WILSON!

In order to get back to the raft, Tom Hanks is limited to swimming in the region given by the equation:

$$x^2 + y^2 + 4x + 8y + \cancel{1} = 0$$

$-1 \quad -1$

- Graph the circle on the graph provided.

$\sqrt{x^2 + 4x + \sqrt{4}} + \sqrt{y^2 + 8y + \sqrt{16}} = -1 + 4 + 16$

$\frac{4}{2} = (2)^2 \qquad \frac{8}{2} = (4)^2$

Will he be able to rescue Wilson if Wilson is floating at the point $(2, -2)$?

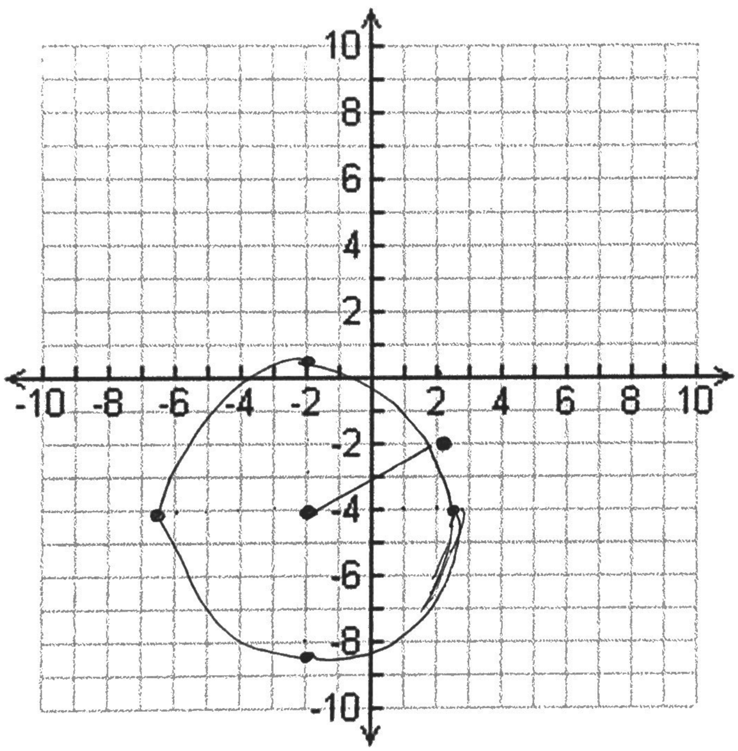
x y

$\boxed{(x+2)^2 + (y+4)^2 = 19}$

$C(\overset{h}{-2}, \overset{k}{-4})$

$r = \sqrt{19} \approx 4.4$

- Plot the point with your circle



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

$(2+2)^2 + (-2+4)^2 = (\sqrt{19})^2$

$(2)^2$

$16 + 4 = 19$

$\underline{20} = 19$

outside of Tom's reach!

What if Tom only has the energy to swim a total of 9 meters to rescue Wilson and get back to the boat? Will he be able to rescue Wilson? (think distance)

The distance there would be 1/2 of 9

The distance back would be 1/2 of 9.

4.5 + 4.5

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

Finding the equation of the circle is important!

1. A circle has a radius of 2 and a center of (2, -3). Will the following points lie on the circle?

h K

a. (2, -5)

x y

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

$(-2)^2$

$0+4 = $

$4=4$ yes!

b. (3, -1)

x y

$(3-2)^2+(-1+3)^2=2^2$

$(1)^2+(2)^2=4$

$1+4=4$

$5=4$ Not on the circle

outside ⊙

2. Casey's dartboard is a circle centered at the origin with a radius of 8 inches. He throws 3 darts:

(0,0)

a) The first dart hits $(-3, 5)$.

b) The second dart hits $(4, 8)$

c) The third dart hits $(2\sqrt{5}, 2\sqrt{11})$

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

$\boxed{(x-0)^2+(y-0)^2=64}$

Are his darts inside, outside, or on the board?

a) $(-3-0)^2+(5-0)^2=64$

$(-3)^2 \quad (5)^2$

$9+25=64$

$34=64$

(inside)

b) $(4-0)^2+(8-0)^2=64$

$(4)^2 \quad (8)^2$

$16+64=64$

$80=64$

(outside)

c) $(2\sqrt{5}-0)^2+(2\sqrt{11}-0)^2=64$

$(2\sqrt{5})^2+(2\sqrt{11})^2=64$

$4\cdot(5) \quad 4(11)$

$20+44=64$

$64=64$

(on).

3. The new Georgia Dome is being built in the region w/ equation:

$$x^2+y^2-6x+20y-39{,}891=0$$

Several churches in the area are protesting that the church might interfere with their building:

Mount Vernon Baptist is located at: $(100, 105)$

Friendship Baptist Church is located at: $(-174, -58)$

(a) If the churches lie within the area of the new stadium, what should the Falcons do?

(b) How much would be a fair price?

4. The Space Race in the 1960's between The Soviets and The Americans was a race to see who could get a spacecraft to the moon first. The moon has a 2-dimensional region of:

$$x^2+y^2+882x-166y+90{,}345=0$$

Russia shoots a rocket that lands at: $(-100, 80)$

USA shoots a rocket that lands at: $(-400, -200)$

Which country "won" the space race (landed on the moon)?

Proving Points on a Circle Notes and Practice

1. Proof #1. Prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and passing through the point (0, 2).

(0, 0)

   a. What do we need to show in order to prove or disprove this statement?

distance between Center (0, 0) + (0, 2)

$x_1\ y_1 \quad x_2\ y_2$

$$d=\sqrt{(0-0)^2+(2-0)^2} = \sqrt{0+4} = \sqrt{4} = 2 = r$$

   b. Write an equation for the circle described in the problem.

$$(x-0)^2+(y-0)^2 = 2^2$$

$$(x-0)^2+(y-0)^2 = 4$$

   c. Substitute the point in for the equation and comment on the results. Did you prove the statement or disprove it?

$(1, \sqrt{3})$

$x \quad y$

$$(1-0)^2+(\sqrt{3}-0)^2 = 4$$

$$1+3=4$$

$$4=4$$

proven $(1, \sqrt{3})$ is on the circle

Guided Practice:

2. a. Write the equation of a circle centered at (5,-2)

$x_1\ y_1$

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

   b. The equation of the circle passes through the point (6,5). Substitute the values into x and y to find the radius.

$x_2\ y_2$

$$d=\sqrt{(6-5)^2+(5+2)^2}$$

$$(1)^2 \quad (7)^2$$

$$\sqrt{1+49} = \sqrt{50} = r$$

   c. Prove or disprove that the point A(10, 3) lies on a circle centered at C(5, -2) and passing through the point B(6, 5).

$r = \sqrt{50}$

$x \quad y$

$$(10-5)^2+(3+2)^2 = (\sqrt{50})^2$$

$$(5)^2+(5)^2 = 50$$

$$25+25=50$$

$$50=50$$

proven (10, 3) lies on the circle C.