$x^2 + y^2 - 2x - 4y - 4 = 0$ $\left(\frac{b}{2}\right)^2$

$(x^2 - 2x + 1) + (y^2 - 4y + 4) = 4$
$+1$
$+4$

$(y-2)(y-2)$

write in standard form

$(x-1)^2 + (y-2)^2 = 9$

C: (1, 2)

r: 3

Check in: 2:05

Check out: 3:25

On

$\underline{\quad\quad} = r^2$

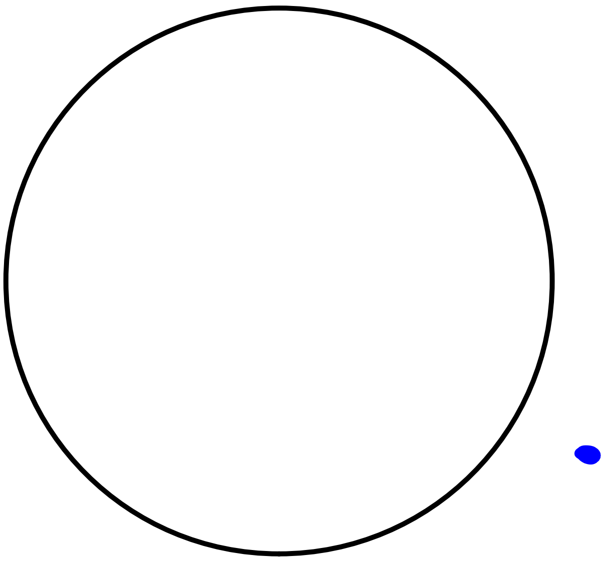
$9 = 9$

In

$< r^2$

Out

$> r^2$



Location of Points and Their Equations

On the Circle | Inside the Circle | Outside the Circle

Determining if a Point is on the Circle

Standard Form of Circles

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

Given a circle, you can verify whether a point lies on the circle by:

*substituting the coordinates of the point into the equation to see if the resulting equation is true

1. A circle has a $\boxed{\text{radius of 2}}$ and a center of $\boxed{(2, -3)}$. Will the following points lie on the circle?

Equation of Circle: $(x-2)^2+(y+3)^2=4$

a. (2, -5)
x y

Substitute point into equation to see if resulting equation is true.
$(2-2)^2 + (-5+3)^2 = 4$ $0^2 + (-2)^2 = 4$ $0 + 4 = 4$

Conclusion: $4=4$ on the circle

b. (3, -1)

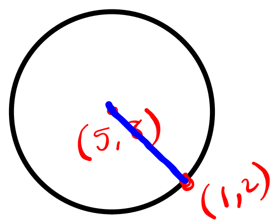
$x \quad y$

$(x-2)^2+(y+3)^2=4$

Substitute point into equation to see if resulting equation is true.
$(3-2)^2 + (-1+3)^2 = 4$ $(1)^2 + (2)^2 = 4$ $1 + 4 = 4$

Conclusion: $5 > 4$ outside the circle

Flip onto back



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

center is $\boxed{(5, 8)}$ with a point on the circle at (1, 2)

find the radius and determine where the point $\boxed{(3, 2)}$ is.

x y

$r = \sqrt{(1-5)^2 + (2-8)^2}$

$\sqrt{(-4)^2 + (-6)^2}$

$\sqrt{16 + 36} = \boxed{\sqrt{52}}$

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

$$(x-5)^2+(y-8)^2=52$$

$$(3-5)^2+(2-8)^2=52$$

$$(-2)^2+(-6)^2=52$$

$$4+36=52$$

$$40<52$$

inside the circle