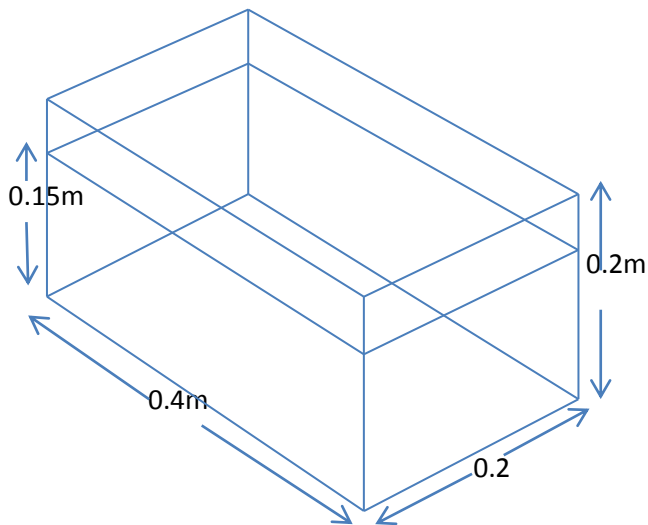# MUCHINGA PROVINCE JETS FAIR, 2014

JUNIOR PSCIENCE OLYMPIADS 2014

ANSWER ALL QUESTIONS

QUESTION 1

A rectangular shaped aquarium with base measuring 0.40m x 0.20m and height 0.2m is filled with water to a depth 0.15 m as shown below.

(a) Calculate the volume of water in the aquarium. **[2]**

(b) What is the mass of this water in kg? (Density of water = 1000Kg/m^3) **[2]**

(c) What is the weight of the water? **[2]**

(d) 1.92g of ornamental gravel is spread on the base of the tank and the water level rises to a height of 0.16 m.

(i) Calculate the volume of the displaced water. **[2]**

(ii) What is the density of the gravel? **[2]**

(e) State two uses of the density of a material. **[2]**

(f) A tin containing 5000cm^3 of paint has a mass of 7 Kg. If the mass of the empty tin including the lid is 0.5 Kg, calculate the density of the paint. **[2]**

(g) What is relative density? **[1]**

QUESTION TWO

Given that E={Natural numbers less than 6} and A ∩ B={   }, A={1,2} ,(A ∪ B)′ = {5}

    (a) Illustrate this information on a Venn diagram   (1 mark)

    (b) Find n(B)′   (1 mark)

    (c) Find n(A∩ B)′   (1 mark)

    (d) Find n(B)   (1 mark)

    (e) State whether the statement below is true or false about sets A and B.

       "Set A is equal to set B"   (1 mark)

QUESTION THREE

Some reactions of metals W, X, Y and Z are given below.

METAL	REACTION WITH WATER	REACTION WITHDILUTE HYDROCHLORIC ACID
W	A few bubbles from slowly in cold water.	Vigorous reaction. Gas given off
X	Vigorous reactions. Metals melts. Gas given off.	Explosive reaction should not be attempted.
Y	No reaction	No reaction
Z	Does not react with cold water. Hot metal reacts with steam	Steady fizzing

(a) arrange these metals in order of reacting.

    Most reactive……………………………………………….[1]

    Least reactive……………………………………………….[1]

(b) which of these metals could be

(i) Magnesium……………………………………………….[2]

(ii) Copper……………………………………………………[2]

ANSWERS FOR QUESTION ONE

V = l x b x h

= 0.4 m x 0.2 m x 0.15 m

= **0.012 m^3**

(b) D = m/V

m = D x V

= 1000 Kg/m^3 x 0.012 m^3

= **12 Kg**

(c) W = m g

= 12 Kg x 9.8 N/Kg

= **117.6 N**

(d) (i) V = l x b x h

= 0.4 m x 0.2 m x o.01 m

= **0.0008 m^3**

(ii) D = m/V

= 1.92 Kg /0.0008 m^3

= **2400Kg/m^3**

(e) (i) It is used to identify substances

(ii) It is used for determining the purity of a substance.

(iii) It is used for separating chemicals and /or substances in industries.

(f) D = m/V

= $\dfrac{7\ Kg\ -0.5\ Kg}{V}$

= 6500g/5000cm^3

= **1.3g/cm^3 or 1300 Kg/m^3**

(f) Relative density is the ratio of the mass of any given volume of a substance to the mass of an equal volume of water.

SOLUTIONS F OR QUESTION 3

(g) (a) X W Z Y

(h) -For most reactive X and least Y

(i) -All other responsesl0]

(j) (b) Magnesium W

(k)   Copper   Y