

Candidate Name

Centre Number

Candidate Number

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**ZIMBABWE SCHOOL EXAMINATIONS COUNCIL**  
**General Certificate of Education Ordinary Level**

**COMBINED SCIENCE**  
 PAPER 2 Theory

**4003/2**  
 2 hours

**JUNE 2024 SESSION**

Additional materials:  
 Calculator (Optional)  
 Answer booklet

**ZC**

**INSTRUCTIONS TO CANDIDATES**

Write your name, centre number and candidate number in the spaces at the top of this page.

**INFORMATION FOR CANDIDATES**

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

This question paper consists of **four** compulsory sections, **A, B, C and D**.

**The Periodic Table is provided on Page 14.**

**FOR EXAMINER'S USE**

<b>Section A</b>	
<b>SECTION B</b>	
<b>Section C</b>	
<b>Section D</b>	
<b>TOTAL</b>	

**This question paper consists of 14 printed pages and 2 blank pages.**

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**Section A**

For  
Examiner's  
Use

Answer **all** questions in the spaces provided on the question paper.

1 (a) (i) Name any **two** female parts of a flower.

\_\_\_\_\_

\_\_\_\_\_ [2]

(ii) State the part that produces male sex cells in a flower.

\_\_\_\_\_ [1]

(b) (i) A farmer in Zimbabwe sow some maize seeds under irrigation in June. The percentage germination was 40%.  
Calculate the total number of seeds that were sown if 20 000 seeds germinated.

[2]

(ii) Explain why the percentage germination was low.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]





2 (a) Name the organ that is affected by excessive alcohol consumption. [1]

(b) Suggest any **two** reasons why people abuse drugs. [2]

1 \_\_\_\_\_

2 \_\_\_\_\_

(c) Describe the effects of tobacco smoking by a pregnant woman. [2]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(d) State any **two** effects of glue sniffing to the human body. [2]

1. \_\_\_\_\_

2. \_\_\_\_\_





- 3 A student carried out a research on a particular species of fish. The fish species cannot survive in water with a pH lower than 5.7 or higher than 8.5. The student analysed the pH of water from three rivers, X, Y and Z.

river	pH
X	3.5
Y	7.0
Z	8.1

- (a) (i) State the river which has alkaline water.

\_\_\_\_\_ [1]

- (ii) Identify the river in which the fish species cannot survive.

\_\_\_\_\_ [1]

- (b) Define the term *neutralisation*.

\_\_\_\_\_  
\_\_\_\_\_ [1]

- (c) Calculate the concentration, in moles per  $\text{dm}^3$ , of a solution made by dissolving 212.0 g of sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) in  $0.25 \text{ dm}^3$  water.  
[ $\text{Mr}(\text{Na}_2\text{CO}_3) = 106$ ]

[4]





4

(a) Fig.4.1 shows displayed formulae of two organic molecules.

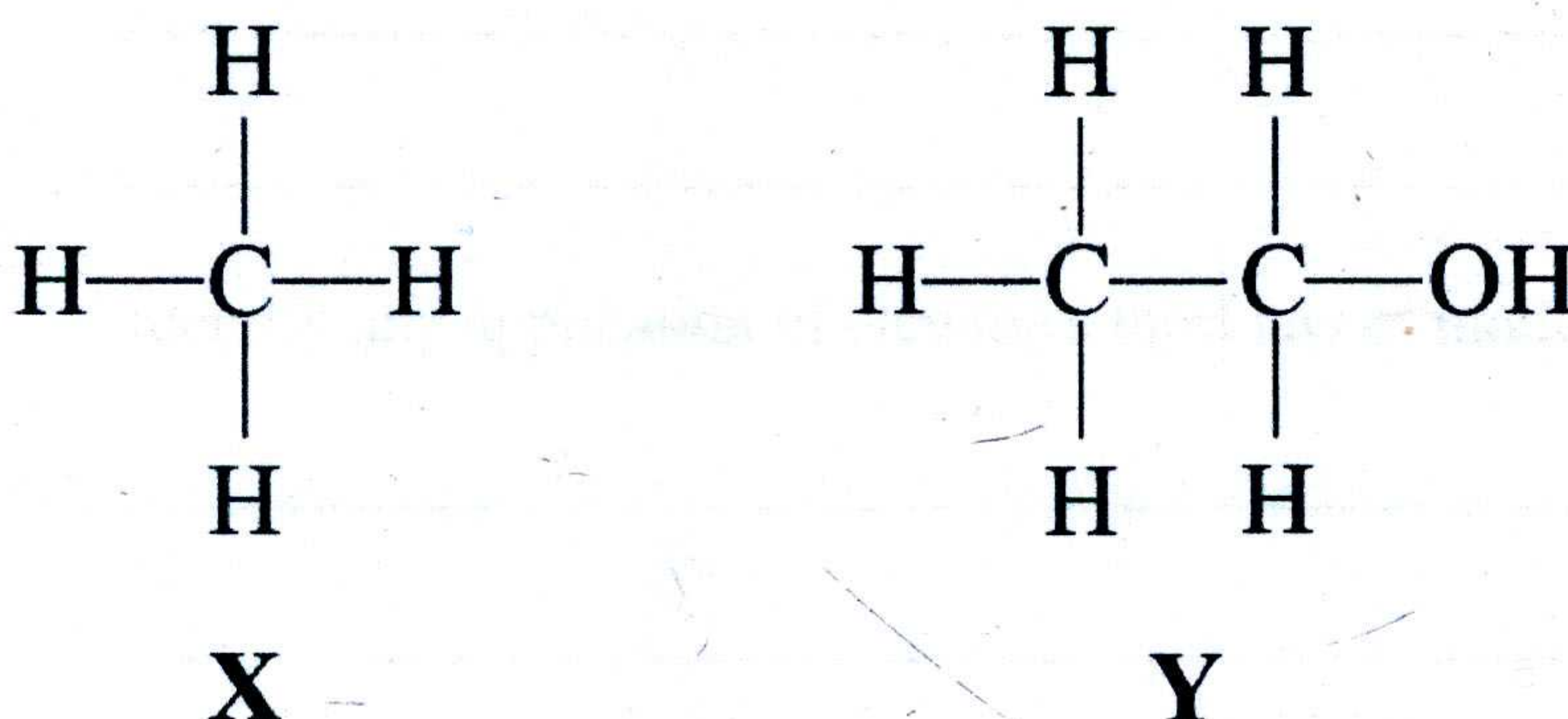


Fig.4.1

(i) Define the term *homologous series*.

\_\_\_\_\_ [1]

(ii) State the homologous series to which each molecule belongs.

X: \_\_\_\_\_

Y: \_\_\_\_\_ [2]

(b) (i) Explain why molecule **Y** **cannot** be classified as a hydrocarbon.

\_\_\_\_\_ [1]

(ii) Calculate the percentage composition by mass of hydrogen in molecule **X**.

[3]

For  
Examine  
Use





- 5 (a) A force of 8 N was applied onto a knife to cut through 0.05 m of a material. Calculate the energy used to cut the material.

[2]

- (b) Fig.5.1 is an incomplete diagram representing the production of shadows.

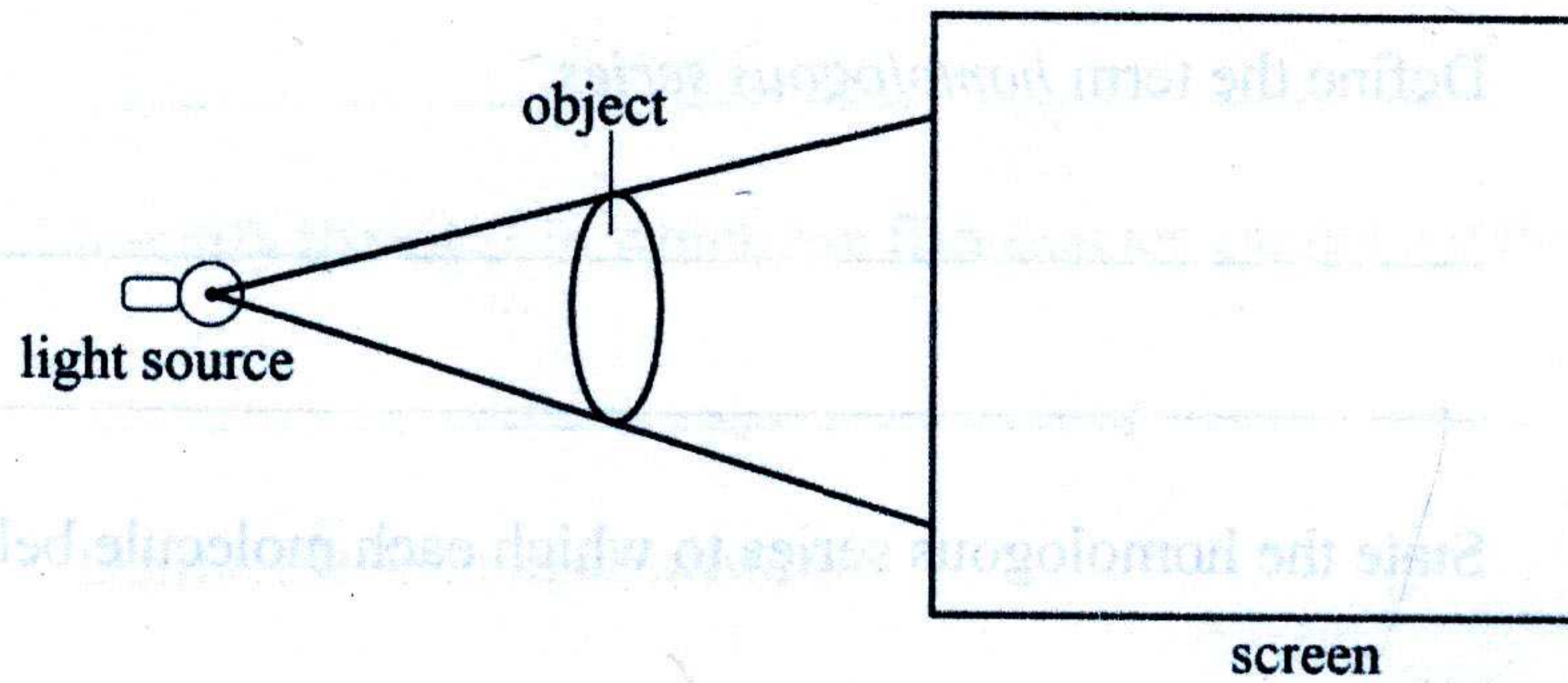


Fig.5.1

Complete the diagram to show the shadow formed.

[2]

- (c) Write the energy chain to show the energy changes that occur when a torch is switched on.

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[3]





- 6 (a) (i) State Newton's third law of motion.

\_\_\_\_\_ [1]

- (ii) Identify any application of Newton's third law of motion.

\_\_\_\_\_  
\_\_\_\_\_ [1]

- (b) (i) Fig.6.1 shows a box of mass 40 kg being pulled horizontally. A frictional force of 80 N is acting on the box.

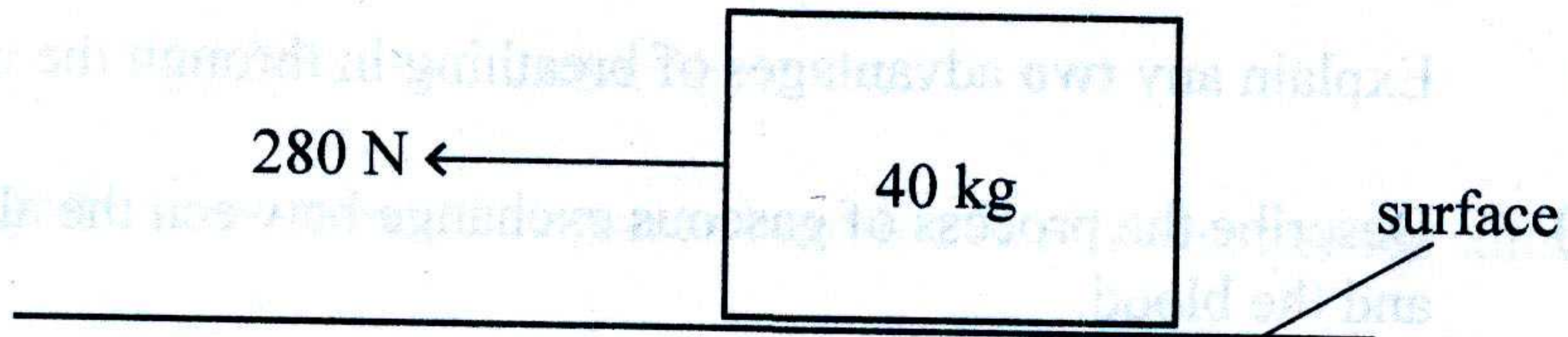


Fig.6.1

Indicate, using an arrow on the diagram, the frictional force. [1]

- (ii) Calculate the resultant force. [2]

- (iii) Calculate the acceleration of the box.

[2]





## Section B

Answer any **two** questions on the separate answer paper provided.

For  
Examiner's  
Use

- 7 (a) State any **two** laboratory safety rules. [2]
- (b) State any **two** materials that can be used for fire fighting in the laboratory. [2]
- (c) (i) Describe how waste chemicals can be properly disposed off in a laboratory. [2]
- (ii) State any other **two** methods of disposing litter. [2]
- (iii) State **one** disadvantage for each method stated in (ii). [2]
- 8 (a) (i) Explain any **two** advantages of breathing in through the nose. [2]
- (ii) Describe the process of gaseous exchange between the alveolus and the blood. [4]
- (b) (i) State any **two** differences between aerobic and anaerobic respiration. [2]
- (ii) State any **two** diseases of the respiratory system that are linked to tobacco smoking. [2]
- 9 (a) Outline the route of a sperm from the vagina to the site of fertilisation. [2]
- (b) (i) State and explain any **two** adaptations of the sperm to its function. [4]
- (ii) State any **four** differences between an egg cell and a sperm cell. [4]





## Section C

Answer any **two** questions on the separate answer paper provided.

For  
Examine  
Use

- 10** Chlorine and bromine are some of the Group VII elements.
- (a) (i) State the number of electrons in a chlorine atom. [1]
- (ii) Draw a diagram to show the electronic structure of a chlorine atom. [2]
- (iii) State the charge that is carried by an ion of chlorine. [1]
- (b) (i) State any **two** physical properties of bromine. [2]
- (ii) State any **two** uses of bromine. [2]
- (c) Explain why chlorine displaces bromine ions in an aqueous solution. [2]
- 11** (a) (i) An iron wedding ring is coated with gold.  
Name the process that is used to coat the ring. [1]
- (ii) State any **two** reasons for coating the ring with gold. [2]
- (iii) State **one** disadvantage of coating the ring with gold. [1]
- (iv) State, with a reason, any other metal which can be used to coat the ring. [2]
- (b) (i) State any **three** differences between a physical change and a chemical change. [3]
- (ii) Give any **one** example of a compound. [1]





- 12 (a) Fig.12.1 shows the reaction of a magnesium ribbon with steam.

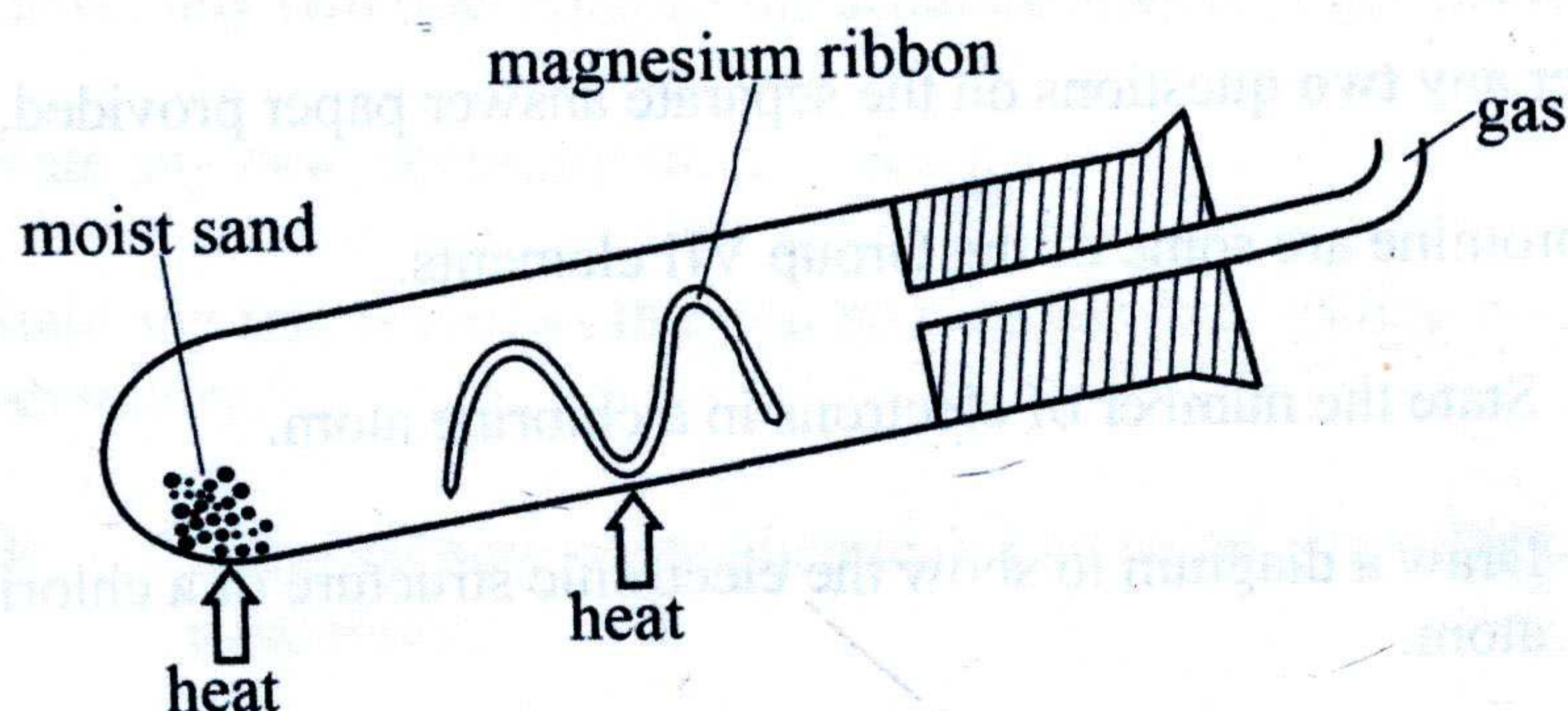


Fig.12.1

- (i) Write the word equation for the reaction. [3]
- (ii) Name, with a reason, the reducing agent in the reaction. [2]
- (b) Cast iron is an alloy of iron.
- (i) Name the element that is combined with iron to form cast iron. [1]
- (ii) State any **two** properties of cast iron. [2]
- (iii) Give any **two** uses of cast iron. [2]





## Section D

Answer any **two** questions on the separate answer paper provided.

For  
Examine  
Use

- 13 (a) (i) State any **two** examples of characteristics that show continuous variation. [2]
- (ii) State the type of distribution that is represented by discontinuous variation. [1]
- (b) (i) When making five counts using the tally method, state how many vertical lines and diagonal lines one can make. [2]
- (ii) Identify the type of data presentation method which uses plotted points as a stage in the process of presenting data. [1]
- (c) Describe the stages of constructing a pie chart. [4]
- 14 (a) Write the base units of the newton (N). [1]
- (b) Fig.14.1 shows an instrument used to measure fluid pressure.

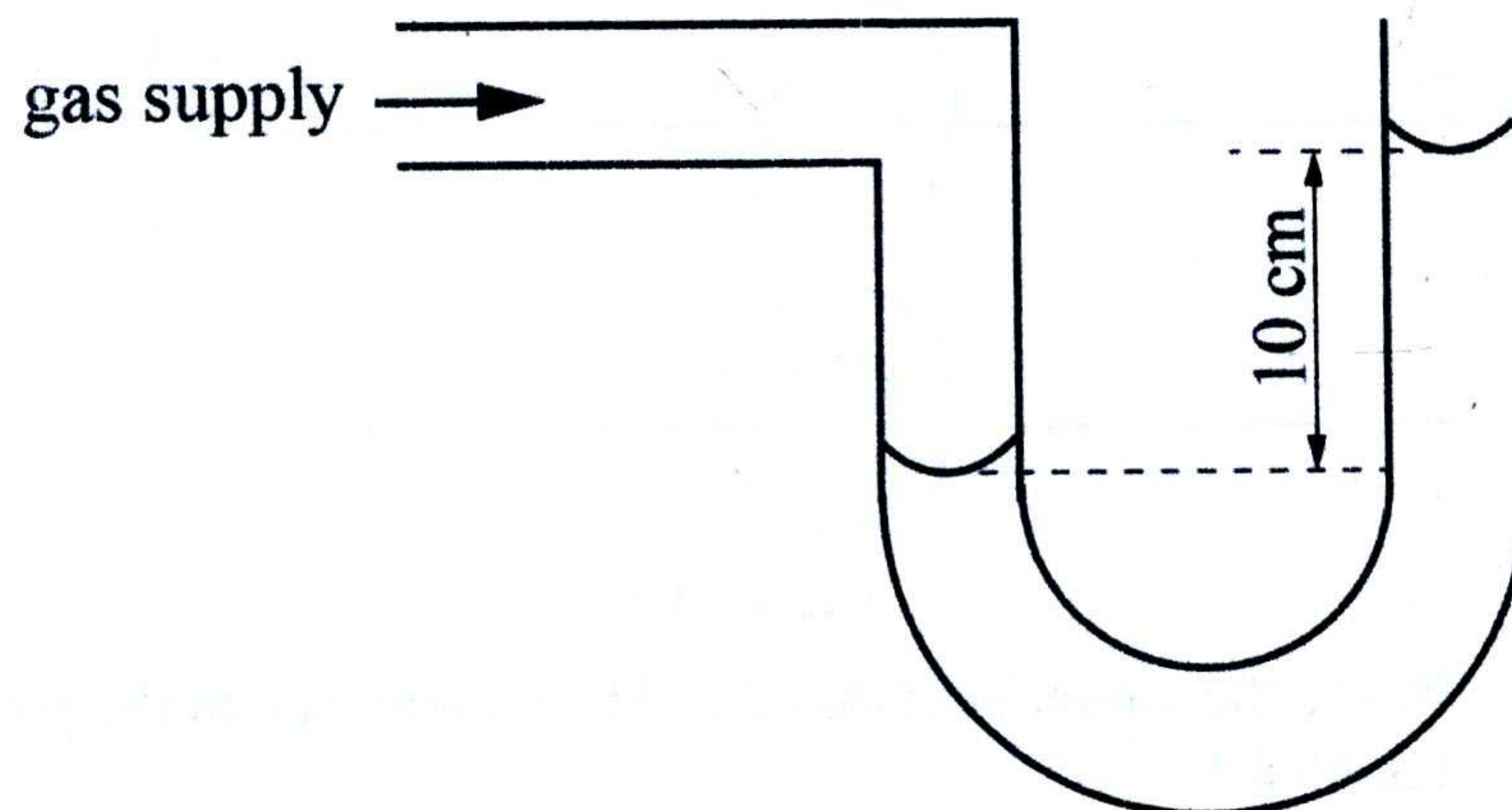


Fig.14.1

- (i) Name the instrument used to measure fluid pressure. [1]
- (ii) The liquid in the instrument in b(i) has a density of  $0.3 \text{ kg/m}^3$  and it rises by 10 cm on one arm when connected to a gas supply. Find the pressure of the gas if atmospheric pressure is 2 Pa. [3]  
[Take  $g$  to be  $10 \text{ N/kg}$ ].





- (c) Explain why the base of a dam is broader or thicker than the top. [2]
  - (d) (i) Describe how a siphon works. [2]
  - (ii) State any **one** other application where pressure is exerted to a fluid. [1]
- 15 (a) (i) Define the term *electric current*. [1]
- (ii) State the Standard International (S I) unit of
1. voltage,
  2. current.
- [2]

(b) Fig.15.1 shows an incomplete circuit.

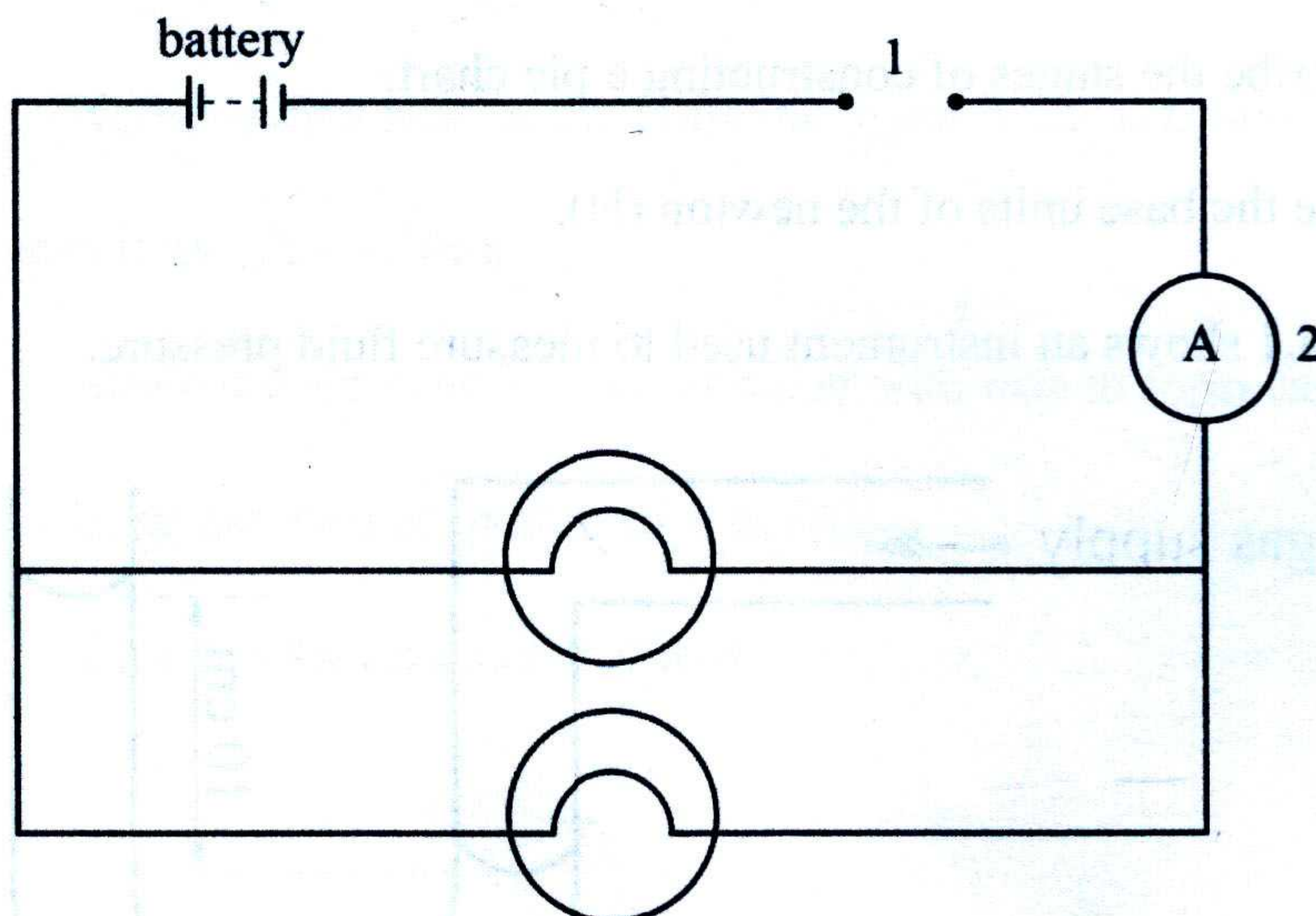


Fig.15.1

- (i) Name the component that should be connected to the position labelled 1. [1]
- (ii) Describe the function of the component labelled 2. [1]
- (iii) Describe the arrangement of bulbs in the circuit. [1]





- (c) Fig.15.2 shows another electric circuit.

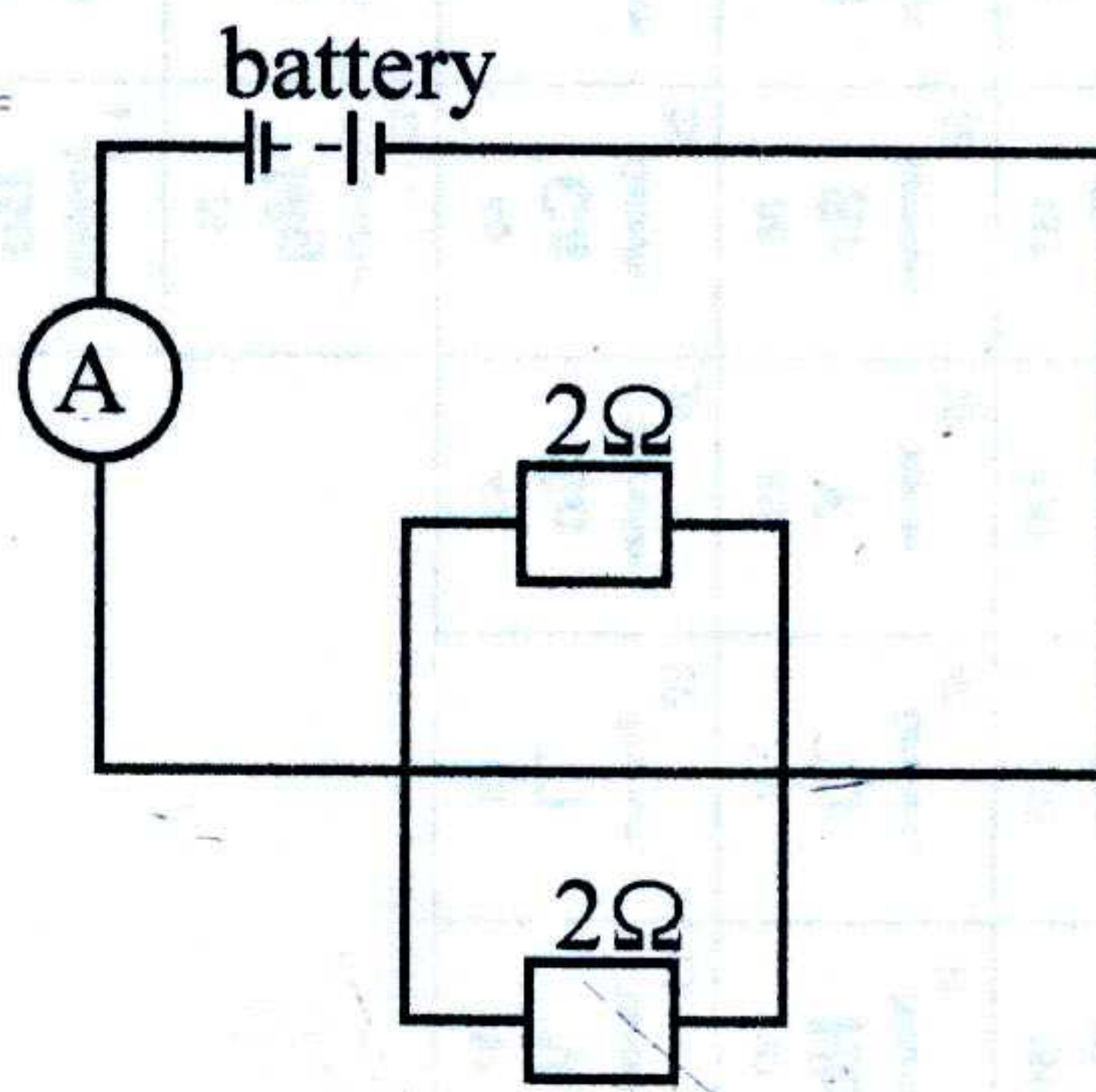


Fig.15.2

- (i) Calculate the total resistance of the resistors in the circuit. [2]
- (ii) State Ohm's law. [2]





**DATA SHEET**  
**The Periodic Table of the Elements**

		Group															
I	II	III	IV	V	VI	VII	VIII				0						
7 <b>Li</b> Lithium	9 <b>Be</b> Beryllium											1 <b>H</b> Hydrogen					
3 <b>Li</b> Lithium	4 <b>Be</b> Beryllium	11 <b>B</b> Boron	12 <b>C</b> Carbon	14 <b>N</b> Nitrogen	16 <b>O</b> Oxygen	19 <b>F</b> Fluorine	20 <b>Ne</b> Neon	11 <b>Na</b> Sodium	12 <b>Mg</b> Magnesium	13 <b>Al</b> Aluminium	14 <b>Si</b> Silicon	15 <b>P</b> Phosphorus	16 <b>S</b> Sulphur	17 <b>Cl</b> Chlorine	18 <b>Ar</b> Argon		
19 <b>K</b> Potassium	20 <b>Ca</b> Calcium	21 <b>Sc</b> Scandium	22 <b>Ti</b> Titanium	23 <b>V</b> Vanadium	24 <b>Cr</b> Chromium	25 <b>Mn</b> Manganese	26 <b>Fe</b> Iron	27 <b>Co</b> Cobalt	28 <b>Ni</b> Nickel	29 <b>Cu</b> Copper	30 <b>Zn</b> Zinc	31 <b>Ga</b> Gallium	32 <b>Ge</b> Germanium	33 <b>As</b> Arsenic	34 <b>Se</b> Selenium	35 <b>Br</b> Bromine	36 <b>Kr</b> Krypton
37 <b>Rb</b> Rubidium	38 <b>Sr</b> Strontium	39 <b>Y</b> Yttrium	40 <b>Zr</b> Zirconium	41 <b>Nb</b> Niobium	42 <b>Mo</b> Molybdenum	43 <b>Tc</b> Technetium	44 <b>Ru</b> Ruthenium	45 <b>Rh</b> Rhodium	46 <b>Pd</b> Palladium	47 <b>Ag</b> Silver	48 <b>Cd</b> Cadmium	49 <b>In</b> Indium	50 <b>Sn</b> Tin	51 <b>Sb</b> Antimony	52 <b>Te</b> Tellurium	53 <b>I</b> Iodine	54 <b>Xe</b> Xenon
55 <b>Cs</b> Caesium	56 <b>Ba</b> Barium	57 <b>La</b> Lanthanum	58 <b>Ce</b> Cerium	59 <b>Pr</b> Praseodymium	60 <b>Nd</b> Neodymium	61 <b>Pm</b> Promethium	62 <b>Sm</b> Samarium	63 <b>Eu</b> Europium	64 <b>Gd</b> Gadolinium	65 <b>Tb</b> Terbium	66 <b>Dy</b> Dysprosium	67 <b>Ho</b> Holmium	68 <b>Er</b> Erbium	69 <b>Tm</b> Thulium	70 <b>Yb</b> Ytterbium	71 <b>Lu</b> Lutetium	
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	89 <b>Ac</b> Actinium	90 <b>Th</b> Thorium	91 <b>Pa</b> Protactinium	92 <b>U</b> Uranium	93 <b>Np</b> Neptunium	94 <b>Pu</b> Plutonium	95 <b>Am</b> Americium	96 <b>Cm</b> Curium	97 <b>Bk</b> Berkelium	98 <b>Cf</b> Californium	99 <b>Es</b> Einsteinium	100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium	

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

Key  

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

140	141	144	150	152	157	159	162	165	167	169	173	175	
<b>Ce</b> Cerium	<b>Pr</b> Praseodymium	<b>Nd</b> Neodymium	<b>Sm</b> Samarium	<b>Eu</b> Europium	<b>Gd</b> Gadolinium	<b>Tb</b> Terbium	<b>Dy</b> Dysprosium	<b>Ho</b> Holmium	<b>Er</b> Erbium	<b>Tm</b> Thulium	<b>Yb</b> Ytterbium	<b>Lu</b> Lutetium	
232	238	238	238	238	238	238	238	238	238	238	238	238	
<b>Th</b> Thorium	<b>Pa</b> Protactinium	<b>U</b> Uranium	<b>Np</b> Neptunium	<b>Pu</b> Plutonium	<b>Am</b> Americium	<b>Cm</b> Curium	<b>Bk</b> Berkelium	<b>Cf</b> Californium	<b>Es</b> Einsteinium	<b>Fm</b> Fermium	<b>Md</b> Mendelevium	<b>No</b> Nobelium	<b>Lr</b> Lawrencium

The volume of one mole of any gas is 28 dm<sup>3</sup> at room temperature and pressure (r.t.p.)

