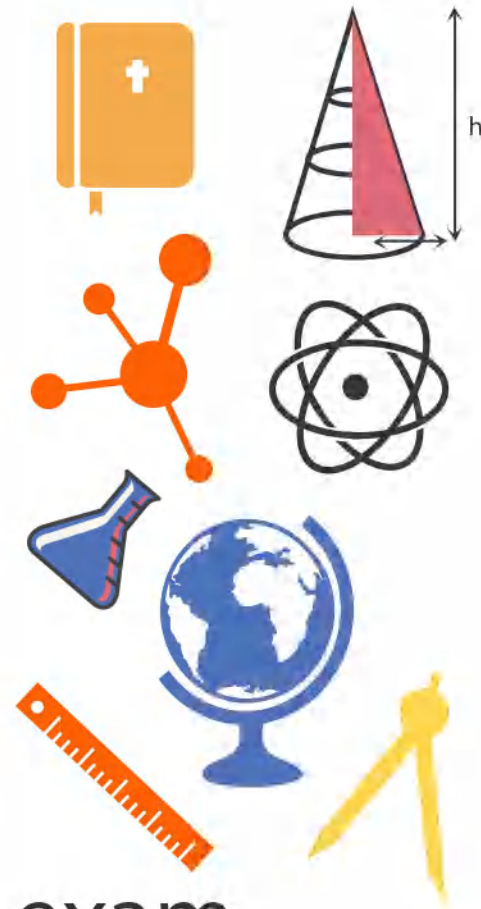


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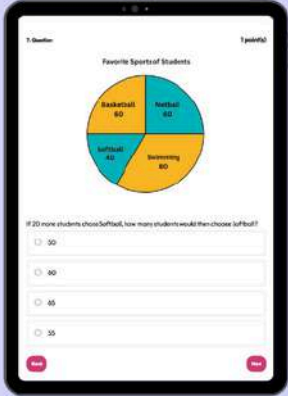


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3102/1

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| Surname and Initials |                  |

# COMBINED SCIENCE

PAPER 1 3102/1

Wednesday **28 MAY 2025** 12:00 NOON–1:15 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.

There are **FIFTY** questions on this paper.

Attempt **ALL** questions.

For each question, there are **FOUR** possible answers labelled **A, B, C** and **D**. Choose the **ONE** you consider correct and record your choice by circling the **LETTER** next to the answer of your choice in the booklet.

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

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

FOR EXAMINER'S USE ONLY

Total Marks

This question paper consists of 15 printed pages and 1 blank page.



The Periodic Table of the Elements

| Group                                                 |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     |                          |                          |
|-------------------------------------------------------|-----------------------|-----------------------|-----------------------|----------------------|------------------------|------------------------|-----------------------|---------------------|-----------------------|--------------------|---------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|--------------------------|--------------------------|
| I                                                     | II                    |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       | III                   | IV                    | V                     | VI                  | VII                      | 0                        |
| <div>1<br/>H<br/>Hydrogen</div>                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 2                        |                          |
| 3<br>Li<br>Lithium                                    | 4<br>Be<br>Beryllium  |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       | 5<br>B<br>Boron       | 6<br>C<br>Carbon      | 7<br>N<br>Nitrogen    | 8<br>O<br>Oxygen    | 9<br>F<br>Fluorine       | 10<br>Ne<br>Neon         |
| 11<br>Na<br>Sodium                                    | 12<br>Mg<br>Magnesium |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       | 13<br>Al<br>Aluminium | 14<br>Si<br>Silicon   | 15<br>P<br>Phosphorus | 16<br>S<br>Sulphur  | 17<br>Cl<br>Chlorine     | 18<br>Ar<br>Argon        |
| 19<br>K<br>Potassium                                  | 20<br>Ca<br>Calcium   | 21<br>Sc<br>Scandium  | 22<br>Ti<br>Titanium  | 23<br>V<br>Vanadium  | 24<br>Cr<br>Chromium   | 25<br>Mn<br>Manganese  | 26<br>Fe<br>Iron      | 27<br>Co<br>Cobalt  | 28<br>Ni<br>Nickel    | 29<br>Cu<br>Copper | 30<br>Zn<br>Zinc    | 31<br>Ga<br>Gallium  | 32<br>Ge<br>Germanium | 33<br>As<br>Arsenic   | 34<br>Se<br>Selenium  | 35<br>Br<br>Bromine   | 36<br>Kr<br>Krypton |                          |                          |
| 37<br>Rb<br>Rubidium                                  | 38<br>Sr<br>Strontium | 39<br>Y<br>Yttrium    | 40<br>Zr<br>Zirconium | 41<br>Nb<br>Niobium  | 42<br>Mo<br>Molybdenum | 43<br>Tc<br>Technetium | 44<br>Ru<br>Ruthenium | 45<br>Rh<br>Rhodium | 46<br>Pd<br>Palladium | 47<br>Ag<br>Silver | 48<br>Cd<br>Cadmium | 49<br>In<br>Indium   | 50<br>Sn<br>Tin       | 51<br>Sb<br>Antimony  | 52<br>Te<br>Tellurium | 53<br>I<br>Iodine     | 54<br>Xe<br>Xenon   |                          |                          |
| 55<br>Cs<br>Caesium                                   | 56<br>Ba<br>Barium    | 57<br>La<br>Lanthanum | 72<br>Hf<br>Hafnium   | 73<br>Ta<br>Tantalum | 74<br>W<br>Tungsten    | 75<br>Re<br>Rhenium    | 76<br>Os<br>Osmium    | 77<br>Ir<br>Iridium | 78<br>Pt<br>Platinum  | 79<br>Au<br>Gold   | 80<br>Hg<br>Mercury | 81<br>Tl<br>Thallium | 82<br>Pb<br>Lead      | 83<br>Bi<br>Bismuth   | 84<br>Po<br>Polonium  | 85<br>At<br>Astatine  | 86<br>Rn<br>Radon   |                          |                          |
| 87<br>Fr<br>Francium                                  | 88<br>Ra<br>Radium    | 89<br>Ac<br>Actinium  |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     |                          |                          |
| * 58-71 Lanthanoid series<br>† 90-103 Actinoid series |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     |                          |                          |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 71<br>Lu<br>Lutetium     | 72<br>Hf<br>Hafnium      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 73<br>Yb<br>Ytterbium    | 74<br>Ta<br>Tantalum     |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 75<br>Tm<br>Thulium      | 76<br>W<br>Tungsten      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 77<br>Er<br>Erbium       | 78<br>Re<br>Rhenium      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 79<br>Ho<br>Holmium      | 80<br>Os<br>Osmium       |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 81<br>Dy<br>Dysprosium   | 82<br>Ir<br>Iridium      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 83<br>Pr<br>Praseodymium | 84<br>Pt<br>Platinum     |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 85<br>Ce<br>Cerium       | 86<br>Au<br>Gold         |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 87<br>La<br>Lanthanum    | 88<br>Hg<br>Mercury      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 89<br>Ce<br>Cerium       | 90<br>Th<br>Thorium      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 91<br>Pr<br>Praseodymium | 92<br>Pa<br>Protactinium |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 93<br>Nd<br>Neodymium    | 94<br>U<br>Uranium       |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 95<br>Pm<br>Promethium   | 96<br>Np<br>Neptunium    |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 97<br>Sm<br>Samarium     | 98<br>Pu<br>Plutonium    |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 99<br>Eu<br>Europium     | 100<br>Am<br>Americium   |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 101<br>Gd<br>Gadolinium  | 102<br>Cm<br>Curium      |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 103<br>Tb<br>Terbium     | 104<br>Bk<br>Berkelium   |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 105<br>Dy<br>Dysprosium  | 106<br>Cf<br>Californium |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 107<br>Ho<br>Holmium     | 108<br>Es<br>Einsteinium |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 109<br>Er<br>Erbium      | 110<br>Fm<br>Fermium     |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 111<br>Tm<br>Thulium     | 112<br>Md<br>Mendelevium |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 113<br>Yb<br>Ytterbium   | 114<br>No<br>Nobelium    |
|                                                       |                       |                       |                       |                      |                        |                        |                       |                     |                       |                    |                     |                      |                       |                       |                       |                       |                     | 115<br>Lu<br>Lutetium    | 116<br>Lr<br>Lawrencium  |

a

X

b

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

Key

a

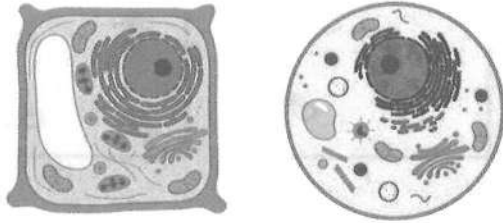
X

b

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

1. The diagram shows two types of cells.

Which structure is **not** found in both cells?



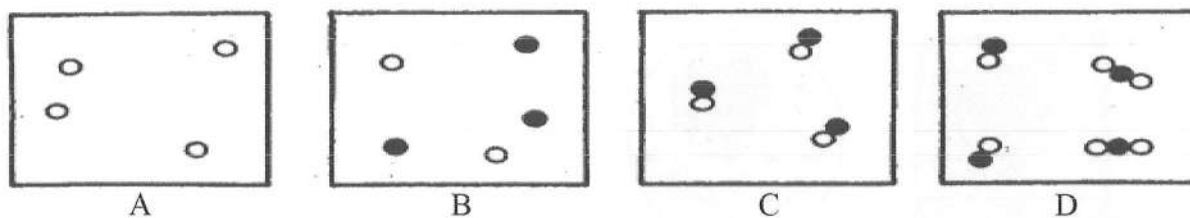
- A. cell membrane  
B. cell wall  
C. cytoplasm  
D. nucleus
2. Which statement best describes what happens to the particles when a liquid freezes?
- A. They gain kinetic energy and are arranged in a fixed pattern.  
B. They gain kinetic energy and move freely from place to place.  
C. They lose kinetic energy and move away from each other.  
D. They lose kinetic energy and do not move from place to place.
3. The sides of a cuboid measure 8 cm wide, 10 cm long and 15 cm tall.

What is the volume of the cube?

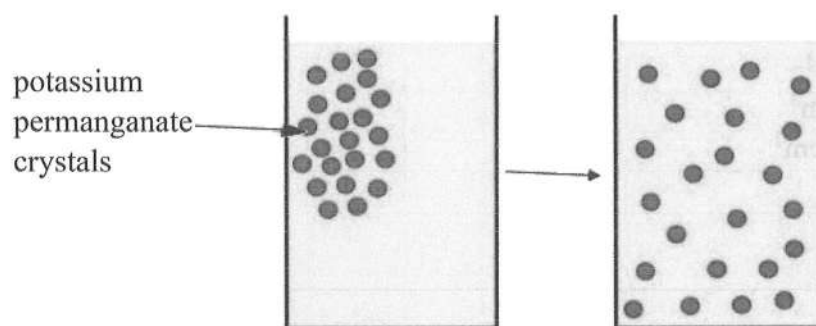
- A.  $33 \text{ cm}^3$   
B.  $95 \text{ cm}^3$   
C.  $150 \text{ cm}^3$   
D.  $1200 \text{ cm}^3$

The diagrams show the arrangement of atoms in four substances.

Use the diagram to answer questions 4 and 5



4. Which diagram represents a mixture of compounds?      A.    B.    C.    D.
5. Which diagram represents atoms of one element?      A.    B.    C.    D.
6. What happens when water is heated from 20 °C to 30 °C?
  - A. density increases
  - B. mass increases
  - C. volume decreases
  - D. volume increases
7. The diagrams show potassium permanganate crystals in a beaker of water at the beginning and end of an experiment.



Which process is occurring in the experiment?

- A. active transport
- B. diffusion
- C. osmosis
- D. transpiration



8. The table shows the mass of nutrients in 100 g of ripe watermelon.

| NUTRIENT | MASS (g) |
|----------|----------|
| Sugar    | 7.5      |
| Fat      | 0.2      |
| Fibre    | 0.8      |
| Water    | 91.5     |

What is the mass of the nutrient in the watermelon that helps to increase the bulk of faeces?

- A. 0.2
- B. 0.8
- C. 7.5
- D. 91.5

9. The cooling fans of a refrigerator are painted black.

Which method(s) of heat transfer does this improve?

- A. conduction only
- B. convection only
- C. radiation only
- D. convection and conduction

10. Which row in the table correctly identifies the end products of digestion?

|   | carbohydrates | fats                    | proteins    |
|---|---------------|-------------------------|-------------|
| A | calcium       | amino acids             | sucrose     |
| B | glucose       | fatty acid and glycerol | amino acids |
| C | lipases       | fatty acid and glycerol | amino acids |
| D | sucrose       | lipase                  | starch      |

11. What is the electron configuration of the magnesium ion in magnesium chloride?

- A. 2.8
- B. 2.8.2
- C. 2.8.4
- D. 2.8.8

12. A spring is stretched by hanging a block of metal from it.

Which force causes the spring to stretch?

- A. elastic
- B. friction
- C. weight
- D. magnetic

13. What happens to an atom when a covalent bond is formed?

- A. lose protons
- B. lose outer-shell electrons
- C. share inner-shell electrons
- D. share outer-shell electrons

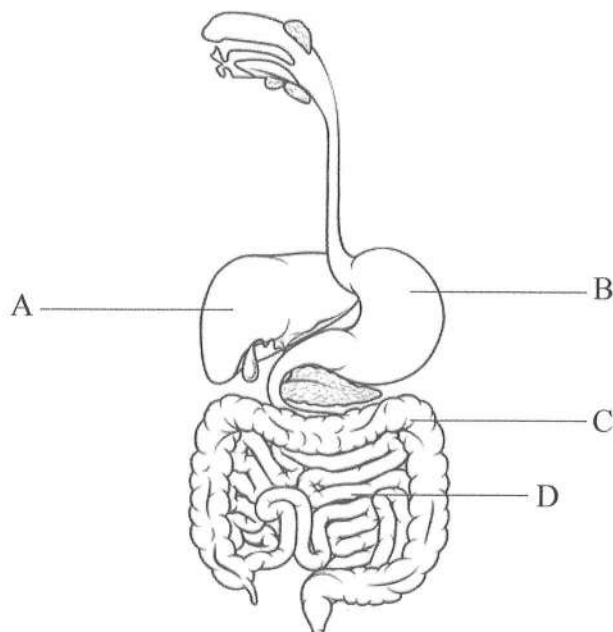
14. Which force slows down a moving object?

- A. tension
- B. friction
- C. electrostatic
- D. weight



15. The diagram shows the human alimentary canal and associated organs.

In which labelled structure does the absorption of digested products take place?



16. Which is a renewable source of energy?

- A. biomass
- B. coal
- C. natural gas
- D. oil

17. Which statement does **not** give the correct information on the role of the liver?

- A. breaks down alcohol and drugs
- B. it stores glycogen
- C. makes red blood cells
- D. produces urea

18. Which type of bonding involves the transfer of electrons between atoms?

- A. ionic bonding only
- B. covalent bonding only
- C. metallic bonding and ionic bonding
- D. covalent bonding and ionic bonding

19. When the loudness of a musical notes is increased, which property of the sound wave has changed?
- A. amplitude
  - B. frequency
  - C. speed
  - D. wavelength

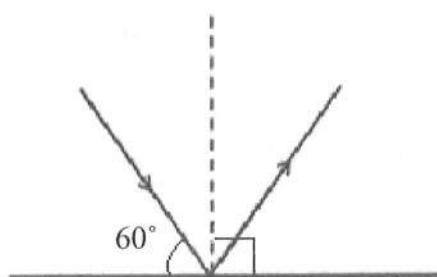
20. **X** and **Y** represents two elements on the Periodic Table. One atom of **X** reacts with three atoms of **Y**.

What is the formula of the product?

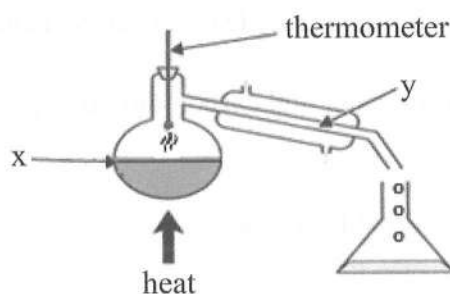
- A.  $X_3Y$
  - B.  $X_3Y_3$
  - C.  $XY$
  - D.  $XY_3$
21. If Sally's heart pumps seven gallons of blood in one minute, how many gallons of blood will her heart pump in one hour?
- A. 70 gallons
  - B. 60 gallons
  - C. 240 gallons
  - D. 420 gallons
22. Which process is responsible for the breakdown of glucose in the presence of oxygen?
- A. aerobic respiration
  - B. anaerobic respiration
  - C. breathing
  - D. excretion



23. Determine the angle of reflection for the ray of light shown.



- A.  $30^\circ$   
 B.  $60^\circ$   
 C.  $90^\circ$   
 D.  $180^\circ$
24. The diagram shows an apparatus used to separate mixtures.



Which processes occur at the parts labelled x and y?

|   | x            | y            |
|---|--------------|--------------|
| A | boiling      | cooling      |
| B | condensation | evaporation  |
| C | cooling      | boiling      |
| D | evaporation  | condensation |

25. Light waves pass from air into glass.

Which property of the wave always remain constant when this happens?

- A. direction  
 B. frequency  
 C. speed  
 D. wavelength

26. Which equation represents anaerobic respiration during alcoholic fermentation?

- A. glucose + carbon dioxide  $\longrightarrow$  lactic acid
- B. glucose + ethanol  $\longrightarrow$  carbon dioxide
- C. glucose  $\longrightarrow$  ethanol + carbon dioxide
- D. glucose  $\longrightarrow$  lactic acid + carbon dioxide

27. A solution has a high concentration of hydrogen ions ( $H^+$ ).

What is the pH of the solution?

- A. 1
- B. 7
- C. 9
- D. 11

28. Which of these statements is **not** an example of a chemical change?

- A. burning petrol to form water and carbon dioxide
- B. shiny steel rusts
- C. molten iron solidifying
- D. zinc dissolving in hydrochloric acid

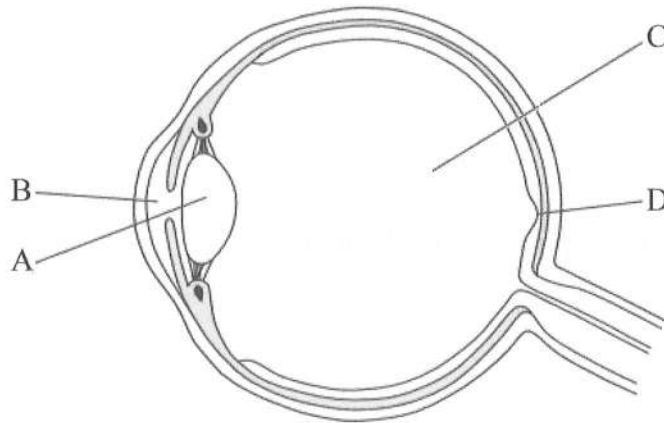
29. Which tissue connects a bone to a bone?

- A. cartilage
- B. ligament
- C. muscle
- D. tendon



30. The diagram shows a section through the human eye.

Which labelled structure nourishes the eye and keeps proper eye pressure?



31. Which of the listed non-metals is a colourless, odourless gas that relights a glowing splint?

- A. chlorine
- B. hydrogen
- C. nitrogen
- D. oxygen

32. Which hormone is responsible for controlling blood glucose levels?

- A. adrenaline
- B. oestrogen
- C. insulin
- D. testosterone

33. Which is the SI unit of current?

- A. Ampere
- B. Coulomb
- C. Newton
- D. Ohm

34. Which gas, when its proportion increases in the atmosphere, is the major cause of global warming?

- A. ammonia
- B. carbon dioxide
- C. oxygen
- D. sulphur dioxide

35. Which row gives the correct symbols for the SI unit for energy and potential difference?

|   | <b>energy</b> | <b>potential difference</b> |
|---|---------------|-----------------------------|
| A | J             | N                           |
| B | J             | V                           |
| C | W             | N                           |
| D | W             | V                           |

36. Which method of contraception is tubal ligation?

- A. chemical
- B. mechanical
- C. natural
- D. surgical

37. Which is a charged particle in the nucleus of an atom?

- A. electron
- B. ion
- C. neutron
- D. proton

38. Alex is experiencing a burning sensation while urinating.

Which sexually transmitted infection has this symptom?

- A. AIDS
- B. gonorrhea
- C. syphilis
- D. warts

39. Which method is best suited to test the purity of water?

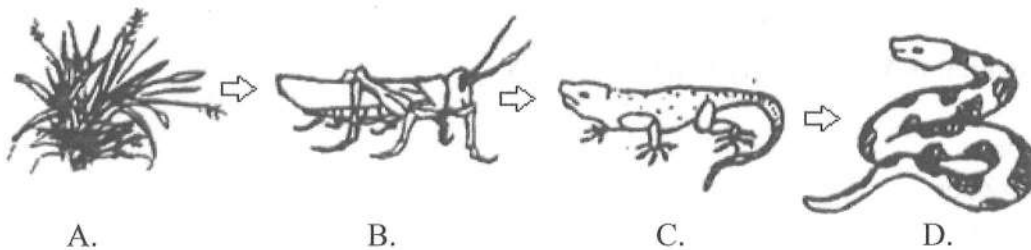
- A. litmus paper
- B. melting and boiling points
- C. pH meter
- D. hydrogen carbonate



40. Which two cations cause hard water in The Bahamas?
- A.  $\text{Al}^{3+}$  and  $\text{Mg}^{2+}$
  - B.  $\text{Ca}^{2+}$  and  $\text{Mg}^{+}$
  - C.  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$
  - D.  $\text{Na}^{+}$  and  $\text{Ca}^{2+}$
41. Why are lamps in a house connected in parallel rather than in series?
- A. If one lamp stops working, the remaining lights become brighter.
  - B. Less current is taken from the power supply.
  - C. The lamps can be turned off independently using switches.
  - D. When more lamps are added, their brightness decreases.

42. The diagram shows a food chain.

Which organism is a second level consumer?

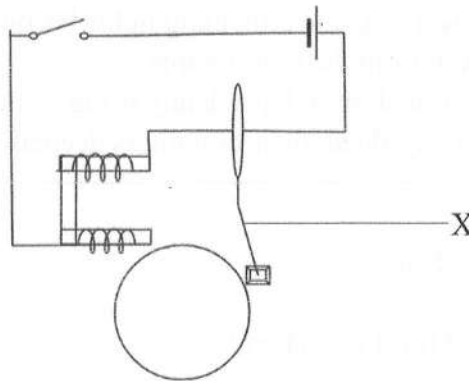


43. Which structure is a characteristic of the red mangrove plant?
- A. breathing roots
  - B. brown roots
  - C. prop roots
  - D. salt glands
44. Why is the overloading of electrical circuits at home dangerous?
- A. It can cause increase in monthly usage.
  - B. It can lead to fires.
  - C. It can cause longer lifespan of electrical appliances.
  - D. It can keep electrical wires cool

45. Which metal is primarily extracted from bauxite ore?

- A. iron
- B. copper
- C. aluminium
- D. gold

46. The diagram shows a circuit for an electric bell. X is a metal bar that is attracted to the electromagnet.



Which material is X most likely to be?

- A. brass
- B. copper
- C. iron
- D. zinc

47. What is the name of the excessive growth of algae in lakes and river?

- A. bioaccumulation
- B. biomagnification
- C. contamination
- D. eutrophication

48. Many metals are extracted from their ores by heating the metal oxide with carbon.

Which metal cannot be extracted using this method?

- A. aluminium
- B. copper
- C. iron
- D. zinc



49. Why is it important to conserve natural resources?

- A. They can be reused.
- B. They can be easily replaced.
- C. They can be easily exported.
- D. They take a long time to be replaced.

50. Which activity is **not** important in biotechnology?

- A. diagnosis of diseases
- B. enhancing growth of plants
- C. improving colour and shelf life of food
- D. lowering crop yields

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3102/2

BGCSE

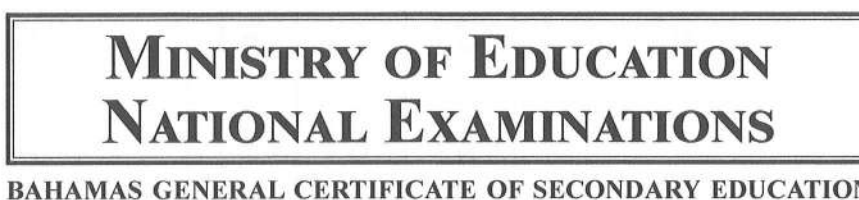
| School Number        | Candidate Number |
|----------------------|------------------|
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| Surname and Initials |                  |

# COMBINED SCIENCE

PAPER 2 3102/2

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

No additional materials required.



## 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.



## Group

[illegible]

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

**Key**

|          |          |
|----------|----------|
| <b>a</b> | <b>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.

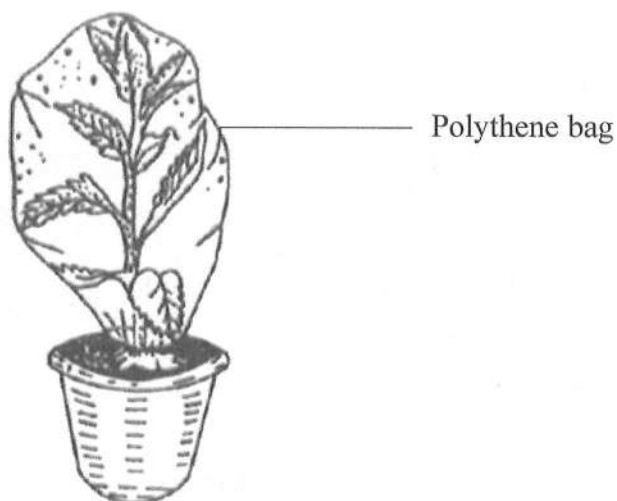


Fig. 1.1

- (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                          |
|----------|----------------------|-----------------------------------|
| <b>X</b> |                      |                                   |
| <b>Y</b> | Capillary            |                                   |
| <b>Z</b> |                      | 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.

---



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[4]

**TOTAL MARKS [10]**

**[Turn over**

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

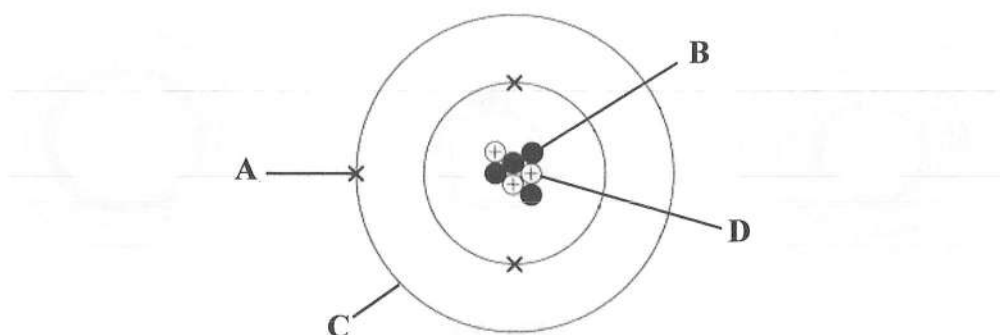


Fig. 3.1

- (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 |
|----------------------|------------|------------|
| <b>Charge</b>        |            |            |
| <b>Relative mass</b> |            |            |

[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.

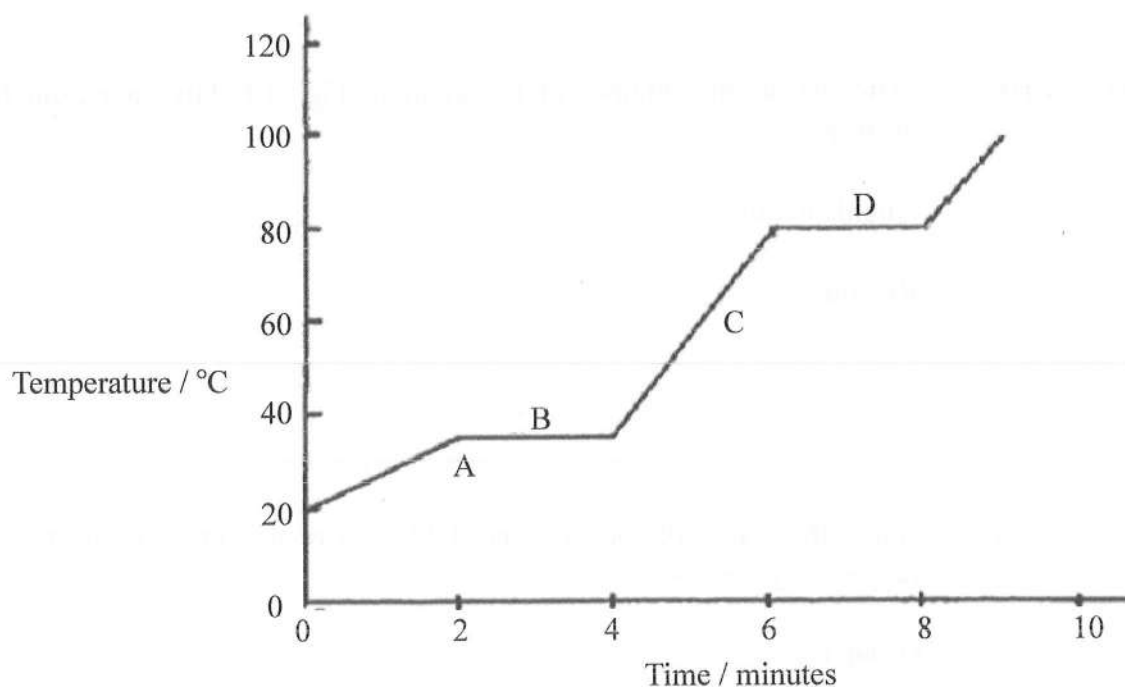


Fig. 4.1

- (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.

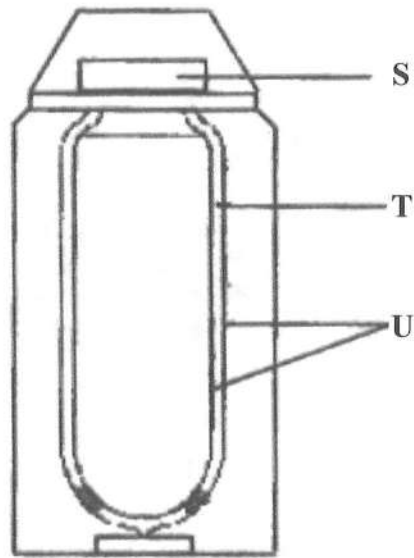


Fig. 4.2

- (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**.

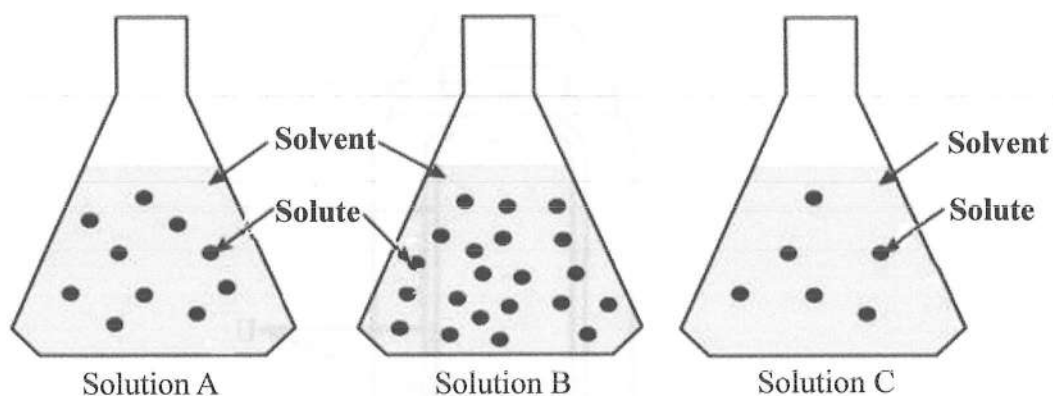


**Fig. 5.1**

- (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]

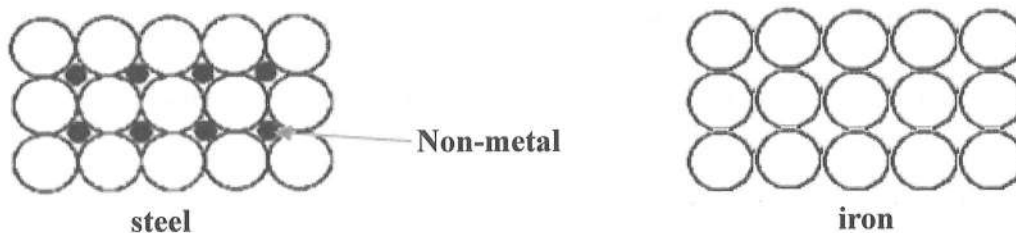


- (ii) Acetone is an example of an organic solvent.

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.



- (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  $g = 10\text{N/kg}$ . **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.

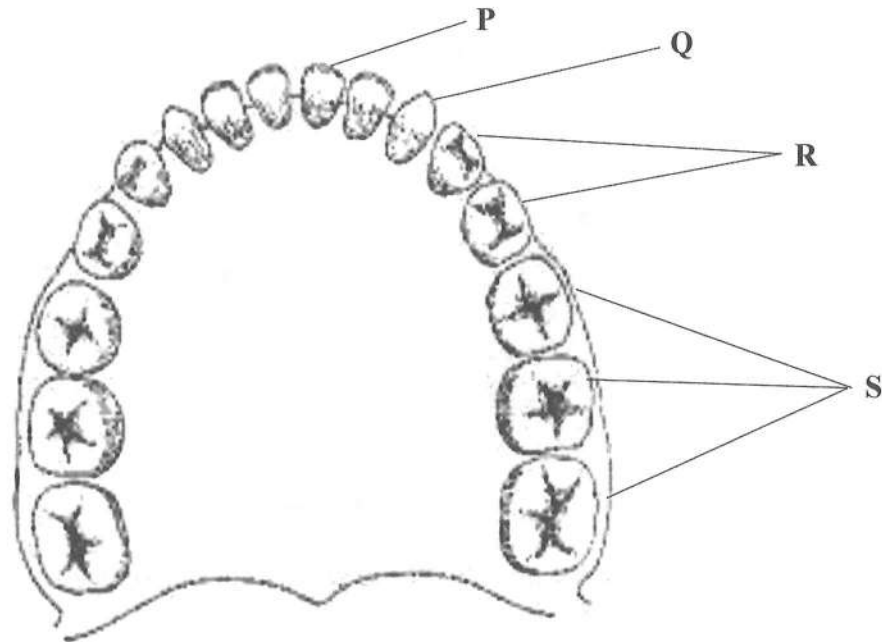


Fig. 7.1

- (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]

[Turn over

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

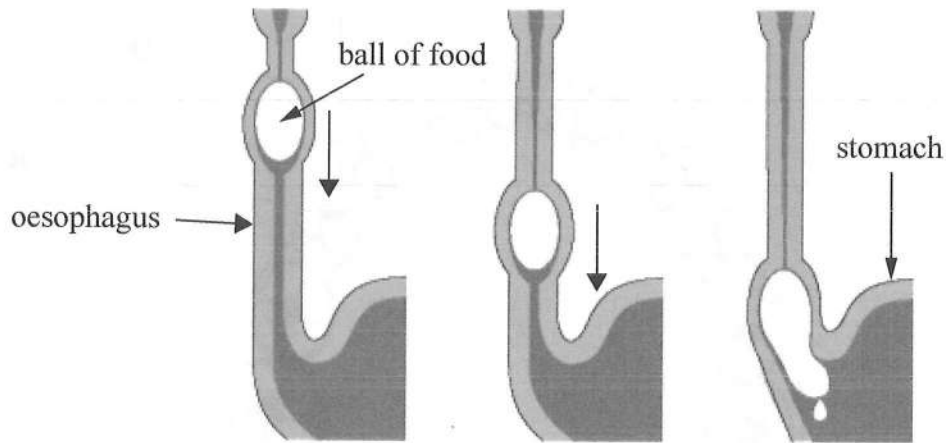


**Fig. 7.2**

- (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.).

---

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[2]

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

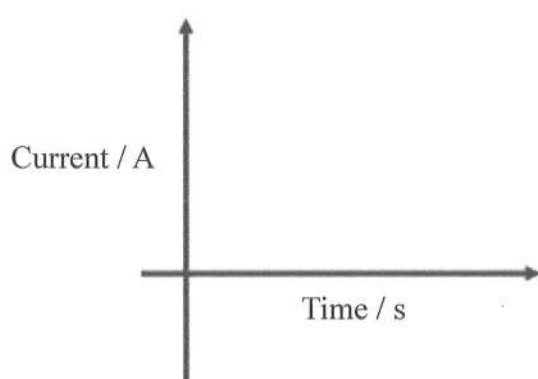
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[1]

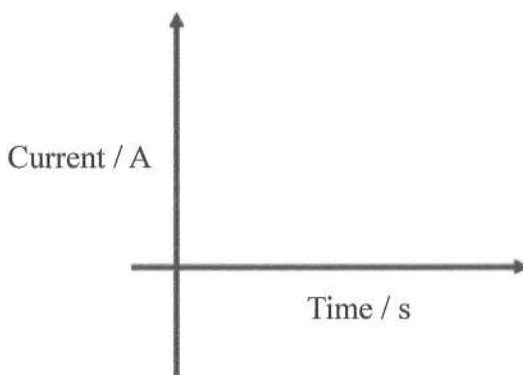
(iii) Complete Fig. 8.1 to show the graph of a direct current (d.c.) supply and an alternating current (a.c.) supply.

---

[2]



DIRECT CURRENT



ALTERNATING CURRENT

Fig. 8.1

- (b) Fig. 8.2 shows a simple circuit.

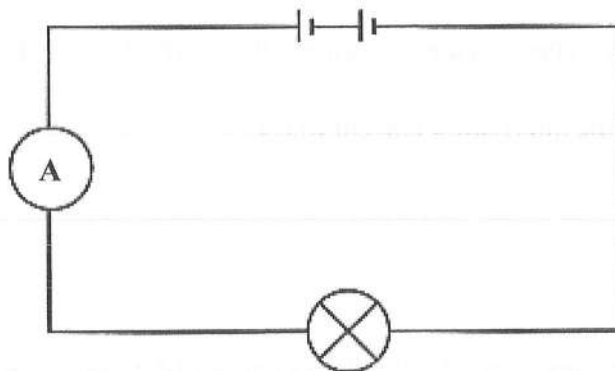


Fig. 8.2

- (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  $2.5 \Omega$ .

**Write the correct formula, show all working and units.**

- (iii) Explain what would be observed if an additional, identical lamp was added to the circuit in series. [3]

---

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[1]

**TOTAL MARKS [10]**



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| Surname and Initials |                  |

# COMBINED SCIENCE

PAPER 3 3102/3

Wednesday **4 JUNE 2025** 9:00 A.M.–10:30 A.M.  
(1 hr. 30mins)

Additional materials:  
Graph paper

## MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

### INSTRUCTIONS AND INFORMATION 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 in **Section A** (1 – 4) in the spaces provided.

Answer **ANY** two (2) out of the three [3] questions from **Section B** on the lined pages provided in this booklet.

Candidates are advised to spend no more than 35 minutes on **Section A**.

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 |  |
|--------------------|--|
| SECTION A          |  |
| 1                  |  |
| 2                  |  |
| 3                  |  |
| 4                  |  |
| SECTION B          |  |
| 5                  |  |
| 6                  |  |
| 7                  |  |
| TOTAL              |  |

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



## Group

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

**b = proton (atomic) number**

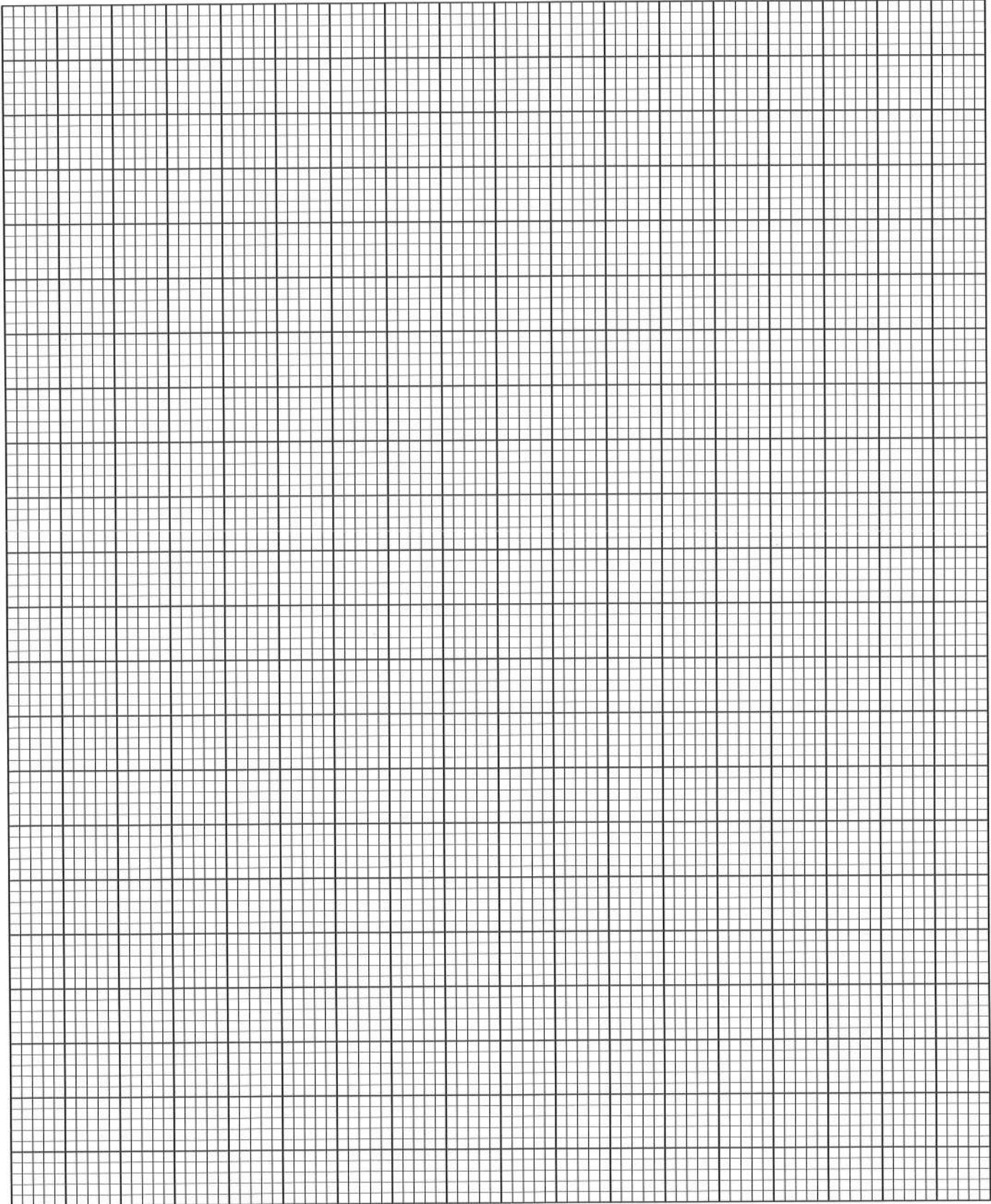
Key

SCIENCE GRAPH PAPER

MINISTRY OF EDUCATION  
BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION  
EXAMINATION

AB7

|                         |               |          |                       |
|-------------------------|---------------|----------|-----------------------|
| School No.              | Candidate No. | Level:   | For Examiner's<br>Use |
| Subject Number & Title: |               | Paper:   |                       |
| Surname & Initials:     |               | Section: |                       |
| Signature:              | Date:         | Qu. No.  |                       |



## EXAMINATION

|                         |               |          |                    |
|-------------------------|---------------|----------|--------------------|
| School No.              | Candidate No. | Level:   | For Examiner's Use |
| Subject Number & Title: |               | Paper:   |                    |
| Surname & Initials:     |               | Section: |                    |
| Signature:              | Date:         | Qu. No.  |                    |

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin black lines. There are no margins, text, or other markings on the page.

**SECTION A**

Answer **ALL** Questions in this Section.

1. Biological washing powders contain enzymes that breakdown food stains.

(a) (i) Describe what is meant by an enzyme.

\_\_\_\_\_

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

(ii) List **two** properties of enzymes.

1 \_\_\_\_\_

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

(b) State why biological washing powders should **not** be used in hot water.

\_\_\_\_\_

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

(c) Complete the table by listing the enzyme that breakdowns the nutrient substance in foods.

| <b>nutrient</b> | <b>enzyme</b> |
|-----------------|---------------|
| starch          |               |
| fat             |               |

[2]

- (d) The graph in **Fig. 1.1** shows the activity of enzymes **A** and **B**.

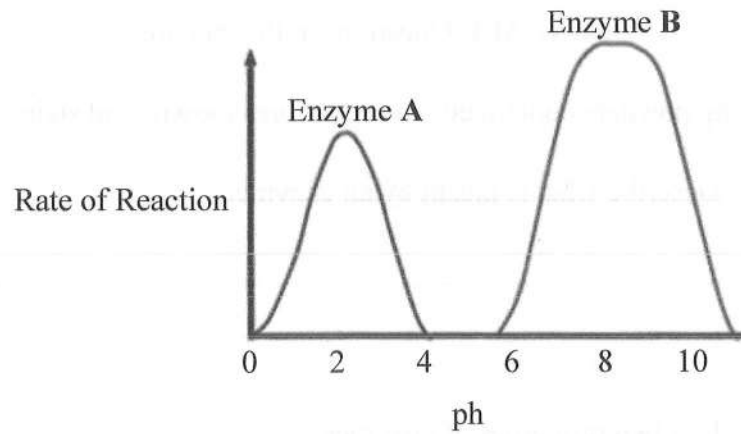


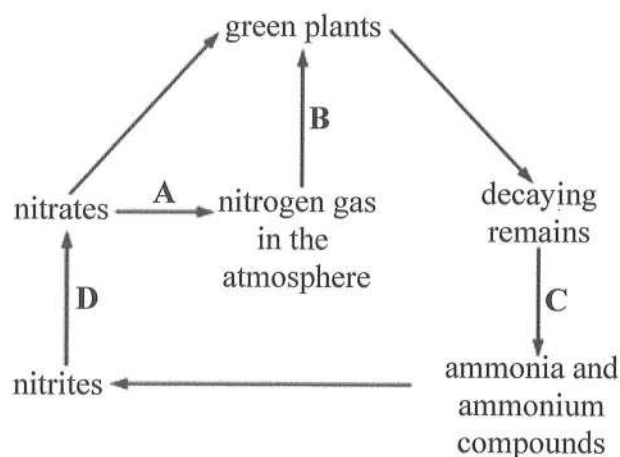
**Fig. 1.1**

- (i) State the property of enzymes shown in the graph.  
\_\_\_\_\_ [1]
- (ii) Use the graph to identify the condition in which enzymes **A** and **B** work best.  
**A** \_\_\_\_\_  
**B** \_\_\_\_\_ [2]

**TOTAL MARKS [10]**



2. The diagram shows a part of the nitrogen cycle.



- (a) The labels A–D represents four key processes that occur in the nitrogen cycle.

Identify the processes labelled A–D.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

D \_\_\_\_\_

[4]

- (b) (i) Name a natural process that converts nitrogen gas into nitrates.

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

- (ii) State the name of the type of plants that contain bacteria in their root nodules.

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

- (iii) Explain the advantage of these plants having bacteria in root nodules.

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

(c) Plants absorb nitrogen in the form of nitrates from the soil.

(i) Write the symbol for the nitrate ion.

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

(ii) State how plants use nitrates from the soil.

\_\_\_\_\_

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

**TOTAL MARKS [10]**



3. This question is about **speed**, **velocity** and **acceleration**.

(a) Define the terms speed and velocity.

**speed:** \_\_\_\_\_

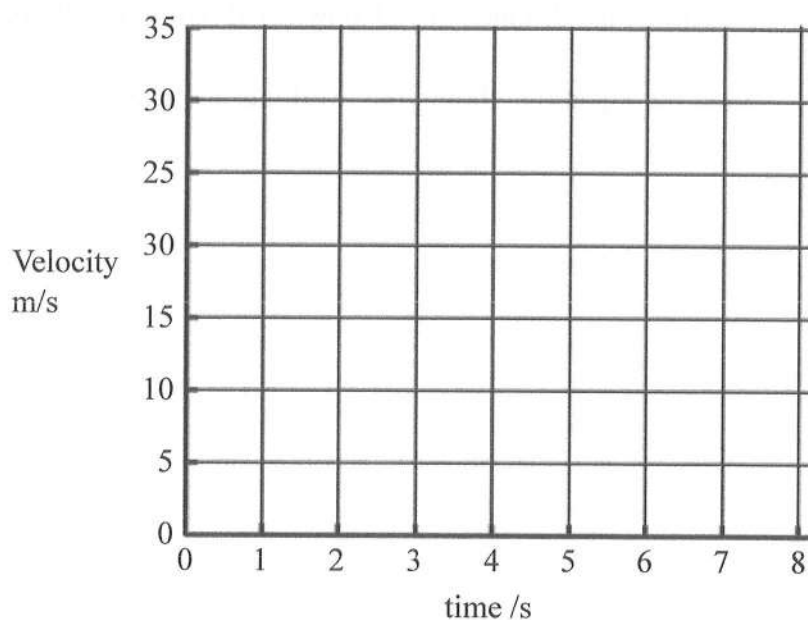
\_\_\_\_\_

**velocity:** \_\_\_\_\_

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

(b) Car A begins a journey from rest with a constant acceleration, reaching a velocity of 15 m/s within 3 seconds. It maintains this velocity for 5 seconds.

Sketch a graph of velocity (y-axis) against time (x-axis) for the first 8 seconds of car A's journey.



[2]

(c) Calculate the total distance travelled in (m), by car A for the first 8 seconds of the journey.

**Show your working.**

[2]

**[Turn over]**

- (d) Another car, **B** starts its journey from rest and travels with a constant acceleration of  $6.5 \text{ m/s}^2$  for 20 seconds. Show all working and state the equation. State the answer with the correct unit.

**Show your working.**

- (i) Determine the velocity of car **B**.

[2]

- (ii) Determine the distance travelled by car **B** during the 20 seconds.

State the equation, show your working and state the answer with the correct units.

[2]

**TOTAL MARKS [10]**



4. **Fig. 4.1** shows changes occurring in the uterine lining of a female during a 28-day menstrual cycle.

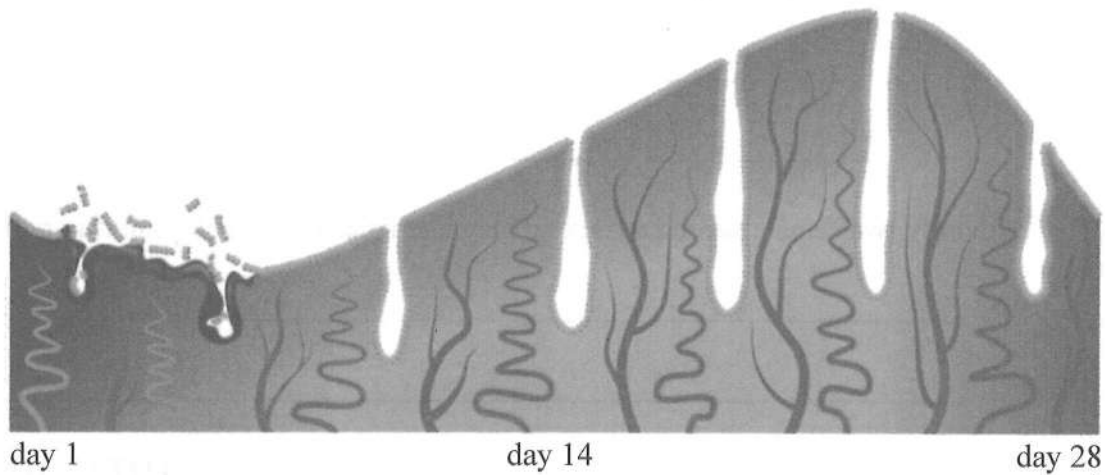


**Fig. 4.1**

- (a) Define the term menstrual cycle.

\_\_\_\_\_

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

- (b) The menstrual cycle is regulated by hormones.

- (i) Describe the role of **oestrogen** and **progesterone** in the menstrual cycle.

\_\_\_\_\_

\_\_\_\_\_

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

- (ii) State how these hormones travel from the ovary to the uterus.

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

- (c) (i) On the diagram draw a line to show where ovulation takes place. Label it **X**. [1]

- (ii) Describe what happens at ovulation and give the name of the hormone responsible for this process.

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

- (d) Identify **two** female secondary sexual characteristics that develops during puberty.

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

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

**TOTAL MARKS [10]**



## SECTION B

Answer any **two** questions in this section

5. This question is based on energy changes and rate of reaction.

A sample of oxygen can be prepared in the science laboratory using hydrogen peroxide and a **catalyst**, manganese dioxide.

The equation for the reaction is given below:



This reaction is exothermic.

- (a) Describe an exothermic reaction in terms of bond-making and bond-breaking energies. [2]
- (b) Explain in terms of collision theory the effect of lowering the temperature of  $\text{H}_2\text{O}_2$  on the rate of reaction. [3]
- (c) A student recommends using 1 g of powdered manganese dioxide instead of lumps to prepare the sample of oxygen.
  - (i) Explain if the student's recommendation is correct. [1]
  - (ii) Explain the purpose of the manganese oxide catalyst in the preparation of hydrogen peroxide. [2]

- (d) In another experiment zinc was reacted with excess dilute hydrochloric acid at room temperature and pressure. In the experiment 0.002 moles of the zinc metal was used to produce the chloride of the metal and hydrogen gas. The volume of hydrogen gas produced was recorded at time intervals as shown in the table below.

|                                             |   |    |    |    |    |    |    |    |    |
|---------------------------------------------|---|----|----|----|----|----|----|----|----|
| Time/minutes                                | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
| Volume of hydrogen produced/cm <sup>3</sup> | 0 | 17 | 30 | 41 | 50 | 58 | 65 | 70 | 72 |

- (i) Plot a suitable graph of the volume of hydrogen produced in this experiment. Label your graph **A**. [4]
- (ii) Determine the volume of the gas produced in the first 30 seconds for the zinc experiment using dilute hydrochloric acid. [1]
- (iii) Write a balanced symbol equation for the reaction between zinc and dilute hydrochloric acid. [3]
- (e) The experiment is repeated using a higher concentration of hydrochloric acid. All other conditions remain the same.
- (i) On the graph you have drawn in (d)(i), sketch a graph to show the volume of hydrogen produced using a higher concentration of hydrochloric acid. Label your graph **B**. [1]
- (ii) Describe and explain, in terms of particles and collisions, the effect that increasing the concentration of the hydrochloric acid has on the rate of the reaction. [3]

**TOTAL MARKS [20]**



6. This question is about electricity.

(a) Define the term **potential difference** and **electric current**.

[2]

(b) **Fig. 6.1** shows two resistors in parallel.

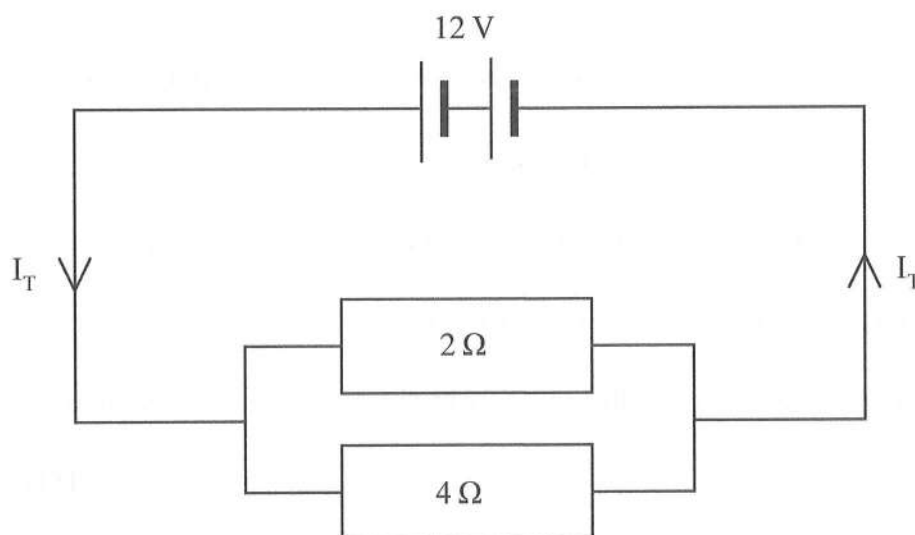


**Fig. 6.1**

(i) Calculate the total resistance in the circuit.

[2]

(ii) Calculate the total current,  $I_T$ , in the circuit.

[2]

(iii) A technician wants to increase the main current.

State how this can be accomplished by changing the value of one of the resistors.

[1]

(c) A resistor is a fundamental component in the flow of an electric current in a circuit.

(i) State **one** other type of resistor in an electric circuit other than the type shown in the diagram.

[1]

(ii) The resistor in **Fig. 6.1** are now connected in series. Calculate the total current.

[2]

(iii) Calculate the voltage drop across the  $4\ \Omega$  resistor.

[2]

- (d) Some measurements obtained in the experiment are shown in the chart.

|                          |   |     |   |     |     |     |    |
|--------------------------|---|-----|---|-----|-----|-----|----|
| Potential Difference / V | 0 | 2   | 4 | 6   | 8   | 10  | 12 |
| Current / A              | 0 | 0.6 | 1 | 1.3 | 1.6 | 1.8 | 2  |

- (i) Plot a graph of current (y-axis) against potential difference (x-axis) [5]

From the graph, determine:

- (ii) the value for the current when the potential difference is 5 V. [1]

- (iii) the resistance of the conductor at 5 V. [1]

- (iv) suggest a possible reason why the graph is not a straight line. [1]

**TOTAL MARKS [20]**



7. The human nervous system is made up of two parts: the central nervous system and the peripheral nervous system.

(a) Differentiate between the two parts of the human nervous system. [2]

(b) Define the term coordination. [2]

(c) **Fig. 7.1** shows a reflex arc.

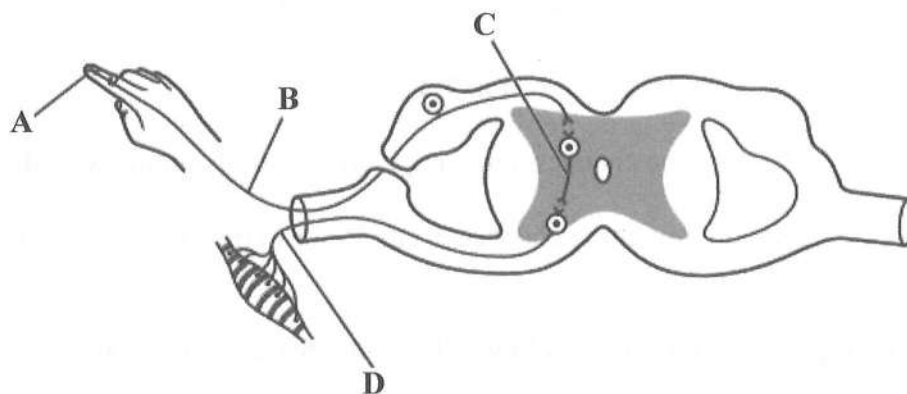


**Fig. 7.1**

(i) State the name and function of the labelled structures **B** and **D**. [4]

(ii) State the difference between a reflex arc and a reflex action. [2]

(iii) Explain the importance of a reflex action and give one other example. [2]

(iv) The impulse shown takes 0.02 seconds to pass from the finger to the spinal cord, a distance of 1.5 meters. Calculate the speed of the impulse.

**Show your working, answer and correct unit.** [2]

- (d) **Fig. 7.2** shows a reflex in the iris of a human eye in response to changes in light intensity.

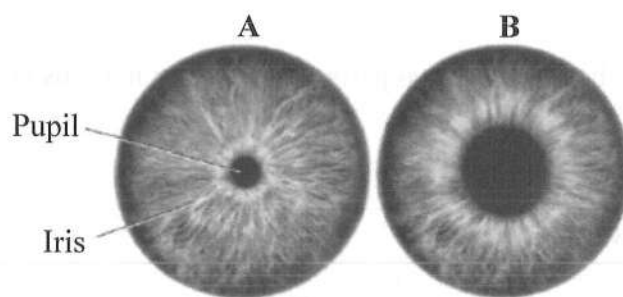


**Fig 7.2**

- (i) Describe the changes in the pupil and iris in diagrams A to B in **Fig. 7.2**.

Explain how these changes occur. Refer to the changes in light intensity in your answer. [4]

The response of the skin to cold weather is an involuntary action.

- (ii) Explain how an involuntary action differs from a voluntary action. [1]

- (iii) Give another example of an involuntary action and a voluntary action not mentioned in this question. [1]

**TOTAL MARKS [20]**



Question .....

Write on both sides of the paper

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Question .....

Write on both sides of the paper

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Question .....

Write on both sides of the paper

[illegible]

Question .....

Write on both sides of the paper

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