



**ALEXANDER ROAD HIGH SCHOOL**  
**PHYSICAL SCIENCE CONTROL TEST**  
**GRADE 11**

SEPTEMBER 2014

1 HOUR

IC, CO, KB

TOTAL = 60

Instructions

- The question paper consists of 5 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.
- A list of relevant formulas appears at the end of the question paper.
- Round off to two (2) decimal places where necessary.
- A periodic table has been included at the end of the question paper.

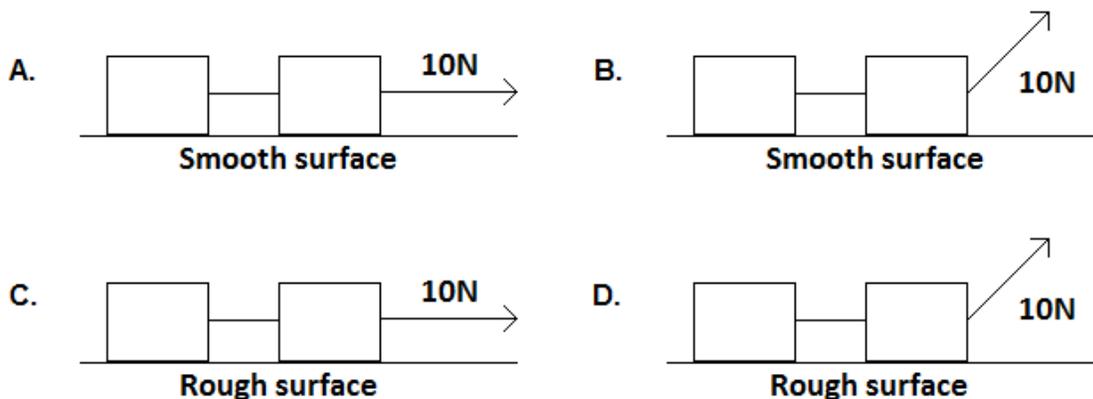
**SECTION A**

- 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 make a Cross (X) over the letter (A – D) next to the relevant question number (1.1 – 1.6)

- 1.1 If two identical masses are being pulled by a 10N force, in which of the following scenarios would the acceleration of the system be the most?

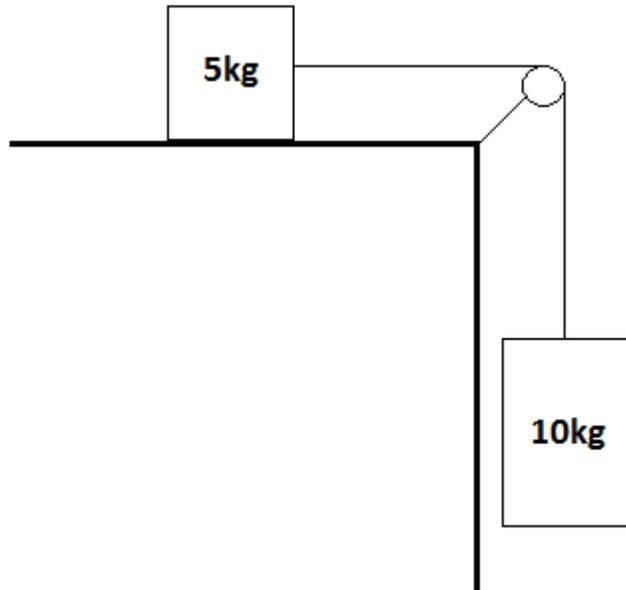




## SECTION B

### QUESTION 2

- 2.1 State Newton's second law. (3)
- 2.2 Two masses are connected by a rope of negligible mass and are allowed to run freely over a frictionless pulley. The 5kg mass is resting on a ROUGH surface and the 10kg mass is hanging freely. The coefficient of kinetic friction for the surface and the 5kg mass is 0,8.



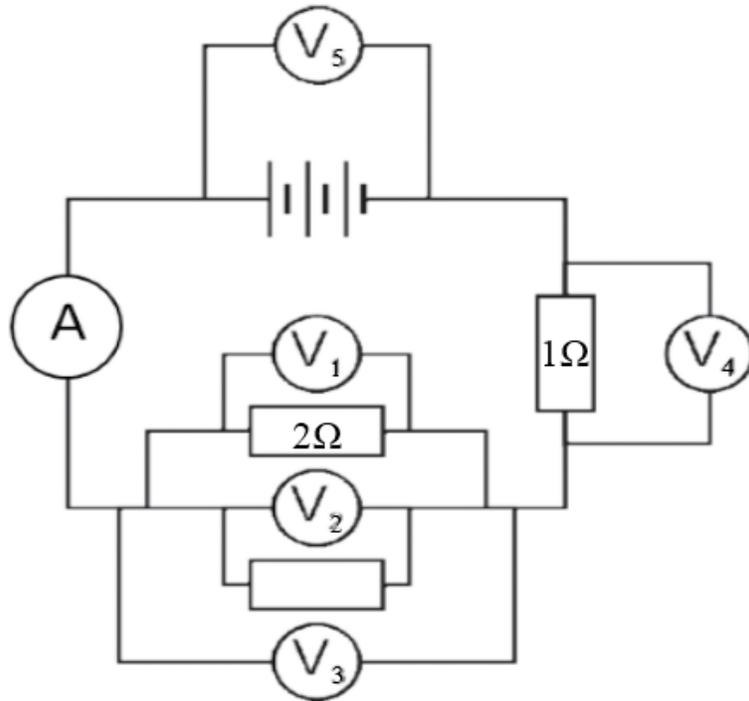
- 2.2.1 Calculate the magnitude of the frictional force acting on the 5kg block. (3)
- 2.2.2 Calculate the magnitude of the acceleration of the system. (5)
- 2.2.3 Calculate the magnitude of the tension in the rope. (2)
- 2.3 Two spheres of masses 10kg and 2kg are placed so that the distance between their centres is 1,5m.
- Calculate the gravitational force of attraction between them. (3)

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**[16]**

### QUESTION 3

- 3.1 Explain the difference between a non-Ohmic and an Ohmic resistor. (3)
- 3.2 Three 1,5 V cells are connected as shown in the diagram below. A  $2\ \Omega$  resistor (under  $V_1$ ) is in parallel with an unknown resistor. The combined parallel resistance is  $1,5\ \Omega$ . The reading on  $V_4$  is 3 V and the resistance under  $V_4$  is  $1\ \Omega$ . Answer the questions that follow:



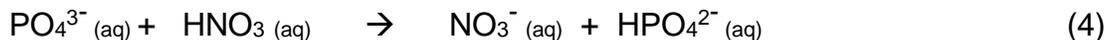
- 3.2.1 What is the reading on voltmeter  $V_5$ ? (1)
- 3.2.2 What is the reading on  $V_1$ ? (2)
- 3.2.3 Calculate the resistance of the unknown resistor. (3)
- 3.2.4 The resistor under  $V_4$  becomes hot; it means that energy is transferred in the resistor. Calculate the rate at which energy is dissipated if 180 C of charge flows through the resistor in 1 minute. (3)
- 3.3 A 60 W light bulb that needs to shine for 8,5 hours every night can be replaced by a 5W energy saver light bulb. Calculate, to the nearest RAND, how much money can be saved in a 30 day month if the cost of electricity is R1,65 per unit. (4)

**[16]**

#### **QUESTION 4**

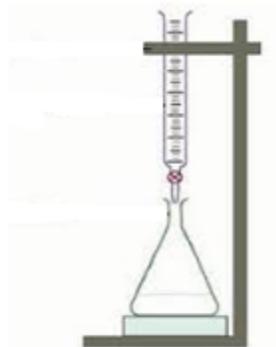
4.1 Define an acid and a base according to the Lowry-Bronsted theory. (2)

4.2 Identify the Conjugate acid-base pairs in the following reaction:



4.3 What is an ampholyte? (1)

4.4 A learner wants to perform a neutralisation reaction between sulphuric acid ( $\text{H}_2\text{SO}_4$ ) and potassium hydroxide (KOH).  $\text{H}_2\text{SO}_4$  was placed in the conical flask and KOH was placed in the burette. A few drops of phenolphthalein was added to the  $\text{H}_2\text{SO}_4$  solution and this was then titrated with the KOH. Using this information answer the following questions.



4.4.1 What colour change occurs when sufficient KOH is added? (Be specific) (1)

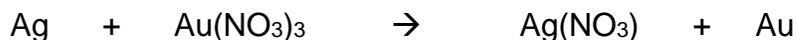
4.4.2 Give a balanced equation for the neutralisation reaction taking place. (2)

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**[10]**

#### **QUESTION 5**

5. Consider the following redox reaction and answer the questions that follow:



5.1 Give the oxidation half reaction. (2)

5.2 Give the reduction half reaction. (2)

5.3 Balance the redox reaction using the ion-electron method. (2)

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**[6]**

**TOTAL 60 MARKS**

## Relevant formulas

**Mechanics:**  $F_{\text{res}} = F_{\text{net}} = m \cdot a$        $f_s = \mu_s N$        $f_k = \mu_k N$

$$F = \frac{G m_1 m_2}{d^2} \quad (G = 6,7 \times 10^{-11} \text{Nm}^2 \text{kg}^{-2})$$

$$F_g = mg \quad (g = 9,8 \text{ms}^{-1})$$

**Circuits:**  $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$       or       $R_p = \frac{R_1 \times R_2}{R_1 + R_2}$

$$V = I R$$

$$Q = I t$$

$$W = VQ = V I t = \frac{V^2 t}{R} = I^2 R t$$

$$P = V I = \frac{V^2}{R} = I^2 R$$

$$E = P t$$