



PROVINCE OF THE EASTERN CAPE

DEPARTMENT OF EDUCATION

PHYSICAL SCIENCES

GRADE 11

CONTROL TEST 2

20 SEPTEMBER 2016

TOTAL MARK = 100

TIME : 2 HOURS

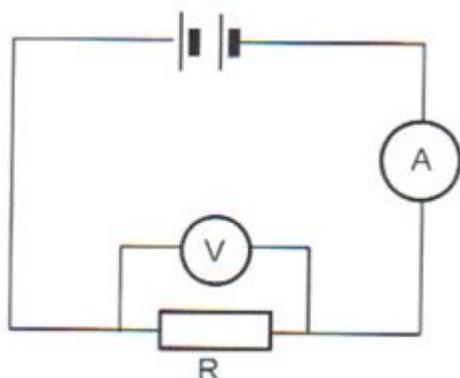
## **INSTRUCTIONS**

1. Answer all questions.
2. Round off all final answers correct to TWO decimal places.
3. A non-programmable calculator may be used.
4. Number the answers correctly according to the numbering system.
5. Show all formulae and substitutions in all calculations.
6. Write neatly and legibly.

## SECTION A MULTIPLE CHOICE

### QUESTION 1

1.1 In the accompanying diagram the battery and the meters have negligible internal resistance. The resistance of R does not change.



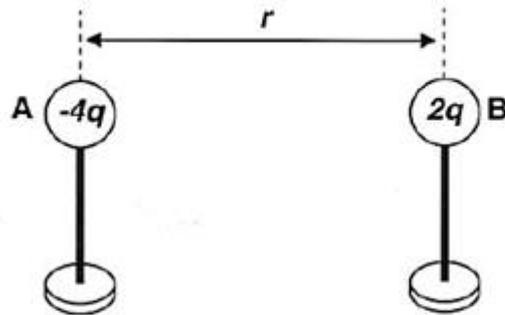
How do the readings on the ammeter and voltmeter change, if at all, when an additional resistor is connected in parallel with R ?

	VOLTMETER	AMMETER
A	Decrease	Increase
B	Remain the same	Decrease
C	Increase	Decrease
D	Remain the same	Increase

1.2 Which ONE of the following combinations is correct regarding the properties of electric field lines?

	DIRECTION	STRENGTH OF FIELD
A	Positive to negative	Strongest where the lines are the most dense
B	Negative to positive	Weakest where the lines are the least dense
C	North to south	Strongest where the lines are the most dense
D	North to south	Weakest where the lines are the least dense

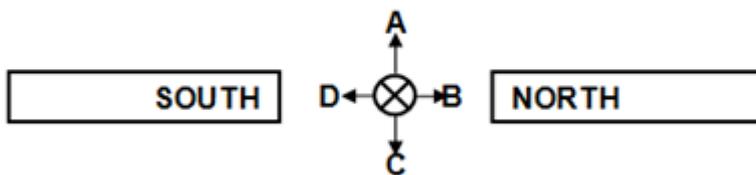
1.3 Two charged spheres, A and B, are placed on insulated stands a distance  $r$  apart, as shown below. The magnitude of the electrostatic force between them is  $F$ .



The spheres are allowed to touch each other and are then moved back to their original positions. The magnitude of the electrostatic force in terms of  $F$  will now be ...

- A  $8F$
- B  $F$
- C  $\frac{1}{7}F$
- D  $\frac{1}{8}F$

1.4 Two strong bar magnets arranged with the North and South poles facing each other as shown in the diagram below. A current-carrying conductor carries conventional current into the plane of the paper when placed between the poles of two magnets



The conductor will experience a force towards ...

- A **A**
- B **B**
- C **C**
- D **D**

1.5 As bondlength decreases, bond energy ..

- A decreases
- B increases
- C remains the same
- D increases then decreases

1.6 Consider the following chemical reaction



Which ONE of the following CORRECTLY identifies the order of Lowry-Bronsted acids and bases in the above reaction?

- A base, acid, acid, base
- B acid, base, base, acid
- C acid, base, acid, base
- D base, acid, base, acid

1.7 The minimum energy that colliding molecules must have in order for a reaction to occur, is called

- A bonding energy
- B lattice energy
- C activation energy
- D ionisation energy

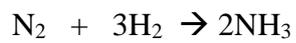
1.8 Which one of the following substances cannot act as an ampholyte?

- A  $\text{H}_2\text{O}$
- B  $\text{HNO}_3$
- C  $\text{HCO}_3^-$
- D  $\text{HSO}_4^-$

1.9 The mass of 4,48dm<sup>3</sup> of oxygen gas is

- A 3,2g
- B 6,4g
- C 0,8g
- D 4,48g

1.10 Ammonia is prepared according to the following reaction:



The amount of hydrogen gas required to prepare 17mol of NH<sub>3</sub> is:

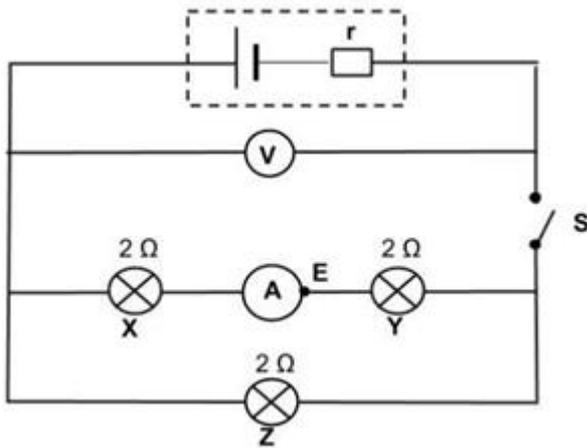
- A  $\frac{17 \times 3}{3}$
- B  $\frac{17 \times 3}{2}$
- C 17 x 3 x 2
- D  $\frac{2 \times 3}{17}$

10x2=20

## SECTION B

### QUESTION 2

The internal resistance of the battery,  $r$ , is negligible. The EMF of the battery is 6V.



2.1 State Ohms law in words. (2)

2.2. Which terminal of the ammeter is represented by point E? Write down only POSITIVE or NEGATIVE.

(1)

2.3. Calculate the total resistance in the circuit when the switch is closed. (3)

2.4. Calculate the reading on ammeter A when the switch is closed. (2)

2.5 If light bulb Z burns out, how will this affect the following values?(Write down INCREASE, DECREASE or REMAINS THE SAME).

2.5.1 The reading on voltmeter V. (1)

2.5.2 The emf of the battery (1)

2.6 Calculate the new reading on ammeter A after light bulb Z has burnt out. (3)

2.7 A tumble dryer is labelled 220V, 2600W.

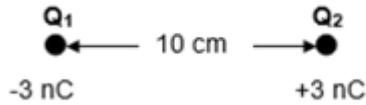
2.7.1 Calculate the resistance of the tumble dryers resistor. (4)

2.7.2 Calculate the cost of using the tumble dryer for  $3\frac{1}{2}$  hours if the electricity costs R1,04 per kWh. (4)

[21]

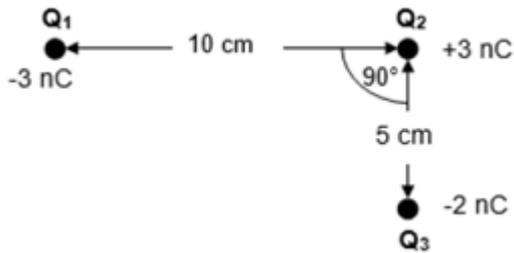
### QUESTION 3

A  $-3\text{nC}$  charge  $Q_1$  is placed  $10\text{cm}$  away from a  $+3\text{nC}$   $Q_2$  charge as shown in the diagram below



3.1 Draw the electric field pattern formed between the two charges. (3)

3.2 A  $-2\text{nC}$  charge  $Q_3$  is placed  $5\text{cm}$  away from  $Q_2$  as indicated in the diagram below



Draw a force diagram showing the electrostatic forces exerted on  $Q_2$  by  $Q_1$  and  $Q_3$  respectively. (2)

3.3 Calculate the net force exerted on  $Q_2$  by  $Q_1$  and  $Q_3$  respectively. (8)

3.4 An unknown point charge  $R$  is placed  $3\text{cm}$  away from point  $P$  as shown in the sketch below

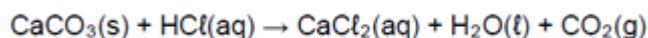


Calculate the charge on  $R$  if the net electric field strength at point  $X$  is zero. (5)

[18]

## QUESTION 4

4.1 Limestone or sometimes ash, is used to neutralise acid waste. Limestone reacts with hydrochloric acid according to the following UNBALANCED equation:



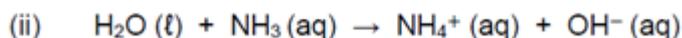
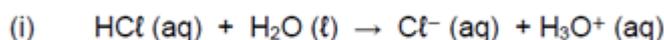
4.1.1 Define an acid in terms of the Arrhenius theory. (2)

4.1.2 Is Limestone(ash) acidic or basic? (1)

4.1.3 Rewrite the above equation into your answer book and then balance the equation. (2)

4.2 Define the term ampholyte. (1)

Consider the two acid-base reactions below and answer the questions which follow:



4.3 Identify the substance which acts as an ampholyte in the above reactions. (2)

4.4 Identify the conjugate acid-base pairs in equation (i) (2)

4.5 In a laboratory, one beaker contains a solution involving reaction (i) and another beaker contains a solution involving reaction (ii). A learner wants to test the solutions to determine whether they are acidic or alkaline.

4.5.1 Give the general term for any substance that can be used by learners to test if the solutions are acidic or alkaline. (1)

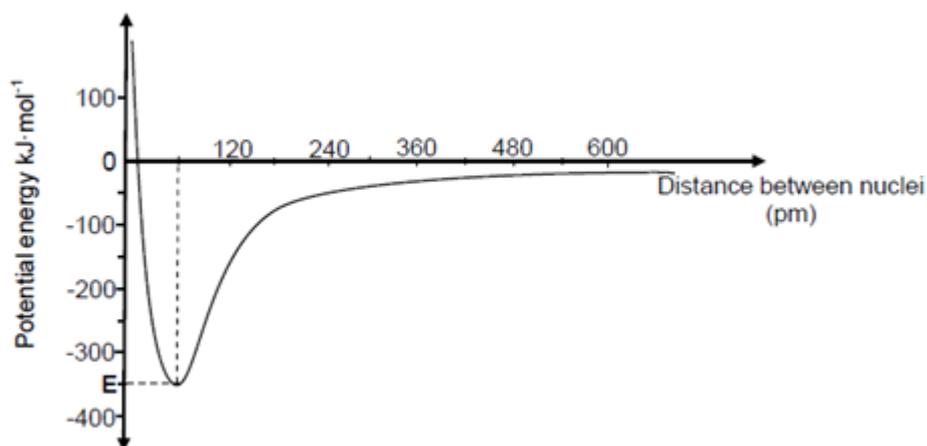
4.5.2 Which ONE of the two solutions will have a pH below 7. Give a reason for your answer. (3)

4.6 If HCl should react with NH<sub>3</sub> in a sealed container, a salt will be formed. Give the NAME and FORMULA of the salt that is formed. (2)

(16)

## QUESTION 5

The graph below shows the change in energy that takes place when a hydrogen (H) atom approaches a bromine (Br) atom.



5.1 Define bond length. (2)

5.2 From the graph, write down the:

5.2.1 Bond length, in pm, of the H-Br bond (2)

5.2.2 Energy, in kJ.mol<sup>-1</sup> needed to break the H-Br bond (2)

5.2.3 Name of the potential energy represented by E. (1)

5.3 How will the bond length of an H-F bond compare to that of the H-Br bond? Write down EQUAL TO, SHORTER THAN or LONGER THAN. Give a reason for the answer. (2)

[9]

## QUESTION 6

6.1 Define the term molar mass of a substance. (2)

6.2 Calculate the number of moles of water in 100g of water. (3)

6.3 Methyl benzoate is a compound used in the manufacturing of perfumes. It is found that a 5,325g sample of methyl benzoate contains 3,758g of carbon, 0,316g of hydrogen and 1,251g of oxygen.

6.3.1 Define the term empirical formula. (2)

6.3.2 Determine the empirical formula of methyl benzoate. (7)

6.3.3 If the molar mass of methyl benzoate is  $136\text{g}\cdot\text{mol}^{-1}$  what is its molecular formula? (2)

(16)

TOTAL = 100