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3102/2 **BGCSE**

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COMBINED SCIENCE

PAPER 2 3102/2

Wednesday 28 MAY 2025 1:30 P.M.–3:00 P.M.

No additional materials required.

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS FOR CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided on this question booklet.

Answer **ALL** questions on this paper in the spaces provided in this question booklet.

Read each question carefully and make sure you know what you have been asked to do before starting your answer.

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

A copy of the Periodic Table is printed on page 2.

Calculators are permitted, however **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This question paper consists of 16 printed pages and 4 blank pages.

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 Sulphur 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 †															

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

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

Key

a
X
b

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

1. A polythene bag was placed over a well-watered potted plant, as shown in Fig. 1.1, to investigate transpiration.

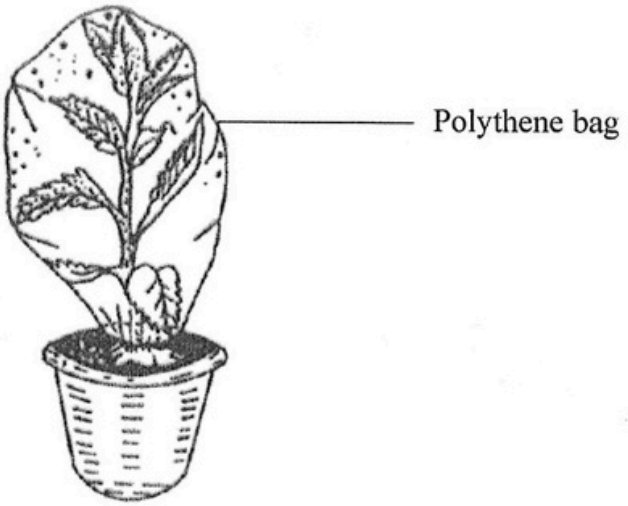


Fig. 1.1

(a) (i) Define the term transpiration.

_____

_____ [2]

(ii) Explain the purpose of the polythene bag covering the plant.

_____ [1]

(b) (i) State **two** atmospheric conditions that affect the rate of transpiration.

1. _____

2. _____ [2]

(ii) How does the surface area of a plant cell affect the rate of water vapour loss through transpiration?

_____

_____ [2]

(c) The diagram in Fig. 1.2 shows a plant several days after a ring of bark was removed from its stem.

Fig. 1.2

Explain why the swelling takes place in the stem.

_____

_____ [1]

(d) Identify the **two** types of plant tissue responsible for the transport of substances in the plant.

_____

_____ [2]

TOTAL MARKS [10]

2. Fig. 2.1 shows diagrams of blood vessels in the human body.

Fig. 2.1

(a) Complete the table by filling in the blank spaces.

	Name of blood vessel	**Function**
X		
Y	Capillary	
Z		Transport blood towards the heart

[4]

(b) State the name and function of **one** feature found in blood vessel **Z**, but not in blood vessel **X** and **Y**.

Feature _____

Function _____ [2]

(c) In order for blood to travel around the human body it must pass through the heart twice.

Describe this process.

_____

_____

_____

_____ [4]

TOTAL MARKS [10]

3. Fig. 3.1 represents the diagram an atom of an element.

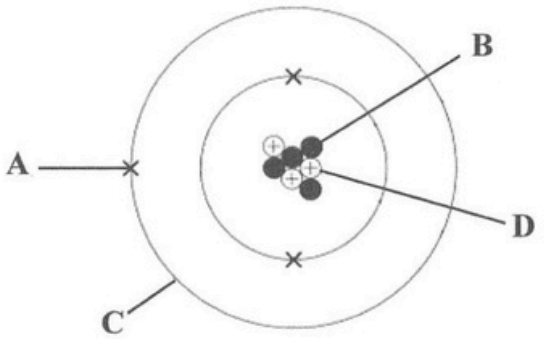


Fig. 3.1

(a) (i) State the letter from Fig. 3.1 that identifies the particle in an atom that takes part in a chemical reaction.

_____ [1]

(ii) State the letters from Fig. 3.1 that identify the particles in an atom that account for the mass of the atom.

_____ [1]

(iii) Distinguish between the particles labelled **A** and **B**, in terms of **charge** and **relative mass**.

	Particle A	**Particle B**
Charge		
Relative mass		

[2]

(b) The atom shown in Fig. 3.1 is stable. Write the electronic configuration of this atom.

_____ [1]

(c) Atoms are electrically neutral. Describe what makes the atom shown in the diagram electrically neutral.

_____

_____ [1]

(d) (i) State the atomic number of the atom in Fig. 3.1. Give a reason for your answer.

Atomic number _____

Reason _____

_____

_____ [2]

(ii) Name the group of the Periodic Table where this atom is located. Give a reason for your answer.

Group name _____

Reason _____

_____ [2]

TOTAL MARKS [10]

4. This question is about temperature and heat.

(a) Fig. 4.1 shows the variation of temperature with time as a substance is changed from the solid state to the gaseous state.

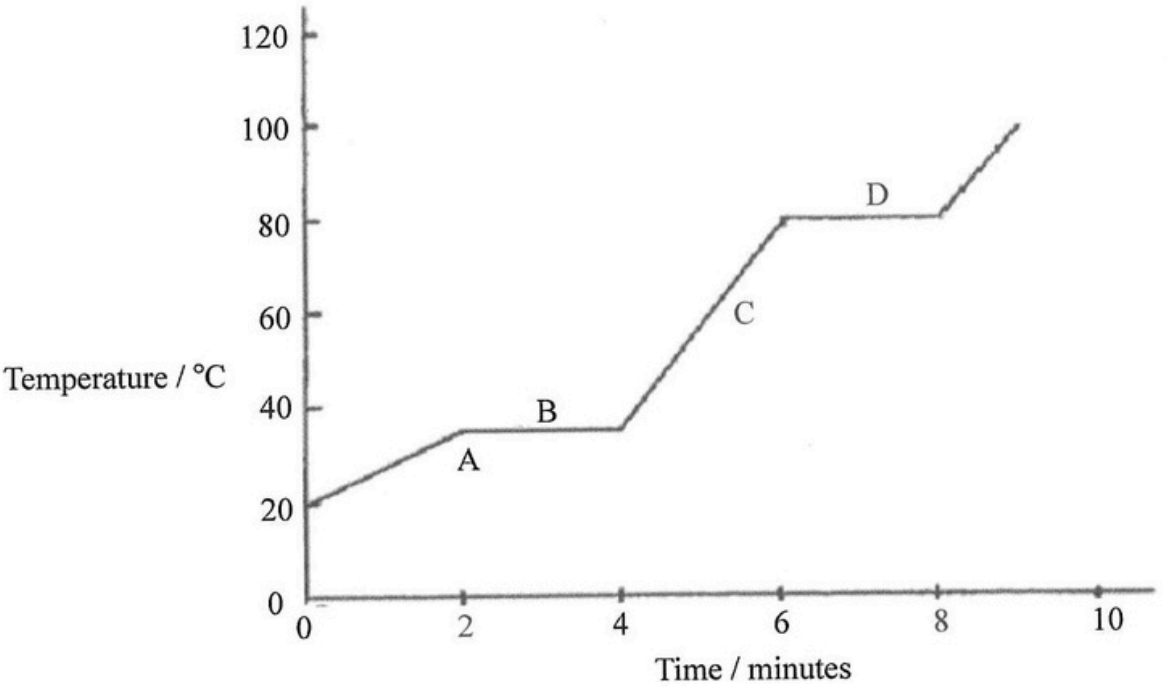


Fig. 4.1

(i) Name the instrument used to measure the temperature of the substance.

_____ [1]

(ii) Using the graph, give the time when the substance begins to change from a liquid to a gas.

_____ [1]

(iii) Give the state of matter of the sample at 5 minutes.

_____ [1]

(iv) If the substance was pure water, state the temperature (in Celsius) at which segment **B** of the graph would take place.

_____ [1]

(b) Fig. 4.2 represents a vacuum flask.

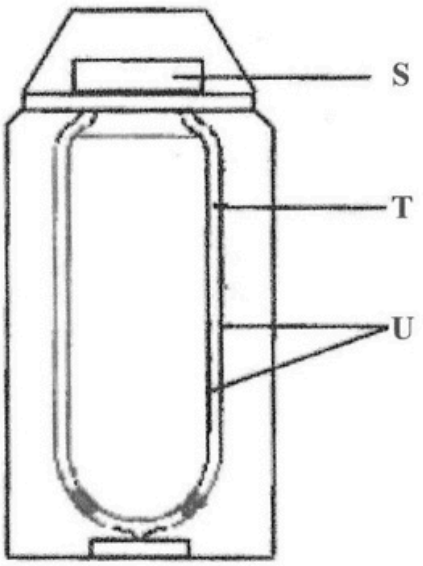


Fig. 4.2

(i) Identify the materials that can be used for the parts labelled **S** and **U** in Fig. 4.2.

S _____

U _____ [2]

(ii) State the name of the space labelled **T**.

_____ [1]

(iii) Name **two** methods of heat transfer that are significantly reduced by the space T.

1. _____

2. _____ [2]

(c) Name the process that occurs when heat is transferred through a material by direct contact between particles.

_____ [1]

TOTAL MARKS [10]

5. Fig. 5.1 shows **three** types of solutions, **A**, **B** and **C**.

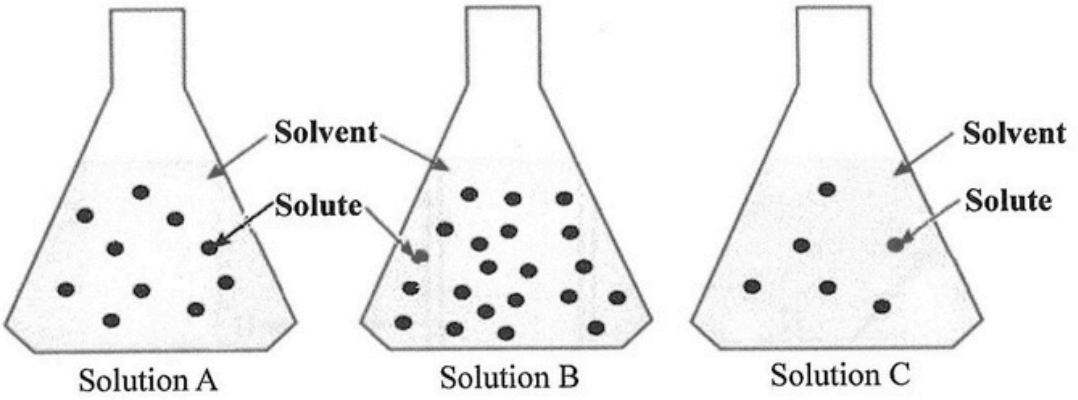


Fig. 5.1

(a) (i) Identify the diagram that shows the most concentrated solution. Explain your choice.

Concentrated solution _____

Explanation _____

_____ [2]

(ii) Define the term **solute** and a **solvent**.

Solute _____

_____

Solvent _____

_____ [2]

(b) (i) The solute in Solution **A** is not very soluble.

State **two** factors that will be required to make the solution.

1. _____

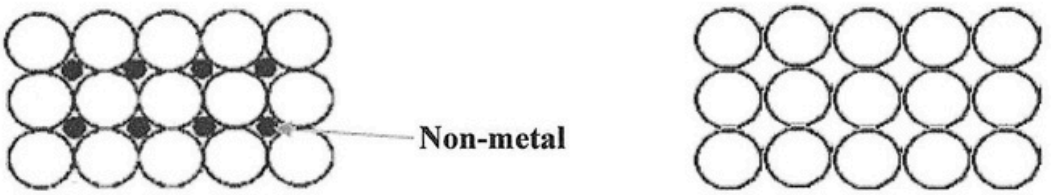
2. _____ [2]

(ii) Acetone is an example of an organic solvent.

State **one** use of acetone.

_____ [1]

(c) A solution of elements is called an alloy. The diagram shows the formation of steel an alloy of the element iron.



steel **iron**

(i) Name the non-metal **X**, in the diagram that can be used to make the alloy steel.

_____ [1]

(ii) Use the diagram, to explain why the alloy steel is harder than the element iron.

_____

_____ [2]

TOTAL MARKS [10]

6. This question is about energy.

(a) Define the term energy.

_____ [1]

(b) Give **one** example of a non-renewable source of energy.

_____ [1]

(c) An 80 kg diver stands at the edge of a diving board 45 m above a pool.

(i) State the form of energy the diver possess while standing at the edge of the board.

_____ [1]

(ii) Calculate the value of the energy named in (c) (i) Use g = 10N/kg. **Write the formula, show all working and correct units.**

[3]

(iii) The diver then jumps into the pool. State the energy transfer that occurs as the diver falls towards the water.

_____ [1]

(iv) Calculate the speed at which the diver enters the pool. Assuming no energy is lost. **Show correct working and units.**

[3]

TOTAL MARKS [10]

7. Fig. 7.1 shows a picture of a full set of teeth in the human upper jaw.

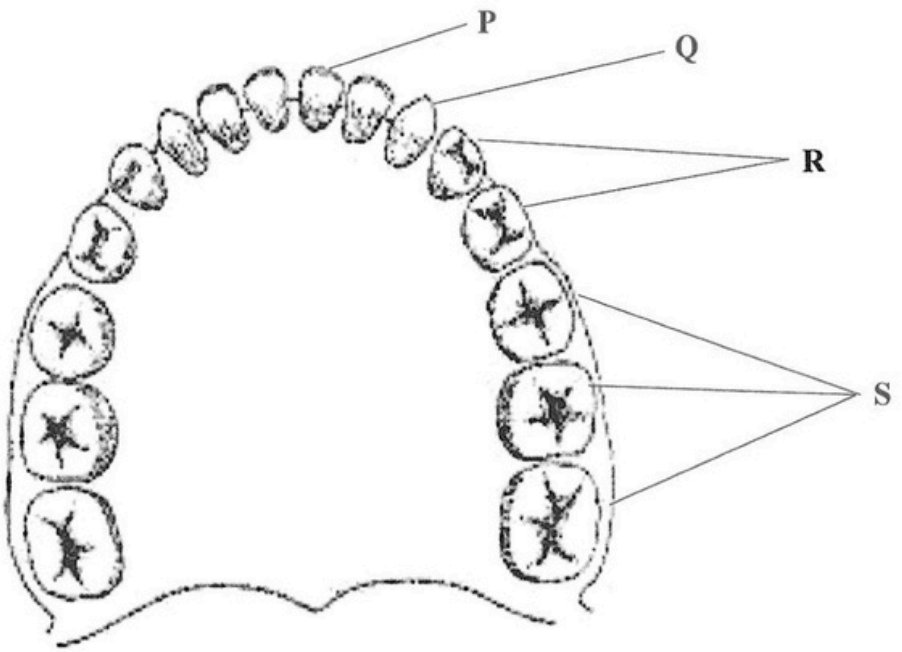


Fig. 7.1

(a) (i) Name the type of teeth indicated by the labels:

Q _____

R _____

S _____ [3]

(ii) State the function of the type of tooth labelled **P**.

_____ [1]

(iii) Explain the role of the teeth in digestion.

_____

_____ [1]

(iv) State the main cause of a tooth decay and describe one thing that can be done to prevent tooth decay.

cause _____

prevention method _____

_____ [2]

(b) Fig. 7.2 shows a ball of food moving along the oesophagus.

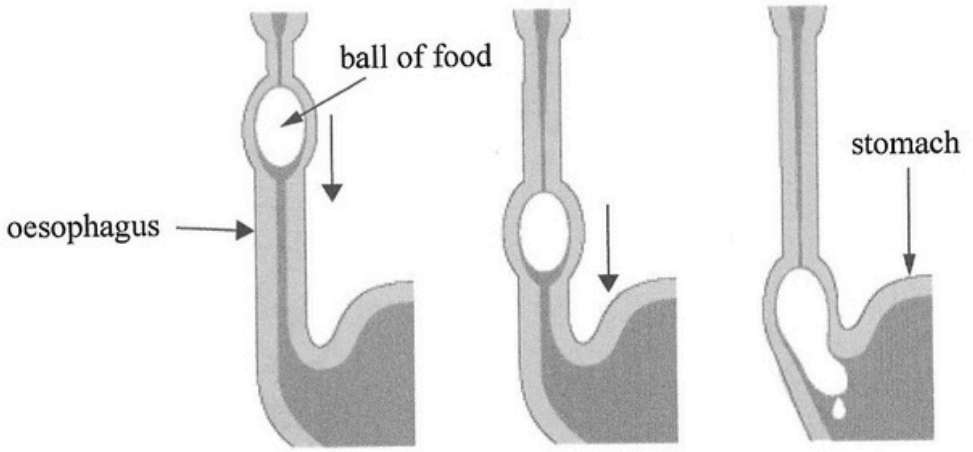


Fig. 7.2

(i) Name the process taking place in the oesophagus.

_____ [1]

(ii) Describe how the ball of food is moved along the oesophagus.

_____

_____ [2]

TOTAL MARKS [10]

8. This question is about current electricity.

(a) There are two types of current – alternating current (a.c.) and direct current (d.c.).

(i) Define alternating current (a.c.).

_____

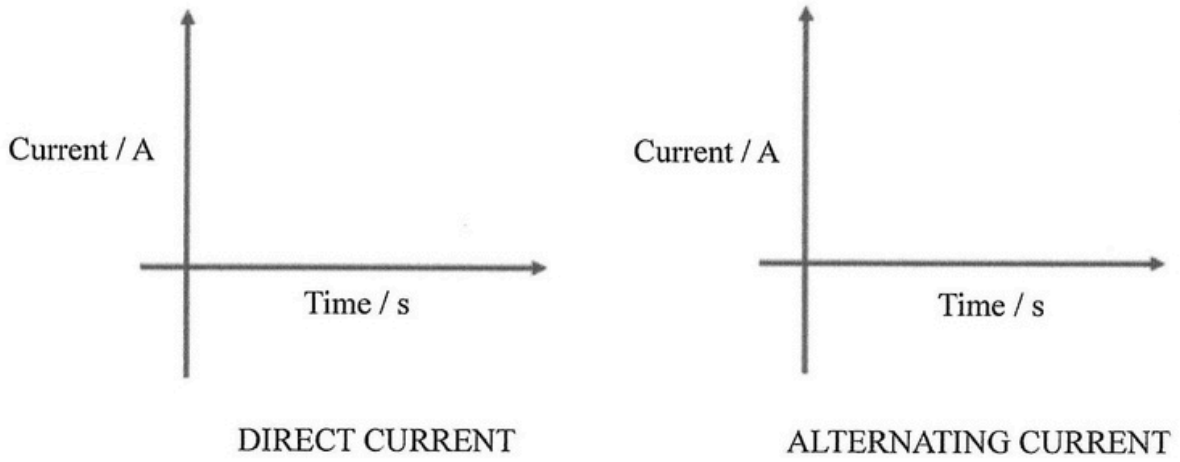
_____ [2]

(ii) Give **one** example of a direct current (d.c.) power supply.

_____ [1]

(iii) Complete Fig. 8.1 to show the graph of a direct current (d.c.) supply and an alternating current (a.c.) supply.

_____ [2]



DIRECT CURRENT ALTERNATING CURRENT

Fig. 8.1

(b) Fig. 8.2 shows a simple circuit.

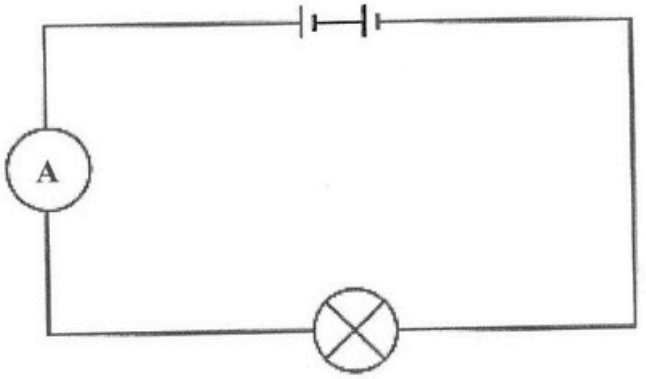


Fig. 8.2

(i) Draw arrows on Fig. 8.2 to show the direction of conventional current. [1]

(ii) Calculate the current flowing in the circuit if the lamp has a resistance of 2.5 Ω.

Write the correct formula, show all working and units.

[3]

(iii) Explain what would be observed if an additional, identical lamp was added to the circuit in series.

_____

_____ [1]

TOTAL MARKS [10]

End]

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