Name _____ Date _____

Day 9 – Point on a Circle

$$distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

1. A circular skylight has a diameter with endpoints at (–6, 32) and (2, 26). Find the center and radius of the skylight.

center = midpoint = $\left(\frac{-6+2}{2}, \frac{32+26}{2}\right)$ = (−2, 29)

center = (−2, 29)

radius = distance = $\sqrt{(2-(-2))^2 + (26-29)^2}$
= $\sqrt{(4)^2 + (-3)^2}$
= $\sqrt{25}$
= 5

r = 5

2. The circle has its center at point (1, 2), and point A(1, 5) is on the circle.
   a. What is the length of the radius of the circle? Show your work.

radius = distance = $\sqrt{(1-1)^2 + (5-2)^2}$
= $\sqrt{(0)^2 + (3)^2}$
= $\sqrt{9}$ = 3

r = 3

   b. Find the *distance* between the center and point B(4, 2).

$d = \sqrt{(4-1)^2 + (2-2)^2}$
= $\sqrt{(3)^2 + (0)^2}$
= $\sqrt{9}$ = 3

d = 3

   c. Is point B on the circle? How do you know?

yes, all points on the circle should be equidistant to the center

3. The circle has its center at the point (1, 1) and point C(-4, 1) is on the circle.
   a. What is the length of the radius of the circle? Show your work.

radius = distance = $\sqrt{(-4-1)^2 + (1-1)^2}$
= $\sqrt{(-5)^2 + (0)^2}$
= $\sqrt{25}$ = 5

r = 5

   b. Find the *distance* between the center and point D(4, 5).

$d = \sqrt{(4-1)^2 + (5-1)^2}$
= $\sqrt{(3)^2 + (4)^2}$
= $\sqrt{25}$ = 5

d = 5

   c. Is point D on the circle? How do you know?

yes, the distances are the same

4. Circle E has a center at (-5, -6) and its radius is $2\sqrt{3}$. Is point F(-8, -4) on the circle? Show your work to justify your answer.

$d = \sqrt{(-8-(-5))^2 + (-4-(-6))^2}$
$= \sqrt{(-3)^2 + (2)^2}$
$= \sqrt{13}$

$\sqrt{13} \neq 2\sqrt{3}$ **No**

5. **Determine whether Point A lies on the circle** whose center is Point C and which contains the Point P. Justify your answer mathematically using a graph of the circle.

a. A(-2, 1); Center C(0, 0); contains Point P(1, 2)

$r = \sqrt{(1-0)^2+(2-0)^2} = \sqrt{5}$

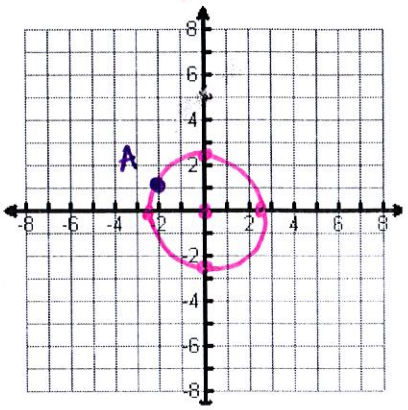
$x^2 + y^2 = 5$

yes

distance AC =
$\sqrt{(-2-0)^2+(1-0)^2} = \sqrt{5}$
$\sqrt{5} = \sqrt{5}$ ✓

OR

$x^2 + y^2 = 5$
$(-2)^2 + (1)^2 = 5$
$5 = 5$ ✓



b. A(5, 3); Center C(3, 1); contains Point P(3, –1)

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

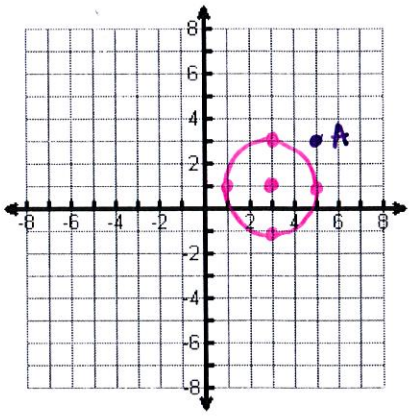
$(x-3)^2 + (y-1)^2 = 4$

NO

distance AC =
$\sqrt{(5-3)^2+(3-1)^2} = \sqrt{8} = 2\sqrt{2}$
$2 \neq 2\sqrt{2}$

OR

$(x-3)^2 + (y-1)^2 = 4$
$(5-3)^2 + (3-1)^2 = 4$
$8 \neq 4$



c. A(3, 2); Center C(–1, –1); contains Point P(4, –1)

$r = \sqrt{(4-(-1))^2 + (-1-(-1))^2} = 5$

$(x+1)^2 + (y+1)^2 = 25$

yes

distance AC =
$\sqrt{(-1-3)^2+(-1-2)^2} = \sqrt{25} = 5$
$5 = 5$ ✓

OR

$(x+1)^2 + (y+1)^2 = 25$
$(3+1)^2 + (2+1)^2 = 25$
$25 = 25$ ✓