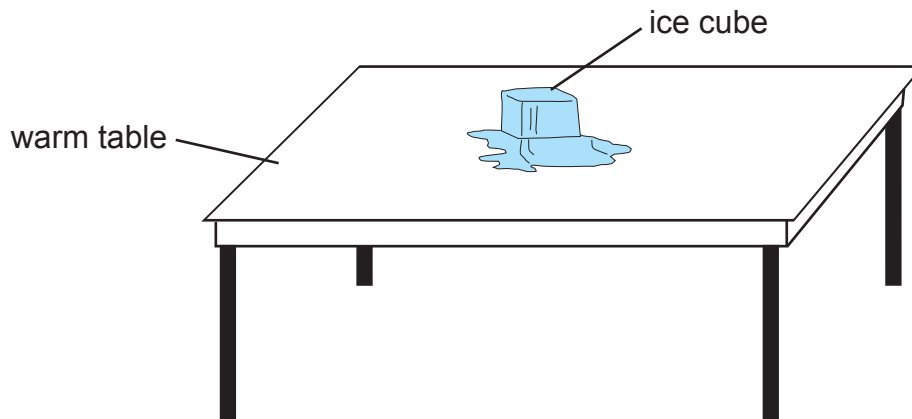
What happens to the molecules of water in the ice cube?

   A   The molecules condense.

   B   The molecules move closer together.

   C   The molecules gain energy.

   D   The molecules lose energy

20 A Grade 9 learner uses her thumb to push a drawing pin into a soft board.
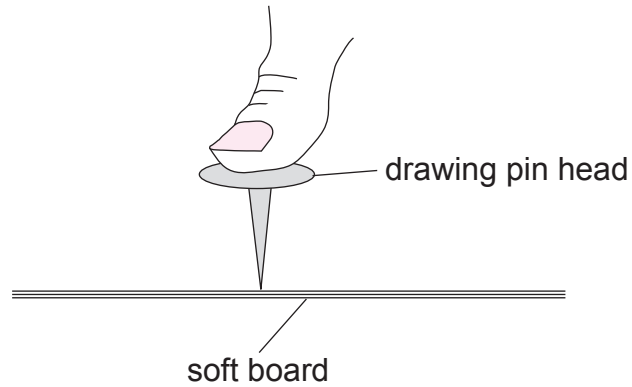
Which of the following statements is correct?

A The pressure on the pin head is greater because the surface area is larger.

B The pressure on the pin head is greater because the surface area is smaller.

C The pressure on the soft board is greater because the surface area is larger.

D The pressure on the soft board is greater because the surface area is smaller.

21 Maria pushes a 14 kg box for 1.7 m across the office floor.

What is the work done on the box?

A 8.2 J

B 23.8 J

C 82 J

D 238 J

22 Which instrument is used to measure atmospheric pressure?

A barometer

B manometer

C measuring cylinder

D thermometer

23 Melting is when solids changes to liquids.

What happens to the energy?

A energy is given out only

B energy is taken in only

C energy stays the same

D energy is given out and taken in

24 Which of the following is described as a force per unit area?

    A   compression

    B   diffusion

    C   expansion

    D   pressure

25 A plastic comb is brought closer to a small piece of aluminium foil hanging from a nylon thread. The foil is repelled by the comb.

Why does this happen?

    A   The comb is charged and the foil is uncharged.

    B   The comb is uncharged and the foil is charged

    C   The comb and the foil have opposite charges

    D   The comb and the foil have the same charges

26 What is the unit of potential difference?

    A   ampere

    B   ohm

    C   volt

    D   watt

27 Four learners are asked to draw a circuit showing three lamps working in parallel. The circuit should have a battery, and a switch that turns all three lamps on/off at the same time.

Which learner is correct?

A

B

C

D
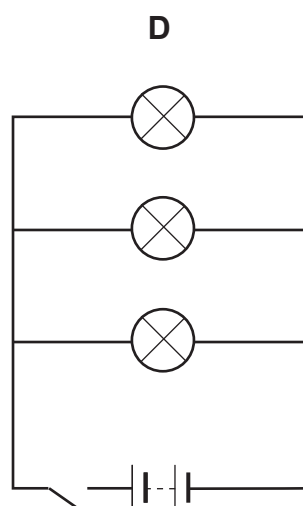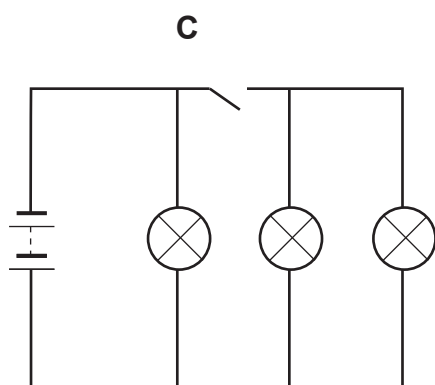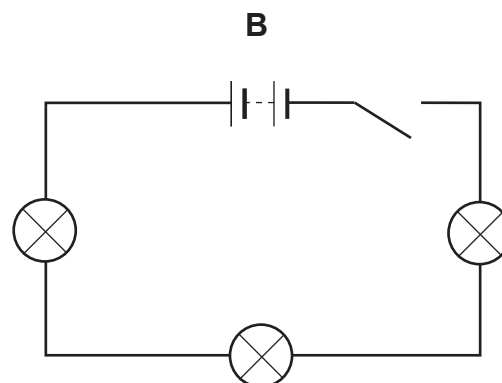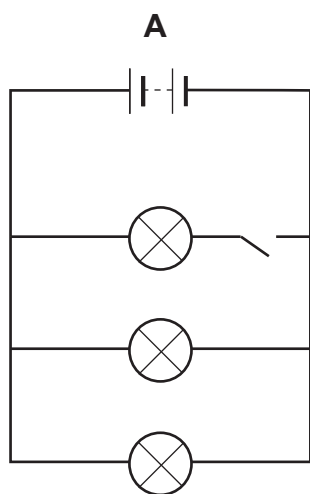
28 A learner in Grade 9 carries out four tests with a magnet.
Which line in the table shows a correct result?

	arrangement		result
A	S　　　　　N	iron bar	repel
B	S　　　　　N	copper bar	attracts
C	N　　　　　S	copper bar	repel
D	N　　　　　S	iron bar	attracts

[Turn over

29 Which of the following defines electric current?

  A the flow of charge

  B the imbalance of protons and electrons

  C static electricity

  D the potential difference

30 Study the electric circuit below.
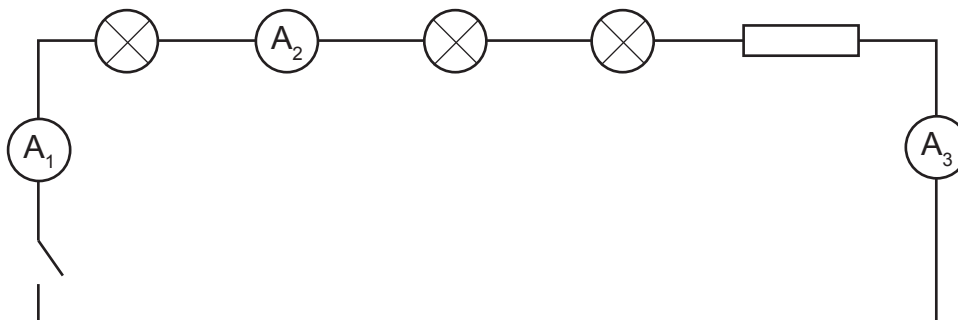
When the switch is closed, the reading on A_1 is 0.6A.
What will be the reading for A_2 and A_3?

	A_2 reading	A_3 reading
A	1.2 A	1.8 A
B	0.3 A	0.15 A
C	0.6 A	0.6 A
D	1.8 A	1.2 A

[30]

SECTION B: STRUCTURED QUESTIONS

- 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 **(a)** Name the pieces of apparatus the learner should use to

    (i) measure the length of a text book,

    .... [1]

    (ii) find the temperature of boiling alcohol,

    .... [1]

    (iii) measure the mass of bread.

    .... [1]

(b) State what the following apparatus are used to measure.

    (i) a measuring cylinder

    .... [1]

    (ii) stopwatch

    .... [1]

(c) A learner determines the density of a piece of glass. She found that it had a mass of 0.3 kg and a volume of 120 cm^3.

    (i) Convert 0.3 kilograms into grams.

    ....g [1]

    (ii) Write down the formula she uses to calculate density.

    [1]

    (iii) Calculate the density of the piece of glass.

    ....g/cm^3 [2]

(d) Suggest **one** way of avoiding errors when taking a reading on a measuring cylinder.

.... [1]

[10]

2 **(a)** Study the following structures and answer the questions that follows.

A	B	C	D
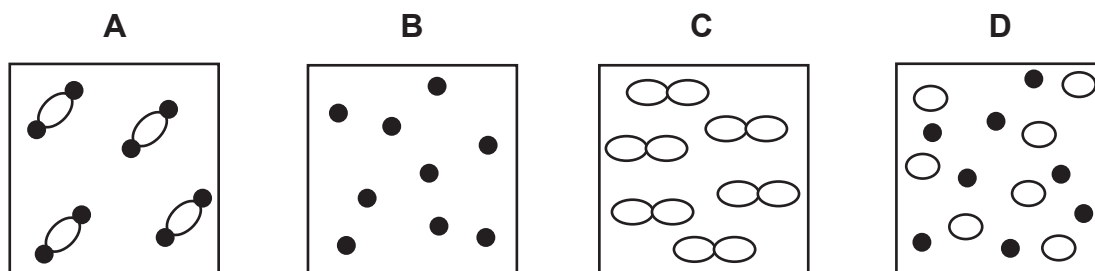
Give the structure **A**, **B**, **C** or **D** which represents,

(i) an element,

.... [1]

(ii) a compound,

.... [1]

(iii) a mixture,

.... [1]

(iv) a substance made up of molecules of the same element.

.... [1]

(b) The diagram shows an incomplete Periodic Table.

The letters shown in the table are not the symbols of the elements.
Use these **letters** in your answers.

(i) Select **two** elements which form ions with a charge +1.

.... [2]

(ii) Select **one** element which is a halogen.

.... [1]

(iii) Give the formula for the compound formed between element **C** and **F**.

.... [1]

(iv) Select an element which is in Period 2.

.... [1]

(c) (i) State the type of bonding between potassium and sulfur.

.... [1]

(ii) Draw a diagram to show how the bonds are formed between potassium and sulfur. Use the Periodic Table on page 24.

[4]

[14]

[Turn over

3 Corrosion of metals (rusting) is an example of a combustion reaction.

(a) Define *combustion*.

....

.... [1]

(b) Explain why most combustion reactions are exothermic.

.... [1]

(c) Combustion is a chemical change.
Give **two** differences between a chemical change and a physical change.

....

....

.... [2]

(d) State the **two** substances that react with iron to produce rust.

1 ....

2 .... [2]

(e) Give another example of combustion in everyday life.

.... [1]

[7]

4 (a) In an experiment, Grade 9 learners measured the pH of a few household substances. The table shows the results.

substance	pH
Hydrochloric acid	2
Baking soda	8
Lemon Juice	4
Pure water	7
Soap	9
Washing soda (sodium carbonate)	12

(i) Suggest what the learners used to measure the pH.

.... [1]

Use the table to identify,

(ii) a weak acid,

.... [1]

(iii) a strong acid,

.... [1]

(iv) a weak alkali.

.... [1]

(v) State the name of the reaction between an acid and a base.

.... [1]

(vi) Suggest the name of the acid and alkali that can be used to prepare calcium sulfate.

Acid ....

Alkali... [2]

(b) (i) Write the general word equation for the reaction between an acid and a carbonate.

....

.... [3]

(ii) Outline a test to confirm that a solution is acidic.

Test ....

Result ....

.... [2]

(iii) With reference to the pH, distinguish between a weak alkali and a strong alkali.

weak alkali..

....

strong alkali ....

.... [2]

(iv) Describe **two** applications of neutralisation reactions in everyday life.

1 ....

....

2 ....

.... [2]

[16]

5 A number of important metals such as uranium and zinc are mined in Namibia.

(a) (i) State the name of the main metal that is mined near Tsumeb.

.... [1]

(ii) Give **two** physical properties of metals.

1 ....

2 .... [2]

(b) The table shows the observations made when three metals are reacted with cold water and with air.

metal	observations	
	cold water	air
calcium	Reacts fast with cold water producing a gas.	Burns vigorously with a flame.
iron	Does not react.	Melts giving sparks.
magnesium	Reacts slowly producing a gas.	Burns vigorously with a bright white flame.

(i) Arrange the metals in order of reactivity from the most reactive to the least reactive.

Most reactive ....

....

Least reactive .... [2]

(ii) State the name of the gas released when metals react with water.

.... [1]

(c) Alloys are mixtures of metals.

(i) State the **two** metals that are mixed to form bronze.

1 ....

2 .... [2]

(ii) Explain the advantage of changing the physical properties of metals by forming alloys.

.... [1]

[Turn over

(d) Sulfur and nitrogen are non-metals which react with oxygen to form non-metal oxides.

(i) State the name of the oxide formed when sulfur reacts with oxygen.

.... [1]

(ii) Describe the effects of sulfur oxide and nitrogen oxides on the environment.

....

.... [2]

[12]

6 **(a)** The table shows the differences between mass and weight.

Fill in the missing information.

	mass	**weight**
description	(i)...................................	The gravitational force exerted on an object by the earth
apparatus used for measuring	Balance Scale	(ii)...................................
SI unit	(iii)................................	Newton

[3]

(b) The sand surfer in the diagram stands at the top of a sand dune that is 15 m high. She has a mass of 75 kg.

15 m
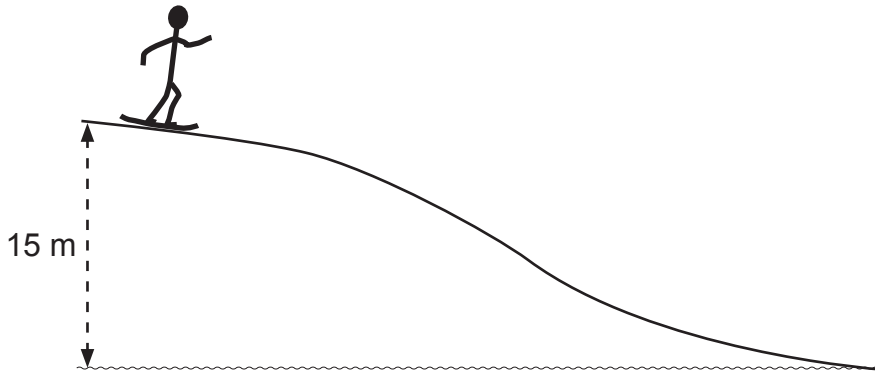
(i) Calculate the weight of the surfer (use g = 10 N/kg).
Write down the formula you used. Show your working.

weight = ...N [3]

(ii) Calculate the amount of work she has done climbing to the height of 15 m.
Show your working.

work = ...J [2]

(iii) When the sand surfer is standing on top of the sand dune she covers a ground of 0.6 m².

Calculate the pressure exerted by the surfer on the sand dune.

pressure =.. Pa [2]

[Turn over

(c) The diagram shows an experiment to investigate the influence of density on the pressure of liquids.

(i) Explain the conclusion that can be made from the experiment.

....

....

....

.... [2]

(ii) List any **one** variable that has to be controlled during the experiment to make it fair.
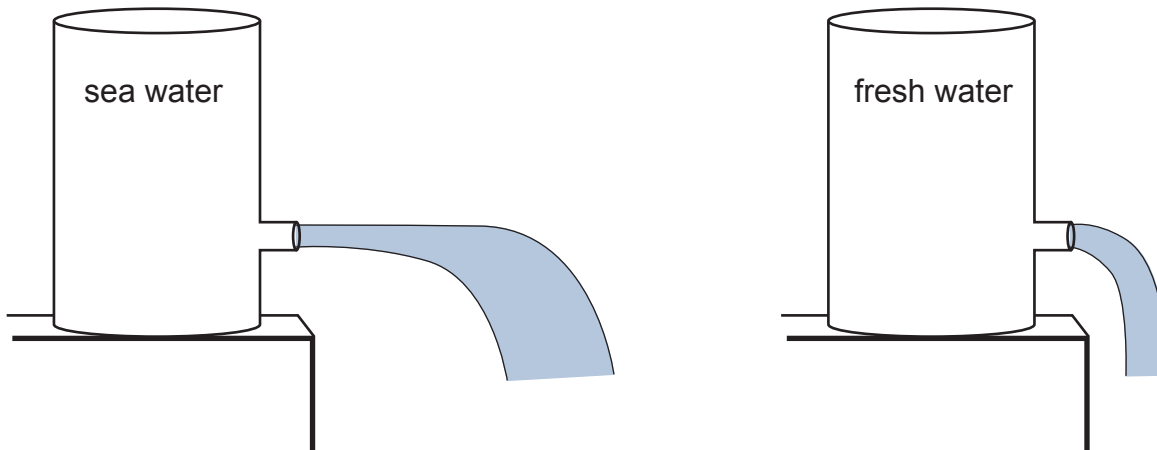
.... [1]

(iii) Describe **one** other factor that influences pressure in liquids

.... [1]

(iv) Give an example of a machine that uses pressure in liquids.

.... [1]

(d) Up-thrust is the upward force exerted on an object in liquids.
What happens to an object placed in a fluid when

(i) up-thrust = weight,

....

.... [1]

(ii) weight of object is less than the up-thrust?

....

.... [1]

[17]

7 (a) Choose words from the box to complete the following sentences that describe the kinetic particle theory for gases.

lots	fast	strong
collide	small	little
large	weak	

(i) Gases consist of very .... particles. [1]

(ii) There are .... spaces between the particles. [1]

(iii) There are .... forces between the particles. [1]

(iv) The particles have a .... amount of kinetic energy. [1]

(v) The particles will .... with other particles. [1]

(b) Diffusion easily takes place in gases and in liquids.

(i) Define *diffusion*.

....

.... [1]

(ii) In terms of the Kinetic Particle theory, compare the diffusion in gases and in liquids.

....

....

....

.... [2]

(c) State the name of the change of state from

(i) gas to liquid,

.... [1]

(ii) solid to gas.

.... [1]

(d) Describe the relationship between volume and pressure of a fixed amount of gas.

.... [1]

[11]

8 Electricity is a form of energy associated with charge.

(a) (i) Distinguish between static electricity and electrical current.

....

.... [2]

(ii) Explain how a charged electroscope can be discharged.

.... [1]

(b) The diagram shows an incomplete circuit diagram designed to determine resistance of a wire **P**.
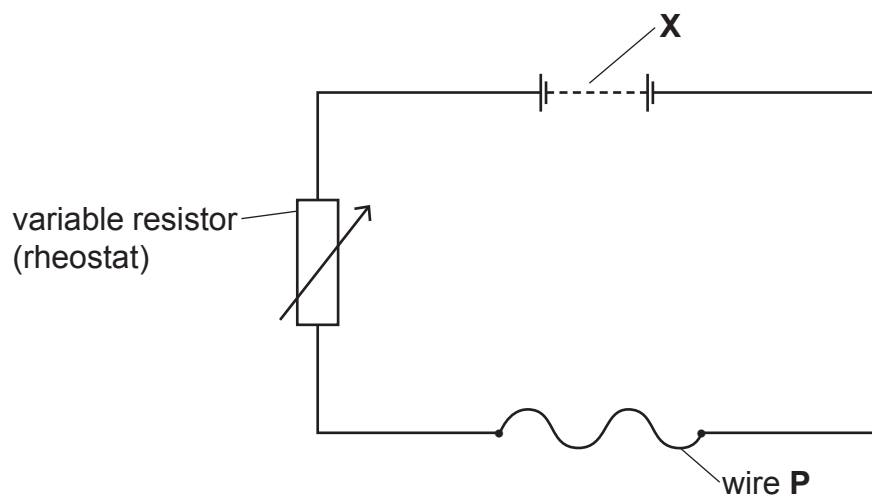
(i) Draw a circuit symbol for the ammeter in the space provided on the diagram. [1]

(ii) Complete the diagram to show how a voltmeter should be connected across wire **P**. [2]

(iii) Identify component **X**.

.... [1]

(iv) Give **one** example of an everyday use of a variable resistor (rheostat).

.... [1]

(c) Describe how the resistance of wire **P** in the diagram in **(b)** changes, if it is replaced by,

(i) a wire of the same material and length but double the diameter,

.... [1]

(ii) a wire of the same length and diameter but hotter.

.... [1]

(d) (i) Draw magnetic field lines to show the interaction between two magnets.

S	N

S	N

[2]

(ii) State **one** proper way of storing magnets.

.... [1]

[13]

DATA SHEET
The Periodic Table of the Elements

Group

I	II												III	IV	V	VI	VII	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	231 **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.).