



SEPTEMBER 2015

ALEXANDER ROAD HIGH SCHOOL

1 HOUR

KB, CO, MH

PHYSICAL SCIENCE CONTROL TEST

TOTAL = 60

GRADE 11

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 on the back of the answer sheet
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SECTION A

- Answer on the answer sheet -

QUESTION 1: Multiple choice

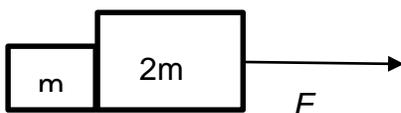
Four possible options are provided as answers to the following questions. Each question has only 1 correct answer. Choose the correct answer and make a Cross (X) over the letter (A – D) next to the relevant question number (1.1 – 1.6)

- 1.1 A difference between a current divider and a voltage divider is:
- A current flows in opposite directions through a parallel branch and voltage remain in one direction
 - B the addition of the currents in each parallel branch and the addition of voltages in each parallel branch give the total
 - C The current is the same in each branch with any type of resistor and the voltage is split proportionally over the resistors in parallel
 - D The total current is obtained by adding each parallel branch's current and the voltages over each series component is added to obtain the total voltage.

1.2 The equivalent unit for Watt is:

- A J.C⁻¹
- B J.s⁻¹
- C C.J⁻¹
- D C.s⁻¹

1.3 Two blocks of mass m and $2m$, in contact with each other, are placed on a frictionless, horizontal surface. What is the magnitude of the acceleration of the system of masses when a horizontal, non-zero resultant force F is applied to it to the right, as shown?



- A $\frac{F}{3m}$
- B $\frac{F}{2m}$
- C $\frac{2F}{3m}$
- D $\frac{F}{m}$

1.4 John lifts a mass of 200kg, with uniform velocity, to a certain height in 2 seconds. What is the magnitude of the force that he exerts on the mass?

- A 4 000 N
- B 1 960 N
- C 1 000 N
- D 400 N

1.5 What is the conjugate base of H_2CO_3 ?

- A H_3CO_3
- B HCO_3^{-1}
- C CO_3^{-2}
- D H_2CO_3

1.6 Nitric acid (HNO_3) is reacted with calcium hydroxide $\text{Ca}(\text{OH})_2$, the products we would expect would be...

- A CaNO_3 and H_2O
- B Ca_2NO_3 and H_2O and CO_2
- C $\text{Ca}(\text{NO}_3)_2$ and H_2O
- D $\text{Ca}(\text{NO}_3)_3$ and H_2O and CO_2

SUB – TOTAL: [12]

SECTION B

QUESTION 2

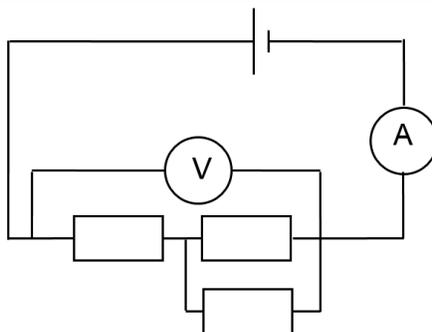
2.1 Calculate the (31 day) monthly cost of the electricity that will be used when a 2000W electric stove is used for 90 minutes every day and the cost of electricity is R1,70 per unit. (3)

2.2 Define:

2.2.1 Power

2.2.2 Current strength (4)

2.3 The following circuit diagram shows a cell with 2 resistors in parallel and one resistor in series, a voltmeter and an ammeter. Twenty coulomb of charge flow through the ammeter in 2 minutes.



2.3.1 Calculate the current strength. (3)

2.3.2 If the 3 resistors are identical (assume resistance = R), what will be the current strength in each parallel branch? (1)

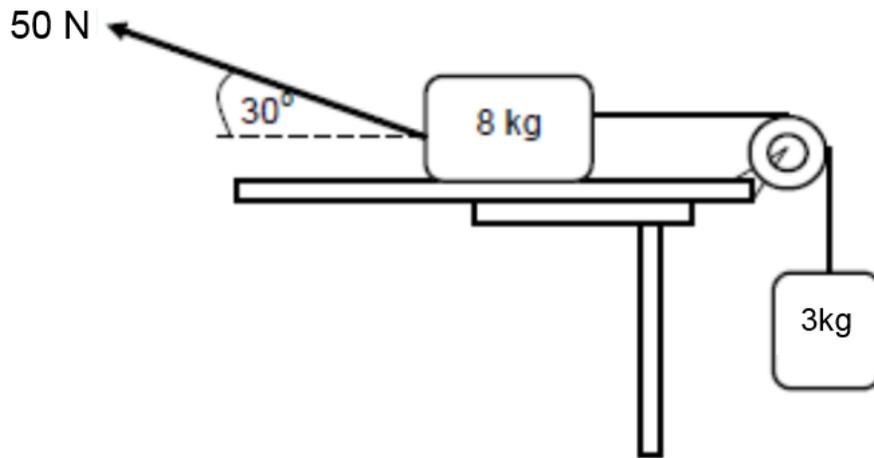
2.3.3 The reading on voltmeter V is 6 V. Calculate the resistance of each resistor. (5)

[16]

QUESTION 3

A block of mass 8 kg resting on a rough horizontal table is connected by a light inextensible string which passes over a light frictionless pulley to another block of mass 3 kg. The 3kg block hangs vertically as shown in the diagram below.

A 50 N force is applied to the 8 kg block at an angle of 30° to the horizontal, causing the block to slide to the left. The coefficient of kinetic friction between the 8kg block and the surface of the table is 0,25. Ignore the effects of air friction.



- 3.1 Draw a free-body diagram showing ALL the forces acting on the 8kg block. (5)
- 3.2 Write down Newton's second law of motion in words. (2)
- Calculate the magnitude of the:
- 3.3 Normal force acting on the 8 kg block (3)
- 3.4 Tension in the string connecting the two blocks (6)

[16]

QUESTION 4

- 4.1 Define an acid and base according to the Lowry-Bronsted theory (2)
- 4.2 Consider the following reaction and identify the:



- 4.2.1 Acid
- 4.2.2 Base

4.2.3 Conjugate acid

4.2.4 Conjugate base (4)

4.3 Water is considered an ampholyte. What is meant by this? (2)

4.4 Which indicator will be the most suitable for the following titrations? Use the list of indicators below

bromothymol blue, phenolphthalein, methyl orange, cabbage juice

4.4.1 Titration between a strong acid and a weak base. (1)

4.4.2 Titration between a strong acid and a strong base (1)

4.5 A lead bar is placed in a solution of silver nitrate. After a while the lead bar gets a greyish coating on the surface that is placed in the solution.

The following redox reaction occurs:



4.5.1 Balance the equation using the ion-electron method. (4)

4.5.2 What is the spectator ion in this reaction? (1)

4.5.3 What do you think the greyish coating on the lead bar is? (1)

[16]

TOTAL 60 MARKS

Relevant formulas

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

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

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

Circuits: $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$ or $R_p = \frac{R_1 \times R_2}{R_1 + R_2}$ $V = I R$ $Q = I t$

Energy and Power: $W = VQ = V I t = \frac{V^2 t}{R} = I^2 R t$

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

$$E = P t$$