

Candidate Name	School Name
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JUNIOR SECONDARY SEMI – EXTERNAL EXAMINATION

PHYSICAL SCIENCE

2210/1

PAPER – Written

2 hours 30 minutes

Marks 130

2018

Additional Materials: Non-programmable calculator
Soft pencil

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.

<i>For Examiner's Use</i>	
Section A	
Section B	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	
<i>Marker</i>	
<i>Checker</i>	

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?

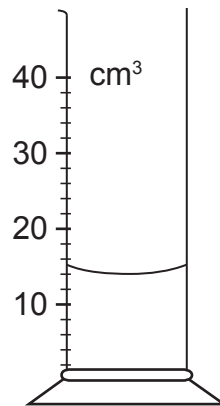
- A** Joule
 - (B)** Newton
 - C** Seconds
 - D** Watt
- If you want to change an answer, erase the one you wish to delete completely.
-

- 1 The diagram shows a thermometer.



What quantity is measured using a thermometer?

- A** length
 - B** mass
 - C** temperature
 - D** time
- 2 The diagram shows a measuring cylinder containing a liquid.



What is the volume of the liquid in the measuring cylinder?

- A** 12.0 cm³
- B** 12.5 cm³
- C** 14.0 cm³
- D** 26.0 cm³

- 3 How many atoms are in the compound NaNO_3 ?
- A 2
B 3
C 4
D 5
- 4 Which row shows the correct combination of protons, neutrons and electrons in a neutral atom of sodium?

	protons	neutrons	electrons
A	11	11	11
B	11	11	12
C	11	12	11
D	12	11	12

- 5 What is the number of electrons on the outer shell of an atom of phosphorus?
- A 3
B 5
C 7
D 8
- 6 What name is given to Group VII elements?
- A alkali metals
B halogens
C noble gases
D transition metals
- 7 Which gas has a double bond on its bonding structure?
- A ammonia
B methane
C nitrogen
D oxygen
- 8 Which of the following is a chemical change?
- A crushing a can
B folding a paper
C freezing water
D ripening fruit
- 9 Which of the following reactions is an example of combustion?
- A aluminium + sulfur \rightarrow aluminium sulfide
B calcium carbonate \rightarrow calcium oxide + carbon dioxide
C carbon + oxygen \rightarrow carbon dioxide
D iron + chlorine \rightarrow iron chloride

10 Which row is correct about sulfuric acid?

	acid strength	pH value
A	high	10 – 14
B	high	0 – 2
C	low	10 – 14
D	low	0 – 2

11 Which compound is an alkali?

- A carbon dioxide
- B magnesium hydroxide
- C nitric acid
- D sodium sulfate

12 What products are formed when magnesium oxide and nitric acid react?

- A magnesium, nitrogen, oxygen
- B magnesium nitrate, water
- C magnesium sulfate, nitrogen, oxygen
- D magnesium, water

13 The equation shows the reaction between sulfuric acid and calcium carbonate.

Sulfuric acid + calcium carbonate \rightarrow solution X + water + carbon dioxide.

What is the name of solution X?

- A calcium carbonate
- B calcium hydroxide
- C calcium oxide
- D calcium sulfate

14 Which of the following steel is suitable for manufacturing of spoons and forks?

- A chromium steel
- B hard steel
- C mild steel
- D stainless steel

15 What is the correct chemical formula for lithium oxide?

- A LiO
- B LiO₂
- C Li₂O
- D Li₂O₃

16 What can be used to test for hydrogen gas?

- A glowing splint
- B lighted splint
- C limewater
- D litmus paper

17 An oxide of element **X** dissolves in water forming a solution with a pH of 4.

Which row is correct about element **X** and its oxide?

	element X	type of oxide
A	metal	acidic
B	non-metal	acidic
C	metal	basic
D	non-metal	basic

18 What is the weight of a 5 kg object?

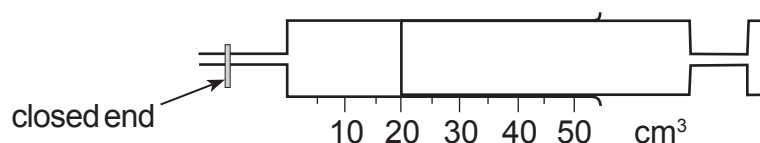
- A 0.5 N
- B 5.0 N
- C 50 N
- D 500 N

19 A learner with a weight of 500 N climbs up a tree to the height of 1.7 m.

What is the total work done by the learner?

- A 29.4 J
- B 85 J
- C 294 J
- D 850 J

20 A syringe contained 50 cm³ volume of gas. The volume is reduced to 20 cm³ as shown in the diagram.



What process is demonstrated in the diagram?

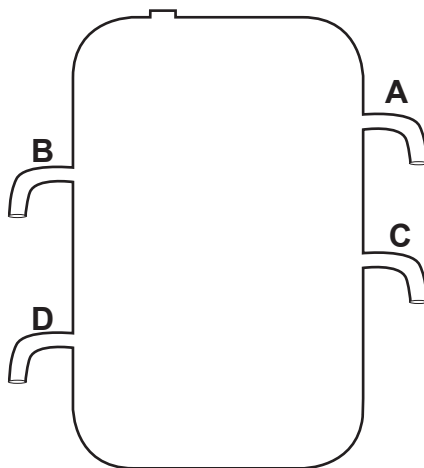
- A compression
- B condensation
- C diffusion
- D expansion

- 21 The diagram shows a change in phase from liquid to solid.



What is the name of the process shown by the arrow?

- A condensation
 - B freezing
 - C melting
 - D sublimation
- 22 Which quantity is measured in pascal?
- A area
 - B mass
 - C pressure
 - D volume
- 23 Which of the following substances has particles closest together at room temperature?
- A cooking oil
 - B sugar
 - C water
 - D water vapour
- 24 The diagram shows a tank filled with water. The tank has four holes at different points.



At which point, A, B, C or D, is the water pressure the greatest?

- 25 Which of the following is the unit for electric current?
- A ampere
 - B joule
 - C ohm
 - D volt

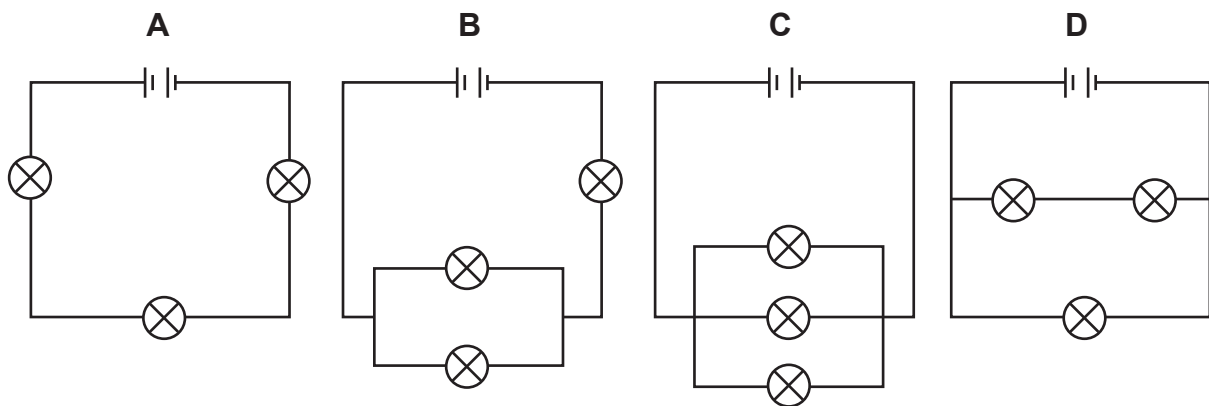
- 26 Which row in the table shows the correct circuit symbols for a bulb, a battery and an ammeter?

	bulb	battery	ammeter
A			
B			
C			
D			

- 27 Which instrument can be used to measure potential difference?

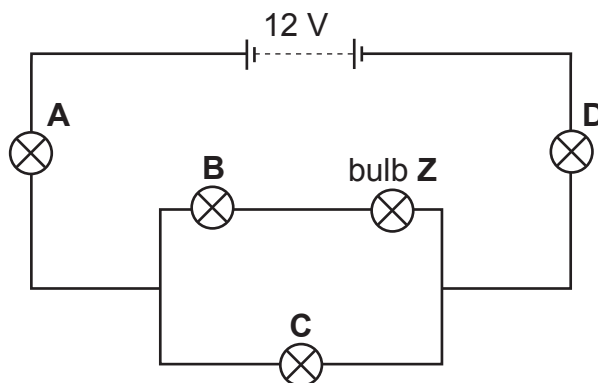
- A ammeter
- B ohm meter
- C thermometer
- D voltmeter

- 28 The diagram shows identical light bulbs connected to the same battery in various ways.



Which circuit will have the lowest resistance?

- 29 The circuit diagram shows five bulbs connected to a 12 V battery.



If bulb Z burned out and went off, which other bulb would also go off?

30 The diagram shows two magnets placed next to each other.



Which row in the table shows the correct orientation in the two magnets?

	V	W	X	Y
A	N	S	N	S
B	N	S	S	N
C	S	N	S	N
D	S	N	N	S

SECTION B: STRUCTURED QUESTIONS

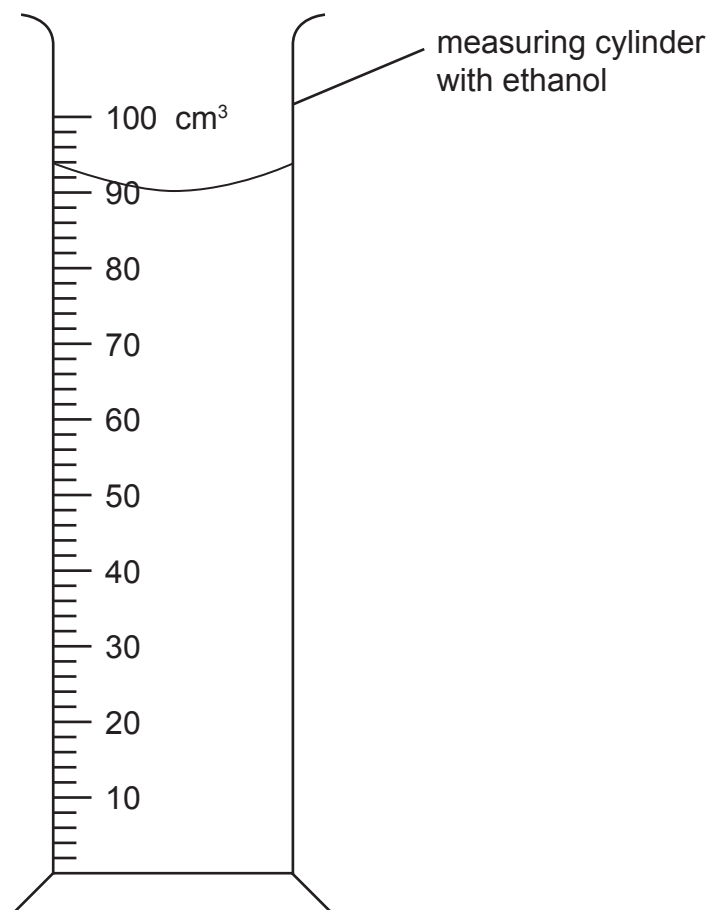
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Use

- 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 A Grade 9 learner is investigating the rate of evaporation of two liquids; water and ethanol.

He adds the same volume of each liquid in a separate 100 cm³ measuring cylinder. He allows the measuring cylinders to stand in the open air for 2 days. He measures the volumes of the liquids after every 10 hours.

The diagram shows the initial volume of the liquids.



- (a) Use the diagram to determine the initial volume of ethanol and record it in the table below.

time (hour)	0	10	20	30	40	48
volume of ethanol (cm³)		60	42	28	8	0
volume of water (cm³)	–	88	80	76	68	62

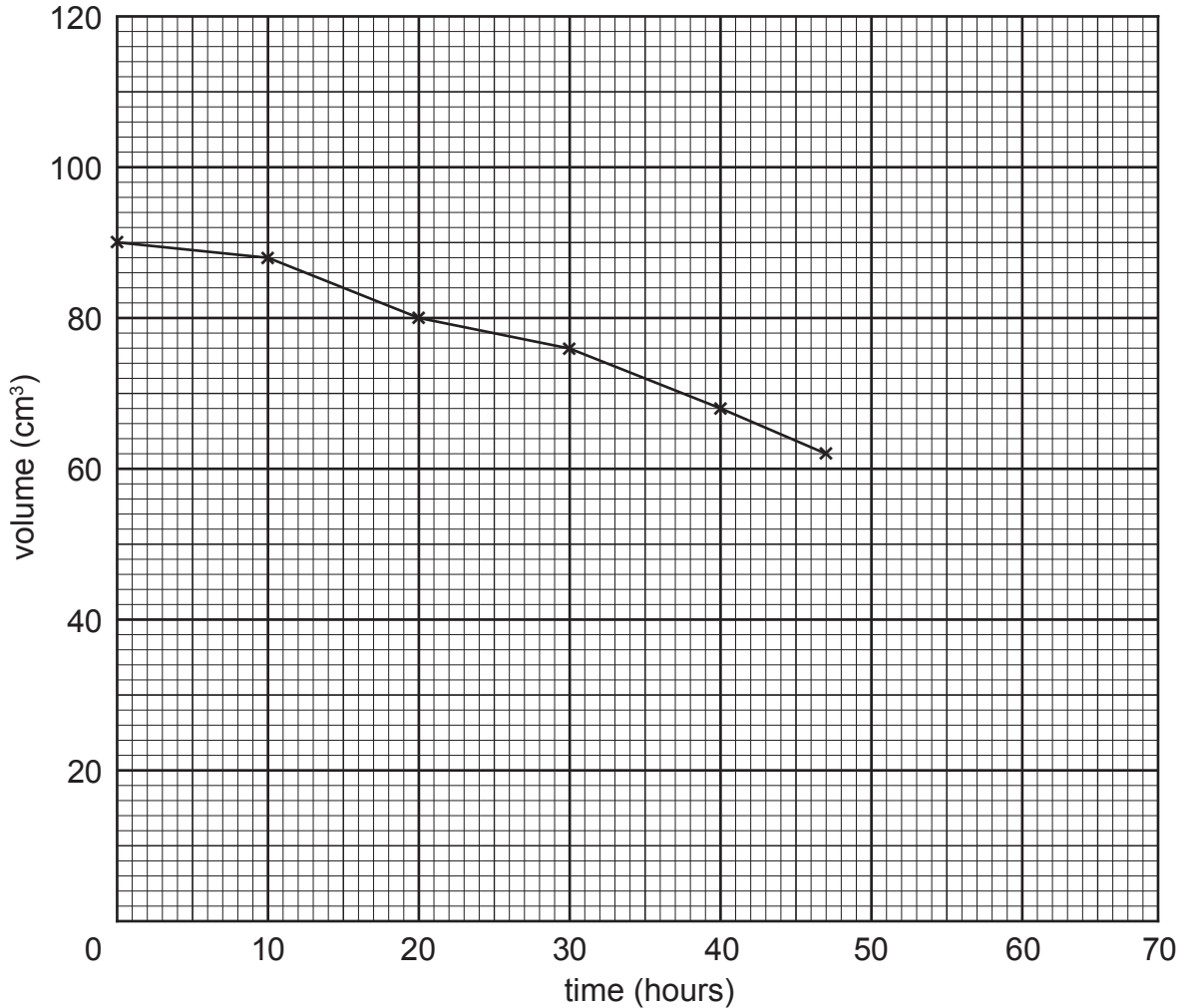
[1]

(b) (i) Identify the dependent variable.

..... [1]

(ii) The graph of the volume of water against time has been drawn for you.

Use the information in the table to draw the points of the volume of ethanol against time.



[3]

(iii) Draw the graph by joining the points you have drawn with a straight line. [1]

(c) Use the graph to state which of the liquids evaporated faster.

..... [1]

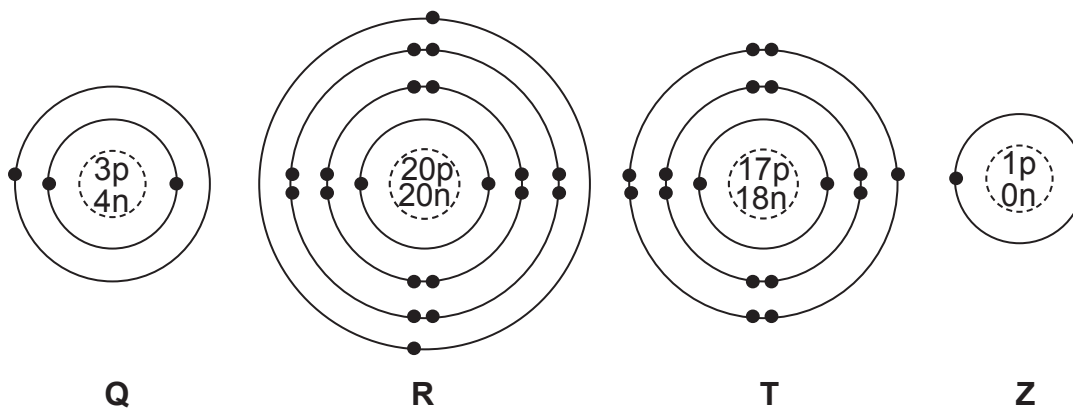
(d) Explain why the same initial volume was used for both liquids.

..... [1]

[8]

2 The diagrams show the structures of different elements **Q**, **R**, **T** and **Z**.

For
Examiner's
Use



(a) (i) Identify the elements represented by **Q** and **Z**.

Q

Z [2]

(ii) Identify the structure that represents an element in Group II.

..... [1]

(iii) Identify the structure that represents an element in Period 3.

..... [1]

(iv) Identify **two** elements from **Q**, **R**, **T** and **Z**, which form a covalent bond when reacted.

..... [2]

(b) Elements of structures **T** and **Z** form diatomic molecules.

(i) Explain the meaning of the term *diatomic molecule*.

.....

..... [2]

(ii) Name **any other two** elements that can form diatomic molecules.

1

2

(iii) Write the formula for the compound formed between element **R** and element **T**.

..... [1]

(c) Element **T** is in Group VII of the Periodic Table.

(i) Give the electron arrangement (configuration) of element **T**.

..... [2]

(ii) State **another** element in Group VII of the Periodic Table.

..... [1]

(d) Oxygen is in Group VI of the Periodic Table.

(i) State the type of bonds formed between oxygen and hydrogen atoms in water.

..... [1]

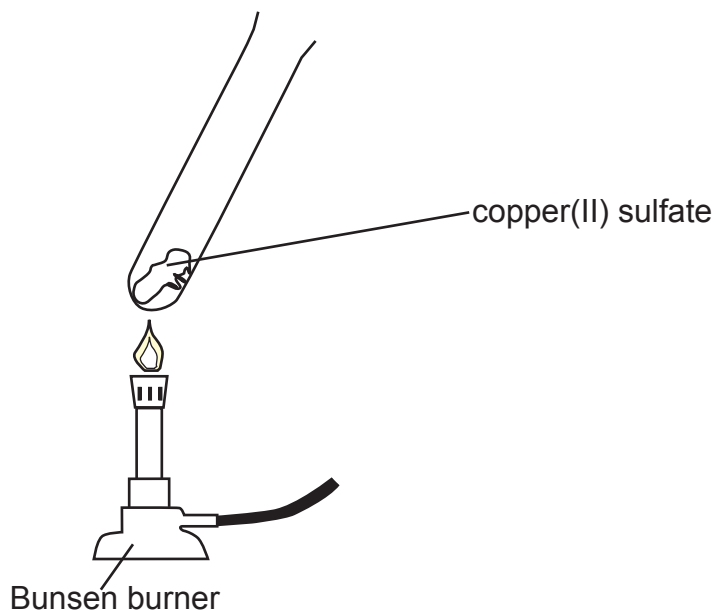
(ii) Draw a dot and cross diagram of a water molecule to show how the bond in **(d) (i)** is formed.

[2]

[17]

- 3 The diagram shows blue crystals of copper(II) sulfate being heated and turns into white copper(II) sulfate.

For
Examiner's
Use



- (a) (i) State whether the change in the above experiment, is a chemical change or a physical change.

..... [1]

- (ii) Give **two** reasons for your answer in (a) (i).

1

2 [2]

- (b) The reaction below shows the heating of baking powder (Sodium hydrogen carbonate).



- (i) State the name of gas **A** produced.

..... [1]

- (ii) Identify the type of reaction as either exothermic or endothermic.

Give a reason for your answer.

Answer

Reason.....

..... [2]

(c) One example of synthesis reaction is the reaction between magnesium and oxygen.

(i) Explain the meaning of the phrase *synthesis reaction*.

.....

..... [1]

(ii) Write the word equation for the reaction between magnesium and oxygen.

..... [2]

[9]

4 The table summarises information on metals and non-metals oxides.

(a) Complete the table by filling in the missing information for (i), (ii), (iii) and (iv).

Elements	Oxide formula	Oxide property
sodium	(i).....	basic
carbon	(ii).....	acidic
(iii).....	SO ₂	(iv).....

[4]

(b) When a metal carbonate reacts with an acid, carbon dioxide is produced.

Outline the test for carbon dioxide.

Test

..... [2]

Result.....

..... [1]

(c) The reaction in (b) is called a neutralisation reaction.

(i) State **two** applications of neutralisation reactions in everyday life.

1

.....

2

..... [2]

(d) Neutralisation reaction is also used in salt production.

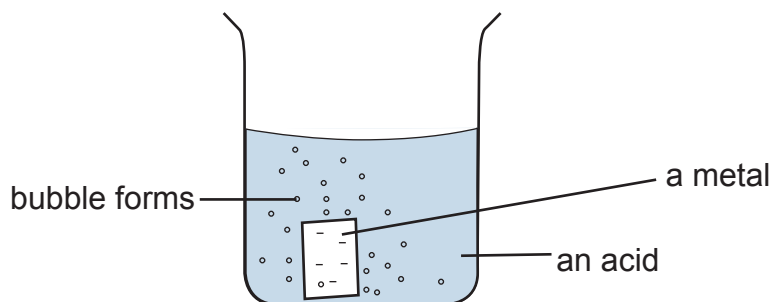
Give the name and the formula of the salt produced when copper oxide (CuO) reacts with sulfuric acid (H₂SO₄).

Name

Formula [2]

[11]

- 5 The diagram shows the reaction between a metal with an acid.



For
Examiner's
Use

- (a) State the observation that shows that a gas is released during the reaction.

..... [1]

- (b) Name the **two** products formed when a metal is added to an acid.

1

2 [2]

- (c) Distinguish between weak and strong acid. In each case give an example and state the pH range.

Weak acid

Example

pH range [3]

Strong acid

Example

pH range [3]

[9]

6 The table shows the reaction of three metals.

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Use

Metals	Reaction with steam or cold water	Reaction with dilute acid
copper	no reaction	no reaction
sodium	rapid with cold water	rapid reaction
magnesium	reacts with steam, but not with cold water	rapid reaction

(a) Place the three metals in order of their reactivity, starting with the **most reactive**.

1.....

2.....

3..... [2]

(b) (i) Define the term *alloy*.

.....

..... [1]

(ii) Bronze is an example of a copper alloy.

State an example of an iron alloy.

..... [1]

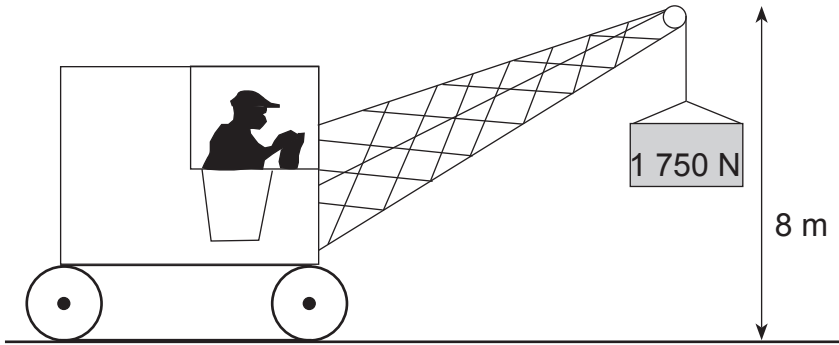
(iii) Give **two** uses of bronze.

1.....

2..... [2]

[6]

7 The diagram shows a crane lifting a pile of bricks to the height of 8 m.



(a) The weight of the pile of bricks is 1 750 N.

(i) Define the term *mass*.

.....
 [1]

(ii) Calculate the mass of the pile of bricks.

Masskg [2]

(b) (i) State the formula for calculating work done.

..... [1]

(ii) Calculate the work done on the pile of bricks as it is lifted to a height of 8 m.

Show your working and state the unit.

Work done.....unit..... [3]

(c) The pile of bricks has a volume of 0.5 m^3 .

(i) Explain the meaning of the term *density*.

..... [1]

(ii) State the formula for calculating density..

..... [1]

(iii) Calculate the density of the pile of bricks.

Density = kg/m^3 [2]

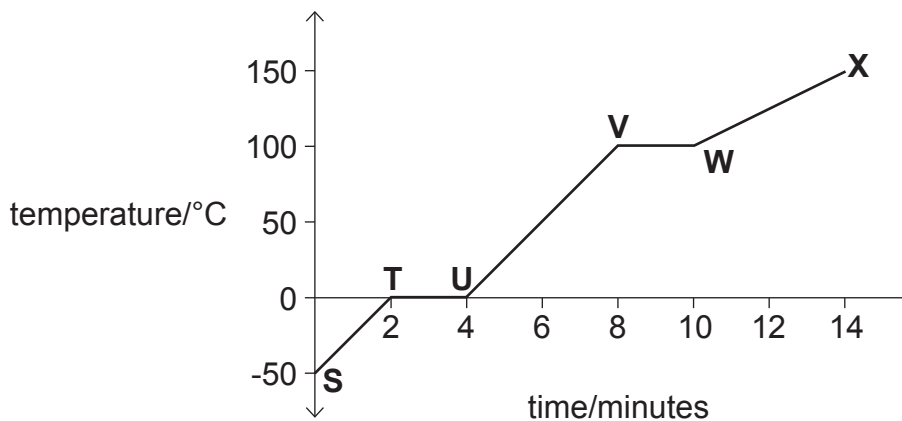
(d) The pile of bricks is placed on a surface of an area of 2.5 m^2 .

Calculate the pressure exerted by the pile of bricks. State the formula and the unit.

Pressure =unit [4]

[15]

8 The diagram shows the heating curve of pure water at sea level.



(a) Write down the phase of pure water at stage **ST** and **WX**.

ST

WX [2]

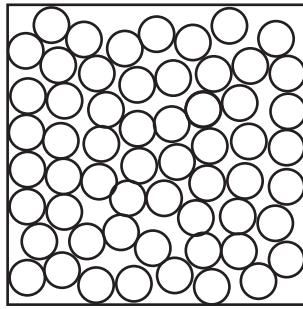
(b) The water changes phase at stages **TU** and **VW** through the process of melting and boiling respectively.

Using the kinetic particle theory, explain what happens when the water is melting.

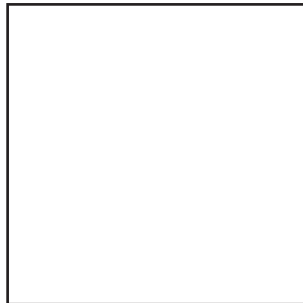
.....

[2]

- (c) The circles drawn in box **A** represents the arrangement of water particles during stage **UV**.

box **A**

In box **B** below draw a similar structure to show the arrangement of pure water particles during stage **WX**.

box **B**

- (d) State the temperature at which pure water boils.

[2]

.....

[1]

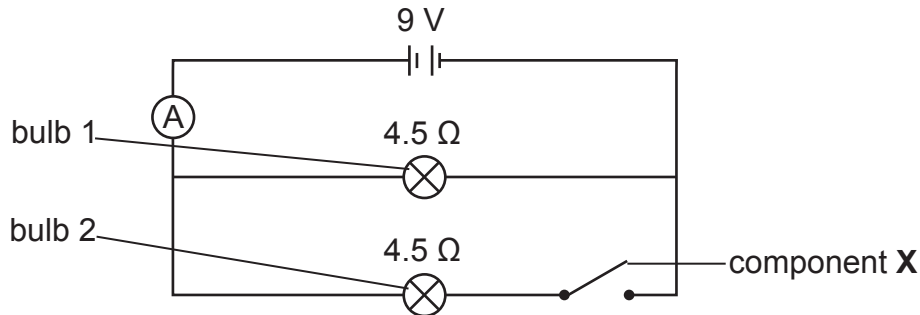
- (e) At which stage do particles have the strongest attractive force between them?

.....

[1]

[8]

- 9 The diagram shows an electric circuit where two identical bulbs are connected to a battery and component X.



- (a) (i) State the name of component X.
 [1]
- (ii) State the type of connection between the bulbs when component X is closed.
 [1]
- (b) (i) Calculate the current through the circuit before component X is closed.
 State the formula you have used.
 Formula
- Current = A [3]
- (ii) State how the current would change when component X is closed.
 [1]
- (c) The potential difference in an electric circuit is measured using a voltmeter.
 Draw the circuit symbol of a voltmeter.
 [1]
- (d) State **two** factors that can affect the resistance of a wire. Explain how these factors affects the resistance of the wire.
 Factor 1
 Explanation [2]
 Factor 2.....
 Explanation [2]
- [11]**

10 The diagram shows a bar magnet.



(a) On the diagram, draw four field lines with arrows to show the direction of the magnetic field around the bar magnet. Draw **two** lines on each side of the bar magnet.

[2]

(b) Name **two** metals that can be attracted by a magnet.

1

2

[2]

(c) State **two** uses of magnets.

1

.....

2

.....

[2]

[6]

DATA SHEET										
The Periodic Table of the Elements										
Group										
I	II	III	IV	V	VI	VII	0			
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 N Nitrogen 7	15 O Oxygen 8	16 F Fluorine 9	17 Ne Neon 10	18 Ar Argon 18
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	40 Ar Argon 18	40 Ar Argon 18	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
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49
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	201 Hg Mercury 80
226 Ra Radium 88	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69
232 Th Thorium 90	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92
175 Lu Lutetium 71	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70	173 Yb Ytterbium 70
103 Lr Lawrencium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium	102 No Nobelium

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

a	X
b	

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

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