Formulas for mathematics 2

Algebra

Rules

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$(a+b)(a-b) = a^2 - b^2$$

Quadratic equations

$$x^2 + px + q = 0 \qquad x = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$$

$$ax^2 + bx + c = 0 \qquad x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

Arithmetic

Prefixes

T	G	M	k	h	d	c	m	μ	n	p
tera	giga	mega	kilo	hecto	deci	centi	milli	micro	nano	pico
10^{12}	10^{9}	10^{6}	10^{3}	10^{2}	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}

Powers

$$a^x a^y = a^{x+y} \qquad \frac{a^x}{a^y} = a^{x-y} \qquad (a^x)^y = a^{xy} \qquad a^{-x} = \frac{1}{a^x}$$

$$a^x b^x = (ab)^x \qquad \frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x \qquad a^{\frac{1}{n}} = \sqrt[n]{a} \qquad a^0 = 1$$

Logarithms

$$y = 10^x \Leftrightarrow x = \lg y$$

$$\lg x + \lg y = \lg xy \qquad \lg x - \lg y = \lg \frac{x}{y} \qquad \lg x^p = p \cdot \lg x$$

Functions and relations

Linear function

$y = kx + m$ $\qquad k = \dfrac{y_2 - y_1}{x_2 - x_1}$

$k_1 \cdot k_2 = -1$, condition for perpendicular lines

$ax + by + c = 0$, where a and b are not both zero

Quadratic functions

$y = ax^2 + bx + c$ $\qquad a \neq 0$

Power functions

$y = C \cdot x^a$

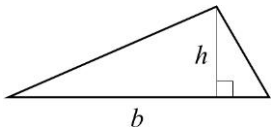
Exponential functions

$y = C \cdot a^x$ $\qquad a > 0$ och $a \neq 1$

Geometry

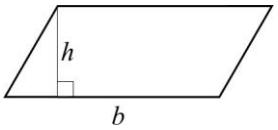
Triangle

$A = \dfrac{bh}{2}$



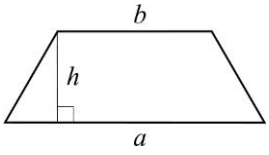
Parallelogram

$A = bh$



Trapezium

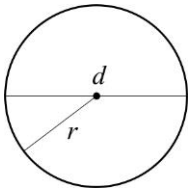
$A = \dfrac{h(a+b)}{2}$



Circle

$A = \pi r^2 = \dfrac{\pi d^2}{4}$

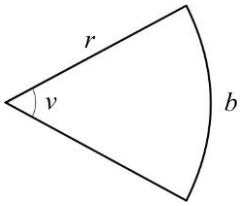
$O = 2\pi r = \pi d$



Circle sector

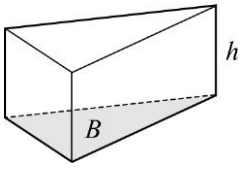
$b = \dfrac{v}{360°} \cdot 2\pi r$

$A = \dfrac{v}{360°} \cdot \pi r^2 = \dfrac{br}{2}$



Prism

$V = Bh$

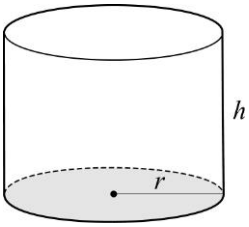


Cylinder

$V = \pi r^2 h$

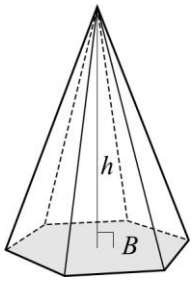
Lateral surface area

$A = 2\pi rh$



Pyramid

$V = \dfrac{Bh}{3}$

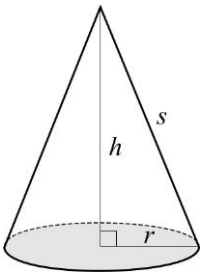


Cone

$V = \dfrac{\pi r^2 h}{3}$

Lateral surface area

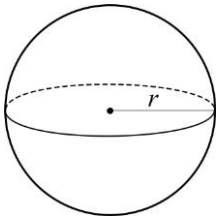
$A = \pi r s$



Sphere

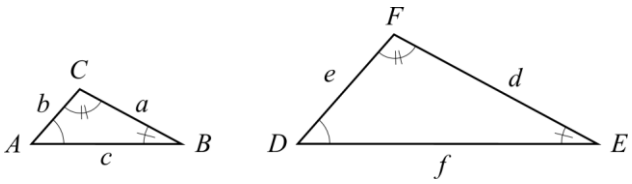
$V = \dfrac{4\pi r^3}{3}$

$A = 4\pi r^2$



Similarity

The triangles *ABC* and *DEF* are similar if $\dfrac{a}{d} = \dfrac{b}{e} = \dfrac{c}{f}$

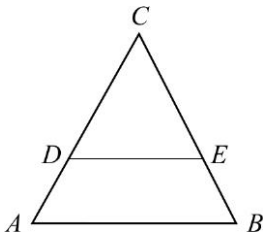


Scale Area scale factor = (Length scale factor)^2 Volume scale factor = (Length scale factor)^3

Triangle with a transversal line

$\dfrac{DE}{AB} = \dfrac{CD}{AC} = \dfrac{CE}{BC}$ and

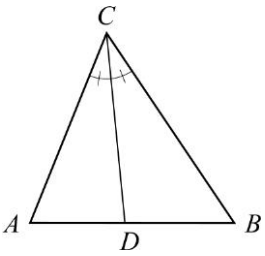
$\dfrac{CD}{AD} = \dfrac{CE}{BE}$



DE is parallel to *AB*

Angle bisector theorem

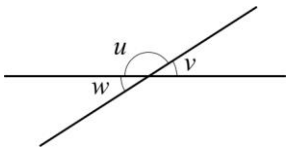
$\dfrac{AD}{BD} = \dfrac{AC}{BC}$



Angles

$u + v = 180°$ Supplementary angles

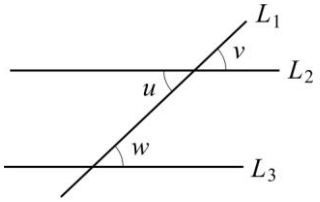
$w = v$ Vertical angles



L_1 intersects two parallel lines L_2 and L_3

$v = w$ Corresponding angles

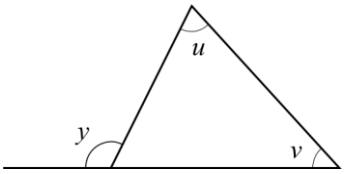
$u = w$ Alternate angles



The sum S of all angles of a *n*-polygon: $S = (n-2)\cdot 180°$

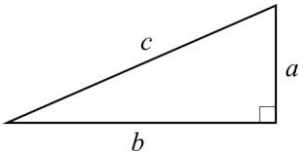
Exterior angle theorem

$y = u + v$



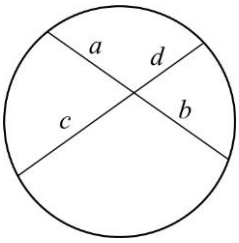
Pythagoras' theorem

$a^2 + b^2 = c^2$



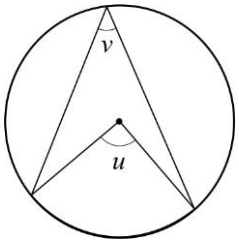
Chord theorem

$ab = cd$



Angles subtended by the same arc

$u = 2v$



Distance formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint formula

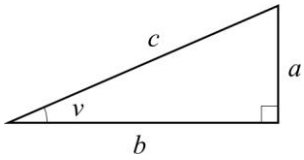
$$x_m = \frac{x_1 + x_2}{2} \text{ and } y_m = \frac{y_1 + y_2}{2}$$

Trigonometry

$$\sin v = \frac{a}{c}$$

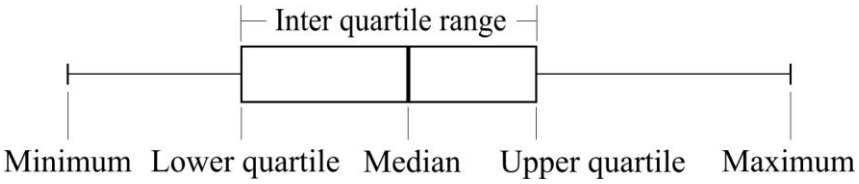
$$\cos v = \frac{b}{c}$$

$$\tan v = \frac{a}{b}$$



Statistics and probability

Box plot



Normal distribution