**Lesson 5:**

**Goal: To solve volume problems using the Imperial and SI systems of measurement.**

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**Note:**

**In Canada, we use the term imperial units to mean British imperial units.**

**The US also uses an imperial system, but the sizes of its units for volume and capacity are different from the British unit.**

**Take note of this on your conversion sheet.**

Example 1:

Answer:

1 gal = 4.5461 L

So 22 gal = 22 x 4.5461 = 100.0142 L

Cost to fill = 100.0142L x $1.20/L = 120.02

It cost $120.02 to fill Nigel’s tank.

Finding the volume of prisms & cylinders

 Ex 2: A cylindrical shape swimming pool is to filled to $\frac{7}{8}$ capacity. How many litres of water will be required if the swimming pool is 18ft in diameter and 6ft tall. ( 1 L = 10003)

Volume of a cylinder = πr2h

 = π( 9)2(6)

 = 1526.8 ft3

Converting ft3 to cm3

 1 ft = 12in

 12 in = 12 x 2.54 = 30.48

1 ft = 30. 48 cm

So (1ft)3 = (30.48 cm)3

1ft3 = 28316.85 cm3

1526.8ft3  = 28316.85 x 1526.8 = 43234161.38

Litres = 43234161.38 ÷ 1000

Litres = 43234.2 l

Only $\frac{7}{8}$ full so

$\frac{7}{8}$ x 43234.21 =37830 L

About 37830 L of water would be required.

Ex 3:

Jill built 12 wood planters for her garden. The inside of each planter measures 4’ long, 2’deep and 1.5’ wide. Soil costs $15.00/yd3. What would be the cost of soil for the planters?

Volume of 1 planter = l x w x h

 = 4 x 1.5 x 2

 = 12 ft3

The volume of 12 planters would be = 12 x 12 = 144 ft3

Convert this to yd3

1 yd = 3 ft

(1yd)3 = (3ft)3

1yd3 = 27ft3

So 144ft3 = 144 ÷ 27 = 5.33yd3

Cost = 5.33yd3 x 15.00/yd3 = $80

It would cost Jill $80 to fill all 12 planters.

Ex 4:

The sun approximates a sphere with a diameter 870 000 mi. What is the approximate volume of the sun?

Radius of the sun = 870 000 ÷ 2

 = 435 000 mi

Volume of a sphere = $\frac{4}{3}$ πr3

 = $\frac{4}{3}$π ( 435 000)3

 = 3.4479 x 1017

The volume of the sun is 3.4 x 1017 mi3.

Finding the volume of pyramids and cones

The formula for volume of a pyramid is

 V = $\frac{1}{3}$ Area of the base x height

NOTE: The height of the object is used **not** the slant height.

Ex 5:

Find the volume of the right square pyramid to the nearest in3.



The base is a square so area of the base = s2

 = ( 3)2

 = 9

V = $\frac{1}{3}$ Ab x h

 = $\frac{1}{3}$ (9) x 4

 = 12 in3

Ex 6 : Find the volume of the cone below:



Volume of a cone = $\frac{1}{3}$ πr2 x h

As with pyramids the h in the formula is the height of the object.

So we need to find h first in this case.

Using the Pythagorean Theorem

a2 + b2  = c2

52  + b2 =122

25 + b2 = 144

b2 = 144 -25

b2 = 119

b =√ 119

b = 10.9

Volume = $\frac{1}{3}$π (5)2 ( 10.9)

 = 285.4 cm3

Extra Practice Questions from textbook p. 182 # 1 to 6