JUNE 2021	**PHYSICAL SCIENCES ASSESSMENT**	2 HOURS
MH	**GRADE 10**	TOTAL = 100

Instructions:

- The question paper consists of 11 questions.

- Answer all the questions.

- Answer section A on the answer sheet provided AND section B on folio sheets.

- Answer section C on the answer sheet provided AND section D on folio sheets.

- A non-programmable calculator may be used.

- Number the answers correctly according to the numbering system.

- Round off to two (2) decimal places where necessary.

- A periodic table has been provided at the end of the question paper.

- A formula sheet has been provided on the back of the answer sheet.

PHYSICS

SECTION A

(answer on the answer sheet)

QUESTION 1:

Four possible options are provided as answers to the following questions. Each question has only one correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.3) on the answer sheet.

1.1 A tuning fork is made to vibrate by striking it gently on a rubber stopper. The sound waves produced are …

    A.   transverse waves and require a medium for propagation.

    B.   longitudinal waves and require a medium for propagation.

    C.   transverse waves and require no medium for propagation.

    D.   longitudinal waves and require no medium for propagation.

1.2 An object which is charged positively has …

    A.   gained protons.

    B.   gained electrons.

    C.   has a surplus of electrons.

    D.   lost electrons.

1.3 Which one of the following combinations represents the correct set of equivalent units for **potential difference** and **resistance** respectively?

    A. $V = J.s^{-1}$ and $\Omega = V.A$

    B. $A = C.s^{-1}$ and $R = V.s^{-1}$

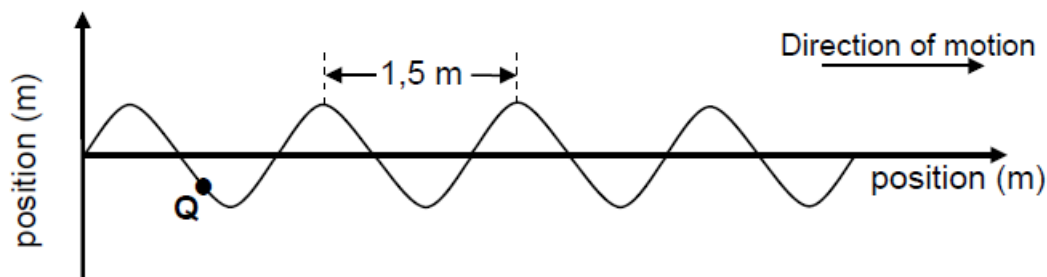   C. $V = J.C^{-1}$ and $\Omega = V.A^{-1}$

    D. $V = J.C^{-1}$ and $R = V.A^{-1}$

TOTAL SECTION A = [6]

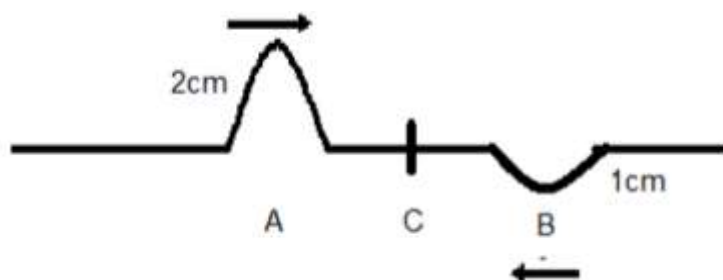## QUESTION 2:

In the sketch below, not drawn to scale, **Q** represents an object on the surface of the water in a dam. A person standing on a bridge observes object **Q** moving up and down. Object **Q** rises to the top every 5 seconds.

2.1   Define the term *wavelength.*   (2)

2.2   In which direction is **Q** about to move?   (1)

2.3   Calculate the:

2.3.1   Frequency of the wave.   (2)

2.3.2   Speed of the wave.   (3)

2.4   Two pulses, **A** and **B**, move towards each other with the same speed. The amplitude to pulse **A** and **B** are 2 cm and 1 cm respectively. The two pulses meet at point **C**.
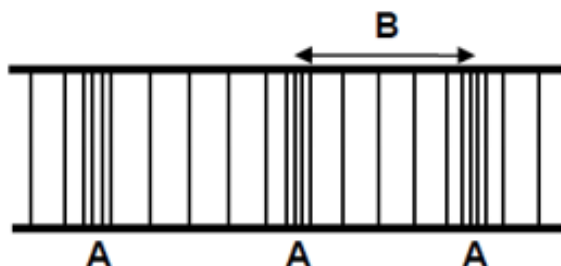

2.4.1   Name the type of interference that occurs at point **C**.   (1)

2.4.2   Make a sketch of the resultant pulse at **C**. Indicate the amplitude of the resultant pulse.   (2)

[11]

QUESTION 3:

The sound wave produced by a vibrating musical instrument is represented below.

B

A   A   A

3.1   Provide a label for the sections marked:

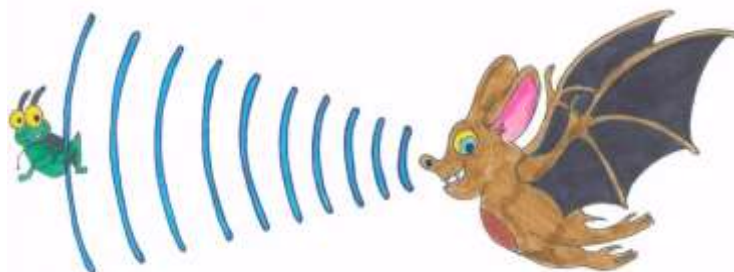3.1.1   A   (1)

3.1.2   B   (1)

3.2   A note of higher frequency, but of the same original loudness is now played on the instrument. How will the magnitude of B be influence?

Only state *INCREASE, DECREASE or STAYS THE SAME.* (1)

3.3   Bats have very poor eye sight and make use of echolocation to find their way. Echolocation is an example of sonar that makes use of ultrasound.

A bat makes peeping sounds and the echo from an object reaches the bat after 0,05 seconds. Take the speed of sound in air to be 342 m.s^{-1}. How far away is the object from the bat? (Assume the bat is not moving.)   (4)

[7]

QUESTION 4:

A laser pointer uses green light photons with a wavelength of 532 nm.

Laser pointer

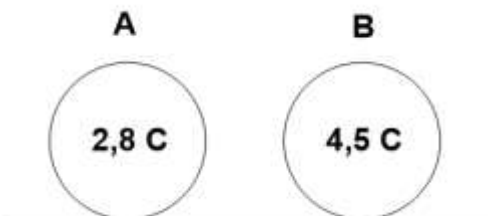4.1   Define the term *photon*.   (2)

4.2   Calculate the energy of a green light photon.   (4)

4.3   How are electromagnetic waves generated?   (1)

[7]

QUESTION 5:

Two identical metal spheres, **A** and **B**, on an insulated surface carry charges of 2,8 C and 4,5 C respectively. The spheres are brought into contact with each other and then move apart again.

A   B

2,8 C   4,5 C

5.1   When the two spheres touch, electrons are transferred from one sphere to the
        other. Indicate the direction of the transfer of electrons.
        Only write *A to B* or *B to A*.   (1)

5.2   Calculate the new charge on each sphere after they separated.   (2)

5.3   Calculate the number of electrons that got transferred during contact. (4)

5.4   **Fill in the missing words:** the principle of conservation of charge states that
        the net charge of …………… remains constant during any physical process.   (1)

[8]

QUESTION 6:

Learners set up a circuit as per the diagram below. The resistance of each resistor is as follows:
A = 2 Ω, **B** = 4 Ω and **C** = 5 Ω. The reading on **V₁** is 12V.
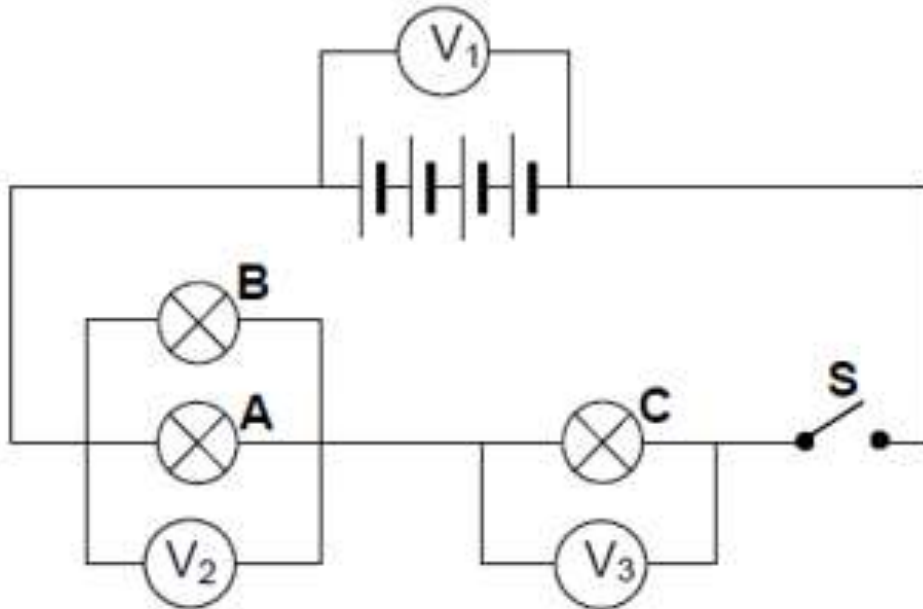
Switch S is closed.

|		
6.1	Calculate the total resistance in the circuit.	(4)
6.2	Calculate the current in the main circuit.	(3)
6.3	Define *current strength*.	(2)
6.4	Calculate the current strength through resistor **A**.	(5)
6.5	Calculate the amount of charge flowing through resistor **A** in 1 minute.	(3)

[17]

TOTAL SECTION B = [50]

CHEMISTRY

(answer on the answer sheet)

QUESTION 7:

Four possible options are provided as answers to the following questions. Each question has only one correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (7.1 – 7.3) on the answer sheet.

7.1   Which of the following diagrams represents a pure substance?
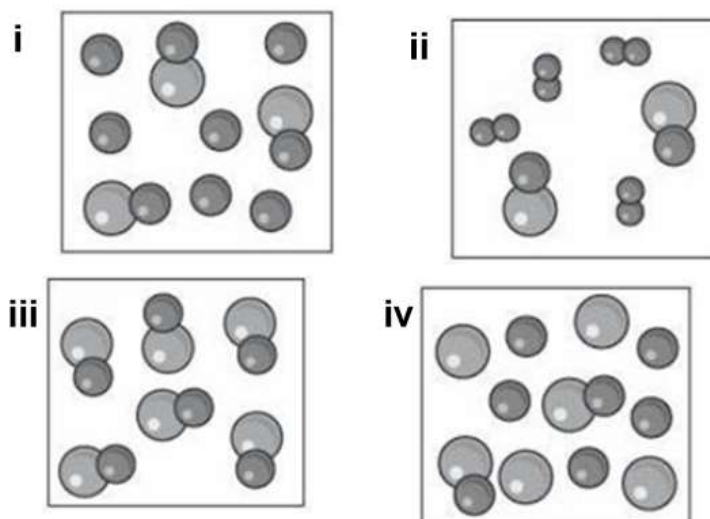
A.   **i** and **iv**
B.   **ii** and **iii**
C.   **iii** only
D.   None of the diagrams.

7.2   When a substance changes directly from the **gas** phase **TO** the **solid** phase **WITHOUT** passing through the intermediate liquid phase, the process is called ...
A.   sublimation
B.   solidification
C.   deposition
D.   crystallisation

7.3 When an atom **X** of an element in Group 1 reacts to become **X⁺**, the …

    A.   mass number of **X** increases.

    B.   atomic number of **X** decreases.

    C.   charge of the nucleus increases.

    D.   number of filled energy levels decreases.

TOTAL SECTION C = [6]

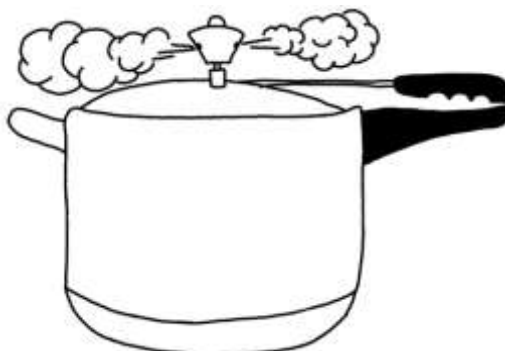## SECTION D

(answer on folio paper)

QUESTION 8:

8.1   Define *boiling point.*   (2)

8.2   Water boils at 100°C in a normal pot on the stove top, but the water in a pressure cooker boils at 123°C. Explain why water boils at a higher temperature in the pressure cooker.

      (3)

8.3   Describe the gas phase in terms of the *kinetic molecular theory.*   (3)

[8]

QUESTION 9:

Sodium reacts with chlorine to form sodium chloride, a substance used in all households.

9.1   Write down the common name for *sodium chloride.*   (1)

9.2   Draw the Aufbau diagram for **chloride.**   (3)

9.3   Give the sp-notation for the **sodium ion**.   (2)

9.4   Represent the formation of sodium chloride from sodium and chlorine with the
       aid of Lewis diagrams.   (3)

9.5   Explain why sodium chloride does not conduct electricity as a solid.   (2)

                                                                                      [11]

QUESTION 10:

Element **X** occurs in nature as two isotopes, X-35 and X-37. The drawing shown below represents a sample of this element.

10.1   Define the term *isotope.*   (2)

10.2   Use the above information to calculate the relative atomic mass of element X.   (4)

10.3   **Name** element X.   (1)

                                                                                      [7]

QUESTION 11:

11.1   Which type of bond exists in each of the following compounds?

11.1.1 NH_4F (1)

11.1.2   Na   (1)

11.2   Consider the following two covalently bonded molecules: O_2 and NH_3.

11.2.1   Define *covalent bonding.*   (2)

11.2.2   Classify the *type* of covalent bonding in:

      a) O_2

      b) NH_3 (2)

11.2.3   Draw a Lewis diagram for NH_3.   (2)

11.2.4   Give the Couper diagram for O_2.   (1)

11.3.1   Give the chemical formula for *ammonium sulphate*.   (2)

11.3.2   How many atoms are there in one formula unit of *ammonium sulphate*?   (1)

[12]

TOTAL SECTION D = [38]

GRAND TOTAL = [100]