Circles

The set of all points that are equidistant from a given point (center) in a plane.

Standard form of the equation of a circle:

$$(x - h)^2 + (y - k)^2 = r^2$$

Center : (h, k)

$r = radius$
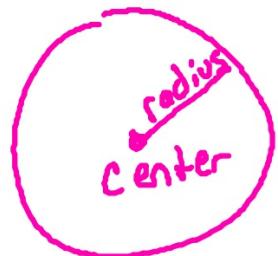
Examples:
1. Find the equation of the circle in standard form who center is at the point $(2,5)$ and passes through the p
$(-1,3)$.
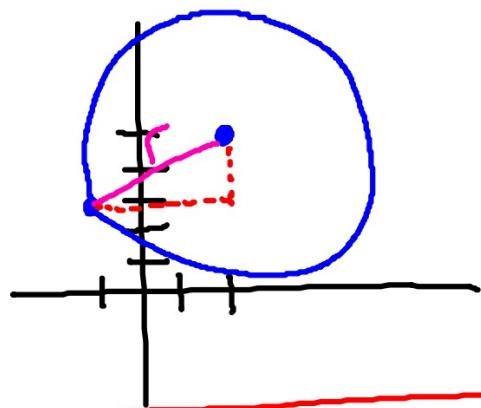
$$(x-h)^2 + (y-k)^2 = r^2$$

$$(x-2)^2 + (y-5)^2 = \sqrt{13}^2$$

$$(x-2)^2 + (y-5)^2 = 13$$

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

$$r = \sqrt{(2+1)^2 + (5-3)^2}$$

$$r = \sqrt{9+4} = \sqrt{13}$$

2. Find the equation of the circle whose diameter has the endpoints (-5, 4) and (1, -4).

$$\text{Center}: \left(\frac{-5+1}{2}, \frac{4+-4}{2} \right)$$

$$(-2, 0)$$
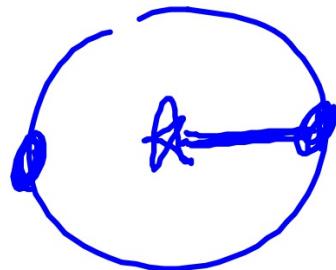
$$\text{Diam}: \sqrt{(-5-1)^2 + (4--4)^2}$$

$$\sqrt{36 + 64}$$

$$\sqrt{100}$$

$$\text{Diam} = 10$$

$$(x+2)^2 + y^2 = 25$$

3. Find the center and radius of the following circle: $x^2 + y^2 + 12x - 16y - 10 = 0$

$$x^2 + y^2 + 12x - 16y - 10 = 0$$

$$x^2 + 12x + 36 + y^2 - 16y + 64 = 10 + 36 + 64$$

$$\left(\frac{12}{2}\right)^2 \qquad \left(\frac{-16}{2}\right)^2$$

$$(x + 6)^2 + (y - 8)^2 = 110$$

$$C: (-6, 8)$$

$$r = \sqrt{110}$$

2.55
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