Distance Between Points

Consider the points (2, 3) and (-4, -1).

How do we find the distance between them?

Distance Formula: Distance, $d$, between two points $(x_1, y_1)$ and $(x_2, y_2)$ is given by...

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Using the distance formula, the distance between (2, 3) and (-4, -1) is....

Midpoint

Consider the points (2, 3) and (-4, -1) again.

If we draw a line segment connecting the points, how do we find the midpoint of the line?

Note: The midpoint of a line segment is the point located exactly halfway between the endpoints.

Midpoint Formula: The midpoint of the line segment between $(x_1, y_1)$ and $(x_2, y_2)$ is given by...

$$\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Using the midpoint formula, the midpoint of the line segment between (2, 3) and (-4, -1) is....
Circles

Consider the set point \((h,k)\) and a point \((x,y)\) that is located \(r\) units from the set point.

Then, using the distance formula….

This is the equation of a circle in standard form. A circle is the set of all points in a plane that are the same distance from a set point. The distance between the set point and the other points is called the radius.

Example 1: Graph the circle \(x^2 + (y + 3)^2 = 4\).
Example 2: Graph the circle \( x^2 + 6x - 4y + y^2 = 3. \)