GRADE 10

PROVINCIAL FORMAL ASSESSMENT TASK

MARCH 2015

PHYSICAL SCIENCES
CONTROL TEST

TIME: 2 HOURS

MARKS: 100

This paper consists of 10 pages.

INSTRUCTIONS AND INFORMATION

1.   Write your name and grade on the ANSWER BOOK.

2.   This question paper consists of EIGHT (8) questions. Answer ALL the questions in the ANSWER BOOK.

3.   Start EACH question on a NEW page in the ANSWER BOOK.

4.   Number the answers correctly according to the numbering system used in this question paper.

5.   Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.

6.   Write neatly and legibly.

7.   You may use a non-programmable calculator.

8.   You may use appropriate mathematical instruments.

9.   Round off your FINAL numerical answers to a minimum of TWO decimal places.

10.   Separate information sheets are not attached. Relevant information you might need is as follows:

$v = f\lambda$	$f = \dfrac{1}{T}$ or/*of* $T = \dfrac{1}{f}$

11.   Give brief motivations, discussions, et cetera where required.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter A, B, C or D next to the question number (1.1 – 1.10) in your ANSWER BOOK.

1.1   Which ONE of the following is a pure substance?

    A   Cup of tea

    B   Salt water

    C   Brass

    D   Oxygen   (2)

1.2   At room temperature water molecules in a beaker will:

    A   Have the same velocity

    B   Have different velocities

    C   Be at a temperature of $70^{o}C$

    D   Have zero velocity   (2)

1.3   A compound consists of the following ions A^{3+} and B^{2-}. A possible formulae for
        the compound could be …

        A $(AB)_6$.

        B $2A_3B$.

        C A_2B_3.

        D $A_3 B_2$.   (2)

1.4   A material that allows heat to pass through easily will be a/an …

        A   thermal conductor.

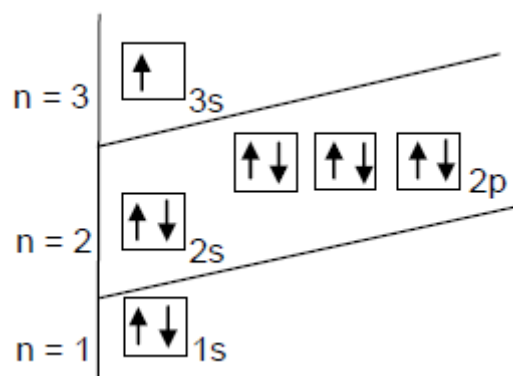   B   electrical insulator.

        C   electrical conductor.

        D   thermal insulator.   (2)

1.5   The diagram below shows the Aufbau diagram for an atom of the element

Which ONE of the following correctly represents the element and the number of valence electrons
represented by this Aufbau diagram?

	Element	Valence electrons
A	Sodium	1
B	Neon	11
C	Neon	10
D	Sodium	11

                                                                                                                 (2)

1.6   The phase change from a solid directly to a gas.

        A   Melting

        B   Sublimation

        C   Evaporation

        D   Freezing   (2)

1.7   Which ONE of the following scientists concluded that electrons orbit the nucleus in fixed energy levels?

        A   Bohr

        B   Rutherford

        C   Thomson

        D   Chadwick

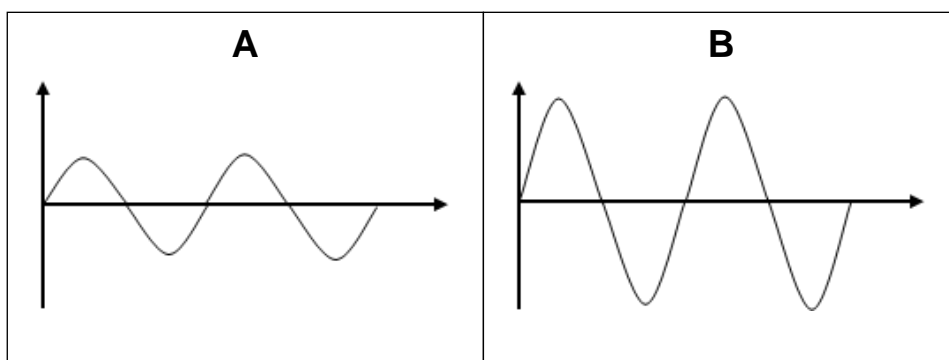1.8   Consider the following atom: $_{12}^{24}\text{Mg}$

        Which ONE of the following represents an isotope of this atom?

        A $_{25}^{12}\text{Mg}$

        B $_{12}^{26}\text{Mg}$

        C $_{24}^{12}\text{Mg}$

        D $_{13}^{25}\text{Mg}$ (2)

1.9   In which ONE of the following compounds does covalent bonds occur between elementary particles?

        A   Table salt

        B   Water

        C   Potassium fluoride

        D   Mercury   (2)

1.10   The diagram below represents two sound waves A and B.

Which ONE of the following combinations that compares the frequency and loudness of A with that of B, is correct?

	Frequency of A	Loudness of A
A	Greater than B	Less than B
B	Less than B	Greater than B
C	The same as B	Greater than B
D	The same as B	Less than B

**(2)**
[2 x 10 = 20]

QUESTION 2

2.1   Most of the substances around us consists of different substances that have been mixed together. The difference in the physical properties of these substances mixed together can be used to separate them.

For each of the descriptions in QUESTIONS 2.1.1 to 2.1.3 state whether it represents a PURE SUBSTANCE, a HOMOGENEOUS MIXTURE or a HETEROGENEOUS MIXTURE.

2.1.1   The air you are breathing   (1)

2.1.2   Sodium chloride   (1)

2.1.3   Oil and vinegar salad dressing   (1)
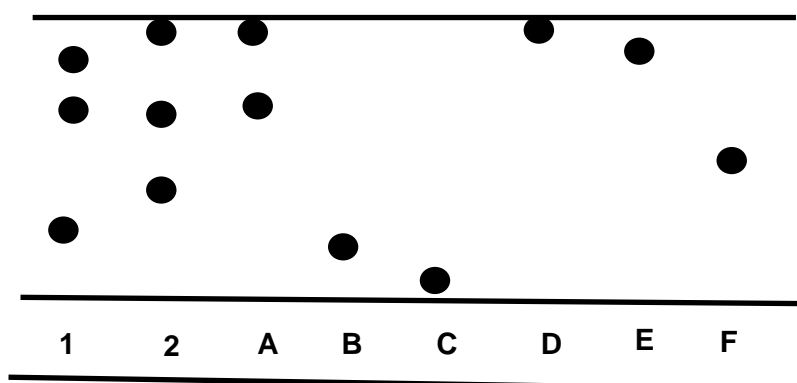
2.2 The sketch below shows a method of separation. Examine the sketch and answer the questions.
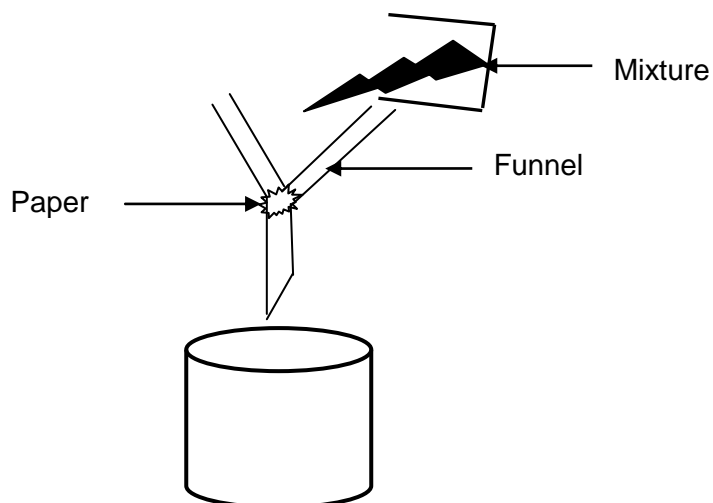
2.2.1 Which method of separation is shown above?   (1)

2.2.2 Which property of the mixture enables it to be separated using the above method? (2)

2.3 The diagram below show the results of a paper chromatography experiment. 1 and 2 are mixtures and A - F are pure substances.

Write down a letter that represents:

2.3.1 A pure substance which is NOT in either mixture   (1)

2.3.2 A pure substance which is in BOTH mixtures   (1)

2.4 Give ONE use of paper chromatography.   (1)

2.5 Classify each of the substances below as either a COMPOUND or an ELEMENT:

2.5.1 Sugar   (1)

2.5.2 Aluminium   (1)

[11]

QUESTION 3

3.1   In the table shown below, some of the chemical names and formulae are missing. Complete the table by writing down only the number (3.1.1 – 3.1.8) and the correct name or formula in your ANSWER BOOK.

Chemical name	Chemical formula
Example: calcium sulphate	$CaSO_4$
3.1.1	SO_3
Calcium Nitrate	**3.1.2**
3.1.3	K_2SO_4
Sodium Iodide	**3.1.4**
3.1.5	$CaCl_2$
Calcium Hydroxide	**3.1.6**
3.1.7	$MgCO_3$
Chlorine	**3.1.8**

[16]

QUESTION 4

The diagram below shows the periodic table of elements.

I	II												III	IV	V	VI	VII	0
																		He
Li	Be													C	N	O	F	Ne
Na															P	S	Cl	Ar
K						Fe											Br	Kr

Answer the following questions using only the elements shown in the diagram above. Each element can only be used once.

4.1   Write the SYMBOL of an element that:

4.1.1   Is a transition element   (1)

4.1.2   Is a halogen   (1)

4.1.3   Is an alkaline earth metal   (1)

4.1.4   Is unreactive   (1)

4.1.5   Has similar chemical properties as chlorine   (1)

4.1.6   Is a liquid at room temperature   (1)

4.1.7   Has the same electron structure as oxygen   (1)

4.1.8   Has the largest atomic radius   (1)

4.1.9   Has the highest ionisation energy in group   I   (1)

4.1.10 Is a metal which is soft enough to be cut by a knife   (1)

4.2   Explain why in the same period, Nitrogen is written on the immediate right side of
         Carbon and not on the immediate left side.   (2)

4.3   Some uses of some non-metallic elements are shown in the table below. Match the
         elements with their correct use by writing down the use of the element next to the
         question number (4.3.1 – 4.3.4) in your ANSWER BOOK.

Question number	Element	Use
4.3.1	Argon	To kill bacteria in water purification
4.3.2	Chlorine	In balloons
4.3.3	Carbon(Graphite)	As a lubricant
4.3.4	Helium	In light bulbs

                                                                                                   [4]

4.4   The element chlorine can have atoms in the following forms: $^{35}_{17}Cl$ and $^{37}_{17}Cl$

4.4.1   Write down the term chemists use to describe atoms of elements that exists like the above
         chlorine atoms.   (1)

4.4.2   Define the above term.   (2)

4.4.3   If a sample contains 22,5% Cℓ -37 and 77,5% Cℓ -35, calculate the relative atomic mass of
         an atom in that sample.   (3)
   **[22]**

QUESTION 5

The formation of a Sodium Chloride (NaCℓ) molecule is due to a chemical bond between sodium
and chlorine atom.

5.1   What type of bond exists in the molecule?   (1)

5.2   Explain your answer in QUESTION 5.1.   (2)

5.3   Show by means of Lewis structure the formation of the NaCℓ molecule.   (4)
                                                                                                    [7]
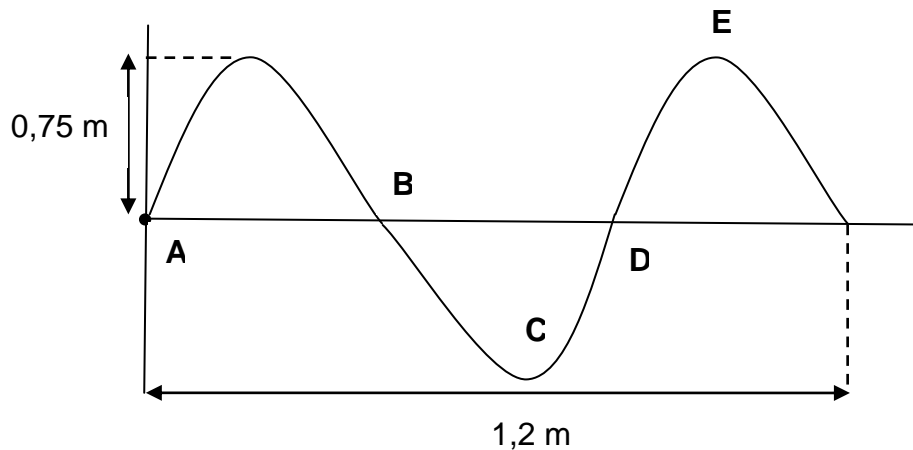
QUESTION 6

6.1 Pulse form part of our daily lives. Pulse can be the result of a chain on the highway, spectators standing up and sitting down during a Mexican wave at a sports event or the sudden compression of air caused by an explosion. Two pulses, P and Q in a string approach each other at the same speed. Pulse P has an amplitude of + 4,0 cm when it is at position X. Pulse Q has an amplitude of – 6,0 cm when it is at position Z. Points X and Z are the same distance from point Y. Both pulses have a length of 8,0 cm. Pulse P and Q meet at position Y. Assume that no energy is lost.
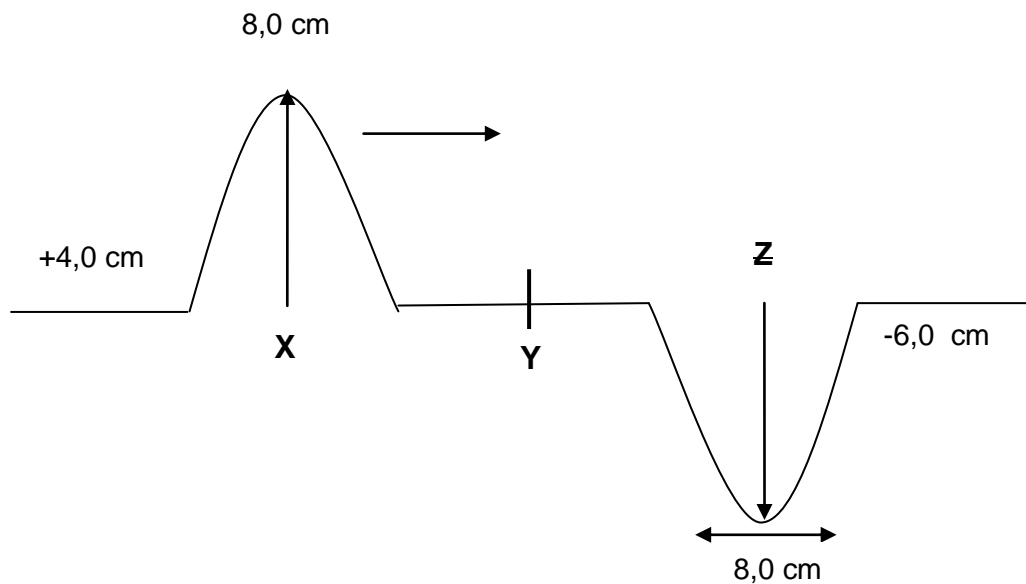
6.1.1 Define a *pulse*. (2)

6.1.2 Name the phenomenon that occurs when the two pulses meet at position Y. (2)

6.1.3 Draw a labelled sketch to show what happens when the pulses P and Q meet at position Y. Also indicate the pulse length. (3)

6.1.4 Pulse P travels from position X to position Z, a distance of 6 cm, in 1,5 s. Calculate the speed of pulse P. (4)

6.2   It took 0,375 s to generate the waves as shown below.

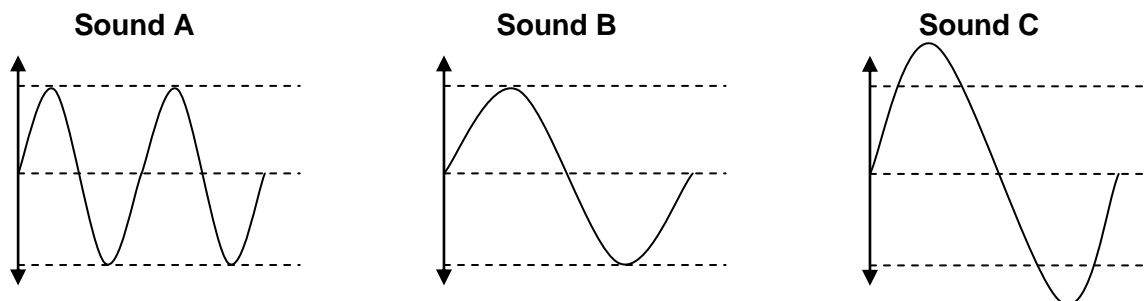6.2.1   Calculate the wavelength of the above wave.   (2)

6.2.2   Calculate the frequency of the above wave.   (3)
                                                                              [16]

QUESTION 7

Anything that generates a disturbance in the air creates a pulse that travels away from the place where it is created. If the pulse enters your ear it may cause your eardrums to vibrate, which is how you hear. Consider the following THREE diagrams that illustrate different sound waves on an oscilloscope:

7.1   Which ONE A, B or C has the highest volume? Explain your answer.   (2)

7.2   The highest frequency that the human ear can detect is about 20 kHz.

7.2.1   Sound waves are longitudinal waves. Define a *longitudinal wave*.   (2)

7.2.2   A certain instrument produces sound waves with a wavelength of 19 mm. If the speed of
        the sound is 342 m·s^{-1}. Determine if the human ear will hear the sound.   (4)
                                                                              [8]

                                                            GRAND TOTAL: 100