



ALEXANDER ROAD HIGH SCHOOL

MARCH 2015

1 HOUR

PHYSICAL SCIENCE CONTROL TEST

MH, CO, KB

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
 - 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 ONE correct answer. Choose the answer and make a cross (X) in the block (A–D) next to the question number (1.1 – 1.6) on the attached ANSWER SHEET.

1.1 Which one of the following molecules is an example of a dative covalent bond

- A KBr
- B NH₃
- C H₃O⁺
- D CO₂

1.2 Which of the following bonds will have the highest bond energy?

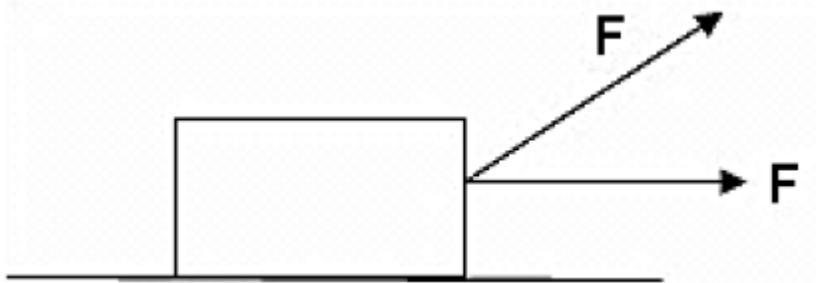
- A C-C
- B C=C
- C Br-Br

D I-I

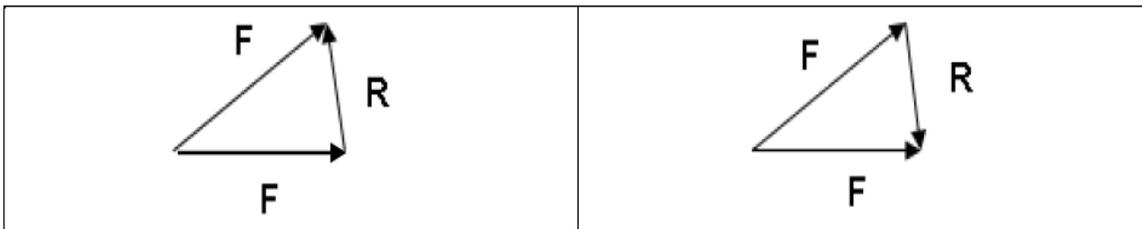
1.3 How does the gravitational force between two objects change when the mass of one of the objects is double and the distance between the midpoints of the objects is halved? The force is

- A four times bigger
- B stays the same
- C eight times bigger
- D half of the original

1.4 A crate is pulled along a smooth frictionless surface by two force, each with a magnitude F , as shown in the diagram.

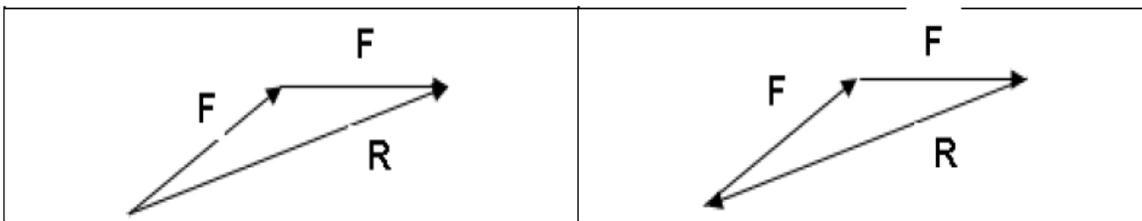


Which vector diagram correctly shows how the resultant force R on the crate can be determined?



A

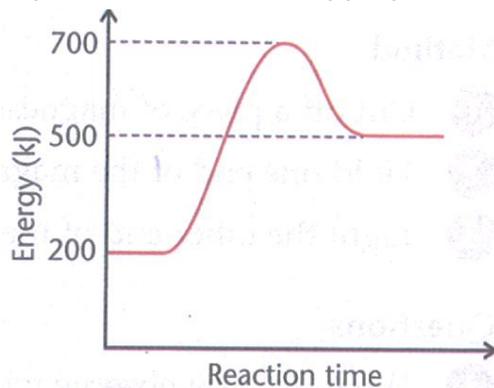
B



C

D

1.5 For the following graph, select the most appropriate description.



- A endothermic reaction with 300kJ change in heat of the reaction
- B exothermic reaction with 500kJ activation energy
- C endothermic reaction with 200kJ change in heat of the reaction
- D exothermic reaction with 200kJ change in heat of the reaction

1.6 If the pressure on a sealed container is doubled and the temperature is a tenth of the original temperature, how will the new volume (V_{new}) compare to the original volume (V_{old})?

- A $V_{\text{new}} = 20 \times V_{\text{old}}$
- B $20 \times V_{\text{new}} = V_{\text{old}}$
- C $V_{\text{new}} = 10 \times V_{\text{old}}$
- D $V_{\text{new}} = 1/10 \times V_{\text{old}}$

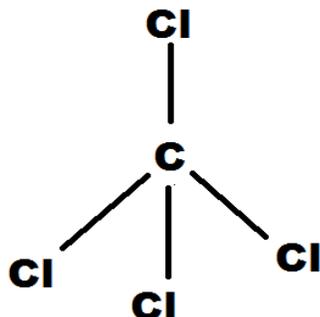
SUB – TOTAL: 12

SECTION B

QUESTION 2

2.1 Draw the Lewis structure of CCl_4 (2)

2.2 The diagram below show the shape of CCl_4 . Answer the questions that follow



2.2.1 What is the name given to this shape? (1)

2.2.2 Use the electronegativity values to determine the polarity of the C-Cl bond (show partial positives and negatives in your answer). (2)

2.2.3 Is this molecule polar or non-polar? (1)

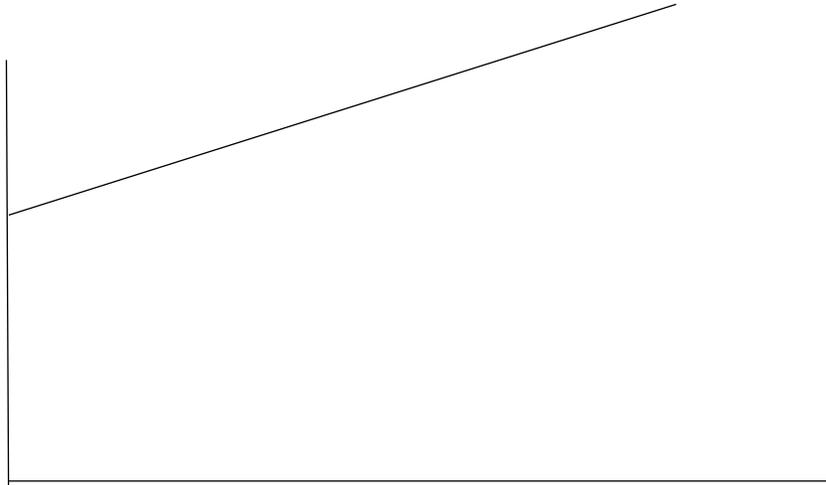
2.3 During an experiment a learner uses Chloroform as a solvent to dissolve certain solutes. The learner finds that I_2 dissolves in the solvent but NaCl does not. Explain why this is the case. (5)

2.4 Which substance, BF_3 or HF , will have a higher boiling point? Explain. (5)

[16]

QUESTION 3

3.1 The experimental finding and establishment of a temperature scale that gives us a direct proportionality between the pressure and the temperature of an enclosed gas, was done by people like Charles and Gay-Lussac. We did it in the practical laboratory. Draw a graph of Pressure vs Temperature (horizontal axis) of this finding and indicate how the value of **absolute zero** was found. Redraw the axes below and complete the given graph. Name the axes properly and indicate the value of absolute zero in degrees Celcius **and** the new scale on the same axis.



(3)

3.2 6 grams of Helium is sealed in a container at a pressure of 120 kPa and a temperature of 25^o C. Calculate the volume of the gas in cubic decimeters. (5)

3.3 The gas inside a sealed container has a volume of 120 cm³. If this container is punctured and the gas leaks out, and only 1 cm³ of the gas remains, what was the original pressure in the container? (4)

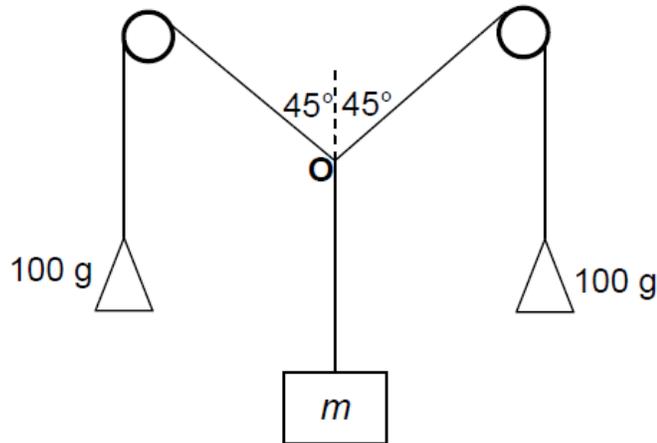
3.4.1 Give Gay-Lussac's law in words. (2)

3.4.2 Explain the law (in 3.4.1) by referring to the Kinetic model of gases. (2)

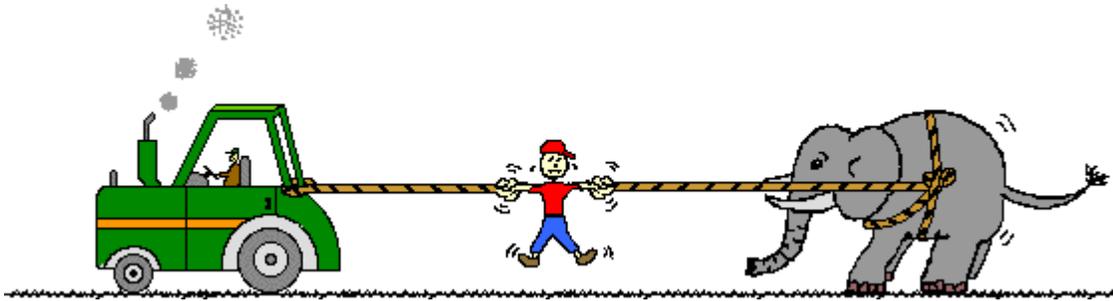
[16]

QUESTION 4

- 4.1 In an experiment to determine the unknown mass of an object, two 100g masses and an object of unknown mass, m , are suspended from three strings, as shown in the diagram below. The strings are light and inextensible. Two of the strings run over frictionless pulleys. When the three forces acting on knot **O** are in equilibrium, the angles between the two strings and the vertical are 45° each, as shown in the diagram.



- 4.1.1 Define the term *equilibrium* as used in this experiment. (1)
- 4.1.2 Draw a *force diagram* showing all the forces acting on knot **O**. Indicate the magnitude of each force on the diagram. (3)
- 4.1.3 Determine the mass of m . (7)
- 4.2.1 State *Newton's Third Law* in words. (2)
- 4.2.2 Identify three action-reaction pairs in the following picture. (3)



[16]

TOTAL 60 MARKS

Gas Laws:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$PV = nRT$$

$$n = \frac{m}{M}$$

Mechanics:

FORCE/KRAG

$F_{\text{net}} = ma$	$w = mg$
$F = \frac{Gm_1 m_2}{r^2}$	$f_{s(\text{max})} = \mu_s N$
$f_k = \mu_k N$	