beta

1st medians' theorem - Apollonius' theorem

$$m_a = \sqrt{\frac{2 \cdot b^2 + 2 \cdot c^2 - a^2}{4}}$$

Solve
Add to Solver

Description

Relates the length of a median and the sides of an arbitrary triangle

Related formulas

Variables

m_a	Median from the vertex A to the side a (m)
b	The side b opposite to the vertex B (m)
c	The side c opposite to the vertex C (m)
a	The side a opposite to the vertex A (m)

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2nd medians' theorem

$$b^2 - c^2 = 2 \cdot a \cdot d$$

Solve
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Description

Relates the projection of a median and the sides of an arbitrary triangle

Related formulas

Variables

b	Side of the triangle (m)
c	Side of the triangle (m)
a	The side of the triangle that corresponds to the median (m)
d	The length of the projection of the median on the corresponding side (m)

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Altitude of a triangle

$$h = \frac{2}{a} \cdot \sqrt{s \cdot (s-a) \cdot (s-b) \cdot (s-c)}$$

Solve
Add to Solver

Description

The altitude of a triangle is the distance from a vertex perpendicular to the opposite side. There is a relation between the altitude and the sides of the triangle, using the term of semiperimeter too.
(The semiperimeter of a triangle is half its perimeter.)

Related formulas

Variables

h	Altitude to side a (m)
a	Side corresponding to altitude h (m)
s	semiperimeter (m)
b	side of the triangle (m)
c	side of the triangle (m)

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Area between a parabola and a chord

$$A = \frac{2}{3} \cdot b \cdot h$$

Solve
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Description

Parabola is a two-dimensional, mirror-symmetrical curve, which is approximately U-shaped. The area enclosed between a parabola and a chord is two-thirds of the area of a parallelogram which surrounds it. One side of the parallelogram is the chord, and the opposite side is a tangent to the parabola.The slope of the other parallel sides is irrelevant to the area. If the chord has length b, and is perpendicular to the parabola's axis of symmetry, and if the perpendicular distance from the parabola's vertex to the chord is h, the parallelogram is a rectangle, with sides of b and h.

Related formulas

Variables

A	Area between the parabola and the chord (m^2)
b	The chord perpendicular to the parabola's axis of symmetry (m)
h	The distance from the parabola's vertex to the chord (m)

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Area of a circular sector (degrees)

$$A = \frac{\pi}{2} \cdot r^2 \cdot \frac{a}{\mathrm{hc}}$$

Solve
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Description

Circular arc is a segment of a circle. A circular sector or circle sector is the portion of a disk enclosed by two radii and an arc, where the smaller area is known as the minor sector and the larger being the major sector. Central angle is an angle whose apex (vertex) is the center of a circle and whose legs (sides) are radii intersecting the circle in two distinct points and thereby subtending an arc between those two points whose angle is (by definition) equal to that of the central angle. The area of a circular sector can be calculated by the radius of the circle and the central angle of the sector.

Related formulas

Variables

A	Area (m^2)
π	pi
r	Radius (m)
a	Central angle of the sector (degree)
hc	Half circle (180°)

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Area of a circular sector (radians)

$$A = \frac{\theta \cdot r^2}{2}$$

Solve
Add to Solver

Description

Circular arc is a segment of a circle. A circular sector or circle sector is the portion of a disk enclosed by two radii and an arc, where the smaller area is known as the minor sector and the larger being the major sector. Central angle is an angle whose apex (vertex) is the center of a circle and whose legs (sides) are radii intersecting the circle in two distinct points and thereby subtending an arc between those two points whose angle is (by definition) equal to that of the central angle. The area of the circular sector can be obtained by the circle's radius and the corresponding central angle (in radians).

Related formulas

Variables

A	Area of the sector (m^2)
θ	Central angle to the sector (radians)
r	Radius (m)

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Area of a circular segment

$$A_{\text{seg}} = \frac{R^2}{2} \cdot (\theta - \sin(\theta))$$

Solve
Add to Solver

Description

Circular segment is a region of a circle which is “cut off” from the rest of the circle by a secant or a chord. More formally, a circular segment is a region of two-dimensional space that is bounded by an arc (of less than 180°) of a circle and by the chord connecting the endpoints of the arc.
Central angle is an angle whose apex (vertex) is the center of a circle and whose legs (sides) are radii intersecting the circle in two distinct points and thereby subtending an arc between those two points whose angle is (by definition) equal to that of the central angle. The area of a circular segment can be calculated by the radius of the circle and the cental angle of the arc of the segment.

Related formulas

Variables

A_{seg}	Area of the circular segment (m^2)
R	The radius of the circle (m)
θ	The central angle (radians)

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Area of a convex quadrilateral (in terms of the sides and angles)

$$A_q = \frac{1}{2} \cdot a \cdot d \cdot \sin A + \frac{1}{2} \cdot b \cdot c \cdot \sin C$$

Solve
Add to Solver

Description

A quadrilateral is a polygon with four sides (or edges) and four vertices or corners.The area of a convex quadrilateral can be expressed in terms of the sides and angles; with angle C being between sides b and c, and A being between sides a and d.

Related formulas

Variables

A_q	Area of the quadrilateral (m^2)
a	Side a (m)
d	Side d (m)
A	Angle between sides a and d (degree)
b	Side b (m)
c	Side c (m)
C	Angle between sides b and c (degree)

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Area of a convex quadrilateral (in terms of sides and angle θ of the diagonals)

$$A_q = \frac{|\tan\theta|}{4} \cdot \left|a^2 + c^2 - b^2 - d^2\right|$$

Solve
Add to Solver

Description

Quadrilateral is a polygon with four sides (or edges) and four vertices or corners. The area of a quadrilateral can be calculated by the sides and the intersection angle θ of the diagonals of the quadrilateral (so long as this angle is not 90).

Related formulas

Variables

A_q	Area of the quadrilateral (m^2)
θ	Intersection angle of the diagonals (degree)
a	Side a (m)
c	Side c (m)
b	Side b (m)
d	Side d (m)

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Area of a convex quadrilateral (in trigonometric terms)

$$A_q = \frac{1}{2} \cdot p \cdot q \cdot \sin\theta$$

Solve
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Description

Quadrilateral is a polygon with four sides (or edges) and four vertices or corners. The area of a convex quadrilateral can be expressed in trigonometric terms in relation to the diagonals and the angle between them.

Related formulas

Variables

A_q	Area of the quadrilateral (m^2)
p	Diagonal (m)
q	Diagonal (m)
θ	The angle between diagonals (degree)

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Area of a Cylinder

$$A = 2 \cdot \pi \cdot r \cdot h + 2 \cdot \pi \cdot r^2$$

Solve
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Description

A cylinder is a geometric shape, that its surface is forming by the points at a fixed distance from a given line segment, the axis of the cylinder. The solid enclosed by this surface and by two planes perpendicular to the axis is also called a cylinder. The surface area of a cylinder can be calculated by the radius of the base circle and the cylinder’s height.

Related formulas

Variables

A	area (m^2)
π	pi
r	radius (m)
h	height (m)

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Area of a right prism (surface area)

$$A = \frac{n}{2} \cdot s^2 \cdot \frac{1}{\tan\left(\frac{\pi}{n}\right)} + n \cdot s \cdot h$$

Solve
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Description

Prism is a polyhedron with an n-sided polygonal base, a translated copy (not in the same plane as the first), and "n" other faces (necessarily all parallelograms) joining corresponding sides of the two bases. All cross-sections parallel to the base faces are the same.A right prism is a prism in which the joining edges and faces are perpendicular to the base faces.
The surface area of a right prism whose base is a regular n-sided polygon is related to the length of the side of the base and the height of the prism.

Related formulas

Variables

A	Area of the prism (m^2)
n	Number of the sides of the base (dimensionless)
s	Length of the side of the base (m)
π	pi
h	Height of the prism. (m)

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Area of a Torus

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

Solve
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Description

In geometry, a torus (pl. tori) is a surface of revolution generated by revolving a circle in three-dimensional space about an axis coplanar with the circle. If the axis of revolution does not touch the circle, the surface has a ring shape and is called a ring torus or simply torus if the ring shape is implicit.
The surface area of a torus is easily computed using Pappus's centroid theorem

Related formulas

Variables

A	area of a torus (m^2)
π	pi
R	major radius(distance from the center of the tube to the center of the torus) (m)
r	minor radius(radius of the tube) (m)

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Area of a trapezoid

$$A_{\mathrm{tr}} = \frac{a+b}{2} \cdot h$$

Solve
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Description

Trapezoid is a convex quadrilateral with only one pair of parallel sides. The parallel sides are called the bases of the trapezoid and the other two sides are called the legs or the lateral sides.The height (or altitude) is the perpendicular distance between the bases. The area of a trapezoid can be calculated by the length of the bases and the length of the height of the trapezoid.

Related formulas

Variables

A_{tr}	The area of the trapezoid (m^2)
a	One of the bases of the trapezoid (m)
b	The other base of the trapezoid (m)
h	The height of the trapezoid (m)

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Area of a triangle (related to the two of its altitudes)

$$S = \frac{h_a \cdot h_b}{2 \cdot \sin C}$$

Solve
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Description

Altitude of a triangle is a straight line through a vertex and perpendicular to a line containing the base (the opposite side of the triangle). The area of the triangle can be calculated by the two of its altitudes and the sine an angle.

Related formulas

Variables

S	Area of the triangle (m^2)
h_a	Altitude perpendicular to side a (m)
h_b	Altitude perpendicular to side b (m)
C	Angle opposite side c (degrees)

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Area of an arbitrary inscribed triangle

$$A = \frac{a \cdot b \cdot c}{4 \cdot R}$$

Solve
Add to Solver

Description

Related to the length of the sides of the triangle and the radius of the circumcircle of the triangle.

Related formulas

Variables

A	Area of the triangle (m^2)
a	Side of the triangle (m)
b	Side of the triangle (m)
c	Side of the triangle (m)
R	Radius of the circumcircle of the triangle (m)

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Area of an arbitrary triangle (incircle and excircles)

$$A = \sqrt{r \cdot r_a \cdot r_b \cdot r_c}$$

Solve
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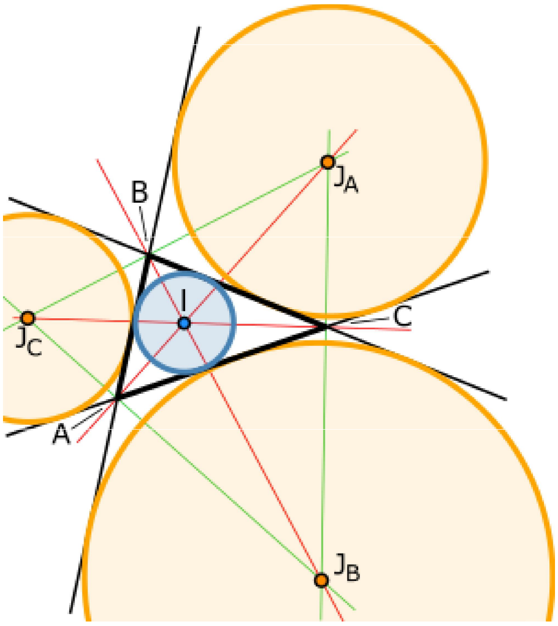
Description

The incircle or inscribed circle of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides. The center of the incircle is called the triangle's incenter and can be found as the intersection of the three internal angle bisectors. Excircle or exscribed circle of a triangle is a circle lying outside the triangle, tangent to one of its sides and tangent to the extensions of the other two. Every triangle has three distinct excircles, each tangent to one of the triangle's sides. The triangle's area is related to the inscribed radius and the excircles radii.



Related formulas

Variables

A	Area of the triangle (m^2)
r	Inscribed circle radius (m)
r_a	Excircle radius (tangent to side a) (m)
r_b	Excircle radius (tangent to side b) (m)
r_c	Excircle radius (tangent to side c) (m)

Area of an arbitrary triangle related to the incircle radius

$$A = \frac{1}{2} \cdot (a + b + c) \cdot r$$

Solve
Add to Solver

Description

The area related to the semi perimeter of the triangle and the radius of the inscribed circle.

Related formulas

Variables

A	Area of the triangle (m^2)
a	Side of the triangle (m)
b	Side of the triangle (m)
c	Side of the triangle (m)
r	Radius of the incribed circle (m)

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Area of an Ellipse

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

Solve
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Description

Calculates the surface area of an ellipse with one-half minor and major axis of a and b respectively.

Related formulas

Variables

A	Area (m^2)
π	pi
a	one-half of major axe (m)
b	one-half of minor axe (m)

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Area of the spherical zone

$$A = 2 \cdot \pi \cdot R \cdot h$$

Solve
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Description

Spherical zone is the surface of the solid defined by cutting a sphere with a pair of parallel planes excluding the top and bottom bases. The area can be calculated by the radius of the sphere and the height of the segment (the distance from one parallel plane to the other)

Related formulas

Variables

A	Area (m^2)
π	pi
R	Radius of the sphere (m)
h	Height (m)

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Cyclic quadrilateral (cosine of an angle)

$$\cos A = \frac{a^2 + d^2 - b^2 - c^2}{2 \cdot (a \cdot d + b \cdot c)}$$

Solve
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Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. A convex quadrilateral ABCD is cyclic if and only if its opposite angles are supplementary. The cosine of an angle of a cyclic quadrilateral can be calculated by the sides of the quadrilateral.

Related formulas

Variables

A	Angle of the quadrilateral between sides AB and AD (degrees)
a	Length of the side of the cyclic quadrilateral (AB) (m)
d	Length of the side of the cyclic quadrilateral (DA) (m)
b	Length of the side of the cyclic quadrilateral (BC) (m)
c	Length of the side of the cyclic quadrilateral (CD) (m)

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Cyclic quadrilateral (Length of the diagonal opposite angle A)

$$q = \sqrt{\frac{(a \cdot c + b \cdot d) \cdot (a \cdot b + d \cdot c)}{a \cdot d + b \cdot c}}$$

Solve
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Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic.In a cyclic quadrilateral with successive vertices A, B, C, D and sides a = AB, b = BC, c = CD, and d = DA, the lengths of the diagonals p = AC and q = BD can be expressed in terms of the sides.

Related formulas

Variables

q	Length of the diagonal opposite angle A (m)
a	Length of the side of the cyclic quadrilateral (AB) (m)
c	Length of the side of the cyclic quadrilateral (CD) (m)
b	Length of the side of the cyclic quadrilateral (BC) (m)
d	Length of the side of the cyclic quadrilateral (DA) (m)

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Cyclic quadrilateral (Length of the diagonal opposite angle B)

$$p = \sqrt{\frac{(a \cdot c + b \cdot d) \cdot (a \cdot d + b \cdot c)}{a \cdot b + c \cdot d}}$$

Solve
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Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. In a cyclic quadrilateral with successive vertices A, B, C, D and sides a = AB, b = BC, c = CD, and d = DA, the lengths of the diagonals p = AC and q = BD can be expressed in terms of the sides.

Related formulas

Variables

p	Length of the diagonal opposite angle B (m)
a	Length of the side of the cyclic quadrilateral (AB) (m)
c	Length of the side of the cyclic quadrilateral (CD) (m)
b	Length of the side of the cyclic quadrilateral (BC) (m)
d	Length of the side of the cyclic quadrilateral (DA) (m)

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Cyclic quadrilateral (Ptolemy's theorem)

$$p \cdot q = a \cdot c + b \cdot d$$

Solve
Add to Solver

Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. Ptolemy's theorem expresses the product of the lengths of the two diagonals of a cyclic quadrilateral as equal to the sum of the products of opposite sides.

Related formulas

Variables

p	Diagonal of the cyclic quadrilateral (m)
q	The other diagonal of the cyclic quadrilateral (m)
a	Side of the cyclic quadrilateral (opposite to side c) (m)
c	Side of the cyclic quadrilateral (opposite to side a) (m)
b	Side of the cyclic quadrilateral (opposite to side d) (m)
d	Side of the cyclic quadrilateral (opposite to side b)) (m)

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Cyclic quadrilateral (sine of an angle)

$$\sin A = 2 \cdot \frac{\sqrt{(s-a)\cdot(s-b)\cdot(s-c)\cdot(s-d)}}{a\cdot d + b\cdot c}$$

Solve
Add to Solver

Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. A convex quadrilateral ABCD is cyclic if and only if its opposite angles are supplementary. The sine of an angle of the quadrilateral can be calculated by the sides and the semiperimeter of the quadrilateral.

Related formulas

Variables

A	Angle of the quadrilateral between sides AB and AD (degrees)
s	Semiperimeter of the cyclic quadrilateral (m)
a	Length of the side of the cyclic quadrilateral (AB) (m)
b	Length of the side of the cyclic quadrilateral (BC) (m)
c	Length of the side of the cyclic quadrilateral (CD) (m)
d	Length of the side of the cyclic quadrilateral (DA) (m)

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Cyclic quadrilateral (tangent of an angle)

$$\tan\left(\frac{A}{2}\right) = \sqrt{\frac{(s-a)\cdot(s-d)}{(s-b)\cdot(s-c)}}$$

Solve
Add to Solver

Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. A convex quadrilateral ABCD is cyclic if and only if its opposite angles are supplementary. The tangent of an angle of a quadrilateral can be calculated by the sides and the semiperimeter of the quadrilateral.

Related formulas

Variables

A	Angle of the quadrilateral between sides AB and AD (degrees)
s	Semiperimeter of the cyclic quadrilateral (m)
a	Length of the side of the cyclic quadrilateral (AB) (m)
d	Length of the side of the cyclic quadrilateral (DA) (m)
b	Length of the side of the cyclic quadrilateral (BC) (m)
c	Length of the side of the cyclic quadrilateral (CD) (m)

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Cyclic quadrilateral (tangent of the acute angle between the diagonals)

$$\tan\left(\frac{\theta}{2}\right) = \sqrt{\frac{(s-b)\cdot(s-d)}{(s-a)\cdot(s-c)}}$$

Solve
Add to Solver

Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. The tangent of the acute angle between the diagonals of the quadrilateral can be calculated by the sides and the semiperimeter of the quadrilateral.

Related formulas

Variables

θ	The acute angle between the diagonals (degrees)
s	Semiperimeter of the cyclic quadrilateral (m)
b	Length of the side of the cyclic quadrilateral (BC) (m)
d	Length of the side of the cyclic quadrilateral (DA) (m)
a	Length of the side of the cyclic quadrilateral (AB) (m)
c	Length of the side of the cyclic quadrilateral (CD) (m)

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Cyclic quadrilateral circumradius (Parameshvara's formula)

$$R = \frac{1}{4} \cdot \sqrt{\frac{(a \cdot b + c \cdot d) \cdot (a \cdot c + b \cdot d) \cdot (a \cdot d + b \cdot c)}{(s-a) \cdot (s-b) \cdot (s-c) \cdot (s-d)}}$$

Solve
Add to Solver

Description

In Euclidean geometry, a cyclic quadrilateral or inscribed quadrilateral is a quadrilateral whose vertices all lie on a single circle. This circle is called the circumcircle or circumscribed circle, and the vertices are said to be concyclic. The circumradius of a Cyclic quadrilateral is related to its successive sides and the semiperimeter of the Cyclic quadrilateral.

Related formulas

Variables

R	Cyclic quadrilateral circumradius (m)
a	Length of the side of the cyclic quadrilateral (m)
b	Length of the side of the cyclic quadrilateral (m)
c	Length of the side of the cyclic quadrilateral (m)
d	Length of the side of the cyclic quadrilateral (m)
s	Semiperimeter of the cyclic quadrilateral (m)

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Descartes' theorem (internally tangent circle to three given kissing circles)

$$k_4 = (k_1 + k_2 + k_3) - 2 \cdot \sqrt{k_1 \cdot k_2 + k_2 \cdot k_3 + k_3 \cdot k_1}$$

Solve
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Description

n geometry, Descartes' theorem states that for every four kissing, or mutually tangent, circles, the radii of the circles satisfy a certain quadratic equation. By solving this equation, one can construct a fourth circle tangent to three given, mutually tangent circles. In mathematics, curvature is the amount by which a geometric object deviates from being flat, or straight in the case of a line. Descartes' theorem is most easily stated in terms of the circles' curvatures. The curvature (or bend) of a circle is defined as k = ±1/r, where r is its radius. The larger a circle, the smaller is the magnitude of its curvature, and vice versa. If four circles are tangent to each other at six distinct points, and the circles have curvatures k1,k2,k3,k4 and trying to find the radius of the fourth circle that is internally tangent to three given kissing circles, Descartes' theorem is giving the solution.

Related formulas

Variables

k_4	Curvature (or bend) of the internally tangent circle (m^{-1})
k_1	Curvature of the circle having radius r1 (m^{-1})
k_2	Curvature of the circle having radius r2 (m^{-1})
k_3	Curvature of the circle having radius r3 (m^{-1})

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Diameter of a triangle's circumscribed circle (related to the sides)

$$d_c = \frac{a \cdot b \cdot c}{2 \cdot S}$$

Solve
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Description

The circumscribed circle or circumcircle of a triangle is a circle which passes through all the vertices of the triangle. The circumcenter of a triangle can be found as the intersection of any two of the three perpendicular bisectors. (A perpendicular bisector is a line that forms a right angle with one of the triangle's sides and intersects that side at its midpoint.). The diameter of the circumcircle of the triangle can be calculated by the area of the triangle and its sides.

Related formulas

Variables

d_c	Diameter of the circumscribed circle (m)
a	Side of the triangle (m)
b	Side of the triangle (m)
c	Side of the triangle (m)
S	Area of the triangle (m^2)

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Diameter of a triangle's circumscribed circle (related the angles)

$$d_c = \sqrt{\frac{2 \cdot S}{\sin A \cdot \sin B \cdot \sin C}}$$

Solve
Add to Solver

Description

The circumscribed circle or circumcircle of a triangle is a circle which passes through all the vertices of the triangle. The circumcenter of a triangle can be found as the intersection of any two of the three perpendicular bisectors. (A perpendicular bisector is a line that forms a right angle with one of the triangle's sides and intersects that side at its midpoint.). The diameter of the circumcircle of the triangle can be calculated by the area of the triangle and the sines of its angles.

Related formulas

Variables

d_c	Diameter of the circumscribed circle (m)
S	Area of the triangle (m^2)
A	Angle of the triangle (degree)
B	Angle of the triangle (degree)
C	Angle of the triangle (degree)

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Diameter of the circumcircle of a triangle (trigometric expression)

$$d = \sqrt{\frac{2 \cdot A_t}{\sin A \cdot \sin B \cdot \sin C}}$$

Solve
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Description

The diameter of the circumcircle is related to the area of the triangle and the sines of the angles

Related formulas

Variables

d	Circumcircle diameter (m)
A_t	Area of the triangle (m^2)
A	Angle A (degrees)
B	Angle B (degrees)
C	Angle C (degrees)

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Distance betweeen the circumcenter and the orthocenter of a triangle

$$\mathrm{OH}^2 = R^2 - 8 \cdot R^2 \cdot \cos(A) \cdot \cos(B) \cdot \cos(C)$$

Solve
Add to Solver

Description

A circumscribed circle or circumcircle of a triangle is a circle which passes through all the vertices of the triangle.The center of this circle is called the circumcenter and its radius is called the circumradius. The circumcenter of a triangle can be found as the intersection of any two of the three perpendicular bisectors. The three altitudes intersect in a single point, called the orthocenter of the triangle. The orthocenter lies inside the triangle if and only if the triangle is acute.The distance between the circumcenter and the orthocenter of a triangle can be calculated by the circumradius and the angles of the triangle.

Related formulas

Variables

OH	The distance between circumcenter O and orthocenter H (m)
R	Radius of the circle (m)
A	Angle of the triangle (degree)
B	Angle of the triangle (degree)
C	Angle of the triangle (degree)

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beta

Distance between the circumcenter and the incenter of a triange

$$d_{\mathrm{Rr}} = \sqrt{R \cdot (R - 2 \cdot r)}$$

Solve
Add to Solver

Description

A circumscribed circle or circumcircle of a triangle is a circle which passes through all the vertices of the triangle. The center of this circle is called the circumcenter and its radius is called the circumradius. An incircle or inscribed circle of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides.The center of the incircle is called the triangle's incenter and its radius is called inradius.

Related formulas

Variables

d_{Rr}	Distance between the circumcenter and the incenter of the triange (m)
R	Circumradius (m)
r	Inradius (m)

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Distance of the focal point from the center of an ellipse

$$f = \sqrt{|a^2 - b^2|}$$

Solve
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Description

Ellipse is a curve on a plane surrounding two focal points such that a straight line drawn from one of the focal points to any point on the curve and then back to the other focal point has the same length for every point on the curve. The intersection of the X and Y Cartesian axes, is the center of the ellipse

Related formulas

Variables

f	Distance of the focal point from the center (m)
a	One-half of the ellipse's major axe (m)
b	One-half of the ellipse's minor axe (m)

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beta

Distance to exsphere center from a vertex of a regular tetrahedron

$$d_{\mathrm{ve}} = \sqrt{\frac{3}{2}} \cdot a$$

Solve
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Description

The exsphere of a face of a regular tetrahedron is the sphere outside the tetrahedron which touches the face and the planes defined by extending the adjacent faces outwards

Related formulas

Variables

d_{ve}	Distance to exsphere center from a vertex (m)
a	Edge length (m)

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Ellipse Circumference (Ramanujan formula)

$$C = \pi \cdot (a+b) \cdot \left(1 + \frac{3 \cdot \frac{(a-b)^2}{(a+b)^2}}{10 + \sqrt{4 - 3 \cdot \frac{(a-b)^2}{(a+b)^2}}}\right)$$

Solve
Add to Solver

Description

Ellipse is a curve on a plane surrounding two focal points such that a straight line drawn from one of the focal points to any point on the curve and then back to the other focal point has the same length for every point on the curve. The shape of an ellipse is represented by its eccentricity, which for an ellipse can be any number from 0 (the limiting case of a circle) to arbitrarily close to but less than 1. Ellipses have two mutually perpendicular axes about which the ellipse is symmetric. These axes intersect at the center of the ellipse due to this symmetry. The larger of these two axes, which corresponds to the largest distance between antipodal points on the ellipse, is called the major axis or transverse diameter. The smaller of these two axes, and the smallest distance across the ellipse, is called the minor axis or conjugate diameter. Ramanujan gives an approximation for the circumference of an ellipse.

Related formulas

Variables

C	Circumference of the ellipse (m)
π	pi
a	The semi-majior axis (m)
b	The semi-minor axis (m)

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beta

Elliptic cylinder (Volume)

$$V = \pi \cdot a \cdot b \cdot h$$

Solve
Add to Solver

Description

An elliptic cylinder has ellipse bases.The volume of an elliptic cylinder can be calculated by the half- axes of the ellipse base and the height of the elliptic cylinder.

Related formulas

Variables

V	Volume of the elliptic cylinder (m^3)
π	pi
a	Major half-axis of the elipse base (m)
b	Minor half-axis of the elipse base (m)
h	The heigth of the elliptic cylinder (m)

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Equation of an ellipse

$$\left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 = 1$$

Solve
Add to Solver

Description

Ellipse is a curve on a plane surrounding two focal points such that a straight line drawn from one of the focal points to any point on the curve and then back to the other focal point has the same length for every point on the curve. The equation of an ellipse whose major and minor axes coincide with the X and Y Cartesian axes, relates the one-half of the ellipse’s major and minor axes with the Cartesian coordinates of any point of the ellipse.

Related formulas

Variables

x	Coordinate of a point of the ellipse on X axe (m)
a	One-half of the ellipse's major axe (m)
y	Coordinate of a point of the ellipse on Y axe (m)
b	One-half of the ellipse's minor axe (m)

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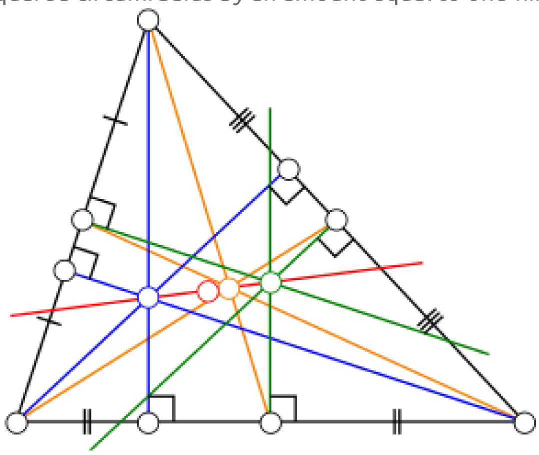
Euler line (distance between the centroid and the circumcenter of a triangle)

$$\mathrm{GO}^2 = R^2 - \frac{1}{9} \cdot \left(a^2 + b^2 + c^2\right)$$

Solve
Add to Solver

Description

In geometry, the Euler line is a line determined from any triangle that is not equilateral. It passes through several important points determined from the triangle, including the orthocenter, the circumcenter, the centroid, the Exeter point and the center of the nine-point circle of the triangle. In any triangle, the orthocenter, circumcenter and centroid are collinear. The squared distance between the centroid and the circumcenter along the Euler line is less than the squared circumradius by an amount equal to one-ninth the



sum of the squares of the side lengths a, b, and c.

Related formulas

Variables

GO	The distance between the centroid and the circumcenter of the triangle (m)
R	The circumradius of the triangle (radius of the circle which passes through all the vertices of the triangle) (m)
a	Side of the triangle opposite to angle A (m)
b	Side of the triangle opposite to angle B (m)
c	Side of the triangle opposite to angle C (m)

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beta

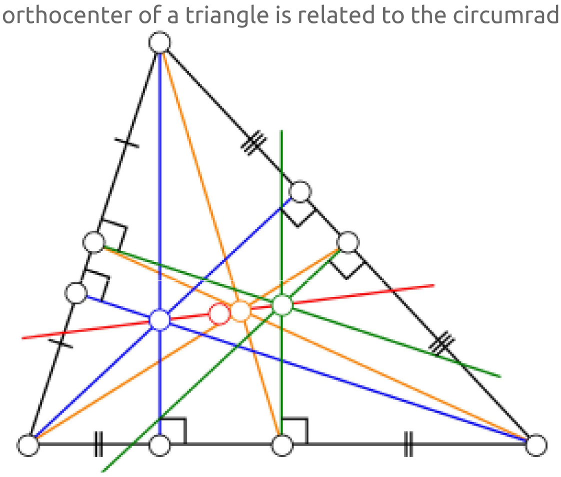
Euler line (distance between the circumcenter and the orthocenter of a triangle)

$$\mathrm{OH}^2 = 9 \cdot R^2 - \left(a^2 + b^2 + c^2\right)$$

Solve
Add to Solver

Description

In geometry, the Euler line is a line determined from any triangle that is not equilateral. It passes through several important points determined from the triangle, including the orthocenter, the circumcenter, the centroid, the Exeter point and the center of the nine-point circle of the triangle. In any triangle, the orthocenter, circumcenter and centroid are collinear. The distance between the circumcenter and the orthocenter of a triangle is related to the circumradius and the sides of the triangle.



Related formulas

Variables

OH	The distance between the circumcenter and the orthocenter of the triangle (m)
R	The circumradius of the triangle (radius of the circle which passes through all the vertices of the triangle) (m)
a	Side of the triangle opposite to angle A (m)
b	Side of the triangle opposite to angle B (m)
c	Side of the triangle opposite to angle C (m)

Categories

- Geometry

Euler line (its slope related to the slopes of the sides of a triangle)

$$m_E = -\left(\frac{m_1 \cdot m_2 + m_1 \cdot m_3 + m_2 \cdot m_3 + 3}{m_1 + m_2 + m_3 + 3 \cdot m_1 \cdot m_2 \cdot m_3}\right)$$

Solve
Add to Solver

Description

In geometry, the Euler line is a line determined from any triangle that is not equilateral. It passes through several important points determined from the triangle, including the orthocenter, the circumcenter, the centroid, the Exeter point and the center of the nine-point circle of the triangle. In any triangle, the orthocenter, circumcenter and centroid are collinear.
The slope of the Euler line (if finite) is expressible in terms of the slopes of the sides of the triangle.

Related formulas

Variables

m_E	The slope of the Euler line in a Cartesian coordinate system (dimensionless)
m_1	The slope of a side of the triangle in a Cartesian coordinate system (dimensionless)
m_2	The slope of a side of the triangle in a Cartesian coordinate system (dimensionless)
m_3	The slope of a side of the triangle in a Cartesian coordinate system (dimensionless)

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beta

Euler's quadrilateral theorem

$$a^2 + b^2 + c^2 + d^2 = p^2 + q^2 + 4 \cdot x^2$$

Solve
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Description

In any convex quadrilateral the sum of the squares of the four sides is equal to the sum of the squares of the two diagonals plus four times the square of the line segment connecting the midpoints of the diagonals.

Related formulas

Variables

a	Side (m)
b	Side (m)
c	Side (m)
d	Side (m)
p	Diagonal (m)
q	Diagonal (m)
x	Line segment connecting the midpoints of the diagonals (m)

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Euler's theorem (excircles)

$$(R + r_{\mathrm{ex}})^2 = d^2 + r_{\mathrm{ex}}^2$$

Solve
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Description

The circumscribed circle or circumcircle of a triangle is a circle which passes through all the vertices of the triangle. The center of this circle is called the circumcenter and its radius is called the circumradius.
An excircle or escribed circle of the triangle is a circle lying outside the triangle, tangent to one of its sides and tangent to the extensions of the other two. Every triangle has three distinct excircles, each tangent to one of the triangle's sides. The center of an excircle is the intersection of the internal bisector of one angle and the external bisectors of the other two.
Euler's theorem states that the distance d between the excircles centrum and circumcenter of a triangle can be expressed by the radius of one of the excircles and the circumradius.

Related formulas

Variables

R	Circumradius (m)
r_{ex}	The radius of one of the excircles (m)
d	The distance between the circumcenter and this excircle's center (m)

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Euler's theorem (triangles)

$$(R - r_{in})^2 = d^2 + r_{in}^2$$

Solve
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Description

The circumscribed circle or circumcircle of a triangle is a circle which passes through all the vertices of the triangle. The center of this circle is called the circumcenter and its radius is called the circumradius.
The incircle or inscribed circle of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides. The center of the incircle is called the triangle's incenter.
Euler's theorem gives the relation between the circumradius and inradius of a triangle, and the distance between the circumcenter and the incenter.

Related formulas

Variables

R	Circumradius (m)
r_{in}	Inradius (m)
d	Distance between the circumcenter and the incenter (m)

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Externally Tangent Circles

$$(x_1 - x_2)^2 + (y_1 - y_2)^2 = (r_1 + r_2)^2$$

Solve
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Description

Two circles of non-equal radius, both in the same plane, are said to be tangent to each other if they meet at only one point.
Two circles are externally tangent if the distance between their centres is equal to the sum of their radii.

Related formulas

Variables

x_1	X-coordinate of the center of one circle (dimensionless)
x_2	X-coordinate of the center of other circle (dimensionless)
y_1	Y-coordinate of the center of one circle (dimensionless)
y_2	Y-coordinate of the center of other circle (dimensionless)
r_1	Radius of one circle (dimensionless)
r_2	Radius of other circle (dimensionless)

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Height of a Circular Segment

$$h_s = R - \sqrt{R^2 - \frac{c^2}{4}}$$

Solve
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Description

Circular segment is a region of a circle which is “cut off” from the rest of the circle by a secant or a chord. More formally, a Circular segment is a region of two-dimensional space that is bounded by an arc (of less than 180°) of a circle and by the chord connecting the endpoints of the arc. The height of a circular segment can be calculated by the radius of the circle and the chord length.

Related formulas

Variables

h_s	The height of the Circular Segment (m)
R	Radius of the circle (m)
c	The chord length (m)

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Height of a regular tetrahedron

$$H = \frac{\sqrt{6}}{3} \cdot a$$

Solve
Add to Solver

Description

The tetrahedron is one kind of pyramid, which is a polyhedron with a flat polygon base and triangular faces connecting the base to a common point. A regular tetrahedron is one in which all four faces are equilateral triangles

Related formulas

Variables

H	Height of the tetrahedron (m)
a	Edge length (m)

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Inradius of arbitrary triangle

$$\frac{1}{r} = \frac{1}{h_a} + \frac{1}{h_b} + \frac{1}{h_c}$$

Solve
Add to Solver

Description

The radius of the inscribed circle of an arbitrary triangle is related to the altitudes of the triangle

Related formulas

Variables

r	Inradius (m)
h_a	Altitude to side a (m)
h_b	Altitude to side b (m)
h_c	Altitude to side c (m)

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beta

Interior perpendicular bisector of a triangle

$$p_a = \frac{2 \cdot a \cdot T}{a^2 + b^2 - c^2}$$

Solve
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Description

The interior perpendicular bisector of a side of a triangle is the segment, falling entirely on and inside the triangle, of the line that perpendicularly bisects that side. The three perpendicular bisectors of a triangle's three sides intersect at the circumcenter (the center of the circle through the three vertices). Thus any line through a triangle's circumcenter and perpendicular to a side bisects that side. In an acute triangle the circumcenter divides the interior perpendicular bisectors of the two shortest sides in equal proportions. In an obtuse triangle the two shortest sides' perpendicular bisectors (extended beyond their opposite triangle sides to the circumcenter) are divided by their respective intersecting triangle sides in equal proportions. For any triangle the interior perpendicular bisectors are related to the lengths of the sides of the triangle and its area.

Related formulas

Variables

p_a	The interior perpendicular bisector falling on side a (m)
a	Side of the triangle opposite to angle A (m)
T	The Area of the triangle (m^2)
b	Side of the triangle opposite to angle B (m)
c	Side of the triangle opposite to angle C (m)

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Interior Volume of a Torus

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

Solve
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Description

In geometry, a torus (pl. tori) is a surface of revolution generated by revolving a circle in three-dimensional space about an axis coplanar with the circle. If the axis of revolution does not touch the circle, the surface has a ring shape and is called a ring torus or simply torus if the ring shape is implicit.
The interior volume of a torus is easily computed using Pappus's centroid theorem.

Related formulas

Variables

V	interior volume of torus (m^3)
π	pi
R	major radius(distance from the center of the tube to the center of the torus) (m)
r	minor radius(radius of the tube) (m)

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beta

Internally Tangent Circles

$$\left(x_1 - x_2\right)^2 + \left(y_1 - y_2\right)^2 = \left(r_1 - r_2\right)^2$$

Solve
Add to Solver

Description

Two circles of non-equal radius, both in the same plane, are said to be tangent to each other if they meet at only one point.
Two circles are internally tangent if the distance between their centres is equal to the difference between their radii.

Related formulas

Variables

x_1	X-coordinate of the center of major circle (dimensionless)
x_2	X-coordinate of the center of minor circle (dimensionless)
y_1	Y-coordinate of the center of major circle (dimensionless)
y_2	Y-coordinate of the center of minor circle (dimensionless)
r_1	Radius of major circle (dimensionless)
r_2	Radius of minor circle (dimensionless)

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Lateral surface area of a right circular cone

$$A_l = \pi \cdot r \cdot l$$

Solve
Add to Solver

Description

The lateral surface area of a cone (excluded the area of the base) can be calculated by the radius of the circle at the bottom of the cone and the lateral slant height

Related formulas

Variables

A_l	Lateral surface area (m^2)
π	pi
r	Radius of the circle at the bottom of the cone (m)
l	Lateral slant height (m)

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Length of a side of an inscribed square in a triangle

$$q = \frac{(2 \cdot T) \cdot a}{a^2 + 2 \cdot T}$$

Solve
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Description

Every acute triangle has three inscribed squares (squares in its interior such that all four of a square's vertices lie on a side of the triangle, so two of them lie on the same side and hence one side of the square coincides with part of a side of the triangle). In a right triangle two of the squares coincide and have a vertex at the triangle's right angle, so a right triangle has only two distinct inscribed squares. An obtuse triangle has only one inscribed square, with a side coinciding with part of the triangle's longest side. Within a given triangle, a longer common side is associated with a smaller inscribed square. If an inscribed square has side of length q and the triangle has a side of length a, part of which side coincides with a side of the square, then q, a, and the triangle's area T are related

Related formulas

Variables

q	The length of the inscribed square (m)
T	The triangle's area (m^2)
a	The triangle's side (a part of which coincides with the side of the square) (m)

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Length of an Arc of a Circle

$$s = \frac{\pi \cdot r \cdot a}{\text{hc}}$$

Solve
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Description

Circular arc is a segment of a circle, or of its circumference (boundary) if the circle is considered to be a disc. Central angle is an angle whose apex (vertex) is the center of a circle and whose legs (sides) are radii intersecting the circle in two distinct points and thereby subtending an arc between those two points whose angle is (by definition) equal to that of the central angle itself. It is also known as the arc segment's angular distance.. Arc lengths are denoted by s, since arcs "subtend" an angle. The length of an arc of a circle can be calculated multypling the central angle (measure in degrees) with π and the radius of the circle, dividing by 180 degrees (the semiperimeter of the circle).

Related formulas

Variables

s	The arc's length (m)
π	pi
r	The circle's radius (m)
a	The angle that corresponds to the arc (The angle which the arc subtends at the centre of the circle) (degree)
hc	Half circle (180°)

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Length of internal bisector of an angle in triangle in relation to the opposite segments

$$t_a{}^2 = b \cdot c - m \cdot n$$

Solve
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Description

In geometry, bisection is the division of something into two equal or congruent parts, usually by a line, which is then called a bisector. If the internal bisector of an angle in a triangle divides the side opposite that angle into two segments, then the length of the bisector can be calculated by the lengths of the segments and the lengths of the other two sides of the triangle.

Related formulas

Variables

t_a	Bisector of angle A to the ABC triangle (m^2)
b	Side of the triangle opposite to angle B (m)
c	Side of the triangle opposite to angle C (m)
m	One of the segments that bisector divides the side opposite A (m)
n	The other of the segments that bisector divides the side opposite A (m)

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Length of the internal bisector of a triangle

$$w_a = \frac{2 \cdot \sqrt{b \cdot c \cdot s \cdot (s-a)}}{b+c}$$

Solve
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Description

An angle bisector of a triangle is a straight line through a vertex which cuts the corresponding angle in half. The three angle bisectors intersect in a single point, the incenter, the center of the triangle's incircle.There is a relation between the length of the internal bisector, opposite to the side "a" and the sides of the triangle. (Also equivalently for bisectors Wb and Wc).

Related formulas

Variables

w_a	Length of the internal bisector (m)
b	Length of the side b (m)
c	Length of the side c (m)
s	Semiperimeter of the triangle (m)
a	Length of the side a (m)

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Length of the medians of a triangle

$$m_a = \frac{1}{2} \cdot \sqrt{2 \cdot b^2 + 2 \cdot c^2 - a^2}$$

Solve
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Description

Median of a triangle is a line segment joining a vertex to the midpoint of the opposing side. Every triangle has exactly three medians, one from each vertex, and they all intersect each other at the triangle’s centroid. The relation between the median “ma” to the side “a” and the length of the sides of the triangle. (Also equivalently for medians mb and mc).

Related formulas

Variables

m_a	Median to the side a (m)
b	Length of the side b (m)
c	Length of the side c (m)
a	Length of the side a (m)

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Length of the perimeter of a circular sector

$$P_{\text{sec}} = \theta \cdot R + 2 \cdot R$$

Solve
Add to Solver

Description

Circular arc is a segment of a circle. A circular sector or circle sector is the portion of a disk enclosed by two radii and an arc, where the smaller area is known as the minor sector and the larger being the major sector. Central angle is an angle whose apex (vertex) is the center of a circle and whose legs (sides) are radii intersecting the circle in two distinct points and thereby subtending an arc between those two points whose angle is (by definition) equal to that of the central angle. The perimeter of a circular sector is the sum of the arc length and the two radii.

Related formulas

Variables

P_{sec}	The perimeter of the circular sector (m)
θ	The central angle (radians)
R	The radius of the circle (m)

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Medians' theorem

$$m_a{}^2 + m_b{}^2 + m_c{}^2 = \frac{3}{4} \cdot \left(a^2 + b^2 + c^2\right)$$

Solve
Add to Solver

Description

Relates the medians and the sides of an arbitrary triangle. Median of a triangle is a line segment joining a vertex to the midpoint of the opposing side. Every triangle has exactly three medians, one from each vertex, and they all intersect each other at the triangle's centroid.

Related formulas

Variables

m_a	Median from the vertex A to the side a (m)
m_b	Median from the vertex B to the side b (m)
m_c	Median from the vertex C to the side c (m)
a	The side a opposite to the vertex A (m)
b	The side b opposite to the vertex B (m)
c	The side c opposite to the vertex C (m)

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Perimeter of a Regular polygon

$$P = 2 \cdot n \cdot b \cdot \sin\left(\frac{\pi}{n}\right)$$

Solve
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Description

A regular polygon is a polygon that is equiangular (all angles are equal in measure) and equilateral (all sides have the same length). Regular polygons may be convex or star.
A perimeter of a regular polygon is a path that surrounds it in two dimensions. The perimeter of a regular polygon can be calculated by the length of its sides.

Related formulas

Variables

P	perimeter of a regular polygon (m)
n	number of sides (dimensionless)
b	distance between center of the polygon and one of the vertices of the polygon (m)
π	pi

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Pyramid frustum (volume)

$$V = \frac{h}{3} \cdot \left(B_1 + \sqrt{B_1 \cdot B_2} + B_2\right)$$

Solve
Add to Solver

Description

A pyramid frustum is the portion of a pyramid that lies between two parallel planes cutting it.
The volume of a pyramid frustum is related with the areas of the two bases and the height of the frustum.

Related formulas

Variables

V	Volume of the pyramid frustum (m^3)
h	Height of the frustum (m)
B_1	Area of one of the bases (m^2)
B_2	Area of the other base (m^2)

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Pyramid frustum's volume (n-sided regular polygon bases)

$$V = \frac{n \cdot h}{12} \cdot \left({a_1}^2 + a_1 \cdot a_2 + {a_2}^2\right) \cdot \frac{1}{\tan\left(\frac{\pi}{n}\right)}$$

Solve
Add to Solver

Description

A pyramid frustum is the portion of a pyramid that lies between two parallel planes cutting it. The volume of a pyramid frustum, whose bases are n-sided regular polygons, is related with the length of the sides of the two bases and the height of the pyramid frustum.

Related formulas

Variables

V	Volume of the frustum (m^3)
n	Number of the sides of the base (dimensionless)
h	Height of the frustum (m)
a_1	Side of one base (m)
a_2	Side of the other base (m)
π	pi

Categories

- Geometry

External links

- Wikipedia

Last search

Category

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Quadrilateral's length of the diagonals

$$p = \sqrt{a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos B}$$

Solve
Add to Solver

Description

A quadrilateral is a polygon with four sides (or edges) and four vertices or corners. The interior angles of a simple (and planar) quadrilateral add up to 360 degrees of arc.
The two diagonals of a convex quadrilateral are the line segments that connect opposite vertices.
The length of the diagonals in a convex quadrilateral can be calculated using the law of cosines.

Related formulas

Variables

p	Diagolal (opposite to angle B) (m)
a	Side (adjacent to angle B) (m)
b	Side (adjacent to angle B) (m)
B	Angle (between sides a and b) (degree)

Categories

- Geometry
- Trigonometry

External links

- Wikipedia

Radius of circumscribed sphere of a cube

$$R = a \cdot \frac{\sqrt{3}}{2}$$

Solve
Add to Solver

Description

A circumscribed sphere of a polyhedron is a sphere that contains the polyhedron and touches each of the polyhedron’s vertices. The radius of sphere circumscribed around a cube is called the circumradius.

Related formulas

Variables

R	Radius of circumscribed sphere (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

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Category

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Show results

Radius of circumsphere of the regular tetrahedron

$$R = \frac{\sqrt{6}}{4} \cdot a$$

Solve
Add to Solver

Description

The radius of the circumsphere of the regular tetrahedron can be computed by the edge length

Related formulas

Variables

R	Radius of the circumsphere (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

Radius of exsphere of the regular tetrahedron

$$r_e = \frac{a}{\sqrt{6}}$$

Solve
Add to Solver

Description

The exsphere of a face of a regular tetrahedron is the sphere outside the tetrahedron which touches the face and the planes defined by extending the adjacent faces outwards

Related formulas

Variables

r_e	Radius of exsphere (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

Radius of inscribed sphere of a cube

$$r = \frac{a}{2}$$

Solve
Add to Solver

Description

The inscribed sphere or insphere of cube is a sphere that is contained within the cube and tangent to each of the cube's faces

Related formulas

Variables

r	Radius of inscribed sphere (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

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✓ Geometry (363)

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Radius of sphere tangent to edges of a cube

$$R_t = \frac{a}{\sqrt{2}}$$

Solve
Add to Solver

Description

The radius of the sphere tangent to the edges of the cube is related to the length of the edge of the cube

Related formulas

Variables

R_t	Radius of sphere tangent to edges (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

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Category

✓ Mathematics (573)

✓ Geometry (363)

Show results

Radius of tetrahedron's insphere (related to the edge)

$$r = \frac{a}{\sqrt{24}}$$

Solve
Add to Solver

Description

The inscribed sphere or insphere of a regular tetrahedron is a sphere that is contained within the tetrahedron and tangent to each of the tetrahedron's faces.

Related formulas

Variables

r	Insphere radius (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

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Category

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✓ Geometry (363)

Show results

Radius of tetrahedron's insphere (related to the circumradius)

$$r = \frac{1}{3} \cdot R$$

Solve
Add to Solver

Description

The inscribed sphere or insphere of a regular tetrahedron is a sphere that is contained within the tetrahedron and tangent to each of the tetrahedron's faces.

Related formulas

Variables

r	Inshere radius (m)
R	Circumsphere radius (m)

Categories

- Geometry

External links

- Wikipedia

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beta

Radius of tetrahedron's midsphere (related to the edge)

$$r_m = \frac{a}{\sqrt{8}}$$

Solve
Add to Solver

Description

The midsphere or intersphere of a regular tetrahedron is a sphere which is tangent to every edge of the tetrahedron

Related formulas

Variables

r_m	Radius of midsphere (m)
a	Edge length (m)

Categories

- Geometry

External links

- Wikipedia

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Category

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✓ Geometry (363)

Show results

Radius of tetrahedron's midsphere (related to the circumradius and the inradius)

$$r_m = \sqrt{r \cdot R}$$

Solve
Add to Solver

Description

The midsphere or intersphere of a regular tetrahedron is a sphere which is tangent to every edge of the tetrahedron.

Related formulas

Variables

r_m	Midsphere radius (m)
r	Inshere radius (m)
R	Circumsphere radius (m)

Categories

- Geometry

External links

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Category

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✓ Geometry (363)

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beta

Radius of the base of a spherical cap

$$a^2 = 2 \cdot r \cdot h - h^2$$

Solve
Add to Solver

Description

In geometry, a spherical cap or spherical dome is a portion of a sphere cut off by a plane.

Related formulas

Variables

a	Radius of the base of the cap (m)
r	Radius of the sphere (m)
h	Height of the cap ($0 \leq h \leq 2r$) (m)

Categories

- Geometry
- Mechanics

External links

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Category

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beta

Radius of the incircle of a right triangle

$$r = \frac{a + b - c}{2}$$

Solve
Add to Solver

Description

Right triangle or right-angled triangle is a triangle in which one angle is a right angle (that is, a 90-degree angle). The incircle or inscribed circle of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides. The center of the incircle is called the triangle's incenter. The radius of the incircle of a right triangle can be expressed in terms of legs and the hypotenuse of the right triangle.

Related formulas

Variables

r	The inradius of the right triangle (m)
a	The side of the triangle opposite the acute angle A (m)
b	The side of the triangle opposite the acute angle B (m)
c	The hypotenuse of the right triangle (m)

Categories

- Geometry

External links

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Regular polygon's side

$$l_n{}^2 = 4 \cdot \left(r^2 - d^2\right)$$

Solve
Add to Solver

Description

The calculation of a regular polygon side, according to the radius of the circumscribed circle and the distance from the center of the circle to the side

Related formulas

Variables

l_n	Regular polygon's side (m)
r	Radius of the circumscribed circle (m)
d	Distance from the center of the circle to the side (m)

Categories

- Geometry

Last search

Category

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beta

Relation between the inradius and exradii of an equilateral triangle

$$r = \frac{r_a + r_b + r_c}{9}$$

Solve
Add to Solver

Description

an equilateral triangle is a triangle in which all three sides are equal. In traditional or Euclidean geometry, equilateral triangles are also equiangular; that is, all three internal angles are also congruent to each other and are each 60°. The radius of the inscribed circle of the triangle is related to the extraradii of the triangle. (An excircle of the triangle is a circle lying outside the triangle, tangent to one of its sides and tangent to the extensions of the other two. Their radii are called exradii.)

Related formulas

Variables

r	The inradius of the triangle (m)
r_a	The exradius of the triangle (m)
r_b	The exradius of the triangle (m)
r_c	The exradius of the triangle (m)

Categories

- Geometry

External links

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Relation between the inradius,exradii,circumradius and the distances of the orthocenter from the vertices of a triangle

$$r_a + r_b + r_c + r = \mathrm{AH} + \mathrm{BH} + \mathrm{CH} + 2 \cdot R$$

Solve
Add to Solver

Description

Altitude of a triangle is a line segment through a vertex and perpendicular to a line containing the base (the opposite side of the triangle). This line containing the opposite side is called the extended base of the altitude. The intersection between the extended base and the altitude is called the foot of the altitude. The length of the altitude, often simply called the altitude, is the distance between the extended base and the vertex. The three altitudes intersect in a single point, called the orthocenter of the triangle. Denote the vertices of a triangle as A, B, and C and the orthocenter as H, r as the radius of the triangle's incircle, ra, rb, and rc as the radii if its excircles, and R as the radius of its circumcircle, then, there is a relation between them.

Related formulas

Variables

r_a	Exradius of the tangent excircle to BC side (m)
r_b	Exradius of the tangent excircle to AC side (m)
r_c	Exradius of the tangent excircle to AB side (m)
r	The inradius (m)
AH	Distance of the orthocenter from the vertex A (m)
BH	Distance of the orthocenter from the vertex B (m)
CH	Distance of the orthocenter from the vertex C (m)
R	The circumradius (m)

Categories

- Geometry

External links

- Wikipedia

beta

Rhombus' incircle radius

$$r = \frac{p \cdot q}{2 \cdot \sqrt{p^2 + q^2}}$$

Solve
Add to Solver

Description

The inradius (the radius of the incircle of the rhombus) can be expressed in terms of the diagonals.

Related formulas

Variables

r	Inradius (m)
p	Diagonal (m)
q	Diagonal (m)

Categories

- Geometry

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Rhombus' side

$$a = \frac{\sqrt{p^2 + q^2}}{2}$$

Solve
Add to Solver

Description

The length of the side can computed by the length of the diagonals

Related formulas

Variables

a	Side (m)
p	Diagonal (m)
q	Diagonal (m)

Categories

- Geometry

External links

- Wikipedia

Last search

Category

✓ Mathematics (573)

✓ Geometry (363)

Show results

Right triangle altitude theorem

$$f = \sqrt{p \cdot q}$$

Solve
Add to Solver

Description

The right triangle altitude theorem or geometric mean theorem is a result in elementary geometry that describes a relation between the altitude on the hypotenuse in a right triangle and the two line segments it creates on the hypotenuse. It states that the geometric mean of the two segments equals the altitude. Right triangle or right-angled triangle is a triangle in which one angle is a right angle (that is, a 90-degree angle). altitude of a triangle is a line segment through a vertex and perpendicular to (i.e. forming a right angle with) a line containing the base (the opposite side of the triangle). This line containing the opposite side is called the extended base of the altitude. The intersection between the extended base and the altitude is called the foot of the altitude. The shortest altitude (the one from the vertex with the biggest angle) is the geometric mean of the line segments it divides the opposite (longest) side into.

Related formulas

Variables

f	The altitude from the vertex with the right angle (m)
p	The one segment on the hypotenuse (m)
q	The other segment on the hypotenuse (m)

Categories

- Geometry

External links

- Wikipedia

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beta

Spheroid Volume

$$V = \frac{4 \cdot \pi}{3} \cdot a^2 \cdot c$$

Solve
Add to Solver

Description

A spheroid, or ellipsoid of revolution is a quadric surface obtained by rotating an ellipse about one of its principal axes; in other words, an ellipsoid with two equal semi-diameters.

Related formulas

Variables

V	Volume of the spheroid (m^3)
π	pi
a	Semi-major axis (the equatorial radius of the spheroid) (m)
c	Distance from centre to pole along the symmetry axis (m)

Categories

- Geometry

External links

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Category

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Show results

Sum of the circumradius and the inradius of a right triangle

$$R + r = \frac{a+b}{2}$$

Solve
Add to Solver

Description

Right triangle or right-angled triangle is a triangle in which one angle is a right angle (that is, a 90-degree angle). The incircle or inscribed circle of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides. The center of the incircle is called the triangle's incenter. The circumcenter of a triangle is a circle which passes through all the vertices of the triangle. The center of this circle is called the circumcenter and its radius is called the circumradius. The sum of the circumradius and the inradius of a right triangle is half the sum of the legs of the triangle.

Related formulas

Variables

R	The circumradius of the right triangle (m)
r	The inradius of the right triangle (m)
a	The side (leg) of the triangle opposite the acute angle A (m)
b	The side (leg) of the triangle opposite the acute angle B (m)

Categories

- Geometry

External links

- Wikipedia

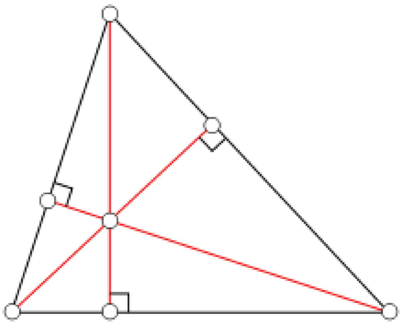
Sum of the ratios on the three altitudes of the distance of the orthocenter from the base to the length of the altitude

$$\frac{\mathrm{HD}}{\mathrm{AD}} + \frac{\mathrm{HE}}{\mathrm{BE}} + \frac{\mathrm{HF}}{\mathrm{CF}} = 1$$

Solve
Add to Solver

Description

Altitude of a triangle is a line segment through a vertex and perpendicular to a line containing the base (the opposite side of the triangle). This line containing the opposite side is called the extended base of the altitude. The intersection between the extended base and the altitude is called the foot of the altitude. The length of the altitude, often simply called the altitude, is the distance between the extended base and the vertex. The three altitudes intersect in a single point, called the orthocenter of the triangle. Denote the vertices of a triangle as A, B, and C and the orthocenter as H, and let D, E, and F denote the feet of the altitudes from A, B, and C respectively. The sum of the ratios on the three altitudes of the distance of the orthocenter from the base to the length of the altitude is 1.



Related formulas

Variables

HD	Distance of the orthocenter from the side BC (m)
AD	The altitude to the side BC (m)
HE	Distance of the orthocenter from the side AC (m)
BE	The altitude to the side AC (m)
HF	Distance of the orthocenter from the side AB (m)
CF	The altitude to the side AB (m)

Categories

beta

Surface area of a regular tetrahedron

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

Solve
Add to Solver

Description

The tetrahedron is one kind of pyramid, which is a polyhedron with a flat polygon base and triangular faces connecting the base to a common point. A regular tetrahedron is one in which all four faces are equilateral triangles The surface area of the regular tetrahedron can be computed by the edge length

Related formulas

Variables

A	Surface area (m^2)
a	Edge length (m)

Categories

- Geometry

External links

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Category

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Surface area of a right regular cone

$$A_s = \pi \cdot r \cdot (r + l)$$

Solve
Add to Solver

Description

The lateral surface area of a cone including the area of the base, can be calculated by the radius of the circle at the bottom of the cone and the lateral slant height

Related formulas

Variables

A_s	Surface area (m^2)
π	pi
r	Radius of the circle at the bottom of the cone (m)
l	Lateral slant height (m)

Categories

- Geometry

External links

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beta

Surface area of a right regular pyramid

$$A = B + \frac{P \cdot L}{2}$$

Solve
Add to Solver

Description

The surface of a right regular pyramid can be calculated by the area and the perimeter of the base and the slant height

Related formulas

Variables

A	Surface area (m^2)
B	The base area (m^2)
P	Perimeter of the base (m)
L	Slant height (the height of the slant triangle) (m)

Categories

- Geometry

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Theorem of internal triangle's bisector

$$\frac{s_a}{a - s_a} = \frac{c}{b}$$

Solve
Add to Solver

Description

The bisector of an angle of a triangle divides the opposite side in two segments that are proportional to the other two sides of the triangle

Related formulas

Variables

s_a	The smaller segment of the side that divided by the bisector, neighboring to the smaller of the rest sides of the triangle (m)
a	The side of the triangle divided by the bisector (m)
c	The side neighboring to the smaller segment (m)
b	The side neighboring to the longer segment (m)

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beta

Total Area of a Frustum of a Right Circular Cone

$$A_t = \pi \cdot \left((R_1 + R_2) \cdot s + {R_1}^2 + {R_2}^2 \right)$$

Solve
Add to Solver

Description

In geometry, a frustum is the portion of a solid (normally a cone or pyramid) that lies between two parallel planes cutting it.The total area of a frustum of a Right Circular Cone can be calculated by the radius of the lower base, the radius of the upper base, the height and the slant height of the frustum.

Related formulas

Variables

A_t	Total Area of the frustum (m^2)
π	pi
R_1	Radius of the lower base (m)
R_2	Radius of the upper base (m)
s	Slant height of the frustum (m)

Categories

- Geometry

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beta

Total volume of the two spherical caps of two intersecting spheres

$$V = \frac{\pi \cdot {h_1}^2}{3} \cdot \left(3 \cdot \frac{{a_1}^2 + {h_1}^2}{2 \cdot h_1}\right) + \frac{\pi \cdot {h_2}^2}{3} \cdot \left(3 \cdot \frac{{a_2}^2 + {h_2}^2}{2 \cdot h_2}\right)$$

Solve
Add to Solver

Description

A spherical cap or spherical dome is a portion of a sphere cut off by a plane. If the plane passes through the center of the sphere, so that the height of the cap is equal to the radius of the sphere, the spherical cap is called a hemisphere. The total volume of the two spherical caps of two intersecting spheres of differend radii can be calculated by the radii of the bases of the caps and their heights.

Related formulas

Variables

V	The total volume (m^3)
π	pi
h_1	The height of the one of the caps (m)
a_1	The radius of the base of the one of the caps (m)
h_2	The height of the other cap (m)
a_2	The radius of the base of the other cap (m)

Categories

- Geometry

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beta

Triangular Prism Volume

$$V = \frac{1}{2} \cdot b \cdot h \cdot l$$

Solve
Add to Solver

Description

A triangular prism is a three-sided prism; it is a polyhedron made of a triangular base, a translated copy, and 3 faces joining corresponding sides.
Equivalently, it is a pentahedron of which two faces are parallel, while the surface normals of the other three are in the same plane (which is not necessarily parallel to the base planes). These three faces are parallelograms. All cross-sections parallel to the base faces are the same triangle. The volume of any prism is the product of the area of the base and the distance between the two bases. In this case the base is a triangle so we simply need to compute the area of the triangle and multiply this by the length of the prism.

Related formulas

Variables

V	Triangular Prism Volume (m^3)
b	The triangle base length (m)
h	The triangle height (m)
l	The length between the triangles (m)

Categories

- Geometry

External links

- Wikipedia

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Category

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✓ Geometry (363)

beta

Volume of a cone - circular

$$V = \frac{1}{3} \cdot \pi \cdot r^2 \cdot h$$

Solve
Add to Solver

Description

A cone is an n-dimensional geometric shape that tapers smoothly from a base (usually flat and circular) to a point called the apex or vertex. It is the solid figure bounded by a base in a plane and by a surface (called the lateral surface) formed by the locus of all straight line segments joining the apex to the perimeter of the base. The axis of a cone is the straight line (if any), passing through the apex, about which the base (and the whole cone) has a rotational symmetry. In common usage in elementary geometry, cones are assumed to be right circular, where circular means that the base is a circle and right means that the axis passes through the centre of the base at right angles to its plane. The volume of a cone can be calculated by the radius of circle at base and the distance from base to tip or height.

Related formulas

Variables

V	volume of a cone - circular (m^3)
π	pi
r	radius of circle at base (m)
h	distance from base to tip or height (m)

Categories

- Geometry

External links

- wikipedia

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Category

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✓ Geometry (363)

Volume of a Frustum of a Right Circular Cone

$$V = \frac{\pi \cdot h}{3} \cdot \left(R^2 + R \cdot r + r^2\right)$$

Solve
Add to Solver

Description

The volume can be calculated from the height of the cone, the radius of the lower base and the radius of the upper base

Related formulas

Variables

V	Volume (m^3)
π	pi
h	Height (m)
R	Radius of the lower base (m)
r	Radius of the upper base (m)

Categories

- Geometry

beta

Volume of a pyramid

$$V_{\text{pyramid}} = \frac{1}{3} \cdot B \cdot h$$

Solve
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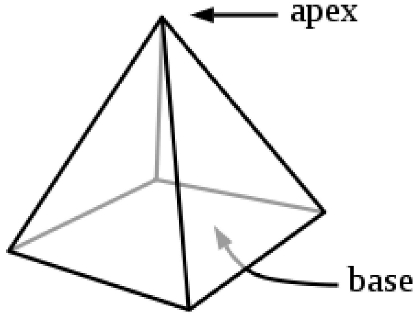
Description

In geometry, a pyramid is a polyhedron formed by connecting a polygonal base and a point, called the apex. Each base edge and apex form a triangle. It is a conic solid with polygonal base.The volume of a pyramid can be calculated by the area of the base and the height from the base to the apex.
(This works for any polygon, regular or non-regular, and any location of the apex, provided that h is measured as the perpendicular distance from the plane which contains the base).



Related formulas

Variables

V_{pyramid}	volume of a pyramid (m^3)
B	area of the base (m^2)
h	height of pyramid (m)

Categories

- Geometry

External links

- wikipedia

Volume of a pyramid (The base is a regular polygon)

$$V = \frac{n}{12} \cdot h \cdot s^2 \cdot \frac{1}{\tan\left(\frac{\pi}{n}\right)}$$

Solve
Add to Solver

Description

A pyramid is a polyhedron formed by connecting a polygonal base and a point, called the apex. Each base edge and apex form a triangle. It is a conic solid with polygonal base. For a pyramid whose base is a n-sided regular polygon the volume can be calculated by the length of the side length of the base and the height of the pyramid

Related formulas

Variables

V	Volume of the pyramid (m^3)
n	Number of the sides of the base (dimensionless)
h	Height of the pyramid (m)
s	Length of a side of the base (m)
π	pi

Categories

- Geometry
- Trigonometry

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Volume of a right prism (regular base)

$$V = \frac{n}{4} \cdot h \cdot s^2 \cdot \frac{1}{\tan\left(\frac{\pi}{n}\right)}$$

Solve
Add to Solver

Description

A right prism is a prism in which the joining edges and faces are perpendicular to the base faces. The volume of a right prism whose base is a regular n-sided polygon is related to the number of the sides of the base, the height and the length of the side of the base.

Related formulas

Variables

V	Volume of the prism (m^3)
n	Number of sides of the base (dimensionless)
h	Height (the perpendicular distance between the bases) (m)
s	Length of the side of the base (m)
π	pi

Categories

- Geometry

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Category

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Volume of a Square Pyramid

$$V = \frac{\sqrt{2}}{6} \cdot a^3$$

Solve
Add to Solver

Description

In geometry, a square pyramid is a pyramid having a square base. If the apex is perpendicularly above the center of the square, it will have C4v symmetry.

Related formulas

Variables

V	volume of a square pyramid (m^3)
a	edge length (m)

Categories

- Geometry

External links

- wikipedia

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Category

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beta

Volume of a tetrahedron

$$V_{\text{tetrahedron}} = \frac{\sqrt{2}}{12} \cdot a^3$$

Solve
Add to Solver

Description

A tetrahedron (plural: tetrahedra) is a polyhedron composed of four triangular faces, three of which meet at each vertex. It has six edges and four vertices. The tetrahedron is the only convex polyhedron that has four faces. The tetrahedron is one kind of pyramid, which is a polyhedron with a flat polygon base and triangular faces connecting the base to a common point. In the case of a tetrahedron the base is a triangle (any of the four faces can be considered the base), so a tetrahedron is also known as a “triangular pyramid”.
A regular tetrahedron is one in which all four faces are equilateral triangles. The volume of a regular tetrahedron can be calculated by the edge length.

Related formulas

Variables

$V_{\text{tetrahedron}}$	volume of a tetrahedron (m^3)
a	length of edge (m)

Categories

- Geometry

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beta

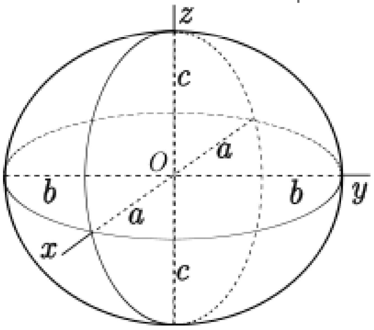
Volume of an ellipsoid

$$V_{\text{ellipsoid}} = \frac{4}{3} \cdot \pi \cdot a \cdot b \cdot c$$

Solve
Add to Solver

Description

An ellipsoid is a closed quadric surface that is a three dimensional analogue of an ellipse.a, b, c.are called the semi-principal axes.They correspond to the semi-major axis and semi-minor axis of the appropriate ellipses.
There are four distinct cases of which one is degenerate: a>b>c — tri-axial or (rarely) scalene ellipsoid; a=b>c — oblate ellipsoid of revolution (oblate spheroid); a=b<c — prolate ellipsoid of revolution (prolate spheroid); a=b=c — the degenerate case of a sphere;
The volume of the internal part of the ellipsoid can be calculated by the semi-principal axes a,b,c.



Related formulas

Variables

$V_{\text{ellipsoid}}$	Volume of an ellipsoid (m^3)
π	pi
a	semi-principal axis (m)
b	semi-principal axis (m)
c	semi-principal axis (m)

Categories

- Geometry

External links

Volume of any right circular cone

$$V = \frac{1}{3} \cdot \pi \cdot r^2 \cdot h$$

Solve
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Description

Right circular cone is assumed to be a cone that its base is a circle and right means that the axis passes through the centre of the base at right angles to its plane For any right circular cone the volume can be calculated by the radius of the circular base and the height

Related formulas

Variables

V	Volume (m^3)
π	pi
r	Radius of the base (m)
h	Height of the cone (m)

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Volume of cone (by the diameter)

$$V = \frac{\pi \cdot d^2}{4} \cdot \frac{h}{3}$$

Solve
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Description

Description

A cone is an n-dimensional geometric shape that tapers smoothly from a base (usually flat and circular) to a point called the apex or vertex. It is the solid figure bounded by a base in a plane and by a surface (called the lateral surface) formed by the locus of all straight line segments joining the apex to the perimeter of the base. The axis of a cone is the straight line (if any), passing through the apex, about which the base (and the whole cone) has a rotational symmetry. In common usage in elementary geometry, cones are assumed to be right circular, where circular means that the base is a circle and right means that the axis passes through the centre of the base at right angles to its plane. The volume of a cone can be calculated by the diameter of the circle at base and the distance from base to tip or height.

Related formulas

Variables

V	Volume of cone (m^3)
π	pi
d	Cone diameter (m)
h	Cone height (m)

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Volume of Spherical Dome (or cap)

$$V = \frac{1}{3} \cdot \pi \cdot h^2 \cdot (3 \cdot r - h)$$

Solve
Add to Solver

Description

The volume of the spherical dome, which is a portion of a sphere cut off by a plane, can be calculated by the radius of the base of the dome and the height of the dome

Related formulas

Variables

V	Volume (m^3)
π	pi
h	Height (m)
r	Radius of the dome (m)

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Volume of Spherical segment

$$V = \frac{\pi \cdot h}{6} \cdot \left(3 \cdot R^2 + 3 \cdot r^2 + h^2\right)$$

Solve
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Description

Spherical segment is the solid defined by cutting a sphere with a pair of parallel planes. The volume can be calculated by the radius of the spherical segment bases and the height of the segment (the distance from one parallel plane to the other)

Related formulas

Variables

V	Volume (m^3)
π	pi
h	Height (m)
R	Radius of the lower base (m)
r	Radius of the upper base (m)

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Volume of the minimum circumscribed box of an elipsoid

$$V_{\min} = 8 \cdot a \cdot b \cdot c$$

Solve
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Description

An ellipsoid is a closed quadric surface that is a three dimensional analogue of an ellipse.a, b, c.are called the semi-principal axes.They correspond to the semi-major axis and semi-minor axis of the appropriate ellipses.
There are four distinct cases of which one is degenerate:
a>b>c — tri-axial or (rarely) scalene ellipsoid;
a=b>c — oblate ellipsoid of revolution (oblate spheroid); a=b<c — prolate ellipsoid of revolution (prolate spheroid);
a=b=c — the degenerate case of a sphere;
The volume of the minimum circumscribed boxes of an elipsoid can be calculated by the semi-principal axes a,b,c of the elipsoid.

Related formulas

Variables

$V_{\min}$	The volume of the minimum circumscribed box (m^3)
a	semi-principal axis (m)
b	semi-principal axis (m)
c	semi-principal axis (m)

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Volumes of the maximum inscribed box of an elipsoid

$$V_{\text{max}} = \frac{8}{3 \cdot \sqrt{3}} \cdot a \cdot b \cdot c$$

Solve
Add to Solver

Description

An ellipsoid is a closed quadric surface that is a three dimensional analogue of an ellipse.a, b, c.are called the semi-principal axes.They correspond to the semi-major axis and semi-minor axis of the appropriate ellipses.
There are four distinct cases of which one is degenerate: a>b>c — tri-axial or (rarely) scalene ellipsoid; a=b>c — oblate ellipsoid of revolution (oblate spheroid); a=b<c — prolate ellipsoid of revolution (prolate spheroid); a=b=c — the degenerate case of a sphere;
The volume of the maximum inscribed box of an elipsoid can be calculated by the semi-principal axes a,b,c of the elipsoid.

Related formulas

Variables

V_{max}	The volume of the maximum inscribed box (m^3)
a	semi-principal axis (m)
b	semi-principal axis (m)
c	semi-principal axis (m)

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