Geometry circle problems with solutions pdf

Grade 11 geometry problems with detailed solutions are presented. Problems The two circles below are concentric (have same center). The radius of the large circle is 10 and that of the small circle is 6. What is the length of the chord AB? . Point A is inside the square BCDE whose side length is 20. The length of AB is 9 and the length of AE is 13. Find x the length of AC. . Find all points of intersections of the circle x2 + 2x + y2 + 4y = -1 and the line x - y = 1 Find the area of the triangle enclosed by the x - axis and the lines y = x and y = -2x + 3. Find the length of the third side of a triangle if the area of the triangle is 18 and two of its sides have lengths of 5 and 10. In the figure below points A, B, C and D are on a circle. Point O is the intersection of chords AC and BD. The area of triangle BOC is 15; the length of AO is 10 and the length of OB is 5. What is the area of triangle AOD? . Solutions to the Above Problems If we draw a radius in the small circle to the point of tangency, it will be at right angle with the chord.(see figure below). If x is half the length of AB, r is the radius of the small circle and R the radius of the large circle then by Pythagora's theorem we have: r2 + x2 = R2 62 + x2 = 102 Solve for x: x = 8 Length of AB = 2x = 16 . Use cosine law in triangle ABE: 132 = 202 + 92 - 2(20)(9)cos(T) Use cosine law in triangle ACB: x2 = 202 + 92 - 2(20)(9)cos(90° - T) . Note that cos(90° - T) = sin(T) and rewrite the second equation as Use cosine law in triangle ACB: x2 = 202 + 92 - 2(20)(9)sin(T) Solve the first equation for cos(T). cos(T) = 13/15 Use trigonometric identity to find sin(T) = 2 √(14) / 15 Substitute sin(T) by 2 √(14) / 15 in the third equation and solve for x x = √(481 - 48 √(14)) = 17.4 (approximated to 3 significant digits) Solve x - y = 1 for x (x = 1 + y) and substitute in the equation of the circle to obtain: (1 + y)2 + 2·(1 + y) + y2 + 4y = -1 Write the above quadratic equation in standard form and solve it to obtain y = - 2 + √2 and y = - 2 - √2 Use x = 1 + y to find x Points of intersection: (-1 + √2, - 2 + √2) and (-1 - √2 , -2 - √2) We first graph the lines y = x and y = -2x + 3 in order to locate the points of intersection of the lines and the x axis and identify the triangle in question. . The height is the y coordinate of the point of intersection of the lines y = x and y = -2x + 3 found by solving the system of equations. solve : y = -2x + 3 , y = x , solution: (1 , 1) which also the point of intersection. The y coordinate = 1 and is also the height. The length of the base is the x intercept of the line y = -2x + 3 which is x = 3/2. Area of the shaded triangle = (1/2)(1)(3/2) = 3/4 The formula for the area using two sides and the internal angle they make, may be written as follows 18 = (1/2) × 5 × 10 × sin(A) which gives: sin(A) = 18/25 We now use the cosine formula to fin the length x of the third side opposing angle A as follows: x2 = 52 + 102 - 2 × 5 × 10 × cos(A) with cos(A) = √(1 - sin(A)2) Substitute in the expression for x2 and solve for x to obtain x = 7.46 (approximated to 3 significant digits) The area of triangle BOC is 15 and is given by (1/2)BO × OC × sin(BOC) The area of triangle AOD is given by (1/2)AO × OD × sin(AOD) Note that angle BOC and AOD are equal. By the theorem of the intersecting chords we have: AO × OC = BO × OD Which may be written as: AO / BO = OD / OC = 10 / 5 = 2 The ratios AO / BO and OD / OC are both equal to 2, hence their product is equal to 4 as follows (AO × OD) / (BO × OC) = 4 Which gives: AO × OD = 4 × (BO × OC) Hence the area of triangle AOD is 4 times the area of triangle BOC and is equal to 60. More References and links High School Maths (Grades 10, 11 and 12) - Free Questions and Problems With Answers Middle School Maths (Grades 6, 7, 8, 9) - Free Questions and Problems With Answers Primary Maths (Grades 4 and 5) with Free Questions and Problems With Answers Home Page report this ad If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *.kastatic.org and *.kasandbox.org are unblocked. Learn Maths from the best First Lesson Free! Calculate the center coordinates and radius of the following circles, if applicable: The best Maths tutors availableExercise 2 Calculate the equation of the circle that has its center at (2, −3) and has the x-axis as a tangent. Exercise 3 Calculate the equation of the circle that has its center at (−1, 4) and has the y-axis as a tangent. Exercise 4 Calculate the equation of the circle which is centered at the point of intersection of the lines and and its radius is equal to 5. Exercise 5 Find the equation of the circle which is concentric to the circle with equation , and passes through the point (−3, 4). Exercise 6 A triangle with vertices A = (0, 0), B = (3, 1) and C = (5, 7) is inscribed in a circle. Calculate the equation of this circle. Exercise 7 The ends of the diameter of a circle are the points A = (−5, 3) and B = (3, 1). What is the equation of this circle? Exercise 8 Find the equation of the concentric circle to the circle which has a tangent of . Exercise 9 Determine the points of intersection for the circle with the following lines: Exercise 10 Determine the equation of the circle which has its center at C = (3, 1) and a tangent of . Exercise 11 Find the equation of the circle that passes through the points A = (2, 1) and B = (−2, 3) and has its center on the line: . Exercise 12 Calculate the equation of the circle that passes through the point (0, −3), whose radius is and whose center is on the angle bisector of the first and third quadrants. Calculate the center coordinates and radius of the following circles, if applicable: 1. , therefore, , therefore, Hence, C= 2. , therefore, , therefore, Hence, C= It is not a circle. 3. Dividing the whole equation by 4: , therefore, , therefore, Hence, C= Calculate the equation of the circle that has its center at (2, −3) and has the x-axis as a tangent. In this question, the circle has an x-axis as a tangent. A tangent is a straight line that touches a curve. This means that the "y coordinate" will be zero. We will use the distance formula to find the radius. Currently, we have 2 coordinates which are: C(2,-3), T(2,0) Plugging the values of C and T: Since we know the value of the radius and center of the circle, the equation will be: Calculate the equation of the circle that has its center at (−1, 4) and has the y-axis as a tangent. This time, the circle has the y-axis as a tangent. This means that the x coordinate will be zero. Hence, we have 2 coordinates which are C(-1,4) and T(0,4). We will use the distance formula again to find the value of the radius. Plugging the values of C and T: Since we know the value of the radius and center of the circle, the equation will be: Calculate the equation of the circle which is centered at the point of intersection of the lines and and its radius is equal to 5. ->Equation 1 ->Equation 2 Now both equations will be solved simultaneously to find the value of x and y. The value of x and y will be the coordinate of the center of the circle. After solving simultaneously, the center of the circle will be C=(0,-1). There is another method to solve this question. However, you still need to find the center by solving the linear equations simultaneously. Below is another method to find the equation of the circle. Find the equation of the circle which is concentric to the circle with equation , and passes through the point (−3, 4). We will find the center of the circle from and then we will find the radius with the help of distance formula. In the end, we will put all the values in the general equation or standard equation to find the equation of the circle. Compairing the above equations to find the value of g and f: Putting the values of a, b, and r: Finding the equation of the circle by using the standard equation: A triangle with vertices A = (0, 0), B = (3, 1) and C = (5, 7) is inscribed in a circle. Calculate the equation of this circle. We will insert all the coordinates in the standard equation to find the value of g, f, and c. Once we find the values of g,f, and c then we will insert all those values in the standard equation to develop the equation of the circle. Standard Equation= Plugging the coordinates of A: Plugging the coordinates of B: Plugging the coordinates of C: After solving the above equations, we will get: Putting all the values in the general equation of the circle: The ends of the diameter of a circle are the points A = (−5, 3) and B = (3, 1). What is the equation of this circle? We will find the diameter with the help of the distance formula. To find the radius, we will divide the diameter into half. Furthermore, if we find the midpoint of the AB line, that will be the center of the circle. We will use the midpoint formula to find the coordinates of the center of the circle. Finding the diameter: Since, midpoint is the center of the circle, therefore, we will declare midpoint as the center of the circle: Plugging the value of C and r in the standard equation: You can also find the equation from the general equation of the circle: Plugging all the values of the g, f, and c in the general equation: Find various Maths tutors on Superprof. Find the equation of the concentric circle to the circle which has a tangent of . Plugging all the values in the general equation: Determine the points of intersection for the circle with the following lines: -> Equation 1 -> Equation 2 After solving the above equations simultaneously, we will get: The factors of the above equation will be: Putting the values of y in the x equation to find values of x: So our coordinates are: 2. -> Equation 1 -> Equation 2 After solving the above equations simultaneously, we will get: The factor of the above equation will be: Putting the values of y in the x equation to find values of x: So our coordinate are: 3. -> Equation 1 -> Equation 2 After solving the above equations simultaneously, we will get: Determine the equation of the circle which has its center at C = (3, 1) and a tangent of . Since we know the coordinate of the center of the circle and value of the radius, therefore, we can create the equation of the circle: Hence, Find the equation of the circle that passes through the points A = (2, 1) and B = (−2, 3) and has its center on the line: . Plugging the coordinates of A in the standard equation: Since both radii are the same, therefore: -> Equation 1 -> Equation 2 After solving the above equations simultaneously, we will get: Plugging the value of a and b in the standard equation to find the radius: Calculate the equation of the circle that passes through the point (0, −3), whose radius is and whose center is on the angle bisector of the first and third quadrants. For b=-1: , For b=-2: , The platform that connects tutors and students

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