SHARP

**Worksheet 18: Measurement**

**Grade 10 Mathematics**

1. Give the formula for the volume and surface area of each of the following solids:

   a) sphere
   b) pyramid with a square base
   c) cone
   d) cylinder
   e) cube
   f) rectangular prism
   g) pyramid with an equilateral triangle base

2. For each of the following give the new formula for volume and surface area when the measurement given in brackets is multiplied by a factor of

   i) 2 and ii) k

   a) sphere (r)
   b) cone (r)
   c) pyramid with a square base (l)
   d) rectangular prism (b)
   e) cube (l)
   f) cylinder (r)
   g) pyramid with an equilateral triangle base (l)

3. An ice cream cone is filled with a spherical scoop of ice-cream. The radius of the ice cream is 3cm and the height of the cone is 8cm.

   a) If the ice-cream is deep-fried, what is the surface area that needs to be coated in batter?
   b) What is the volume of ice cream that will be eaten?
   c) If the ice-cream is placed into the cone so that just the top half of the scoop is visible, and the entire cone and ice-cream deep fried, what is the surface area that needs to be coated in batter?
   d) What is the total volume of deep fried ice cream and cone that will be eaten?

4. A doll house is made up a rectangular prism with a square pyramid as its roof. The height of the house is 50cm and the width and length of the house is 70cm. The height of the roof is 20cm.

a) If Thandi wants to paint the outside her doll house, what is the surface area that she would need to cover for both the roof and the walls?

b) Thandi's brother decides to fill the doll house with popcorn as a prank.

i) What is the volume of popcorn that he needs to make?

ii) If the pot that he makes the popcorn has a diameter of 20cm and a height of 10cm, how much popcorn can he make in one pot?

iii) How many pots of popcorn would he need to make in order to fill the doll house?

c) Thandi's mom is very upset by the prank and makes Thandi's brother turn the popcorn into a Christmas garland.

i) Assume that each piece of popcorn is in the shape of a sphere, with a diameter of 2 cm. How many pieces of popcorn would there be for the garland?

ii) How long would the garland of popcorn be?

5. A rectangular milk carton, holds 2.1 liters of milk and 1ml = 1cm$^3$. The base of the carton is a square.

a) If the width of the carton is $\frac{1}{3}$ of the height, determine the width, length and height of the carton.

b) If the width and length of the carton is doubled, and the height remains the same, how much milk will the carton now hold?

c) If the height of the carton is halved, and the width and length are the same as in question a, how much milk will the carton hold.

d) If the milk is decanted into a cylindrical milk jug, with the same height as in question a, what will the radius of the jug be?

6. A rectangular box is filled with oranges. The box has length 21cm and height 42 cm, and a volume of 55 566 cm$^3$.

a) What is the width of the box?

b) How much space would 4 boxes stacked together take up.

c) If the diameter of an orange is 7cm, what is the volume of one orange?

d) How many oranges would fit into 1 box?

e) What is the actual volume of air in the box, between the oranges?

f) If the oranges start to go off, and their volume shrinks by 20%, what is the diameter of the oranges now?