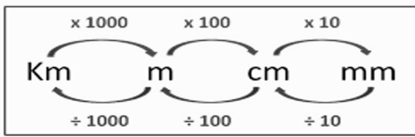


Length

Converting LENGTH Units

It is easiest to use a conversion look-up diagram like the one below.



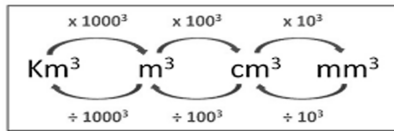
5km = ? m Need to x 1000 5 x 1000 = 5000m ✓
120cm = ? m Need to ÷ 100 120 ÷ 100 = 1.2m ✓

Volume

Converting VOLUME Units

VOLUME is how much 3D space is occupied, and is measured in cubes.

VOLUME consists of Cube Units, so we need to CUBE all our Lengths.



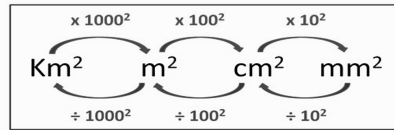
VOLUME conversions use powers of 3, and usually create very large results.

3m³ = ? cm³ Need to x 100³ 3 x 100 x 100 x 100 = 3 000 000 cm³ ✓

Area

Converting AREA Units

AREA consists of Square Units, so we need to SQUARE all our Lengths.



5km² = ? m² Need to x 1000² 5 x 1000 x 1000 = 5 000 000 m² ✓

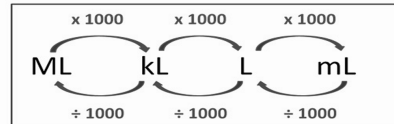
1200cm² = ? m² Need to ÷ 100² 1200 ÷ 100 ÷ 100 = 0.12 m² ✓

Capacity

Converting CAPACITY Units

The Volume of Liquids and Solids is usually measured as a "Capacity".

In the Metric System, Capacity is based on the Litre or "L" unit.



CAPACITY conversions use 1000's, and usually create fairly large results.

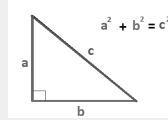
32ML = ? L Need to x 1000 twice 32 x 1000 x 1000 = 32 000 000 L ✓

Length of Segment

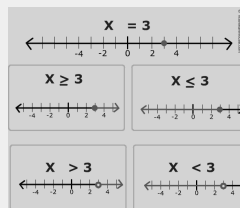
$$\text{Length of the segment} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

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Pythagorean Theorem



Inequalities



Laws of Indices and Surds

Law of Indices

- $a^m \times a^n = a^{m+n}$
- $\frac{a^m}{a^n} = a^{m-n}$
- $(a^m)^n = a^{m \times n}$
- $(a \cdot b)^n = a^n \cdot b^n$
- $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
- $a^0 = 1$

Law of Surds

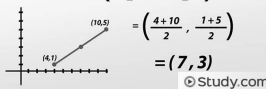
- $\sqrt[n]{a} = a^{1/n}$
- $\sqrt[n]{a \cdot b} = \sqrt[n]{a} \times \sqrt[n]{b}$
- $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
- $(\sqrt[n]{a})^m = a^{m/n}$
- $\sqrt[n]{\sqrt[m]{a}} = \sqrt[n \cdot m]{a}$
- $(\sqrt[n]{a})^m = \sqrt[n]{a^m}$

Midpoint

THE MIDPOINT FORMULA

The Midpoint Formula

$$\text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$



Area

Trapezoid $A + (b_1 + b_2 \div 2) \cdot h$

Volume

Cube	$V = s^3$
Cuboid	$V = lwh$
Prism	$V = Bh$
Cylinder	$V = \pi r^2 h$
Hollow Cylinder	$V = \pi R^2 h - \pi r^2 h$
Cone	$V = 1/3 \cdot \pi r^2 h$
Pyramid	$V = 1/3 \cdot Bh$
Sphere	$V = 4/3 \cdot \pi r^3$
Hemisphere	$V = 2/3 \cdot \pi r^3$

Surface Area

Cube	$TSA = 6s^2$
Cuboid	$TSA = 2(lw + lh + wh)$
Prism	$TSA = 2B + ph$
Cylinder	$TSA = 2\pi r^2 + 2\pi rh$
Hollow Cylinder	$TSA = 2\pi rh + 2\pi Rh + 2(\pi R^2 - \pi r^2)$
Cone	$TSA = \pi r^2 + \pi rs$
Regular Pyramid	$TSA = \text{area of base} + 1/2 \cdot ps$
Square Pyramid	$TSA = b^2 + 2bs$
Sphere	$TSA = 4\pi r^2$
Hemisphere	$TSA = 3\pi r^2$

B = area of base

p = perimeter of base

h = height

R = radius of the outer surface

r = radius of the inner surface

s = slant height

b = length of the base



Chapter 4 Summary

The gradient of a horizontal line ($y = \dots$) has a gradient of zero.

The gradient of a vertical line ($x = \dots$) has an undefined gradient.

Perpendicular lines are at right angles. Their gradients m^1 and m^2 are such that $m^1 m^2 = -1$, i.e. $m^2 = -1 \div m^1$

$y = mx$ passes through the origin, substitute $x = 1$ to find another point.



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