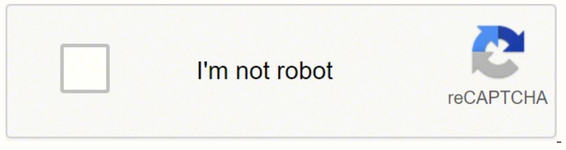

Next

Finding interior angles of a regular polygon

What is the sum of interior angles of a 15 sided polygon? What is the formula for polygons? How many sides does a regular polygon have if each interior angle is 135? What is the formula of regular polygon? How do you find the interior angle of a polygon with 9 sides? How do you find the interior angle? What is the name of the 12 sided polygon? What regular polygon has an interior angle of 156? Which polygon has an interior angle sum of 1080? Is there a regular polygon with an interior angle of 9000? What polygon has an interior angle of 1800? Can 50 degree be an interior angle of a polygon? 1 Set up the formula for finding the sum of the interior angles. The formula is sum=(n−2)×180{\displaystyle sum=(n-2)\times 180}, where sum{\displaystyle sum} is the sum of the interior angles of the polygon, and n{\displaystyle n} equals the number of sides in the polygon.[1] [2] The value 180 comes from how many degrees are in a triangle. The other part of the formula, n−2{\displaystyle n-2} is a way to determine how many triangles the polygon can be divided into. So, essentially the formula is calculating the degrees inside the triangles that make up the polygon.[3] This method will work whether you are working with a regular or irregular polygon. Regular and irregular polygons with the same number of sides will always have the same sum of interior angles, the difference only being that in a regular polygon, all interior angles have the same measurement.[4] In an irregular polygon, some of the angles will be smaller, some of the angles will be larger, but they will still add up to the same number of degrees that are in the regular shape. 2 Count the number of sides in your polygon. Remember that a polygon must have at least three straight sides. For example, if you want to know the sum of the interior angles of a hexagon, you would count 6 sides. Advertisement 3 Plug the value of n{\displaystyle n} into the formula. Remember, n{\displaystyle n} is the number of sides in your polygon. For example, if you are working with a hexagon, n=6{\displaystyle n=6}, since a hexagon has 6 sides. So, your formula should look like this:sum=(6−2)×180{\displaystyle sum=(6-2)\times 180} 4 Solve for n{\displaystyle n}. To do this, subtract 2 from the number of sides, and multiply the difference by 180. This will give you, in degrees, the sum of the interior angles in your polygon. For example, to find out the sum of the interior angles of a hexagon, you would calculate:sum=(6−2)×180{\displaystyle sum=(6-2)\times 180}sum=(4)×180{\displaystyle sum=(4)\times 180}sum=(4)×180=720{\displaystyle sum=(4)\times 180=720}So, the sum of the interior angles of a hexagon is 720 degrees. Advertisement 1 Draw the polygon whose angles you need to sum. The polygon can have any number of sides and can be regular or irregular. For example, you might want to find the sum of the interior angles of a hexagon, so you would draw a six-sided shape. 2 Choose one vertex. Label this vertex A. A vertex is a point where two sides of a polygon meet. 3 Draw a straight line from Point A to each other vertex in the polygon. The lines should not cross. You should create a number of triangles. You do not have to draw lines to the adjacent vertices, since they are already connected by a side. For example, for a hexagon you should draw three lines, dividing the shape into 4 triangles. 4 Multiply the number of triangles you created by 180. Since there are 180 degrees in a triangle, by multiplying the number of triangles in your polygon by 180, you can find the sum of the interior angles of your polygon. For example, since you divided your hexagon into 4 triangles, you would calculate 4×180=720{\displaystyle 4\times 180=720} to find a total of 720 degrees in the interior of your polygon. Advertisement Add New Question Question How do I find a single interior angle? Work out what all the interior adds up to, then divide by however many sides the shape has. Question How do I calculate the number of sides of a polygon if the sum of the interior angles is 1080? Divide that sum by 180°, then add 2. In this example, 1080° / 180° = 6. 6 + 2 = 8. The polygon has 8 sides. Question If two equilateral triangles are placed together to form a rhombus, how do I calculate the value of each interior angle of this rhombus, and how do I find the sum? In the rhombus you describe, the two smaller interior angles would each be 60°, and the two larger interior angles would each be 120°. You wouldn't have to calculate the angles. Simple inspection of the rhombus and the two triangles would show what the angles are, given that equilateral triangles have three 60° angles. The sum is 60° + 60° + 120° + 120°. Question Does a regular polygon's interior angles add up to 160? Not necessarily. A triangle's sum is 180, a quadrilateral's sum is 360, and a pentagon's sum is 540. These are all polygons. Use the formula 180(n-2) where "n" is the number of the sides of the polygon in question to find your sum. Question How do I find the sum of the interior angles of an irregular polygon? The formula for finding the sum of the interior angles of a polygon is the same, whether the polygon is regular or irregular. So you would use the formula (n-2) x 180, where n is the number of sides in the polygon. Question How do I find the missing angle of an irregular polygon? First calculate the sum of all the interior angles of the polygon by using the formula (n - 2)(180°), where n is the number of sides. Then add together all of the known angles, and subtract that sum from the sum you calculated first. That will give you the missing angle. Question Why is the sum of an interior angle 180? The sum of the angles in a triangle is 180°. The sum of the angles in a square (or other quadrilateral) is 360 °. Since two congruent triangles will combine to form a square or other quadrilateral, the sum of the angles in one of the triangles is half of 360°, or 180°. Question If the exterior angle is 72, what is the interior angle? To find the interior angle, subtract the exterior angle from 180°. Question How can we work out 1 or more interior angles of an irregular polygon without a protractor? Without a protractor you would have to know all of the linear dimensions of the polygon, divide the figure into various right triangles, and then use trigonometric functions to find the interior angles. In other words, it would be better to use a protractor on an irregular polygon. Question How do I find the number of triangles in a polygon? By counting them manually. Drawing a diagram is usually the easiest way to visualize this as described in Method 2 above. See more answers Ask a Question Advertisement Thanks! Advertisement Pencil Paper Protractor (optional) Pen Eraser Ruler This article was co-authored by David Jia. David Jia is an Academic Tutor and the Founder of LA Math Tutoring, a private tutoring company based in Los Angeles, California. With over 10 years of teaching experience, David works with students of all ages and grades in various subjects, as well as college admissions counseling and test preparation for the SAT, ACT, ISEE, and more. After attaining a perfect 800 math score and a 690 English score on the SAT, David was awarded the Dickinson Scholarship from the University of Miami, where he graduated with a Bachelor’s degree in Business Administration. Additionally, David has worked as an instructor for online videos for textbook companies such as Larson Texts, Big Ideas Learning, and Big Ideas Math. This article has been viewed 338,938 times. Co-authors: 17 Updated: March 22, 2021 Views: 338,938 Categories: Geometry Print Send fan mail to authors Thanks to all authors for creating a page that has been read 338,938 times. "When you explained slowly how the formula works, I completely understood. I have a big math test tomorrow, and I appreciate this! Thank you!"..." more Share your story The angles that lie inside a shape, are said to be interior angles, or the angles that lie in the area bounded between two parallel lines that are intersected by a transversal are also called interior angles. What are Interior Angles? In geometry, interior angles are formed in two ways. One is inside a polygon, and the other is when parallel lines cut by a transversal. Angles are categorized into different types based on their measurements. There are other types of angles known as pair angles since they appear in pairs in order to exhibit a certain property. Interior angles are one such kind. We can define interior angles in two ways: Angles inside a Polygon: The angles that lie inside a shape, generally a polygon, are said to be interior angles. In the below figure (a), the angles ∠a, ∠b, and ∠c are interior angles. Interior Angles of Parallel Lines: The angles that lie in the area enclosed between two parallel lines that are intersected by a transversal are also called interior angles. In the below figure (b), \(L_1\) and \(L_2\) are parallel, and L is the transversal. The angles ∠1, ∠2, ∠3, and ∠4 are interior angles. Types of Interior Angles There are two types of interior angles formed when two straight lines are cut by a transversal, and those are alternate interior angles and co-interior angles. Alternate Interior Angles: These angles are formed when two parallel lines are intersected by a transversal. This non-adjacent pair of angles are formed on the opposite sides of the transversal. In the above figure (b), the pairs of alternate interior angles are ∠1 and ∠3, ∠2 and ∠4. They are equal in measurement if two parallel lines are cut by a transversal. Co-Interior Angles: These angles are the pair of non-adjacent interior angles on the same side of the transversal. In the above figure (b), the pairs of co-interior angles are ∠1 and ∠4, ∠2 and ∠3. These angles are also called same-side interior angles, or consecutive interior angles. The sum of two co-interior angles is 180º, that's why they form a pair of supplementary angles too. Interior Angles of a Triangle In a triangle, there are three interior angles at each vertex. The sum of those interior angles is always 180°. The bisectors of these angles meet at an point known as incenter. As the sum of interior angles of a triangle is 180°, there is only one possible right angle or obtuse angle possible in each triangle. A triangle with all three acute interior angles is called an acute triangle, a triangle with one interior angle as obtuse is known as an obtuse triangle, while a triangle with one interior angle as right angle is known as a right angled triangle. Sum of Interior Angles Formula From the simplest polygon, let us say a triangle, to an infinitely complex polygon with n sides such as octagon, all the sides of polygon create a vertex, and that vertex has an interior and exterior angle. As per the angle sum theorem, the sum of all the three interior angles of a triangle is 180°. Multiplying two less than the number of sides times 180° gives us the sum of the interior angles in any polygon. Sum, S = (n − 2) × 180° Here, S = sum of interior angles and n = number of sides of the polygon. Applying this formula on a triangle, we get: S = (n − 2) × 180° S = (3 − 2) × 180° S = 1 × 180° S = 180° Using the same formula, the sum of the interior angles of polygons are calculated as follows: Polygon Number of sides, n Sum of Interior Angles, S Triangle 3 180(3-2) = 180° Quadrilateral 4 180(4-2) = 360° Pentagon 5 180(5-2) = 540° Hexagon 6 180(6-2) = 720° Heptagon 7 180(7-2) = 900° Octagon 8 180(8-2) = 1080° Nonagon 9 180(9-2) = 1260° Decagon 10 180(10-2) = 1440° Finding an Unknown Interior Angle We can find an unknown interior angle of a polygon using the "Sum of Interior Angles Formula". Let us consider the below example to find the missing angle ∠x in the following hexagon. From the above given interior angles of a polygon table, the sum of the interior angles of a hexagon is 720°. Two of the interior angles of the above hexagon are right angles. Thus, we get the equation: 90 + 90 + 140 + 150 + 130 + x = 720° Let us solve this to find x. 600 + x = 720 x = 720 - 600 = 120 Thus, the missing interior angle x is 120°. Interior Angles of Polygons A polygon can be considered as a regular polygon when all its sides and angles are congruent. Here are some examples of regular polygons: We already know that the formula for the sum of the interior angles of a polygon of 'n' sides is 180(n-2)°. There are 'n' angles in a regular polygon with 'n' sides/vertices. Since all the interior angles of a regular polygon are equal, each interior angle can be obtained by dividing the sum of the angles by the number of sides. Each Interior Angle = ((180(n-2))/n)° Let us apply this formula to find the interior angle of a regular pentagon. We know that the number of sides of a pentagon is 5 (Here, n = 5). Each interior angle of a regular pentagon can be found using the formula: ((180(n-2))/n)° = ((180(5-2))/5)° = (180 × 3)/5 = 540/5 = 108° Thus, each interior angle of a regular pentagon = 108°. Using the same formula, the interior angles of polygons are calculated as follows: Regular Polygon Sum of Interior Angles, S Measurement of each interior angle((180(n-2))/n)° Triangle 180(3-2) = 180° 180/3 = 60°, Here n = 3 Square 180(4-2) = 360° 360/4 = 90°, Here n = 4 Pentagon 180(5-2) = 540° 540/5 = 108°, Here n = 5 Hexagon 180(6-2) = 720° 720/6 = 120°, Here n = 6 Heptagon 180(7-2) = 900° 900/7 = 128.57°, Here n = 7 Octagon 180(8-2) = 1080° 1080/8 = 135°, Here n = 8 Nonagon 180(9-2) = 1260° 1260/9 = 140°, Here n = 9 Decagon 180(10-2) = 1440° 1440/10 = 144°, Here n = 10 Related Articles on Interior Angles Check out the following pages related to interior angles. Important Notes Here is a list of a few points that should be remembered while studying interior angles: The sum of the interior angles of a polygon of 'n' sides can be calculated using the formula 180(n-2)°. Each interior angle of a regular polygon of 'n' sides can be calculated using the formula ((180(n-2))/n)°. As per the alternate interior angles theorem, when a transversal intersects two parallel lines, each pair of alternate interior angles are equal. Conversely, if a transversal intersects two lines such that a pair of interior angles are equal, then the two lines are parallel. As per the co-interior angles theorem, if a transversal intersects two parallel lines, each pair of co-interior angles is supplementary (their sum is 180°). Conversely, if a transversal intersects two lines such that a pair of co-interior angles are supplementary, then the two lines are parallel. Example 1: Find the interior angle at vertex B in the following figure. Solution: The number of sides of the given polygon is n =6, so it's a hexagon (Hexagon has 6 sides). Thus, the sum of the interior angles of this polygon is 180(n-2)º. = 180(6-2) = 180 × 4 = 720° We know that the sum of all the interior angles in this polygon is equal to 720°. The sum of all the angles of the given polygon is: ∠A + ∠B + ∠C + ∠D + ∠E + ∠F = (x - 60) + (x - 20) + 110 + 120 + 130 + (x - 40) = 3x+ 240 Now we set this sum equal to 720 and solve it for x. 3x+ 240 = 720 3x = 480 x = 480/3 = 160 Now, let us find ∠B. ∠B = (x - 20)° = (160 - 20)° = 140° Therefore, the interior angle at vertex B is ∠B = 140°. Example 2: In the following figure, MN || OP and ON || PQ. If ∠MNO=55°, then find ∠OPQ. Solution: We will extend the lines in the given figure. Here, MN || OP, and ON is a transversal. Thus, 55° and x° are co-interior angles and hence, they are supplementary (by co-interior angle theorem). i.e., 55° + x° = 180° x = 180 - 55 = 125° Again, ON || PQ and OP is a transversal. Thus, x° and ∠OPQ are corresponding angles and hence they are equal. i.e., ∠OPQ = x = 125° Therefore, ∠OPQ = 125° View More > go to slidego to slide Breakdown tough concepts through simple visuals. Math will no longer be a tough subject, especially when you understand the concepts through visualizations. Book a Free Trial Class FAQs on Interior Angles Interior angles are those that lie inside a polygon. For example, a triangle has 3 interior angles. The other way to define interior angles is "angles enclosed in the interior region of two parallel lines when intersected by a transversal are known as interior angles". How to Find the Sum of Interior Angles? The sum of interior angles can be found by using the formula 180(n-2)° where n is the number of sides in a polygon. For example, to find the sum of interior angles of a quadrilateral, we replace n by 4 in the formula. We will get 180(4-2)°= 360°. What is the Sum of the Interior Angles of a Heptagon? A heptagon is a polygon with 7 sides and 7 angles. The sum of all the interior angles of a heptagon is 180(7-2)°, which is equal to 900°. Therefore, the sum of interior angles of a heptagon is 900 degrees. What is the Sum of the Measures of the Interior Angles of a 27-Gon? The sum of measures of interior angles of a 27-gon is 180(27-2)°. It is equal to 180 × 25, which is 4500°. How to Solve Same Side Interior Angles? Same side interior angles are supplementary when two parallel line are cut by a transversal. It means their sum is 180 degrees. So, to solve such angles, we will use this property and find the missing value. What is the Sum of the Interior Angles of a Polygon? The sum of the interior angles of a polygon of n sides can be calculated with the formula 180(n-2)°. It helps us in finding the total sum of all the angles of a polygon, whether it is a regular polygon or an irregular polygon. By using this formula, we can verify the angle sum property as well. The sum of all the interior angles of a triangle is 180º, the interior angle sum of a quadrilateral is 360º, and so on. What is the Sum of the Interior Angles of a Triangle? Let's calculate the sum of the interior angles of a triangle using the sum of interior angles formula S = 180(n-2)°, where n is the number of sides in a polygon. Here, n is 3 as the triangle has 3 sides. Hence, sum is 180(n-2)° = 180(3-2) = 180°. Thus, the sum of the interior angles of a triangle is 180°. What is the Sum of Interior Angles of a Hexagon? Let's calculate the sum of the interior angles of a hexagon, using the sum of interior angles formula S = 180(n-2)°, where n is the number of sides in a polygon. Here, n is 6 as the hexagon has 6 sides. Hence, sum is 180(n-2)° = 180(6-2) = 180 × 4 = 720°. Thus, the sum of the interior angles of a hexagon is 720°. How Many Interior Angles Does an Octagon Have? An octagon has eight sides and thus, it has eight interior angles. The sum of those eight interior angles of an octagon is 1080º. What is the Sum of all Interior Angles of a Pentagon? Let's calculate the sum of the interior angles of a pentagon, using the sum of interior angles formula S = 180(n-2)°, where n is the number of sides in a polygon. Here, n is 5 as the pentagon has 5 sides. Hence, sum is 180(n-2)° = 180(5-2) = 180 × 3 = 540°. Thus, the sum of the interior angles of a pentagon is 540°.

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