A conic section is a curve formed by the intersection of a cone with a plane. Depending on how the plane is oriented, the curve will be one of the conic sections – circle, ellipse, parabola, or hyperbola. Today we are focusing on CIRCLES.

Warm Up

a. Find an equation of the circle with center (3, -4) and radius 6.

\[(x-3)^2 + (y+4)^2 = 36\]

b. Graph \((x + 3)^2 + y^2 = 9\)

\[C: (-3, 0)\]
\[r: 3\]

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Equation of a Circle with Center at (0, 0)

\[x^2 + y^2 = r^2\]

Equation of a Circle with Center \((h, k)\)

\[(x-h)^2 + (y-k)^2 = r^2\]

EXAMPLE 1 – Completing the Square for Circle

If the graph of the given equation/inequality is a circle, find its center and radius. If the equation or inequality has no graph, say so. Then Graph.

a. \[x^2 + y^2 - 4y - 5 = 0\]

\[x^2 + y^2 - 4y + 4 = 5 + 4\]
\[x^2 + (y-2)^2 = 9\]
\[C: (0, 2)\]
\[r: 3\]

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b. \[x^2 + y^2 + 4x + 10y < 7\]

\[x^2 + 4x + 4 + y^2 + 10y + 25 < 7 + 4 + 25\]
\[(x+2)^2 + (y+5)^2 < 36\]
\[C: (-2, -5)\]
\[r: 6\]

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D: \([-3, 3]\)
\[r: \sqrt{10}\]

D: \([-1, 5]\)
\[r: \sqrt{21}\]
EXAMPLE 2 – Writing Equations of Circles

Write the standard form of the equation of the circle that satisfies the given information

a. The circle that has center (-5, 1) and passes through the point (-2, 7)

b. Its center is in the second quadrant with radius 2 and tangent to the x-axis at (-5, 0)