

Featured software

Distillation simulator

[www.vaxasoftware.com/soft\\_eduen/sden.html](http://www.vaxasoftware.com/soft_eduen/sden.html)

FunGraph - Graphs of mathematical functions

[www.vaxasoftware.com/soft\\_eduen/fungraph.html](http://www.vaxasoftware.com/soft_eduen/fungraph.html)

Design of distillation columns by McCabe-Thiele method

[www.vaxasoftware.com/soft\\_eduen/mcth.html](http://www.vaxasoftware.com/soft_eduen/mcth.html)

Worksheets Generators for Maths and Chemistry

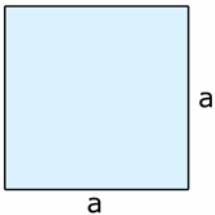
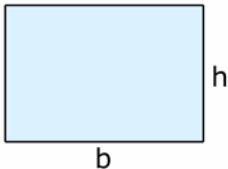
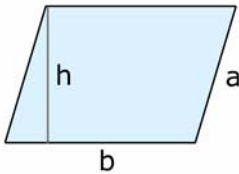
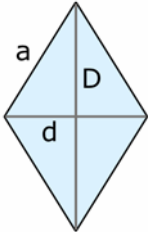
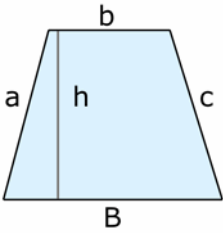
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Acid-base equilibrium calculator

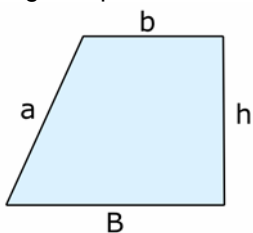
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A = Area, P = Perimeter, V = Volume		
<p>Square</p> 	$A = a^2$ $P = 4a$	<p>Internal angle <math>\alpha = 90^\circ</math></p> <p>External angle <math>\beta = 90^\circ</math></p> <p>Number of diagonals <math>ND = 2</math></p>
<p>Rectangle</p> 	$A = b \cdot h$ $P = 2b + 2h$	
<p>Parallelogram</p> 	$A = b \cdot h$ $P = 2b + 2a$	
<p>Rhombus</p> 	$A = \frac{d \cdot D}{2}$ $P = 4a$ $4a^2 = d^2 + D^2$	
<p>Trapezoid (trapezium)</p> 	$A = \frac{b + B}{2} h$ $P = a + b + B + c$	

Right trapezoid

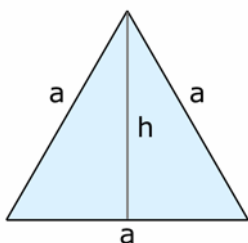


$$A = \frac{b+B}{2}h$$

$$P = a + b + B + h$$

$$a^2 = (B - b)^2 + h^2$$

Equilateral triangle



$$A = \frac{a \cdot h}{2} = \frac{\sqrt{3}}{4}a^2$$

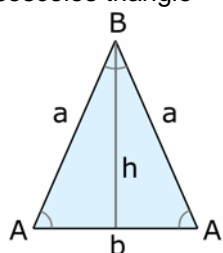
Internal angle  $\alpha = 60^\circ$

$$P = 3a, \quad h = \frac{\sqrt{3}}{2}a$$

External angle  $\beta = 120^\circ$

Number of diagonals  $ND = 0$

Isosceles triangle

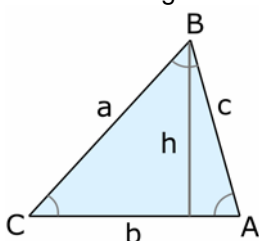


$$A = \frac{b \cdot h}{2} = \frac{a \cdot b \cdot \sin A}{2}$$

$$P = 2a + b, \quad h = a \cdot \sin A$$

$$4a^2 = 4h^2 + b^2$$

Scalene triangle

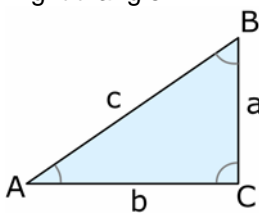


$$A = \frac{b \cdot h}{2}$$

$$P = a + b + c$$

$$h = c \cdot \sin A = a \cdot \sin C$$

Right triangle



$$A = \frac{b \cdot a}{2}$$

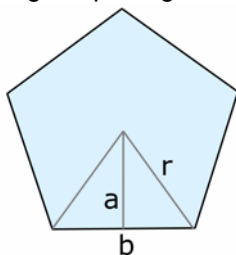
$$a = c \cdot \sin A = c \cdot \cos B$$

$$P = a + b + c$$

$$b = c \cdot \sin B = c \cdot \cos A$$

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

Regular pentagon



$$A = \frac{5a \cdot b}{2} = \frac{5}{8}r^2 \sqrt{10 + 2\sqrt{5}} = \frac{5}{2}r^2 \cdot \sin 72^\circ$$

$$P = 5b$$

$$4r^2 = 4a^2 + b^2$$

Internal angle  $\alpha = 108^\circ$

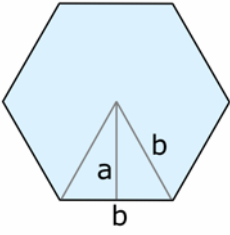
$$b = \frac{r}{2} \sqrt{10 - 2\sqrt{5}} = 2r \cdot \sin 36^\circ$$

External angle  $\beta = 72^\circ$

$$a = \frac{r}{4} \sqrt{6 + 2\sqrt{5}} = r \cdot \cos 36^\circ$$

Number of diagonals  $ND = 5$

Regular hexagon



$$A = \frac{3\sqrt{3}}{2}b^2 = 3b^2 \cdot \sin 60^\circ$$

Internal angle  $\alpha = 120^\circ$

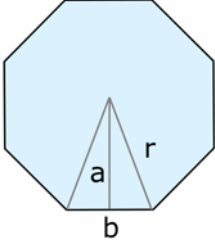
$$P = 6b$$

External angle  $\beta = 60^\circ$

$$a = \frac{\sqrt{3}}{2}b = b \cdot \cos 30^\circ$$

Number of diagonals  $ND = 9$

Regular octagon



$$A = 4 \cdot a \cdot b = 8 \cdot a^2 \cdot \tan 22.5^\circ = (8\sqrt{2} - 8)a^2 = \frac{2b^2}{\tan 22.5^\circ} = \frac{2b^2}{\sqrt{2} - 1}$$

$$P = 8 \cdot b = 16 \cdot a \cdot \tan 22.5^\circ$$

Internal angle  $\alpha = 135^\circ$

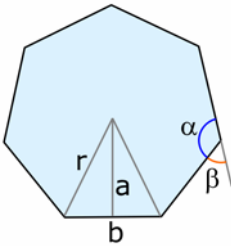
$$a = r \cdot \cos 22.5^\circ$$

External angle  $\beta = 45^\circ$

$$b = 2r \cdot \sin 22.5^\circ$$

Number of diagonals  $ND = 20$

Regular polygon ( $n$  sides)



$$A = \frac{n \cdot a \cdot b}{2} = n \cdot a^2 \cdot \tan \frac{180^\circ}{n}$$

Internal angle :

$$\alpha = \frac{(n-2) \cdot 180^\circ}{n}$$

$$P = n \cdot b = 2n \cdot a \cdot \tan \frac{180^\circ}{n}$$

External angle :

$$\beta = 180^\circ - \alpha$$

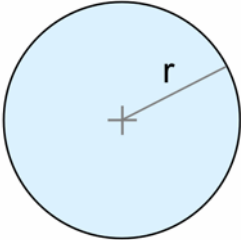
$$a = r \cdot \cos \frac{180^\circ}{n}$$

$$b = 2r \cdot \sin \frac{180^\circ}{n}$$

Number of diagonals :

$$ND = \frac{n \cdot (n-3)}{2}$$

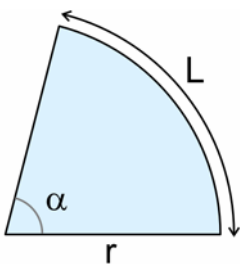
Circle



$$A = \pi r^2$$

$$P = 2\pi r$$

Circular sector



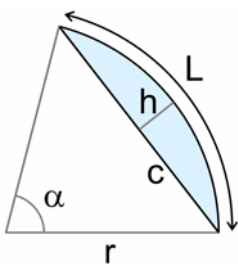
$$A = \pi r^2 \frac{\alpha}{360^\circ}$$

$$L = \pi r \frac{\alpha}{180^\circ}$$

$$P = 2r + L$$

$\alpha$  is expressed in sexagesimal degrees

Circular segment



$$A = r^2 \left( \frac{\pi \alpha}{360^\circ} - \frac{\sin \alpha}{2} \right)$$

$$h = r \left( 1 - \cos \frac{\alpha}{2} \right)$$

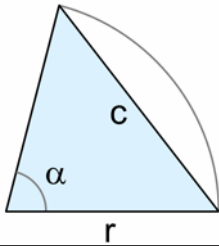
$$c = 2r \sin \frac{\alpha}{2}$$

$$L = \pi r \frac{\alpha}{180^\circ}$$

$$P = L + c, \quad r = \frac{h}{2} + \frac{c^2}{8h}$$

$\alpha$  is expressed in sexagesimal degrees

Circular triangle



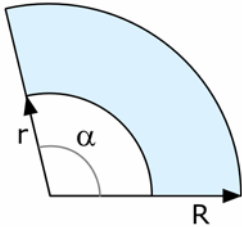
$$A = r^2 \frac{\sin \alpha}{2}$$

$$c = 2r \cdot \sin \frac{\alpha}{2}$$

$$P = 2r + c$$

$\alpha$  is expressed in sexagesimal degrees

Circular trapezoid

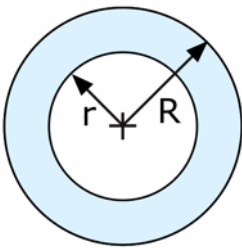


$$A = \pi (R^2 - r^2) \frac{\alpha}{360^\circ}$$

$$P = 2\pi (R + r) \frac{\alpha}{360^\circ} + 2(R - r)$$

$\alpha$  is expressed in sexagesimal degrees

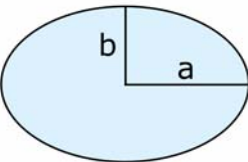
Annulus



$$A = \pi (R^2 - r^2)$$

$$P = 2\pi (R + r)$$

Ellipse

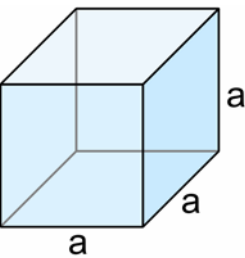


$$A = \pi a \cdot b$$

$$P \cong \pi (a + b)$$

$$P = 4 \int_0^{\pi/2} \sqrt{a^2 \sin^2 t + b^2 \cos^2 t} dt$$

Cube (hexahedron)

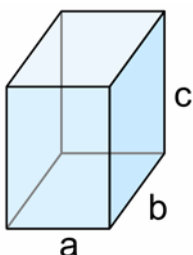


$$A = 6 a^2$$

$$A_{FACE} = a^2$$

$$V = a^3$$

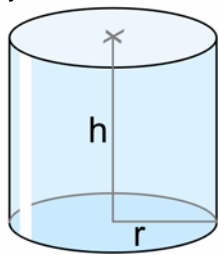
Right prism



$$A = 2a \cdot b + 2a \cdot c + 2b \cdot c$$

$$V = a \cdot b \cdot c$$

Cylinder

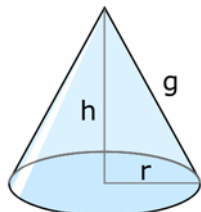


$$A_{TOTAL} = 2\pi r (h + r)$$

$$A_{BASES} = 2\pi r^2 \quad A_{LATERAL} = 2\pi r \cdot h$$

$$V = \pi \cdot r^2 \cdot h$$

Cone

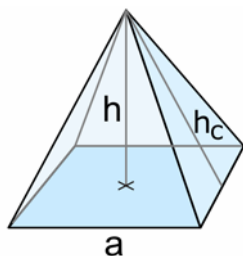


$$A_{TOTAL} = \pi r \cdot g + \pi r^2$$

$$A_{BASE} = \pi r^2 \quad A_{LATERAL} = \pi r \cdot g$$

$$V = \frac{\pi r^2 \cdot h}{3} \quad g^2 = h^2 + r^2$$

Pyramid

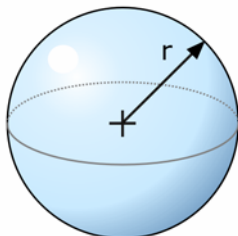


$$A_{TOTAL} = A_{LAT} + A_{BASE}$$

$$A_{LAT} = \frac{\text{Perimeter}_{BASE} \cdot h_C}{2}$$

$$V = \frac{A_{BASE} \cdot h}{3}$$

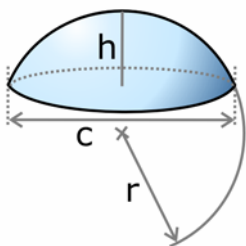
Sphere



$$A = 4\pi \cdot r^2$$

$$V = \frac{4\pi \cdot r^3}{3}$$

Spherical segment

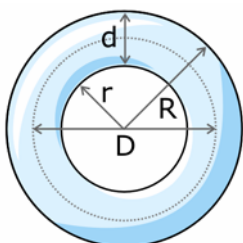


$$A_{TOTAL} = A_{LATERAL} + A_{BASE}$$

$$A_{BASE} = \frac{\pi c^2}{4} \quad A_{LATERAL} = 2\pi r \cdot h = \frac{\pi}{4} (c^2 + 4h^2)$$

$$V = \frac{\pi}{6} h \left( \frac{3c^2}{4} + h^2 \right) = \pi h^2 \left( r - \frac{h}{3} \right) \quad r = \frac{h}{2} + \frac{c^2}{8h}$$

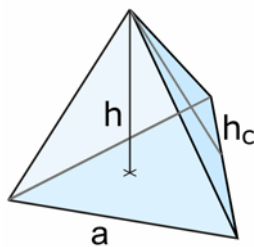
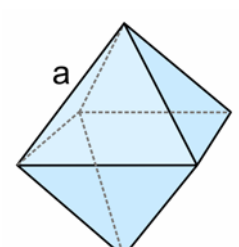
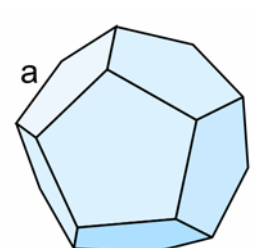
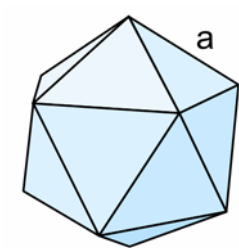
Torus



$$A = \pi^2 D \cdot d = \pi^2 (R^2 - r^2)$$

$$V = \frac{\pi^2}{4} D \cdot d^2 = \frac{\pi^2}{4} (R + r) \cdot (R - r)^2$$

$$D = R + r, \quad d = R - r$$

<p>Tetrahedron</p> 	$A = \sqrt{3} a^2$ $A_{FACE} = \frac{\sqrt{3}}{4} a^2$ $h_c = \frac{\sqrt{3}}{2} a$ $h = \frac{\sqrt{6}}{3} a$ $V = \frac{\sqrt{2}}{12} a^3$
<p>Octahedron</p> 	$A = 2\sqrt{3} a^2$ $A_{FACE} = \frac{\sqrt{3}}{4} a^2$ $V = \frac{\sqrt{2}}{3} a^3$
<p>Dodecahedron</p> 	$A = 3\sqrt{25 + 10\sqrt{5}} a^2$ $A_{FACE} = \frac{\sqrt{25 + 10\sqrt{5}}}{4} a^2$ $V = \frac{15 + 7\sqrt{5}}{4} a^3$
<p>Icosahedron</p> 	$A = 5\sqrt{3} a^2$ $A_{FACE} = \frac{\sqrt{3}}{4} a^2$ $V = \frac{5}{12} (3 + \sqrt{5}) a^3$

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