

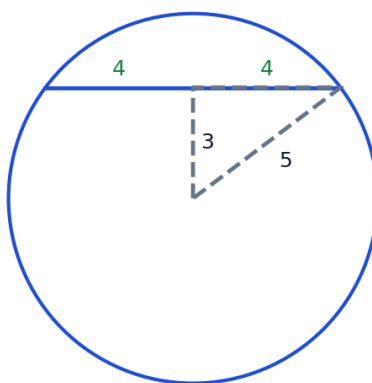
## Solutions

### 5.1 Chords, Arcs, and Angles

5.1.1. A circle of radius 5 has a horizontal chord 3 units above its center. Find the chord length.

Solution. The right triangle from center to chord endpoint has hypotenuse 5 and vertical leg 3. Half the chord is 4, hence its length is 8.

#### Chord at a known distance from the center



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Half the chord is the leg of a 3-4-5 triangle, so the chord is 8.

5.1.2. A tangent from  $P$  touches a radius-6 circle at  $T$ . If the center is 10 units from  $P$ , find  $PT$ .

Solution. The radius is perpendicular to the tangent. Thus  $PT = \sqrt{10^2 - 6^2} = 8$ .

5.1.3. An inscribed angle intercepts a semicircle. Find its measure.

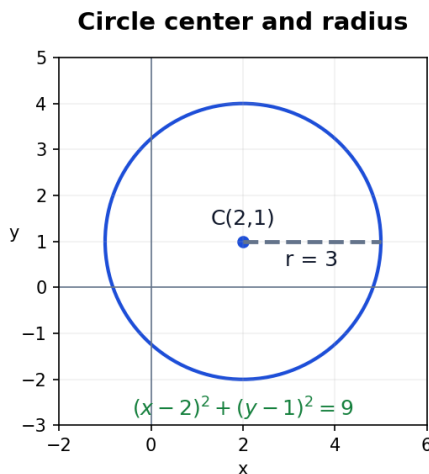
Solution. A semicircle measures  $180^\circ$ , so the inscribed angle measures  $90^\circ$ .

Solutions

## 5.2 Circle Equations

5.2.1. Write the equation of a circle with center  $(2, 1)$  and radius 3.

Solution. Use the center-radius form:  $(x - 2)^2 + (y - 1)^2 = 9$ .



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Subtract center coordinates inside the squares; use radius squared on the right.

5.2.2. Does  $(5, 1)$  lie on the circle  $(x - 2)^2 + (y - 1)^2 = 9$ ?

Solution. Yes. Substitution gives  $3^2 + 0^2 = 9$ .

5.2.3. A diameter has endpoints  $(-2, 1)$  and  $(4, 1)$ . Write the circle equation.

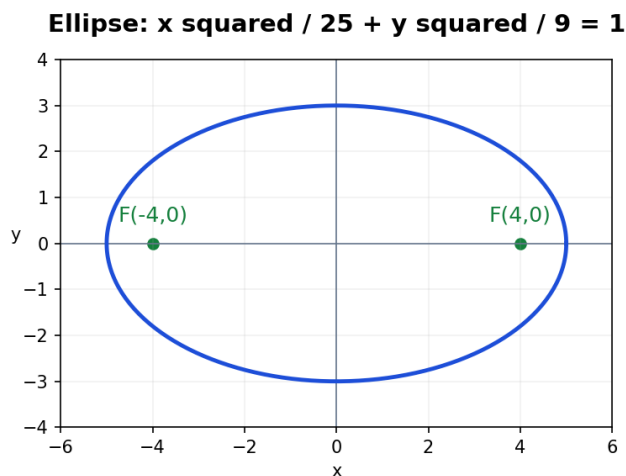
Solution. The midpoint is  $(1, 1)$ , and half the diameter is 3. Thus  $(x - 1)^2 + (y - 1)^2 = 9$ .

Solutions

## 5.3 Conic Sections

5.3.1. For  $x^2/25 + y^2/9 = 1$ , find the foci.

Solution.  $c^2 = a^2 - b^2 = 25 - 9 = 16$ , so the foci are  $(\pm 4, 0)$ .



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The focal distance is  $\sqrt{25 - 9} = 4$ .

5.3.2. Find the vertices and asymptotes of  $x^2/9 - y^2/4 = 1$ .

Solution. Vertices:  $(\pm 3, 0)$ . Asymptotes:  $y = \pm (2/3)x$ .

5.3.3. Explain why  $x^2 + y^2 = -1$  has no real graph.

Solution. Each square is nonnegative, so their sum cannot equal  $-1$ .