Unit 6

L1 Missing measures

Sometimes… we know the Volume or Surface Area of an object and we need to find the _radius_, _height_ or _side_ length.

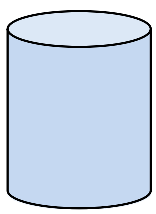
When looking for a missing measure of a solid:

1. choose and write down the applicable formula (as an equation) based on the given information
2. substitute in all known values
3. solve for the unknown value

Ex 1: Find the radius of the sphere

$V=2028\pi\ cm^3$

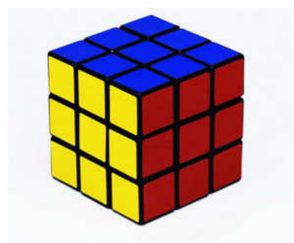
Ex 2: Find the height of the cylinder



$A_T=26.39\ m^2$

$r= 1.2\ m$

Ex 3: Find the side length of the cube



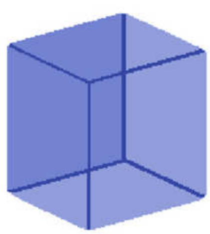
$V=185.2\ cm^3$

Ex 4: Find the radius of the cylinder

$V= 124181\ cm^3$

$h=122\ cm$

Ex 5: Find the side length of the cube



$A_T=294\ cm^2$

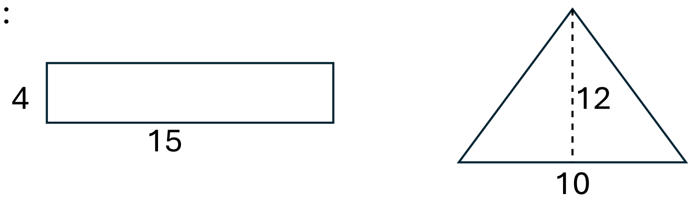
6.1 # 1-7

Unit 6

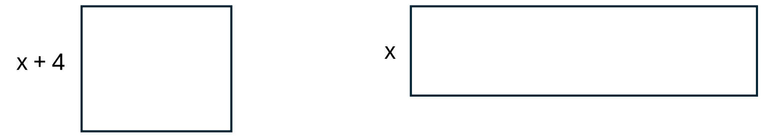
L2 Equivalency

2D shapes are **equivalent** if they have equal areas
3D solids are **equivalent** if they have equal volumes

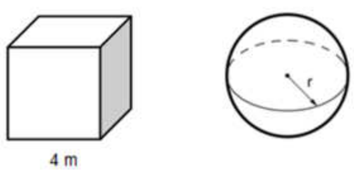
Ex 1:



Ex 2: The square and rectangle below are equivalent. The length of the rectangle is 12 m longer than its width. What is the numerical value of the perimeter of the rectangle?



Ex 3: A cube and a sphere are equivalent. What is the radius of the sphere?



Practice:
6.2 # 1-7

Unit 6

L3 Isometric vs. Similar Figures

- **ISOMETRY** is a transformation that preserves side lengths and angle measurements. Examples:
  Rotation, Reflection or a composite of them
- The result (image) and the original are called **ISOMETRIC FIGURES** or **CONGRUENT FIGURES** (notation: $\cong$)
- **SIMILITUDE** is a transformation that results in a similar figure, but bigger/smaller in size. Example: Dilatation
- The result (image) is **SIMILAR** (notation: $\sim$) to the original: angles are congruent (to preserve the shape), but sides are proportional.

Translation,

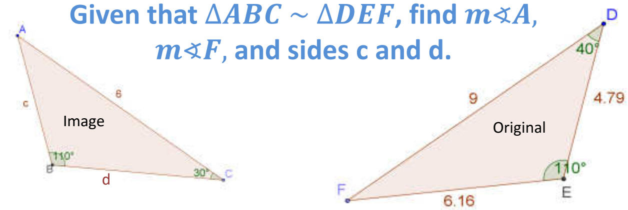
Ratio of similarity (scale factor): k

The ratio of similarity (scale factor) is

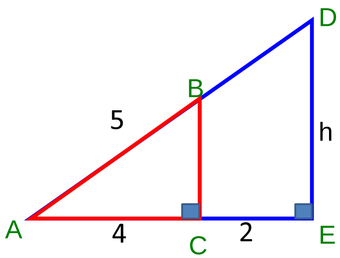
$$k = \frac{\textit{side length from the image}}{\textit{side length from the original figure}}$$

$$k = \frac{l_{new}}{l_{old}} = \frac{s'}{s}$$

Given that $\Delta ABC \sim \Delta DEF$, find $m\sphericalangle A$, $m\sphericalangle F$, and sides c and d.

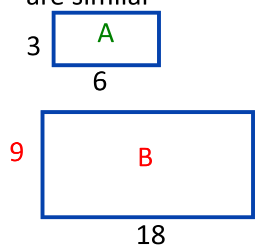


Ex I: Finding an unknown side given 2 similar triangles



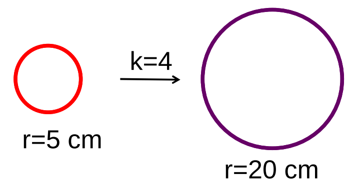
Understanding the ratio of perimeters of two similar rectangles

Ex 1: Figures A and B are similar



Understanding the ratio of areas of two similar circles

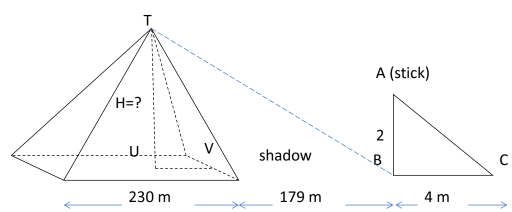
Ex 2:



Application of Similar Triangles

The 3 great pyramids of Egypt are Khufo, Khafre, Menkaure

Their heights were unknown for over 2000 years, until about 600 BC, when Thales of Miletus, a Greek Mathematician calculated it.



Since the sun creates equal angles on the ground, we have similar triangles: $\Delta ABC \sim \Delta TUB$;

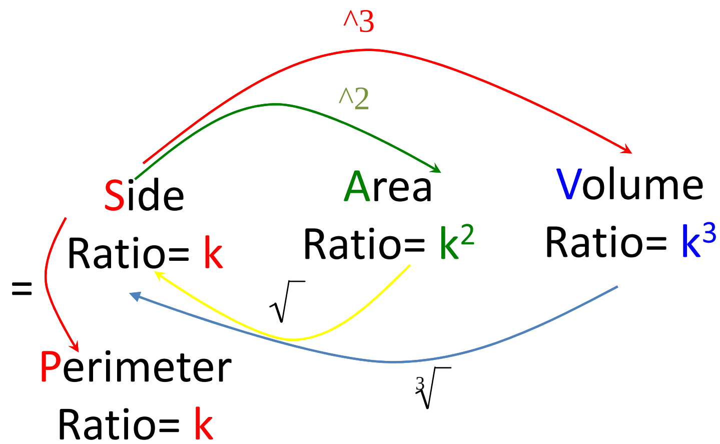
UV = 230/2 = 115; so UB = 115 + 179 = 294m

Practice:
6.3 # 1-3, 7-9

Unit 6

L4 Ratios of similar solids

k	k^2	k^3
2		
	25	
		27
$\frac{2}{7}$		
	$\frac{9}{4}$	
		$\frac{8}{27}$



To solve a similar figure problem:

- First step is: find k then find k^2 and/or k^3

K (sides)	k^2 (areas)	k^3 (volumes)

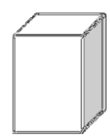
- to find a missing side/Area/Volume, write the ratios and cross multiply:

$$\frac{New\ side}{Old\ side} = k$$

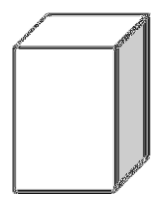
- **Note:** Keep the image always on top in your ratios*
- * if you don't know which is image, putting the bigger one on top might simplify your calculations.

Ex 1: find the volume of the bigger prism

$K = \frac{3}{2}$

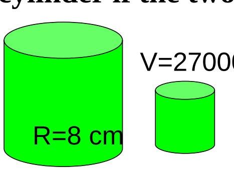


V = 16 cm^3



V = ?

Ex 2: Determine the area of the base of the small cylinder if the two cylinders are similar.



V=27000π cm^3

V=64000π cm^3

Practice:
6.3 # 4-6, 10-15