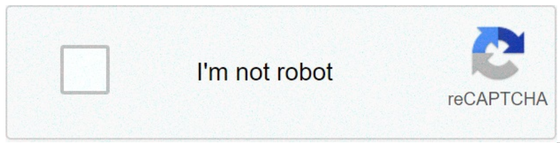

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All properties of equilateral triangle

Equilateral triangle is a figure where all three sides and angles are equal Equilateral Triangle Properties of an Equilateral Triangle 1. All three sides are equal; in ΔABC, sides AB = BC = CA 2. All three angles are equal (equiangular), so ∠ABC = ∠BAC = ∠ACB = 60° 3. There are three lines of symmetry 4. The altitude, median, angular bisector, and the perpendicular line are all same and together called the perpendicular bisector, shown as AE 5. The orthocenter and centroid are the same point, represented as O Formulas Area The formula is given below: Area of an Equilateral Triangle Problem: Finding the area of an equilateral triangle when only THREE SIDES are known Find the area of the equilateral triangle whose side measures 6 cm.Solution:As we know,A = √3/4 (a)² Here, a = 6 cmHence, A = √3/4× (6 × 6) cm2= 9√3 cm2 We know, Perimeter (P) = a+ b +c, where a, b, c are the measures of three sides Since in an equilateral triangle three sides are equal i.e., a = b = c Hence, P = 3a Last modified on April 22nd, 2021 In geometry, an equilateral triangle is a triangle where all three sides are the same length and all three angles are also the same and are each 60°. If an altitude is drawn, it bisects the side to which it is drawn, in turn leaving two separate 30-60-90 triangles Other websites MathWorld - the construction of an equilateral triangle Principal properties An equilateral triangle. It has equal sides (a=b=c), equal angles ([math]\alpha = \beta =\gamma[/math]), and equal altitudes (ha=hb=hc). Denoting the common length of the sides of the equilateral triangle as a, we can determine using the Pythagorean theorem that: The area is [math]A=\frac{\sqrt{3}}{4} a^2[/math] The perimeter is [math]p=3a\.\![/math] The radius of the circumscribed circle is [math]R = \frac{a}{\sqrt{3}}[/math] The radius of the inscribed circle is [math]r=\frac{\sqrt{3}}{6} a[/math] or [math] r=\frac{R}{2}[/math] The geometric center of the triangle is the center of the circumscribed and inscribed circles And the altitude (height) from any side is [math]h=\frac{\sqrt{3}}{2} a[/math]. Denoting the radius of the circumscribed circle as R, we can determine using trigonometry that: The area of the triangle is [math]\mathrm{A}=\frac{3\sqrt{3}}{4}R^2 [/math] Many of these quantities have simple relationships to the altitude ("h") of each vertex from the opposite side: The area is [math]A=\frac{h^2}{\sqrt{3}}[/math] The height of the center from each side, or apothem, is [math]\frac{h}{3} [/math] The radius of the circle circumscribing the three vertices is [math]R=\frac{2h}{3} [/math] The radius of the inscribed circle is [math]r=\frac{h}{3}[/math] In an equilateral triangle, the altitudes, the angle bisectors, the perpendicular bisectors and the medians to each side coincide. Equal cevians Three kinds of cevians are equal for (and only for) equilateral triangles:[1] Coincident triangle centers Every triangle center of an equilateral triangle coincides with its centroid, which implies that the equilateral triangle is the only triangle with no Euler line connecting some of the centers. For some pairs of triangle centers, the fact that they coincide is enough to ensure that the triangle is equilateral. In particular: Six triangles formed by partitioning by the medians For any triangle, the three medians partition the triangle into six smaller triangles. A triangle is equilateral if and only if any three of the smaller triangles have either the same perimeter or the same inradius.[4]:Theorem 1 A triangle is equilateral if and only if the circumcenters of any three of the smaller triangles have the same distance from the centroid.[4]:Corollary 7 Points in the plane A triangle is equilateral if and only if, for every point P in the plane, with distances p, q, and r to the triangle's sides and distances x, y, and z to its vertices, [5]:p.178,#235.4 [math]4(p^2+q^2+r^2) \geq x^2+y^2+z^2.[/math] References pt:Triângulo#Tipos de triângulos home / geometry / triangle / equilateral triangleAn equilateral triangle is a triangle that has sides that are all equal in length. △ABC is an equilateral triangle since AB≅AC≅BC. An isosceles triangle has at least two equal sides, so an equilateral triangle is also an isosceles triangle. Angle measures An equilateral triangle is also called an equiangular triangle since its three angles are equal to 60°. In an isosceles triangle, the base angles are congruent. Recall from above that an equilateral triangle is also an isosceles triangle. Since DE≅EF, the base angles, ∠D and ∠F, are congruent. Also, since DE≅DF, ∠E≅∠F, so by the transitive property, ∠D≅∠E≅∠F. Since the sum of the angles for any triangle is 180°: This is true for any equilateral triangle. Properties of equilateral triangles Equilateral triangles are regular polygons Since an equilateral triangle is also an equiangular triangle, it is a regular polygon. All equilateral triangles are similar Triangle △ABC and triangle △PQR are equiangular so, △ABC ~ △PQR. Altitudes of equilateral triangles An altitude of an equilateral triangle is also an angle bisector, median, and perpendicular bisector. The three altitudes of an equilateral triangle intersect at a single point. The three altitudes extending from the vertices A, B, and C of △ABC above intersect at point G. Since the altitudes are the angle bisectors, medians, and perpendicular bisectors, point G is the orthocenter, incenter, centroid, and circumcenter of the triangle. Lines of symmetry of an equilateral triangle The three altitudes of an equilateral triangle are also lines of symmetry. Refer to altitude BD extending from vertex B in the diagram below: Side AB reflects across the altitude to side BC. Similarly, side BC reflects to side AB. Side AC reflects onto itself when reflecting across the altitude. The same relationships would be found for altitudes drawn from vertices A and C. Special triangles An altitude divides an equilateral triangle into two 30°-60°-90° triangles. Altitude CD divides equilateral triangle △ABC into two 30°-60°-90° triangles. Triangles △ACD and △BCD both have legs of length , and hypotenuse s. A triangle which has all three of its sides equal in length. Try this Drag the orange dots on each vertex to reshape the triangle. Notice it always remains an equilateral triangle. The sides AB, BC and AC always remain equal in length An equilateral triangle is one in which all three sides are congruent (same length). Because it also has the property that all three interior angles are equal, it really the same thing as an equiangular triangle. See Equiangular triangles. An equilateral triangle is simply a specific case of a regular polygon, in this case with 3 sides. All the facts and properties described for regular polygons apply to an equilateral triangle. See Regular Polygons Properties All three angles of an equilateral triangle are always 60°. In the figure above, the angles ∠ABC, ∠CAB and ∠ACB are always the same. Since the angles are the same and the internal angles of any triangle always add to 180°, each is 60°. The area of an equilateral triangle can be calculated in the usual way, but in this special case of an equilateral triangle, it is also given by the formula: where S is the length of any one side. See Area of an equilateral triangle. With an equilateral triangle, the radius of the incircle is exactly half the radius of the circumcircle. Constructing an Equilateral Triangle It is possible to construct an equilateral triangle of a given side length using just a compass and straightedge. See Constructing an Equilateral Triangle Other triangle topics General Perimeter / Area Triangle types Triangle centers Congruence and Similarity Solving triangles Solving the Triangle Law of sines Law of cosines Triangle quizzes and exercises Triangle type quiz Ball Box problem How Many Triangles? Satellite Orbits (C) 2011 Copyright Math Open Reference. All rights reserved c2ZWPA3kduw A triangle has three sides and three angles The three angles always add to 180° Equilateral, Isosceles and Scalene There are three special names given to triangles that tell how many sides (or angles) are equal. There can be 3, 2 or no equal sides/angles: Three equal sides Three equal angles, always 60° Two equal sides Two equal angles No equal sides No equal angles How to remember? Alphabetically they go 3, 2, none: Equilateral: "equal"-lateral (lateral means side) so they have all equal sides Isosceles: means "equal legs", and we have two legs, right? Also iSOSceles has two equal "Sides" joined by an "Odd" side. Scalene: means "uneven" or "odd", so no equal sides. What Type of Angle? Triangles can also have names that tell you what type of angle is inside: All angles are less than 90° Has a right angle (90°) Has an angle more than 90° Combining the Names Sometimes a triangle will have two names, for example: Has a right angle (90°), and also two equal angles Can you guess what the equal angles are? Play With It ... Try dragging the points around and make different triangles: geometry/images/triangle.js?mode=type You might also like to play with the Interactive Triangle. Angles The three interior angles always add to 180° geometry/images/triangle.js?mode=angles The perimeter is the distance around the edge of the triangle: just add up the three sides: geometry/images/triangle.js?mode=perim The area is half of the base times height. "b" is the distance along the base "h" is the height (measured at right angles to the base) Area = ½ × b × h The formula works for all triangles. Note: a simpler way of writing the formula is bh/2 (Note: 12 is the height, not the length of the left-hand side) Height = h = 12 Base = b = 20 Area = ½ × b × h = ½ × 20 × 12 = 120 The base can be any side, Just be sure the "height" is measured at right angles to the "base": geometry/images/triangle.js?mode=area (Note: You can also calculate the area from the lengths of all three sides using Heron's Formula.) Imagine you "doubled" the triangle (flip it around one of the upper edges) to make a square-like shape (a parallelogram) which can be changed to a simple rectangle: THEN the whole area is bh, which is for both triangles, so just one is ½ × bh. 6702, 6708,720, 3134, 5032,627,723, 3132, 3133, 7502
an equilateral triangle never has all the properties of an isosceles triangle

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