**Lesson 6:**

**Goal: To solve problems involving composite surface area and volume, where measurement given are in Imperial and SI units**

**Composite Surface Area:**

Recall from grade 9:

A composite object is an object composed of 2 or more shapes. To find the surface area, find the area of the objects and take away the overlap.

Ex 1:



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Surface Area of the top = 2LW +2LH+ 2WH

 = 2(11)(4) + 2(11)(5) + 2(4)(5)

 = 88 + 110 + 40

 = 238

Surface area of the two cylinders = ( 2πr2 + 2πrh) x 2

 = (2π(1.5)2 + 2π(1.5)(9)) x 2

 = (14.14 + 84.82) x 2

 = 198

There are 2 overlaps

Area of 1 overlap = πr2 x 2

 = π(1.5)2 x 2

 = 14.14

Total overlap = 14.14 x 2

 = 28.28

Surface Area = 198 – 28.28

 = 169.7 m2

Ex 2:

A rocket has a cylindrical body and a cone shaped nose. The cylinder is 75 cm long with a radius of 8 cm. The cone has a slant height of 15 cm and the same radius as the cylinder. What is the surface area of the rocket?

Answer:

The bottom of the cone is covered so we only need the lateral surface area of the cone

SA cone = πrs

 = π(8)(15)

 = 377

SA of cylinder ( without the top) = πr2 + 2πrh

 = π(8)2 + 2π(8)(75)

 = 3971

Total surface area = 377 + 3971

 = 4348 cm2

**Composite Volume:**

To find the volume of a composite shape , find the volume of each shape and then add them together.

Ex 3:

Find the volume of the rocket in Ex 2.

Volume of cone = $\frac{1}{3}$ πr2 h

Since we know the slant but not the height , it must be found first.

a2 + b2 = c2

82 + b2 = 152

64 + b2 = 225

b2 = 225 – 64

b =√ 161

b = 12.7 cm

Volume of cone = $\frac{1}{3}$ πr2 h

 = $\frac{1}{3}$π(8)2(12.7)

 = 851.2

Volume of cylinder = $π$r2h

 = π(8)2(75)

 = 15079.6

Total volume = 852.2 + 15079.6

 = 15931.8 cm3

The volume of the rocket is 15932 cm3.

Ex 4:

Find the volume of

Volume of prism = L x W x H

 = 8.5 x 6.8 x 4.5

 = 260.1

Volume of pyramid = $\frac{1}{3}$ Area of Base x H

 =$\frac{1}{3}$ ( 8.5 x 6.8) x 3.1

 = 59.7

Total Volume = 260.1 + 59.7

 =319.8 ft3

Extra Practice questions can be found on p. 59 – 60 of Foundations & Pre Calculus Math 10 ( Orange book from last term)

The link to this book is on my teacher page.

We will be using it for the section on trigonometry also.