



ALEXANDER ROAD HIGH SCHOOL

SEPTEMBER 2018

1 HOUR

PHYSICAL SCIENCE CONTROL TEST

CO, JA, MH

TOTAL = 60

GRADE 11

Instructions

- The question paper consists of 7 questions.
- Answer all the questions.
- Answer section A on the answer sheet provided AND section B on folio sheets.
- Rule off after each question in Section B.
- 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.
- Formulas and a periodic table have been included at the end of the question paper

SECTION A

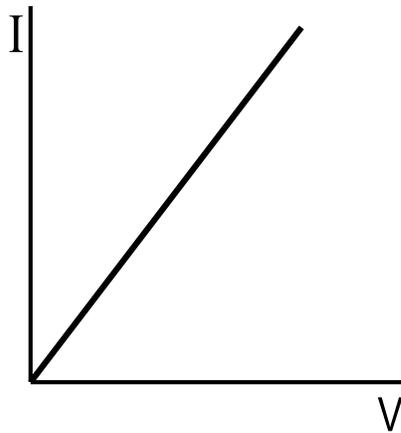
- Answer on the answer sheet -

QUESTION 1: Multiple choice

Four possible options are provided as answers to the following questions. Each question has only 1 correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.6) on the answer sheet.

- 1.1 Which ONE of the following combination of acids shows two diprotic acids and one monoprotic acid, respectively?
- A H_2SO_4 , H_2PO_4^- , CH_3COOH
- B HCl , HNO_3 , H_2SO_4
- C CH_3COOH , H_2SO_4 , $\text{H}_2\text{PO}_4^{2-}$
- D HCl , CH_3COOH , H_2SO_4
- 1.2 Which ONE of the following equations represents a REDOX reaction?
- A $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$
- B $\text{AgNO}_3 + \text{KI} \rightarrow \text{AgI} + \text{KNO}_3$
- C $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- D $\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$

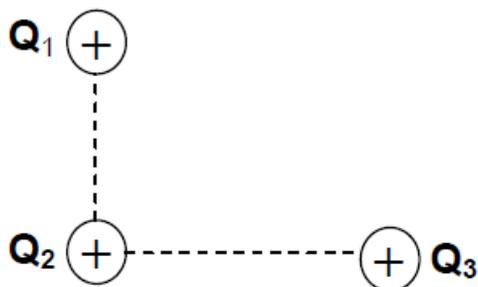
1.3 Consider the following I vs V graph:



What ONE of the following statements is correct?

- A The current is directly proportional to the voltage AND the gradient of the graph is the resistance (R).
 - B The current is directly proportional to the voltage AND the gradient of the graph is the inverse of the resistance ($1/R$).
 - C The current is not directly proportional to the voltage AND the gradient of the graph is the resistance (R).
 - D The resistor is non-Ohmic in nature.
- 1.4 A light bulb is marked $6W : 220V$. Assuming the light bulb is 100% efficient, the energy consumed by the light bulb in 4 hours is:
- A 86,4 kJ
 - B 86,4 kWh
 - C 8,07 kJ
 - D 24 kWh

- 1.5 Three identical positive point charges, Q_1 , Q_2 and Q_3 , are initially situated on a smooth flat table at the corners of a right-angled triangle. The diagram below shows the charges as viewed from above.



Which ONE of the following diagrams shows the direction in which Q_2 will move as a result of the electrostatic forces exerted by Q_1 and Q_3 on it?



- 1.6. The electrostatic force between two charged spheres, a distance r apart, is F . When the charge on each sphere is tripled and the distance between the spheres is also tripled, the force between the spheres will now be ...

- A $\frac{1}{3} F$
 B F
 C $3F$
 D $6F$

[2 x 6 = 12]

SECTION B

QUESTION 2

2. Answer the questions based on the following reaction:



- 2.1 Identify and label ONE conjugate acid-base pair. (1)
- 2.2 Which acid base theory did you use to determine the conjugate pair in the previous question; Lowry-Bronsted or Arrhenius? (1)
- 2.3 Define what an Arrhenius base is. (2)
- 2.4 Write down the FORMULAS of the **products** (only) for the reaction when CH₃COOH is mixed with water. (1)
- 2.5 Give the name of CH₃COOH. (1)
- 2.6 What would be the colour of methyl orange in the solution in 2.4? (1)

[7]

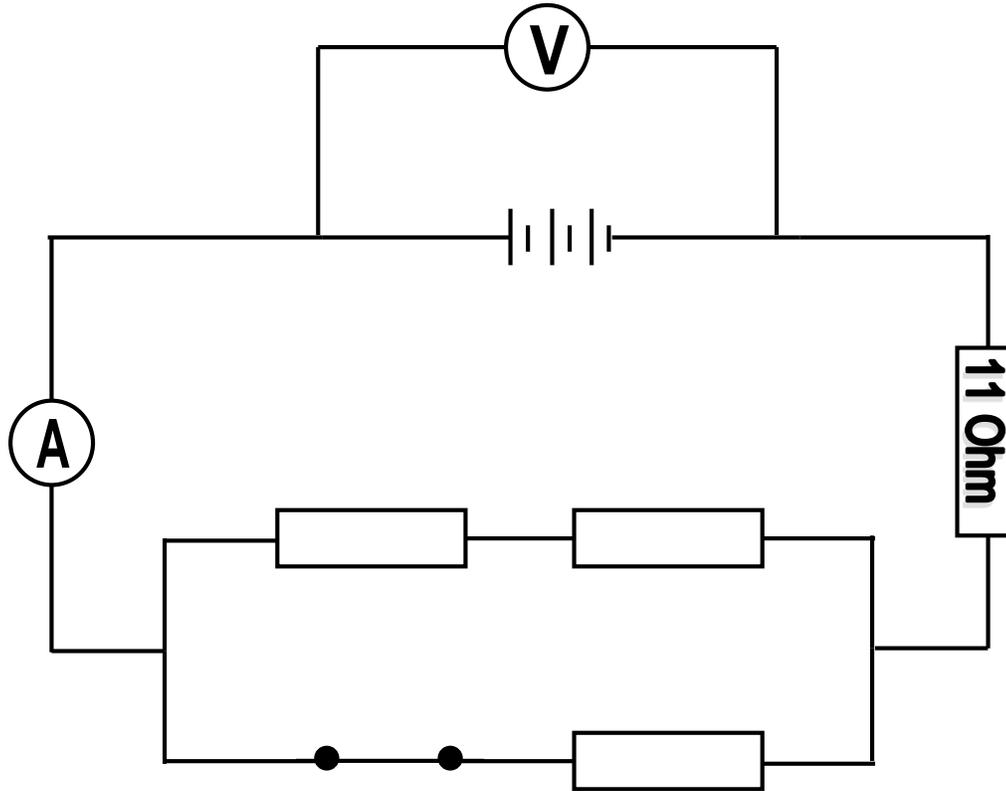
QUESTION 3

3. Balance the following equation by using the half reaction table (ion-electron method).
- 3.1 $\text{NO}_3^- + \text{H}_2\text{S} \rightarrow \text{S} + \text{NO}$ (in an acidic medium) (4)
- 3.2 Change the above equation to an **alkaline** medium. (1)
- 3.3 What is the oxidation number of N in NO_3^- ? (1)
- 3.4 What is the reducing agent in the reaction? (1)
- 3.5 Define *reduction* in terms of *oxidation numbers*. (2)

[9]

QUESTION 4

In the circuit below the resistance of the battery, ammeter and connecting wires can be ignored. The power of the 11Ω resistor is 25W . The effective resistance across the parallel part of the circuit is $13,92\Omega$.



- 4.1 State *Ohm's law* in words. (2)
- 4.2.1 Calculate the reading on the voltmeter (V). (6)
- 4.2.2 How would the reading on the ammeter be affected if the switch was opened? Write only INCREASE, DECREASE or REMAIN THE SAME. (1)
- 4.3 Sonwabile installs a 2500W geyser in her roof.
- 4.3.1 Calculate the cost to operate the geyser per one 30-day month if the geyser is operational for an average of 8 hours per day. The price of electricity where Sonwabile stays is $\text{R}1,20 / \text{kWh}$. (2)
- 4.3.2 Suggest ONE way Sonwabile can reduce the amount calculated in 4.3.1. (1)

[12]

QUESTION 5

Gold ore is processed using the cyanidation process. Initially sodium cyanide ($NaCN$) solution is added to the gold ore causing it to dissolve according to the following balanced chemical equation:



5.1 Identify BOTH the oxidising and reducing agents in the above reaction. (2)

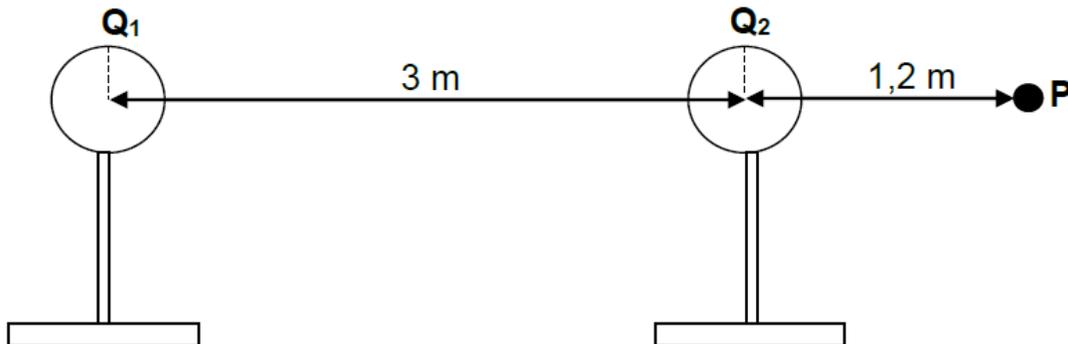
5.2 Give a property of gold and explain how this property makes gold useful to us in our everyday lives. (2)

[4]

QUESTION 6

6.1 Define the term electric field at a point. (2)

6.2 Two metal spheres charges, Q_1 and Q_2 , on insulated stands carry charges of $+4 \mu C$ and $-2 \mu C$ respectively are separated by a distance of 3 m between their centres. A point charge P is 1,2 m from Q_2 in the same plane as indicated in the diagram below.



Calculate the net electric field strength at point P due to Q_1 and Q_2 . (6)

[8]

QUESTION 7

A single circular loop of wire, 15 cm in diameter, is placed in a 6 mT magnetic field.

It is removed from the magnetic field in 0,05 s.

7.1 Calculate the flux that is linked to this coil. (4)

7.2 The average induced emf. (4)

[8]

TOTAL 60 MARKS