

MEASUREMENT

MEASUREMENT	IMPERIAL	METRIC
LENGTH	In, ft, Yd	mm, cm, m, Km
AREA	in ² , ft ² , Yd ²	mm ² , cm ² , m ² , Km ²
VOLUME	in ³ , ft ³ , Gallon	mm ³ , cm ³ , m ³ , liter
MASS	lb, kips	gm, Kg, ton
WEIGHT (FORCE)	lb, kips	N, kN
DESITY	lb/ft ³	Kg/m ³
PRESSURE	lb/in ² (psi)	N/m ² (Pa)

BASIC CONVERFSIONS

FROM	X	TO
in	25.4	mm
ft	0.3048	m
yd	3	ft
ft	12	in
m	1.094	yd
lb	0.453	Kg
liter	1000	cm ³
m ³	1000	liter
Gallon	4.54	liter
Ton	1000	Kg
Kg	9.81	N

Converting Meters Centimeters and Millimeters (H)

$$1 \text{ mm} = 0.1 \text{ cm}$$

$$1 \text{ cm} = 0.01 \text{ m}$$

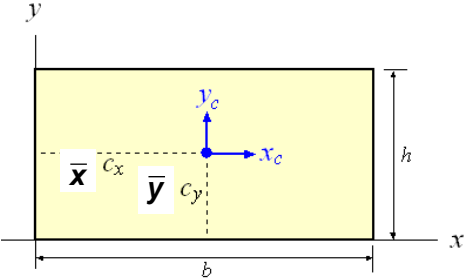
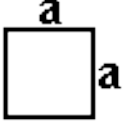
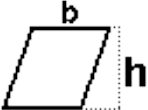
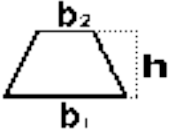
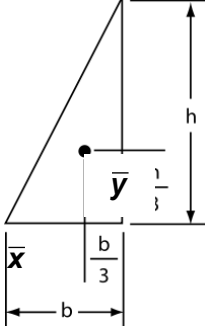
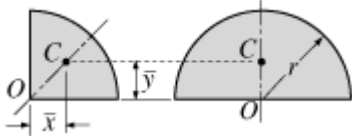
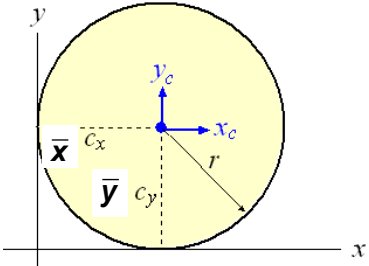
$$1 \text{ mm} = 0.001 \text{ m}$$

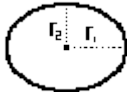
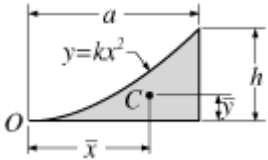
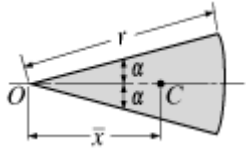
$$1 \text{ cm} = 10 \text{ mm}$$

$$1 \text{ m} = 100 \text{ cm}$$

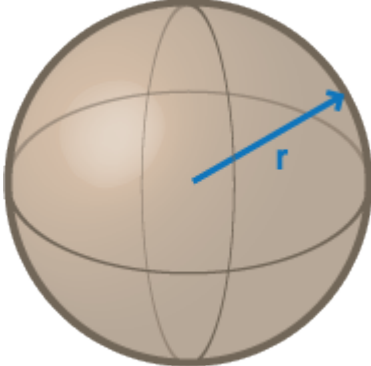
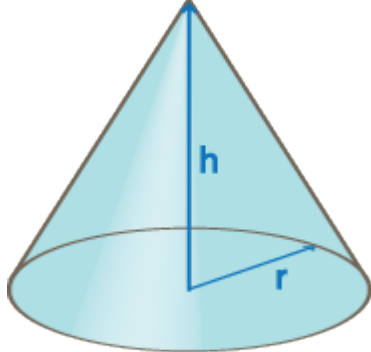
$$1 \text{ m} = 1000 \text{ mm}$$

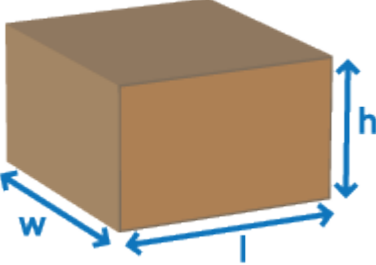
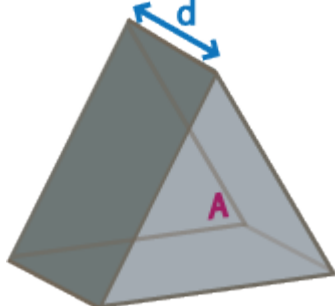
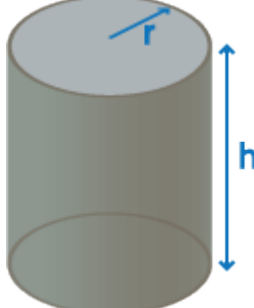
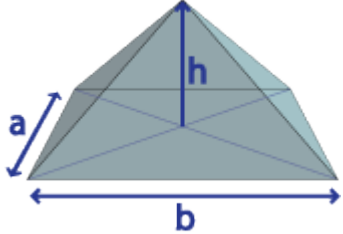
SOME IMPORTANT SHAPE AREA FORMULA

Shapes	Images	Area
Rectangular Area		$b \times h$
square		a^2
parallelogram		$b \times h$
trapezoid		$h/2 (b_1 + b_2)$
Triangular Area		$\frac{bh}{2}$
Quarter-circular area		$\frac{\pi \times r^2}{4}$
Semicircular area		$\frac{\pi r^2}{2}$
Circular area		$\pi \times r^2$

<p>ellipse</p>		<p>$\pi \times r_1 \times r_2$</p>
<p>Parabolic spandrel</p>		<p>$\frac{ah}{3}$</p>
<p>Circular Sector</p>		<p>$\alpha \times r^2$</p>

SOME IMPORTANT SHAPES VOLUME FORMULA

<p>Shapes</p>	<p>Images</p>	<p>Volume</p>
<p>Sphere</p>		<p>$\frac{4}{3}\pi r^3$</p>
<p>cone</p>		<p>$\frac{1}{3}(\pi r^2 h)$</p>

<p>Rectangular solid</p>		<p>$l \times h \times w$</p>
<p>Prism</p>		<p>Ad</p>
<p>Cylinder</p>		<p>$\pi r^2 h$</p>
<p>Pyramid</p>		<p>$1/3 Ah$</p>

DENSITY

Density (D): the mass (M) per unit volume (V) of a material

$D = M/V$

Imperial units- lb/cu.ft, tons/cu.yd.

Metric units- g/cu.cm, Kg/cu.m

Unit weight (γ): the weight (W) per unit volume (V) of a material
 it is also calculated as density X acceleration of gravity ($g = 9.81 \text{ m/s}^2$)

$W=Mg$

$\gamma = W/V = Mg/V = Dg = \frac{\text{Kg}}{\text{m}^3} \times \frac{\text{m}}{\text{s}^2} = \frac{\text{N}}{\text{m}^3}$

Imperial units- lb/cu.ft,

Metric units- kN/cu.cm

SPECIFIC GRAVITY

Specific gravity (S.G or G) (AKA- relative density of materials): the ratio of the density of a material to the density of water.

Densities of Various Construction Materials

1	2	3	4	5	6
Material	Density Kg/m ³	Density g/cm ³	Density lb/ft ³	Unit weight kN/m ³	Specific Gravity
Water	1000	1	62.4	9.81	1
Concrete	2200-2700	2.2 – 2.7	137.34 -168.55	21.58 -26.48	2.2 - 2.7
Limestone	2600 - 2700	2.6 – 2.7	162.31 – 168.55	25.5 – 26.48	2.6 – 2.7
Brick, common red	1920-1950	1.92 – 1.95	120 - 122	18.8 – 19.12	1.92 – 1.95
Soft woods	350 - 500	0.35 – 0.5	21.85 – 31.21	3.4 – 4.9	0.35 – 0.5
Hard woods	450 – 650	0.45 – 0.65	28.1 – 40.58	4.41 – 6.37	0.45 – 0.65
Steel	7750 - 7950	7.75 – 7.95	483.8 – 496.3	76.02 – 77.98	7.75 – 7.95
Copper	8850 - 9000	8.85 – 9.00	552.48 – 561.85	86.8 – 88.29	8.85 – 9.00
Aluminum	2739 – 2750	2.739 – 2.75	171- 172	26.86 – 26.97	2.739 – 2.75