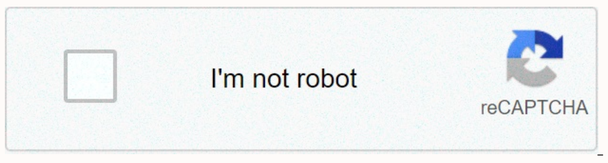

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How to draw an equilateral triangle with compass

In this lesson, we will learn how to construct a 60 degrees angle. how to construct an equilateral triangle. how to Inscribe a Regular Hexagon in a Circle. how to Inscribe an Equilateral Triangle in a Circle. We now construct a 60˚ angle by constructing an equilateral triangle. Recall that the angles in an equilateral triangle are 60˚. Go through the steps below to construct an equilateral triangle. Pick any length for a side of the equilateral triangle. Example : Construct = 60˚. Solution: Step 1 : Mark the point B on the line. Step 2 : Stretch the compasses to any width. Put the sharp end of the compasses at point B and draw an arc on the line. Label the point where the arc intersects the line as point C. Step 3: While keeping the sharp end of the compasses at point B, move the compasses away from C and draw a second arc above the line about mid-way between points B and C. Step 4: Without changing the width of the compasses, place the sharp end of the compasses at point C and draw an arc to intersect the second arc. Step 5 : Draw a line from point B to the point of intersection of the 2 arcs. Label the angle 60˚. How to construct a 60 degree angle and an equilateral triangle? Show Step-by-step Solutions How to construct a 60 degree angle using only a compass and straight edge? Show Step-by-step Solutions How to construct an equilateral triangle? Show Step-by-step Solutions How to Inscribe a Regular Hexagon in a Circle? 1. Measure the distance of the circle's radius. 2. Plot a point on the circle. 3. Starting from that point, use the compass to measure the distance of the radius and make an arc intersecting the circle. 4. Repeat step 3 around the circle until you return to the original point. 5. Connect the six points to form a hexagon. How to Inscribe an Equilateral Triangle in a Circle? 1. Inscribe a hexagon in the circle. 2. Connect every other point on the hexagon to form an equilateral triangle. Show Step-by-step Solutions Try the free Mathway calculator and problem solver below to practice various math topics. Try the given examples, or type in your own problem and check your answer with the step-by-step explanations. We welcome your feedback, comments and questions about this site or page. Please submit your feedback or enquiries via our Feedback page. Something went wrong. Wait a moment and try again. Last updated at March 13, 2021 by Teachoo Transcript Ex 11.1, 5 Construct an equilateral triangle, given its side and justify the construction.Let’s assume side of equilateral triangle is 5.5 cm In an equilateral triangle, all sides are equal So, our triangle looks like Let’s construct it Steps of construction 1. Draw a line segment AB of length 5.5 cm 2. Taking 5.5 cm as radius, and A as center, draw an arc. 3. Taking 5.5 cm as radius, and B as center, draw another arc. Let C be the point where the two arcs intersect Join AC and BC and label the sides Thus, Δ ABC is the required equilateral triangle Justification By construction, AB = AC = BC Since all sides are equal ∴ ΔABC is an equilateral triangle. Thus, the Construction is justified. (Radius of equal arcs) Practice Unlimited Questions 1. Draw an equilateral triangle with side 5 cm. Step 1: Draw a straight line 5 cm long. Call it AB. Step 2: Using a protractor draw an angle of 60° from Point A. Each angle of an equilateral triangle is 60°. Step 3: Using a protractor draw an angle of 60° from Point B. Step 4: Mark the point where both these lines meet as C. CHECK Measure the lengths of lines AC and BC. They should each be equal to 5 cm. Using a protractor measure ∠ACB. It should be equal to 60°. Δ ABC is the required equilateral triangle. Each side of an equilateral triangle is of the same length. Practice Unlimited Questions Use only your compass and straight edge when drawing a construction. No free-hand drawing! We will be doing THREE constructions of an equilateral triangle. The first will be to construct an equilateral triangle given the length of one side, and the other two will be to construct an equilateral triangle inscribed in a circle. Given: the length of one side of the triangle Construct: an equilateral triangle STEPS: 1. Place your compass point on A and measure the distance to point B. Swing an arc of this size above (or below) the segment. 2. Without changing the span on the compass, place the compass point on B and swing the same arc, intersecting with the first arc. 3. Label the point of intersection as the third vertex of the equilateral triangle. See the full circles at work. Proof of Construction: Circle A is congruent to circle B, since they were each formed using the same radius length, AB. Since AB and AC are lengths of radii of circle A, they are equal to one another. Similarly, AB and BC are radii of circle B, and are equal to one another. Therefore, AB = AC = BC by substitution (or transitive property). Since congruent segments have equal lengths, and ΔABC is equilateral (having three congruent sides). Given: a piece of paper Construct: an equilateral triangle inscribed in a circle. This is a modification of the construction of a regular hexagon inscribed in a circle. STEPS: 1. Place your compass point on the paper and draw a circle. (Keep this compass span!) 2. Place a dot, labeled A, anywhere on the circumference of the circle to act as a starting point. 3. Without changing the span on the compass, place the compass point on A and swing a small arc crossing the circumference of the circle. 4. Without changing the span on the compass, move the compass point to the intersection of the previous arc and the circumference and make another small arc on the circumference of the circle. 5. Keep repeating this process of "stepping" around the circle until you return to point A. 6. Starting at A, connect every other arc on the circle to form the equilateral triangle. Proof of Construction: The proof of the inscribed regular hexagon shows that the central angles of a regular hexagon contain 60º. The central angles of the triangle inscribed in this circle contain 120º. Since ΔAOC is isosceles (OA and OC are radii lengths), m∠OCA = m∠OAC = ½ (180 - 120) = 30º. ΔAOC ΔCOB ΔBOA by SAS. By CPCTC, ∠OCB ∠OCA and m∠OCB = 30º by substitution and m∠BCA = 60º. In similar fashion, we have m∠ACB = m∠CBA = m∠BAC = 60º and equilateral ΔABC. Given: a piece of paper Construct: an equilateral triangle inscribed in a circle. This method uses knowledge of the special right triangle 30º - 60º - 90º. STEPS: 1. Place your compass point on the paper and draw a circle, O. (Keep this compass span!) 2. Using a straightedge, draw a diameter of the circle, labeling the endpoints P and B. 3. Without changing the span on the compass, place the compass point on P and draw a full circle. 4. Label the points of intersection of the two circle circumferences with A and C. 5. Draw segments from A to B, B to C and C to A, to form the equilateral triangle. Proof of Construction: This construction uses the fact that an angle inscribed in a semicircle is a right angle, and that in a 30º-60º-90º triangle, the length of the short leg is half of the length of the hypotenuse. In this construction, circle O and circle P are congruent since they have the same radius length. AP is a radius length of circle P and radii AP = OP. OP is also a radius length of circle O (along with OB) and diameter BP = BO + OP = 2 OP. By substitution, BP = 2 AP, creating the conditions necessary for m∠ABP = 30º. Consequently, m∠APB = 60º. A similar argument can be used to establish that for ΔPBC, m∠PBC = 30º and m∠BPC = 60º making ΔPBC ΔPBA by ASA (with shared side from B to P). Now, since they are the corresponding sides of the two congruent triangles, making ΔABC isosceles. ∠BAC ∠BCA since the base angles of an isosceles triangle are congruent. m∠ABC = m∠ABP + m∠PBC = 30º + 30º = 60º by Angle Addition Postulate and substitution. m∠BAC + m∠BCA + m∠ABC = 180º because the sum of the angle measures in a triangle is 180º. Since m∠BAC + m∠BAC + 60º = 180º by substitution, we know 2m∠BAC = 120º and m∠BAC = 60º. Consequently m∠BCA also equals 60º by substitution, making ΔABC equilateral. NOTE: The re-posting of materials (in part or whole) from this site to the Internet is copyright violation and is not considered "fair use" for educators. Please read the "Terms of Use". The way of constructing a triangle with a compass depends on the information given in the question. The construction of triangles is very important while applying the Pythagorean theorem and trigonometry.Here, we will learn how to construct a triangle if we have the following data.All the three sides of a triangle are given.The measure of the hypotenuse and one side is given in the right triangle.Two sides of a triangle and included angle are given.Two angles of a triangle and included sides are given.How to Construct Triangles?Triangle is a two-dimensional polygon shape with three sides and three angles, which can be formed by joining the points in a plane.But, the question arises how to construct triangles?A unique triangle can be easily constructed using the concept of Geometry.Geometry is a branch of Mathematics that deals with lines, angles, shapes, size, and dimension of different things we observe in everyday life. In Euclidean Geometry, there are different two dimensional and three -dimensional shapes. Flat shapes such as square, triangle, and circle are known as two -dimensional shapes. These shapes have only length and width.Solid shapes such as cube, cuboid, sphere, cone, etc are three-dimensional shapes. These shapes have length, width, or height.These geometric shapes can be easily constructed using compass, ruler, and protractor. Let us learn the steps of constructing triangles with compass, ruler, and protector below.Constructing Triangle When Hypotenuse and One Side is GivenTo construct a triangle when hypotenuse and one side is given, we need the following geometric tools:Let us learn to construct a triangle when hypotenuse and one side is given through examples:Construct a right-angled triangle ABC with the length of the hypotenuse AB = 3 cm and side BC = 5 cm. The steps of construction are:Step 1:Draw a line of any length and mark a point C on it.Step 2:Set the width of the compass to 3 cm.Step 3:Place the pointer of the compass at C and draw an arc on both sides of C.Step 4:Mark the point as P and A where both the arc crosses the line.Step 5:Taking P as the centre, draw an arc above the point C.Step 6:Taking A as the centre, draw an arc that cuts the previous arc.Step 7:Mark the point B, where two arcs intersect each other.Step 8:Join the points B and A along with B and C with the help of the ruler.Thus, ΔABC is the required right-angled triangle.Constructing Triangle When Two Sides and Included Angle are GivenTo construct a triangle when two sides and angle, we need the following geometric tools:A RulerA ProtractorA CompassLet us learn to construct a triangle when the length of two sides and included angle are given through an example.Example:Construct a triangle PQR with PQ = 4 cm, QR = 6.5 cm , and ∠PQR = 60°.The steps of construction are:Step 1:Draw a line QR = 6.5 cm using a ruler.Step 2:Using protractor at Q, draw a line QX making an angle of 60° with QRStep 3:Taking Q as the centre, draw an arc of radius 4 cm to cut the line QX at P.Step 4:Join PR.Therefore, PQR is the required triangle.Constructing Triangle When Two Sides and Included Angle are GivenTo construct a triangle when two sides and angle, we need the following geometric tools:Let us learn to construct a triangle when the length of one side and included angle are given through examples.Construct a triangle XYZ with XY = 4 cm, ∠ZXY = 100° and ∠ZXY = 30°.The Steps of Construction are:Step 1:Draw a line segment XY = 4 cm using a rulerStep 2:Using protractor at X, draw a ray XP forming an angle of 30° with XY Step 3:Using protractor at Y, draw another ray YQ making an angle of 100° with XYStep 4:Let the rays XP and QY intersect at Z.Step 5:Using the property, sum of all the angles of a triangle is equal to 180°, we can easily find the third angle of the triangle which is 50°. Hence, ∠Z = 50°.Step 6:Hence, XYZ is a required triangle.Constructing Triangle Given Three SidesTo construct a triangle when all the three sides are given, we need the following geometric tools:Before knowing how to construct a triangle with given sides, we should check the following property of triangles is met by the length of all the three sides.“ The sum of all the three sides of a triangle should always be greater than its third side”.We will not be able to construct a triangle with the given three sides if the above-mentioned property is not met by the given three sides.Let us learn to construct a triangle given three sides through an example.Example:Construct a triangle ABC with side AB = 4 cm, BC = 6 cm and AC = 5 cm.The steps of construction are:Step 1:Draw a line BC = 6 cm (the longest side).Step 2:Taking B as centre, draw an arc of radius 4 cm above the line segment BC.Step 3:Taking C as centre, draw an arc of radius 5 cm that intersects the previous arc at ‘A’.Step 4:Join line segments AB and ACHence, ABC is the required triangle.Drawing Triangle With ProtractorConstruct an isosceles triangle PQR with PQ = 6 cm, QR = 6 cm and ∠PQR = 50°.Steps of drawing a triangle with protractor for the given sides and angles are as follows:Draw a line QR 6 cm long.Taking Q as the centre, draw an angle of 50° using the protractor.Taking R as the centre, draw an angle of 50° using the protractor (angles opposite to the equal sides of an isosceles triangle are equal).Mark the point P where two lines intersect.Therefore, PQR is the required isosceles triangle.Solved Examples:1. Construct an equilateral triangle with a side 5 cm long using a protractor?Ans: An equilateral triangle is a triangle whose all the three sides are equal in length. Another property of the equilateral triangle is that three angles of the triangle are equal, and each angle of a triangle is equal to 60 degrees.Following are steps to construct an equilateral triangle with each side 5 cm long.Step 1:Draw a line AB of 5 cm long.Step 2:Taking A as centre, draw an angle of 60° using a protractor.Step 3:Taking B as centre, draw another angle of 60° using a protractor.Step 4:Mark the point C where both the lines meet.Hence, ABC is a required equilateral triangle of length 5 cm.2. Write down the steps in constructing a triangle ABC with sides AB = 3.5 units, BC = 6 units and AC = 4.5 units.SolutionStep 1:Draw a line segment BC measuring 6 units.Step 2:With B as center, and draw an arc of radius 3.5 unitsStep 3:With C as center, draw an arc of radius 4.5 units to intersect the previous arc at AStep 4:Join the line segment AB and AC.Hence, the triangle ABC is drawn.Fun FactsTriangle is a polygon with the minimum possible number of sides (three).Hatch marks, also known as tick marks are used in triangles to identify the sides of equal length.Two triangles are considered similar if each angle of one triangle has the same measure as the corresponding angle in the other triangle.