ALEXANDER ROAD HIGH SCHOOL

SEPTEMBER 2010 — 1 HOUR

PHYSICAL SCIENCE CONTROL TEST

IC, MA, CO — TOTAL = 60

GRADE 11

Instructions

- The question paper consists of 6 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 data sheet is provided for your use.
- LO 1,2, 3 AS 1,2, 3

SECTION A

- Answer on the answer sheet -

QUESTION 1: One-word questions

1.1 Ratio of load to effort. (1)

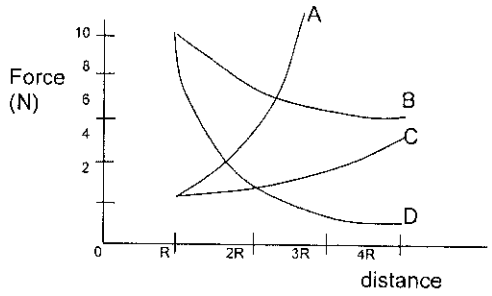
1.2 The ion or molecule that forms after a base has accepted a proton. (1)

1.3 The number on the periodic table that represents a multiple of the atomic mass unit (amu). (1)

[3]

QUESTION 2: Multiple choice

2.1 Which of the following graphs best represents the variation of the gravitational force on a **1** kg mass piece at various distances from the centre of the earth?
Distance is measured in terms of the earth's radius (R).



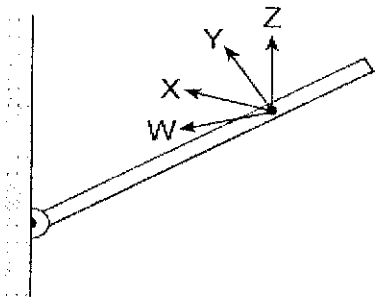
A. Graph A

B. Graph B

C. Graph C

D. Graph D

2.2 In which direction should a force act on the boom so that it creates a **maximum** torque about the hinge?



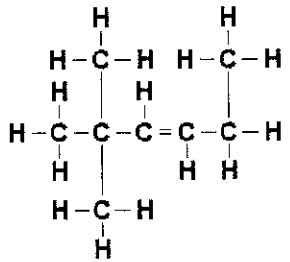
A. Towards W

B. Towards X

C. Towards Y

D. Towards Z

2.3 Consider the following molecule...



According to IUPAC naming rules, which of the following names is the most correct for this molecule...

A. 2,2,5 – trimethylpent-3-ene
B. 2,2 – dimethylhex-3-ene
C. 5,5 – dimethylhex-3-ene
D. none of the above

2.4 In the reaction... $H_2SO_4 + X \longrightarrow HSO_4^- + H_2O$

X is a/an...

A. Base with formula H_3O^+
B. Base with formula OH^-
C. Acid with formula H_3O^+
D. Acid with formula H_3O^+

2.5 2,5 mol Na_2CO_3 contains.... Atoms

A $2,5 \times N_A$
B $2,5 \times 2 \times N_A$
C $2,5 \times (2+1) \times N_A$
D $2,5 \times (2+1+3) \times N_A$

2.6 How many moles of water can form when 0, 2 mol Oxygen reacts with excess hydrogen?

A $0,2 \times 2$
B $0,2 \times N_A$
C $0,2 \div 2$
D $0,2 \div N_A$

[6 x 2 = 12]
SUB – TOTAL: 15

SECTION B

QUESTION 3

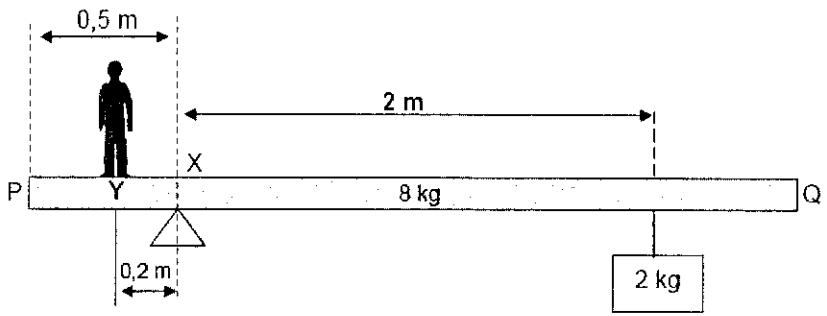
3.1 A force exerted by the Earth on a planet called Saturn is 1,13 x10^{14} N. The masses of Earth and Saturn are 5,97x10^{24} kg and 7,15x10^{28}kg respectively. Calculate the distance between their centres. Write your answer in kilometres. (5)

3.2 If the mass of one planet is doubled and the distance between the two planets is reduced to a third, what will happen to the force? (2)

[7]

QUESTION 4

4. Your study group wants to determine the weight of a friend. You have a 3 m long plank, PQ, having a mass of 8 kg. You set up the plank with the pivot at **X**, 0,5 m away from point P. Your friend stands at point Y, 0,2 m away from the pivot. In order to balance the plank horizontally, a 2 kg mass is hung 2 m away from the pivot



4.1 Draw a labelled force diagram indicating ALL the forces acting on the friend, the plank and the mass while the plank is horizontal. (3)

4.2 Calculate the weight of your friend. (5)

[8]

QUESTION 5

5.1 Consider the following reaction.

$$5SO_3^{2-} + 2MnO_4^- + 6H^+ \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 3H_2O$$

5.1.1 What is the oxidation number of Mn in MnO_4^-? (1)

5.1.2 What is the oxidation number of S in SO_3^{2-}? (1)

5.1.3 Identify the reducing agent. (1)

5.1.4 Write down the formula for the spectator ion in the reaction. (1)

5.2 The following reaction is an acid-base reaction.

$$CH_3COOH + KOH \rightarrow KCH_3COO + H_2O$$

Write down the formula for the following in the reaction...

a) The acid (1)
b) The base (1)
c) The conjugate Base (1)
d) Which species in the reaction is amphiprotic? (1)

5.3 Consider the following TWO reactions.

Reaction 1: $X \xrightarrow[\text{Heat}]{H_2SO_4} H-\underset{H}{\overset{H}{C}}=\underset{H}{\overset{H}{C}}-H + H_2O$

Reaction 2: $H-\underset{H}{\overset{H}{C}}=\underset{H}{\overset{H}{C}}-H + Y \longrightarrow$ **BROMOETHANE**

5.3.1 Give a possible structural formula for molecule X. (2)

5.3.2 Give the general name for the first reaction. (1)

5.3.3 Give the specific name for the second reaction. (2)

5.3.4 Give the formula for molecule (1)

5.3.5 What part does H_2SO_4 play in the second reaction? (1)

[15]

QUESTION 6

6.1 Define the mole. (2)

6.2 Calculate the amount of Hydrogen atoms in 2 mole of hydrogen. (2)

6.3 Calculate the mass (in grams) of $1,806 \times 10^{24}$ sodium atoms. (3)

6.4 Nicotine is a poisonous compound found in tobacco leaves. It consists of 74% carbon, 8,65% hydrogen and 17,35% nitrogen. Calculate the real molecular formula of nicotine if it has a molar mass of 162 $g.mol^{-1}$ (4)

6.5 Sodium hydroxide and nitric acid are used in an acid base titration. The incomplete and therefore also unbalanced equation is given and you need to **standardise the acid.**

_____ + HNO_3 ⟶ $NaNO_3$ + _____

You know that 15,3cm^3 of the base with concentration 4,61 $mol.dm^{-3}$ was used and 23,5 cm^3 of the acid was used. Standardise the acid. (4)

[15]

TOTAL 60 MARKS