I'm not a robot

Use this calculator to easily calculate the area of a circle, given its radius in any metric: mm, cm, meters, km, inches, feet, yards, miles, etc. Circle area 28.274334 cm2 Quick navigation: The formula for the area of a circle is π x radius2, but the diameter of the circle is d = 2 x r2, so another way to write it is π x (diameter / 2)2. Visual on the figure below: π is, of course, the famous mathematical constant, equal to about 3.14159, which was originally defined as the ratio of a circle's circumference to its diameter. The formula above is the one used in our area of a circle calculator. How to calculate the area of a circle? Calculation is easy once you have measured the circle's radius or diameter, or if you know it from plans and schematics: just plug the numbers into the formulas above or use our circle area calculator instead. If you are measuring it by hand, remember that the diameter is the largest measurement you can get from a circle. Example: find the area of a circle Task 1: Given the radius of a circle, find its area. For example, if the radius is 5 inches, then using the first area formula calculate π x 52 = 3.14159 x 25 = 78.54 sq in. Task 2: Find the area of a circle given its diameter is 12 cm. Apply the second equation to get π x (12 / 2)2 = 3.14159 x 36 = 113.1 cm2 (square centimeters). Practical application Circle geometry has a wide array of practical uses. Circles are used when planning athletic tracks, recreational areas, buildings, and roundabouts, so knowing their area is important in construction, landscaping, etc. The famous Ferris-wheel attraction is a circle, as are the wheels on your car or bike. Circle-like parts, e.g. cylinders, tubes, gears, and others are used by engineers in clocks, bikes, cars, trains, ships, planes, and even rockets. The invention of the wheel was one of the transforming events in early human history, as it dramatically reduced the energy expended in moving stuff around and made travelling easier. The number π has application in calculating statistical distributions like the normal distribution (gaussian distribution), which are used throughout the sciences. The calculation of the area of a circle is fundamental in geometry and engineering. It determines the space enclosed within a circular boundary.This article explores detailed formulas, common values, and real-world applications for precise area calculations. Expect comprehensive tables and expert insights. Calculate the area of a circle with radius 7 cm.Find the area of a circle given a diameter of 10 inches.Determine the area of a circle with circumference 31.4 meters.Compute the area of a circle when the radius is 5.5 feet.Extensive Tables of Common Circle Area ValuesBelow is a comprehensive table listing the area of circles for a wide range of common radii. This table is designed to provide quick reference values for engineers, architects, and students alike.Radius (units)Diameter (units)Circumference (units)Area (square units)126.28323.14162412.566412.56643618.849628.27434825.132750.265551031.415978.539861237.6991113.097371443.9823153.938081650.2655201.061991856.5487254.4690102062.8319314.1593153094.2478706.85832040125.66371256.63712550157.07961963.49543060188.49562827.433450100314.15937853.9816100200628.318531415.9265This table assumes the use of the constant π (pi) approximated as 3.1416. The circumference is calculated as 2πr, and the area as πr^2. These values are rounded to four decimal places for clarity.Fundamental Formulas for Calculating the Area of a CircleCalculating the area of a circle involves several key formulas, each depending on different known variables such as radius, diameter, or circumference. Understanding these formulas and their variables is essential for accurate computation.1. Area Using RadiusThe most direct formula for the area (A) of a circle is based on its radius (r):A: Area of the circle (square units)r: Radius of the circle (linear units)π: Pi, a mathematical constant approximately equal to 3.141592653589793The radius is the distance from the center of the circle to any point on its circumference. Common radius values range from millimeters in micro-engineering to kilometers in geospatial calculations.2. Area Using DiameterIf the diameter (d) is known instead of the radius, the formula can be rewritten as:d: Diameter of the circle (linear units), equal to 2 × rThis formula is useful when the diameter is easier to measure or given directly, such as in pipe dimensions or circular plates.3. Area Using CircumferenceWhen the circumference (C) is known, the area can be calculated by first deriving the radius from the circumference and then applying the area formula:Then, substitute r into the area formula:Simplifying:C: Circumference of the circle (linear units)This formula is particularly useful in scenarios where the perimeter is measured directly, such as in circular tracks or roundabouts.4. Area Using Sector Angle and RadiusFor calculating the area of a sector (a portion of a circle defined by a central angle θ), the formula is: A_sector = (θ / 360) × π × r^2θ: Central angle of the sector in degreesr: Radius of the circleThis formula is essential in fields like mechanical engineering and architecture when dealing with pie-shaped components or circular segments.Detailed Explanation of Variables and Constantsπ (Pi): An irrational constant representing the ratio of a circle's circumference to its diameter. Its value is approximately 3.141592653589793, but for practical calculations, 3.1416 or 22/7 are often used.Radius (r): The linear distance from the center of the circle to its edge. It is the fundamental measurement for area calculations.Diameter (d): Twice the radius, representing the full width of the circle through its center.Circumference (C): The total distance around the circle, calculated as 2πr.Central Angle (θ): Used in sector area calculations, measured in degrees or radians.Understanding these variables and their interrelationships is critical for accurate and efficient area calculations in various technical fields.Real-World Applications and ExamplesExample 1: Calculating the Area of a Circular GardenSuppose a landscape architect needs to determine the area of a circular garden with a radius of 12 meters to estimate the amount of soil required for planting.Given: r = 12 mFormula: A = π × r^2Calculation: A = 3.1416 × 12 × 12 = 3.1416 × 144 = 452.3904 m^2The garden covers approximately 452.39 square meters. This precise area helps in budgeting for soil, plants, and irrigation systems.An engineer receives a circular metal plate with a measured circumference of 62.83 cm and needs to calculate its area for material stress analysis.Given: C = 62.83 cmFormula: A = C^2 / (4 × π)Calculation: A = $(62.83)^2$ / (4 × 3.1416) = 3947.0889 / 12.5664 = 314.159 cm^2The metal plate has an area of approximately 314.16 square centimeters, which is critical for calculating load distribution and material strength.While the basic formulas suffice for most applications, advanced scenarios may require consideration of unit conversions, precision of π, and computational methods for irregular circular shapes.Unit Consistency: Always ensure that radius, diameter, and circumference are in the same units before calculation to avoid errors.Precision of π: For high-precision engineering tasks, use π to more decimal places or symbolic computation to minimize rounding errors.Computational Tools: Software like MATLAB, AutoCAD, or Python libraries can automate area calculations for complex circular geometries.Sector and Segment Areas: For partial circles, formulas involving central angles and chord lengths become necessary.Incorporating these considerations ensures that the calculation of the area of a circle meets the rigorous demands of professional and scientific applications.References and Further Reading Łucja Zaborowska, MD, PhD candidateŁucja ZaborowskaMD, PhD candidateŁucja is a physician and researcher specializing in obstetrics and gynecology. She is currently pursuing a Ph.D. in Medical Sciences at the Jagiellonian University in Cracow, Poland. Her engagement in the subject is extensive, including academics, research, and clinical practice. In addition to her main duties, she also lectures at the university and oversees student research groups. On a personal note, her love for dogs has inspired her to start fostering, giving them a safe place to stay until they find their forever homes. See full profileCheck our editorial policyDominik Czernia, PhDDominik CzerniaPhD, Institute of Nuclear Physics PANDominik Czernia, PhD, is a physicist at the Institute of Nuclear Physics in Kraków, specializing in condensed matter physics with a focus on molecular magnetism. He has led several national research projects, pioneering innovative approaches to novel materials for high technology. Passionate about making science accessible, Dominik has created various calculators, mostly in physics and math categories. In his free time, he enjoys family walks, city explorations, mountain hiking, and traveling everywhere by bike. See full profileCheck our editorial policy and Jack Bowater2 313 people find this calculator helpfulTable of contentsThe area of a circle calculator helps you compute the surface of a circle given a diameter or radius. Our tool works both ways — no matter if you're looking for an area-to-radius calculator or a radius to the area one, you've found the right place ◔ We'll give you a tour of the most essential pieces of information regarding the area of a circle, its diameter, and its radius. We'll learn how to find the area of a circle, talk about the area of a circle formula, and discuss the other branches of mathematics that use the very same equation.So, let's see how to find the area of a circle. There are several ways to achieve it. Here, we can calculate the area of a circle using a diameter or using a radius. The diameter is the line that crosses the center of the figure and touches both of its margins. The radius begins at the center of the figure and ends at the figure's margin.You can find the diameter of a circle by multiplying the radius of a circle by two: Diameter = 2 × Radius The formula to calculate the area of a circle using radius is as follows: Area of a circle = π × r2 And, to calculate the area of a circle using diameter use the following equation: Area of a circle = π × (d/2)2 where: π is approximately equal to 3.14. It doesn't matter whether you want to find the area of a circle using diameter or radius — you'll need to use this constant in almost every case. Another relevant aspect of circles is their circumference. You can learn more about it and its relationship with area in our circle formula calculator.Now that you know how to calculate the area of a circle, we encourage you to discover similar topics: Circle circumference and perimeter. Pie chart. Area of the incircle of a square, that is, of the largest circle that fits inside the square. Sector of a circle — this is a section of a circle between two radii. You can think of it as a giant slice of pizza. Also, why don't you try our other circle calculators:You can easily calculate everything, the area of a circle, its diameter, and its radius, using our area of a circle calculator in a blink of an eye: Determine whether your given value is a diameter or a radius using the picture on the right and definitions available in the section above (you can calculate the area of a circle using its diameter as well as radius). Enter your value into the proper field of the calculator. It didn't take long — your results are here! We decided to include the step-by-step solution and all the most important data right below the calculator. That is how to calculate the area of a circle in no time ☺.The circle's area found with both the radius and diameter calculators serves as a base for many other equations — not only in mathematics but also in everyday life! Here are a few examples where knowing how to find the area of a circle might be useful: We need to know the surface area of a circle in order to calculate a cone's volume and its surface area . Your pizza party wouldn't be complete without estimating the pizza's size based on the diameter to area calculator . We use calculations similar to this one when obtaining information about a sphere, such as a sphere volume . Do you fancy nice dresses? Maybe you love to sew? Efficient sewing of circle skirts has never been easier . The formulas linking the diameter and area of a circle reads area = π × (diam/2)2 and diam = 2 × √(area / π). For instance, the diameter of a circle with unit area is approximately equal to 1.128 because diam = 2 × √(1 / π) ≈ 1.128.The radius is approximately equal to 1.784. The precise answer is √(10 / π). To get this result, recall the formula area = π × r2. We transform it to the form r2 = area / π, and so we see that the radius is equal to the square root of area / π. Plugging in area = 10, we obtain: radius = √(10 / π) ≈ √(10 / 3.14) ≈ √3.185 ≈ 1.785.To determine the circumference of a circle from its area, follow these steps: Multiply the area by π. Take the square root of the result from Step 1. Multiply by 2. You found the circle's circumference from its area! Well done! Yes, the area and circumference of a circle have the same value 4π if the radius of the circle has length 2. Remember, however, that the units are different! The circumference has length units, and the area has, well, area units.Yes, take a circle with radius r = 1/π. Then its area is equal to πr^2 = π(1/π)2 = 1/π, so it has the same value as the radius. Remember, however, that the units differ! The radius and area have, respectively, length and area units; for instance, in and in sq.Did we solve your problem today?Check out 11 similar circle calculators Circle calc: find c, d, a, r The area of a Circle is the measure of the two-dimensional space enclosed within its boundaries. It is mostly calculated by the size of the circle's radius which is the distance from the center of the circle to any point on its edge. The area of a circle is proportional to the radius of the circle. The area of the circle is calculated using the formula,Area of Circle = πd^2 / 4Where,r is radius,d is diameter, andπ = 22/7 or 3.14Area of a CircleArea of circle formula is useful for measuring areas of circular fields or plots. It is also useful to measure the area covered by circular furniture and other circular objects.Parts of CircleA circle is a closed curve in which all the points are equidistant from one fixed point i.e. centre. Examples of circles as seen in everyday life are clocks, wheels, pizzas, etc. Illustration of Circle and its PartsRadiusThe distance of a point from the boundary of the circle to its centre is termed its radius. Radius is represented by the letter 'r' or 'R'. The area and circumference of a circle are directly dependent on its area.DiameterThe longest chord of a circle that passes through its centre is termed its diameter. It is always twice its radius.Diameter formula: The formula for the diameter of a circle is Diameter = 2 × Radiusd = 2×r or D = 2×Ralso, conversely, the radius can be calculated as:r = d/2 or R = D/2CircumferenceThe circumference of the circle is the total length of its boundary i.e. perimeter of a circle is termed its circumference. The Circumference of a circle is given by the formula C = 2πr.Circumference of Circle Area of Circle FormulasThe formula for finding an area of a circle is directly proportional to the square of its radius. It can also be found out if the diameter or circumference of a circle is given. The area of a circle is calculated by multiplying the square of the radius by π. Area of Circle with RadiusArea = $\pi r^2$where, r is the radius and π is the constant valueExample: If the length of the radius of a circle is 3 units. Calculate its area.Solution:We know that radius r = 3 unitsSo by using the formula: Area = πr^2r = 3, π = 3.14Area = 3.14 × 3 × 3 = 28.26Therefore, the area of the circle is 28.26 units2Area of Circle in Terms of DiameterThe diameter of a circle is double the length of the radius of the circle, i.e. 2r. The area of the circle can also be found using its diameterArea = (π/4) × d^2 where, d is the diameter of the circle.Example: If the length of the diameter of a circle is 8 units. Calculate its area.Solution:We know that diameter = 8 units, so by using the formulas: Area = (π/4) × d^2 d = 8, π = 3.14Area = (3.14 /4) × 8 × 8 = 50.24 unit 2Thus, the area of the circle is 50.24 units2Area of a Circle Using CircumferenceThe circumference is defined as the length of the complete arc of a circle.Area = C^2/4πWhere, C is the circumferenceExample: If the circumference of the circle is 4 units. Calculate its area.Solution:We know that circumference of the circle = 4 units (given) so by using the above formula:C = 4, π = 3.14Area = 4 × 4 / (4 × 3.14) = 1.273 unit2Therefore, the area of the circle is 1.273 unit2Area of Circle DerivationThe area of a circle can be visualized and proved using two methods, namelyCircle Area Using RectanglesCircle Area Using TrianglesCircle Area Using RectanglesThe area of the Circle is derived by the method discussed below. For finding the area of a circle the diagram given below is used,Derivation of Circle Area Using RectanglesAfter studying the above figure carefully, we split the circle into smaller parts and arranged them in such a way that they formed a parallelogram. If the circle is divided into small and smaller parts, at last, it takes the shape of a rectangle.Area of Rectangle = length × breadthComparing the length of a rectangle and the circumference of a circle we can see that, the length is = ½ the circumference of a circleLength of a rectangle = ½ × 2πr = πrBreadth of a rectangle = radius of a circle = rArea of circle = Area of rectangle = πr × r = πr^2Area of the circle = πr^2Where r is the radius of the circle.Circle Area Using TrianglesThe area of the circle can easily be calculated by using the area of a triangle. For finding the area of the circle using the area of the triangle consider the following experiment. Let us take a circle with a radius of r and fill the circle with concentric circles till no space is left inside the circle.Now cut open each concentric circle and arrange them in a triangular shape such that the shortest length circle is placed at the top and the length is increased gradually.The figure so obtained is a triangle with base 2πr and height r as shown in the figure given below,Thus the area of the circle is given as,A = 1/2 × base × heightA = 1/2 × (2πr) × rA = πr^2Area of a Sector of CircleThe area of a sector of a circle is the space occupied inside a sector of a circle's border. A semi-circle is likewise a sector of a circle, where a circle has two equal-sized sectors. of a sector of a circle formula is given below:A = (θ/360°) × πr^2Where,θ is the sector angle subtended by the arcs at the center (in degrees),r is the radius of the circle.Area of Quadrant of circleA quadrant of a circle is the fourth part of a circle. It is the sector of a circle with an angle of 90°. So its area is given by the above formula.A = (θ/360°) × πr^2Area of Quadrant = (90°/360°) × πr^2 = πr^2 / 4Difference Between Area and Circumference of CircleThe basic difference between the area and the circumference of the circle is discussed in the table below, Circumference (C)Area (A)DefinitionThe length of the boundary of the circle is called the circumference of the circle. The total space occupied by the boundary of the circle is called the area of the circle.FormulaC = 2πr A = πr^2UnitsThe circumference is measured in m, cm, etc.The area is measured in m2, cm2Radius DependenceThe radius is directly proportional to the circumference of the circle.The area is directly proportional to the square of the radius of the circle.Diameter DependenceThe diameter is directly proportional to the circumference of the circle.The area is directly proportional to the square of the diameter of the circle.Circle Real World ExamplesWe come across various examples which resemble circular shapes in our daily life.Some of the most common examples of the real-life circular things which we observe in our daily life are shown in the image below.Read More:Area of Circle ExamplesLet's solve some example questions on the area of circle concepts and formulas you learnedin so far :Example 1: A large rope is in a circular shape. Its radius is 5 units. What is its area?Solution:A large rope is in circular shape means it is similar to circle, so we can use circle formulae to calculate the area of the large rope.given, r = 5 units, π = 3.14Area = 3.14 × 5 × 5 = 78.50 unit2Thus, the area of the circle is 78.50 units2Example 2: If the rope is in a circular shape and its diameter is 4 units. Calculate its area.Solution:We know that rope is in circular shape, and its diameter = 4 unitsπ = 3.14Area = (3.14 /4) × 4 × 4 = 12.56 units2Therefore, the area of the rope is 12.56 units2Example 3: If the circumference of the circle is 8 units. Calculate its area.Solution:Circumference of the circle = 8 units (given), π = 3.14Area = 8 × 8 / (4 × 3.14) = 5.09 units2Therefore, the area of the circle is 5.09 units2Example 4: Find the circumference and the area of the circle if the radius is 21 cm.Solution: Radius, r = 21 cm, circumferencer of the circle = 2πr cm.Now, substituting the value, we getC = 2 × (22/7)× 21C = 2×22×3C = 132 cmThus, circumference of the circle is 132 cm.Now, area of the circle = πr^2 cm2A = (22/7) × 21 × 21A = 22 × 63A = 1386 cm2 Thus, area of the circle is 1386 cm2 Example 5: Find the area of the quadrant of a circle if its radius is 14 cm.Solution:Given r = 14 cm, π = 22 / 7Area of quadrant = πr^2 / 4 = 22 / 7 × 142 × 1/4 = 154 cm2Thus, the required area of quadrant = 154 cm2Example 6: Find the area of the sector of a circle that subtends 60° angle at the center, and its radius is 14 cm.Solution:Given r = 14 cm, π = 22 / 7Area of sector = (θ/360°) × πr^2 = (60° / 360°) × 22 / 7 × 142 = 102.67 cm2Thus, the required area of quadrant = 102.67 cm2Practice Problems on Area of CircleHere are some practice problems on the area of a circle for you to solve:Question 1: What is the area of a circle of radius 7 cm?Question 2: The diameter of a circle is 7 cm. Find its area.Question 3: Determine the area of a circle in terms of pi, if radius = 6 cm.Question 4: Calculate the area of a circle if its circumference is 88 cm.Answer KeyAnswer 1: Area of a circle with radius 7 cm is 154 cm2.Answer 2: Area of a circle with diameter 7 cm is 38.5 cm2.Answer 3: Area in terms of π, radius = 6 cm is 36π cm2.Answer 4: Area of a circle with circumference 88 cm is 616 cm2. CBSE Class 10 Maths Notes PDF: Chapter Wise Notes 2024 Real Numbers Euclid Division Lemma Fundamental Theorem of Arithmetic HCF / GCD and LCM - Definition, Formula, Full Form, Examples Irrational Numbers- Definition, Examples, Symbol, Properties Decimal Expansions of Rational Numbers Rational Numbers Algebraic Expressions in Math: Definition, Example and Equation Polynomial Formula Types of Polynomials (Based on Terms and Degrees) Zeros of Polynomial Geometrical meaning of the Zeroes of a Polynomial Factorization of Polynomial Division Algorithm for Polynomials Algebraic Identities Relationship between Zeroes and Coefficients of a Polynomial Division Algorithm Problems and Solutions Linear Equation in Two Variables Pair of Linear Equations in Two Variables Graphical Methods of Solving Pair of Linear Equations in Two Variables Solve the Linear Equation using Substitution Method Solving Linear Equations Using the Elimination Method Quadratic Equations Roots of Quadratic Equation Solving Quadratic Equations How to find the Discriminant of a Quadratic Equation? Arithmetic Progressions Class 10- NCERT Notes Sequences and Series Arithmetic Progression in Maths Arithmetic Progression - Common difference and Nth term | Class 10 Maths How to find the nth term of an Arithmetic Sequence? Arithmetic Progression â€“ Sum of First n Terms | Class 10 Maths Arithmetic Mean Arithmetic Progression â€“ Sum of First n Terms | Class 10 Maths Triangles in Geometry Similar Triangles Criteria for Similarity of Triangles Basic Proportionality Theorem (BPT) Class 10 | Proof and Examples Pythagoras Theorem | Formula, Proof and Examples Coordinate Geometry Distance formula - Coordinate Geometry | Class 10 Maths Distance Between Two Points Section Formula How to find the ratio in which a point divides a line? How to find the Trisection Points of a Line? How to find the Centroid of a Triangle? Area of a Triangle in Coordinate Geometry Trigonometric Ratios Unit Circle: Definition, Formula, Diagram and Solved Examples Trigonometric Ratios of Some Specific Angles Trigonometric Identities Download Article Download Article Need to know how to find the area of a circle? This is a common geometry problem and figuring out the answer is pretty easy. In most cases, you can use the simple formula A = π r 2 {\displaystyle A=\pi r^{2}} . If you don't know the radius, don't worry! We'll help you solve for the area no matter what info you're given, thanks to some of our other formulas. Read on to learn how to calculate the area of a circle using the radius, diameter, circumference, or even a sector of a circle. To find the area of a circle, use the formula A = π • r2, where r is the radius of the circle. If you only know the diameter of the circle, then use the formula A = π • (d/2)2 where d is diameter. 1 Identify the radius of a circle. The radius is the length from the center of a circle to the edge of the circle. You can measure this in any direction and the radius will be the same. The radius is also one half of the diameter of a circle. The diameter is the line segment that passes through the center and connects opposite sides of the circle.[1] The radius will generally be provided to you. It can be difficult to measure to the exact center of a circle, unless the center is already marked for you on a circle drawn on paper. For this example, assume that you are told that the radius of a given circle is 6 cm. 2 Square the radius. The formula to find the area of a circle is A = π r 2 {\displaystyle A=\pi r^{2}} , where the r {\displaystyle r} variable represents the radius. This variable is squared.[2] Do not get confused and square the entire equation. For the sample circle with radius, r = 6 {\displaystyle r=6} , then r 2 = 36 {\displaystyle r^{2}=36} . Advertisement 3 Multiply by pi. Pi, written symbolically with the Greek letter π {\displaystyle \pi } , is a mathematical constant that represents the ratio between the circumference and the diameter of the circle.[3] As a decimal approximation, π {\displaystyle \pi } is approximately 3.14. The true decimal value continues on infinitely. For an exact statement of the area of a circle, you will usually report your answer using the symbol π {\displaystyle \pi } itself.[4] For the given example with a radius of 6 cm, the area is calculated as: A = π r 2 {\displaystyle A=\pi r^{2}} A = π 6 2 {\displaystyle A=\pi 6^{2}} A = 36 π {\displaystyle A=36\pi } or A = 36 (3.14) = 113.04 {\displaystyle A=36(3.14)=113.04} 4 Report your result. Remember that a calculation of area is going to be reported in "square" units. If the radius was measured in centimeters, the area will be in square centimeters. If the radius was measured in feet, the area will be in square feet. You should also know whether to report your result using the symbol π {\displaystyle \pi } or the numerical approximation. If you do not know, then report both.[5] For the sample circle with a radius of 6 cm, the area will be either 36 π {\displaystyle \pi } cm^2 or 113.04 cm^2. Advertisement 1 Measure or record the diameter. Some problems or situations will not provide you with the radius. Instead, you may be given the diameter of a circle. If the diameter is drawn into your diagram, you can measure it with a ruler. Alternatively, you may just be told the value of the diameter.[6] Assume for this example that the diameter of your circle is 20 inches. 2 Divide the diameter in half. Remember that the diameter is equal to double the radius. Therefore, whatever value you are given for the diameter, cut it in half and you will have the radius. Therefore, the sample circle with a diameter of 20 inches will have a radius of 20/2, or 10 inches. 3 Use the original formula for area. After converting the diameter to the radius, you are ready to use the formula A = π r 2 {\displaystyle A=\pi r^{2}} to calculate the area of the circle. Insert the value for the radius and perform the remaining calculations as follows:[7] A = π r 2 {\displaystyle A=\pi r^{2}} A = π 10 2 {\displaystyle A=\pi 10^{2}} A = 100 π {\displaystyle A=100\pi } 4 Report the value of the area. Recall that your area is to be reported in square units. In this example, the diameter was measured in inches, so the radius is in inches. Therefore, the area will be reported in square inches. For this sample, the area will be 100 π {\displaystyle 100\pi } sq. in. You can also provide the numerical approximation by multiplying by 3.14 instead of π {\displaystyle \pi } . This will give a result of (100)(3.14) = 314 sq. in. EXPERT TIP Grace Imson, MA Math Instructor, City College of San Francisco Grace Imson is a math teacher with over 40 years of teaching experience. Grace is currently a math instructor at the City College of San Francisco and was previously in the Math Department at Saint Louis University. She has taught math at the elementary, middle, high school, and college levels. She has an MA in Education, specializing in Administration and Supervision from Saint Louis University. The most common error when using diameter is forgetting to square the denominator. If you don't divide the diameter by 2 to find the radius, you can still find the area of the circle. However, you need to change the formula so that you square the 'd' otherwise your answer will be wrong. Advertisement 1 Learn the revised formula. If you know the circumference of a circle, you can use a revision of the formula for the area of a circle. This revised formula uses circumference directly, without the radius, to find area. This new formula is: A = C 2 4 π {\displaystyle A={\frac {C^{2}}{4\pi }}} 2 Measure or record the circumference. In some real world situations, you may not be able to measure the diameter or radius accurately. If the diameter is not drawn for you or the center is not identified, it can be difficult to approximate the center of a circle. For some physical circles - a pizza pan or a frying pan, for example - you may be able to use a tape measure and measure the circumference more accurately than you can measure the diameter.[8] For this example, assume that you have been told or have measured that the circumference of a circle (or circular object) is 42 cm. 3 Use the relationship between circumference and radius to revise the formula. The circumference of a circle is equal to pi times the diameter. This can be written as C = π d {\displaystyle C=\pi d} . Then, recall that the diameter is equal to twice the radius, or d = 2 r {\displaystyle d=2r} . You can combine these two equalities to create the following relationship: C = π 2 r {\displaystyle C=\pi 2r} . Rearrange this to isolate the variable r {\displaystyle r} by itself, as follows:[9] C = π 2 r {\displaystyle C=\pi 2r} C 2 π = r {\displaystyle {\frac {C}{2\pi }}=r} ..... (divide both sides by 2 π {\displaystyle \pi }) 4 Substitute into the formula for the area of a circle. You can create a modified version of the formula for the area of a circle, using this relationship between circumference and radius. Substitute this latest equality into the original area formula, as follows:[10] A = π r 2 {\displaystyle A=\pi r^{2}} .....(original area formula) A = π (C 2 π) 2 {\displaystyle A=\pi ({\frac {C}{2\pi }})^{2}} ..... (substitute equality for r) A = π (C 2 4 π 2) {\displaystyle A=\pi ({\frac {C^{2}}{4\pi ^{2}}})} .....(square the fraction) A = C 2 4 π {\displaystyle A={\frac {C^{2}}{4\pi }}} .....(cancel π {\displaystyle \pi } in numerator and denominator) 5 Use the revised formula to solve the area. Using this revised formula, written with the circumference instead of radius, you can use your given information and find the area directly. Insert the value of the circumference and perform the calculations as follows:[11] For this sample, you were given C = 42 {\displaystyle C=42} inches. A = C 2 4 π {\displaystyle A={\frac {C^{2}}{4\pi }}} A = 42 2 4 π {\displaystyle A={\frac {42^{2}}{4\pi }}} .....(insert value) A = 1764 4 π {\displaystyle A={\frac {1764}{4\pi }}} .....(calculate 422) A = 441 π {\displaystyle A={\frac {441}{\pi }}} .....(divide by 4) 6 Report your result. Unless you are told the circumference as a multiple of π {\displaystyle \pi } , then your result is likely to be a fraction with π {\displaystyle \pi } in the denominator. There is nothing wrong with this. You should report your area calculation in that term, or you may approximate it by dividing by 3.14.[12] For this sample circle, with a circumference given as 42 cm, the area is 441 π {\displaystyle {\frac {441}{\pi }}} sq. cm. If you approximate, 441 π = 441 3.14 = 140.4 {\displaystyle {\frac {441}{\pi }}={\frac {441}{3.14}}=140.4} . The area is approximately equal to 140 sq. cm. Advertisement 1 Identify the known or given information. In some problems, you may be told information about a sector of the circle and then be asked to find the full circle. Read the problem carefully and look for information that will say something like, "A sector of Circle O has an area of 15 π {\displaystyle \pi } cm^2. Find the area of Circle O."[13] 2 Define the chosen sector. A sector of a circle is a portion that is sometimes also referred to as a "wedge." A sector is defined by drawing two radii from the center out to the edge of the circle. The space between these two radii is the sector.[14] 3 Measure the central angle of the sector. Use a protractor to measure the central angle made by the two radii. Set the base of the protractor along one of the radii, with the central point of the protractor aligned with the center of the circle. Then read the angle measurement that corresponds with the position of the second radius forming the sector.[15] Make sure you know if you are measuring the small angle between the two radii or the greater angle outside them. The problem you are working on should define this for you. The sum of the small angle and the great angle will be 360 degrees. In some problems, instead of having you measure the central angle, the problem may just tell you the measurement. For example, you might be told, "The central angle of the sector is 45 degrees" or you may be expected to measure it. 4 Use a modified formula for area. When you know the area of a sector and its central angle measurement, you can use the following modified formula to find the area of the circle:[16] A c i r = A s e c 360 C {\displaystyle A_{cir}=A_{sec}{\frac {360}{C}}} A c i r {\displaystyle A_{cir}} is the area of the full circle A s e c {\displaystyle A_{sec}} is the area of the sector C {\displaystyle C} is the central angle measure 5 Enter the values that you know and solve the area. In this example, you have been told that the central angle is 45 degrees and that the sector has an area of 15 π {\displaystyle \pi } . Insert these into this formula and solve as follows:[17] A c i r = A s e c 360 C {\displaystyle A_{cir}=A_{sec}{\frac {360}{C}}} A c i r = 15 π 360 45 {\displaystyle A_{cir}=15\pi {\frac {360}{45}}} A c i r = 15 π (8) {\displaystyle A_{cir}=15\pi (8)} A c i r = 120 π {\displaystyle A_{cir}=120\pi } 6 Report the result. For this example, the sector was one-eighth of the full circle. Therefore, the area of the full circle is 120 π {\displaystyle \pi } cm^2. Since the sector's area was given in terms of π {\displaystyle \pi } , you can assume that your area for the full circle should be reported the same way.[18] If you want to report a numerical value, you can multiply 120 x 3.14 to get a value of 376.8 cm^2. Advertisement Add New Question Question I know the circumference of an object, how do I find the area? If the object is a circle, and you know its circumference, you would divide the circumference by pi to find the diameter of the circle. Half the diameter is the radius. Square the radius and multiply by pi to find the area of the circle. Question How do I calculate the circumference of a circle? To find the circumference of a circle, simply multiply the diameter by pi (3.14). For example: If d= 23cm, C= 3.14 x 23cm, so C= 72.22cm. Question Is this formula correct? C = pi * d calculates the circumference (distance around the outside of the circle). D in the formula refers to the diameter which is the width of the circle. The formula for the area of a circle is A = pi * r * r where r is the radius (diameter / 2). See more answers Ask a Question Advertisement Co-authored by: Math Instructor, City College of San Francisco This article was co-authored by Grace Imson, MA. Grace Imson is a math teacher with over 40 years of teaching experience. Grace is currently a math instructor at the City College of San Francisco and was previously in the Math Department at Saint Louis University. She has taught math at the elementary, middle, high school, and college levels. She has an MA in Education, specializing in Administration and Supervision from Saint Louis University. This article has been viewed 6,251,008 times. Co-authors: 222 Updated: June 4, 2025 Views: 6,251,008 Categories: Calculating Volume and Area Article SummaryXYou can find the area of a circle using the radius, the diameter, or the circumference. To find the area using the radius, or the length from the center of the circle to the edge, use the formula area = πr^2, where r is the radius. For example, if the radius of the circle is 6 inches, first you would square 6 and get 36. Then, you would multiply 36 by π and get 113.04. Therefore, the area of the circle is 113.04 inches squared. To find the area using the diameter, or the distance from one side of the circle to the other, first divide the diameter in half to find the radius. For example, if the diameter is 20 inches, you would divide that in half and get 10 inches. Then, plug the radius into the formula for finding area, area = πr^2. Ten squared is 100, and 100 times π is 314.16. Therefore, the area of the circle is 314.16 inches squared. To find the area using the circumference, or the distance around the circle, use the formula area = c^2/4π, where c is the circumference. For example, if the circumference is 42 inches, first you would square 42 and get 1,764. Then, you would multiply 4 by π and get 12.57. Finally, you would divide 1,764 by 12.57 and get 140.4. Therefore, the area of the circle is 140.4 square inches. If you want to find the area of a sector from a circle, keep reading the article! Print Send fan mail to authors Thanks to all authors for creating a page that has been read 6,251,008 times. "Math has never been my strong point. 8 years and grades of suffering in equations and fractions, and still today I find myself struggling. wikiHow helps with its clear instructions and explanations, even on depressing afternoons where nothing math-related seems to be going right. Thanks loads!"..." more Share your story Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. If you divide the circumference of any circle by its diameter you will always get the same number 3.14... This number is called pi. Pi is usually represented by the symbol π Pi is an irrational number, that means it goes on forever, the first 50 digits of pi are: 3.14159265358979323846264338327950288419716939937510 To calculate the circumference of a circle we use the formula:Circumference = π × diameter This can be simplified to: Circumference = πd Because 2 radiuses are equal to a diameter we can also use the formula:Circumference = 2 × π × radius This can be simplified to: Circumference = 2πr It doesn't matter which formula you use, they are the same and will give the same answer. Example 1: A circle has a diameter of 8 cm. Work out the circumference of the circle. We can use the formula:Circumference = π × diameter We can substitute 8 in for the diameter: Circumference = π × 8 π × 8 can be written as 8π The diameter was given in cm, so the answer is 8π cm We can leave the answer in terms of pi unless we are asked to give the answer as a decimal. To convert our answer in to a decimal we can use a calculator, there should be a pi button on your calculator. On the classwiz it is above the Ans button: For the pi button we press shift then Ans: = To work out the circumference in the calculator we press: This gives an answer of 8π, to convert the answer to a decimal we press the SD button: This gives us 25.13274123, or 25.1 to 1 decimal place. We can say the circumference is 25.1 cm to 1 decimal place. Example 2: A circle has a radius of 9 metres. Work out the circumference of the circle. This time we have been given the radius of a circle. We can either use the formula:Circumference = 2 × π × radius Or we could multiply the radius by 2 to get the diameter and use the formula:Circumference = π × diameter If we use:Circumference = 2 × π × radius We need to substitute 9 in for the radius:Circumference = 2 × π × 9 If we are leaving our answer in terms of pi we can simplify our answer by multiplying 2 and 92 × 9 = 18So now we have 18 × π which we can write as 18π The radius was measured in metres so the answer is 18π metres If we use a calculator to convert 18π to a decimal we get 56.5 metres to one decimal place. Try these: Find the circumference of this circle, give your answer to 1 decimal place: Find the circumference of this circle, give your answer to 1 decimal place: To calculate the area of a circle we use the formula:Area = πr^2r is the circle's radius Example 3: A circle has a radius of 5.2 cmCalculate the area of the circle. To find the area of a circle we use the formula:Area = πr^2 We need to substitute 5.2 in for r:Area = π(5.2)2 We can now type this into a calculator which gives us the answer of: 676⁄25π The radius was given in cm, and we measure area in squares, so the answer is:676⁄25π cm^2 The calculator will convert the answer to a decimal if we press the SD buttonAs a decimal the answer is 84.9 cm^2 to 1 decimal place Example 4: A circle has a diameter of 9 cmCalculate the area of the circle. To find the area of a circle we use the formula:Area = πr^2 We can find the radius of the circle by halving the diameter:9⁄2 = 4.5 We now need to substitute 4.5 in for r:Area = π(4.5)2 We can now type this into a calculator which gives us the answer of:81⁄4π In terms of pi the answer is:81⁄4π cm^2 As a decimal the answer is 63.6 cm^2 to 1 decimal place Try these: Stacey Newman/E+/Getty Images The phrase "pi r squared" refers to the mathematical formula used to determine the area of a circle. Normally, the equation is written as "pi * r2," or "Π * r2.To calculate the area of a circle, it is necessary to first determine the circle's radius, which is half the distance of a straight line across the center of the circle. The formula used to determine the circle's radius is r = C / 2. Pi is a mathematical constant representing the ratio of the circumference of a circle to its diameter, and is approximately equal to 3.14. Pi has also been represented by the Greek letter "Π" since the 18th century. The formula used to determine the area of a circle is: A = pi * r2 or A = Π * r * r Where A represents the area, r is the radius, and pi equals 3.14. For example, the area of a