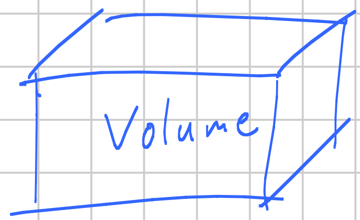
Math 10 Chp 2.1

Note Title 2016-07-18

Units of Area and Volume - area is 2 dimensional, that is, length and width. Therefore we have squared units or units^2. Volume is 3 dimensional, that is, length, width, and height. Therefore, we have cubed units, or units^3.



As before, writing the units is very important to ensure you have done the work correctly. You need to see what is left after cancelling.

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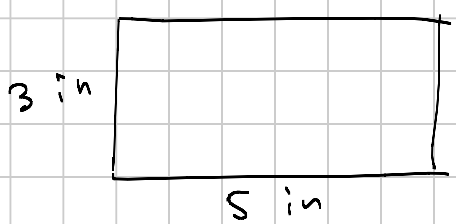
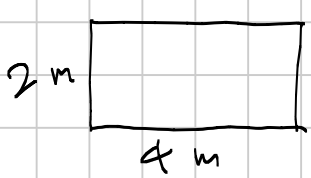
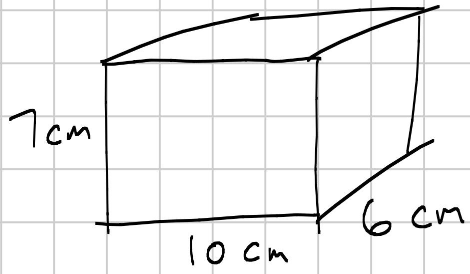
eg) Calculate the area in (in^2) & (cm^2)



eg) Calculate the area in (m^2) & (ft^2)



eg) Calculate the volume in (cm^3) & (in^3)



eg) The Pi Guy mobile (Mazda 3 2.3) has a 2.3 L engine. How many (in^3)?

eg) Arguably, the 1957 Corvette is an iconic classic car. It had one of the first mass-produced engine that had more than 1 HP per in^3. It had a 283 in^3 engine, how many cm^3 is this? How many L?

FYI - although we won't use it, it is common to label cm^3 as c.c. and in^3 as c.i.

Assigned Work: pp. 61-65: 1, 3, 4, 5, 7, 9, 10

Challenge: 11, 12

Note Title 2016-07-18

Math 10 Chp 2.2

Surface Area - What's the difference compared to 'area'? Area is just a 2D shape; surface area applies to a 3D object. It is important to understand that surface area pertains to the container and volume is the amount a container will hold. For example, surface area is the can and volume is the amount of soup we put in the can.

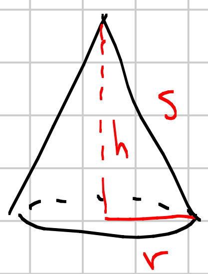
Recall surface area of a cylinder:

The top & bottom are circles, so each circle has area = πr^2.
The lateral surface area has a length equal to the circumference of the circle. Unfolded, it is just a rectangle. area = $(2\pi r)h$

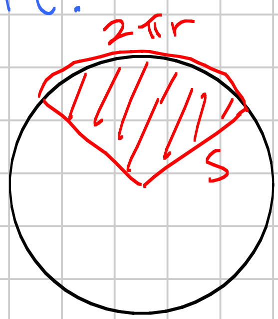
Total Surface Area = $2(\pi r^2) + (2\pi r)h$

brackets are used to show how the formula was derived.

Let's see how the S.A. of a right cone is derived.



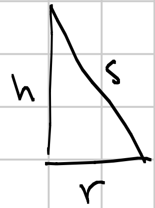
The bottom is a circle, so area = .
The cone looks tricky, but let's unfold it:



The shaded area is the lateral surface area of the cone. It is AKA (also known as) the area of a sector (PREC 12).
The area of the full circle is .

The circumference of the full circle is .
The ratio of the sector to the full circle is
So the lateral SA is

For some harder questions, we may be given r & h.
How can we determine s?



Pythagorean: $s =$

So the Total Surface Area for a cone:

$S.A. =$

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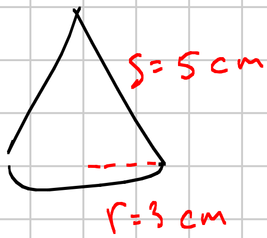
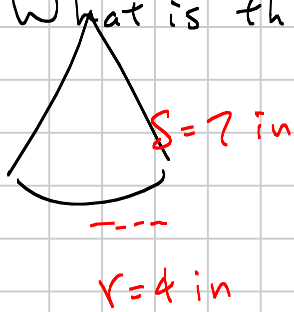
eg) What is the surface area in cm^2 & in^2



eg) What is the surface area in (in^2) & cm^2



Surface area of a sphere (3D, a circle is 2D).

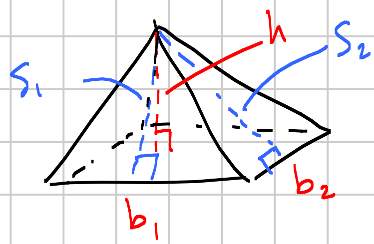
$S.A. =$

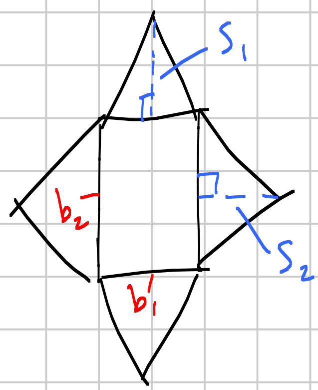
Don't use text explanation for formula. The formula may be linked to a cylinder, but it needs to be derived using Calculus.

eg) Determine the surface area of a sphere with $r = 5$ ft in ft^2 & m^2

eg) Determine the surface area of a sphere with $r = 2\,m$ in m^2 & yd^2

Let's look at how the S.A. of a right rectangular pyramid is derived. We start by making a net

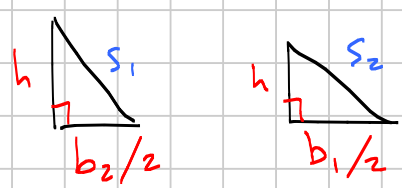




Area of base =
Area of top & bottom triangles =
Area of side triangles =
Total SA =

A harder problem won't give you s_1 or s_2. If this is the case, you will have to use Pythagorean to solve for them.

$s_1 =$



$s_2 =$

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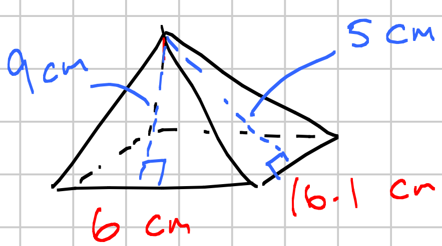
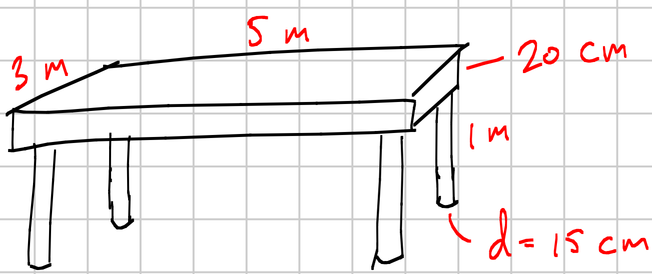
eg) Find the S.A. in cm^2 & in^2



eg) Find the SA in cm^2 & in^2

Composite Objects. - the challenge is determining which surfaces are or are not included.

eg) You are painting a podium; determine the S.A. that requires paint.



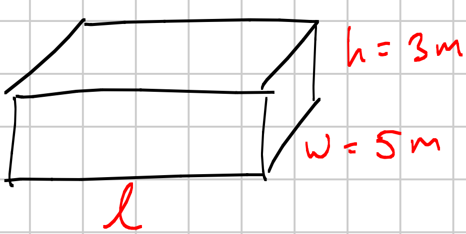
Don't just do calculations. Justify your choices.
You can argue that the bottom of the podium and legs don't need painting.
You can make an argument about not painting the back edge as well.

Edges SA =
Top of podium =
Lateral SA of legs =

Total SA ≈

In addition to calculating the SA, you need to be able to work backwards to find a missing dimension.

eg) Solve for ℓ. $SA = 126\ m^2$



Part 1

Assigned Work: pp. 74-79: 1, 2, 3, 6, 9, 10, 11

Challenge: 13, 15

Part 2

Assigned Work: pp. 74-79: 4, 5, 8, 12, 16

Challenge: 14, 17

Math 10 Chp 2.3

Note Title 2016-07-18

Volume - as before, we are looking for how much stuff we can put into a container. We will look at the volume of some new objects. You will see that volume is generally easier than Surface area.

Recall the formulas from Chp 1.1:

prism $= lwh$
cube $= l^3$
cylinder $= \pi r^2 h$

Note: no adding!

To derive the formulas for the volumes of spheres, right cones, and right pyramids, you need to use calculus. If you are really interested, you can approximate the formulas by slicing the spheres and right cones into cylinders, then add them up.

Video.

Volume of sphere =
right cone =
right rectangular pyramid =
or

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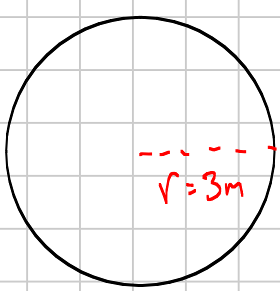
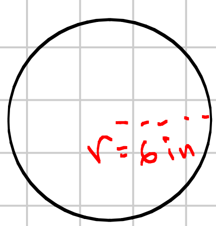
eg) Find the volume of the sphere in m^3 & ft^3.



eg) Find the volume of the sphere in (in^3) & cm^3



eg) The Great Pyramid in Egypt was the tallest building in the world for 3800 years. It has a volume of 91,636,272 ft^3. It's base is 756 ft by 756 ft. Determine it's height in ft and (m)

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eg) A Nestle Drumstick has a total volume of 148 cm^3. The radius at the top is 5.4 cm. The radius at top of the cone is 4.8 cm. Determine the height of the cone in cm.

Assume the scoop of ice cream on top is a sphere.

Assigned Work: pp. 86-91: 1, 3, 5, 6, 8, 9, 11, 12

Challenge: 14, 15, 18