

Homework 2.3 – Circles

Date: Today

1. The graph at the right shows a circle with centre at (0,0).

a) State the x-intercepts.

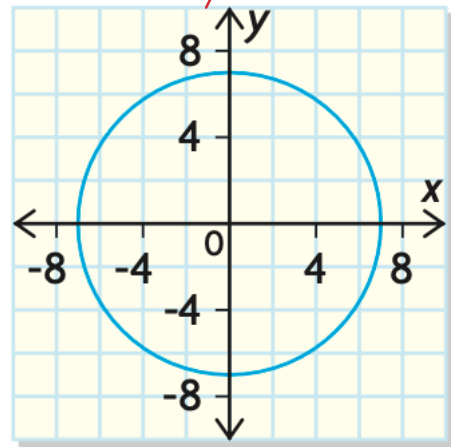
$$(7, 0) \text{ and } (-7, 0)$$

b) State the y-intercepts.

$$(0, -7) \text{ and } (0, 7)$$

c) State the radius

$$r = 7$$



d) Write the equation of the circle.

$$x^2 + y^2 = 7^2 \Rightarrow x^2 + y^2 = 49$$

2. Write the equation of a circle given the radius or point on the circle.

a) $r = 3$

$$x^2 + y^2 = 3^2$$

$$x^2 + y^2 = 9$$

b) $r = 50$

$$x^2 + y^2 = 50^2$$

$$x^2 + y^2 = 2500$$

c) $P(8, -5)$

$$x^2 + y^2 = r^2$$

$$8^2 + (-5)^2 = r^2$$

$$64 + 25 = r^2$$

$$89 = r^2 \quad \therefore x^2 + y^2 = 89$$

d) $Q(-11, 23)$

$$x^2 + y^2 = 650$$

3. Determine whether the following points are inside, on, or outside the circle $x^2 + y^2 = 65$ a) $(-4, 7)$

$$(-4)^2 + 7^2 = r^2$$

$$16 + 49 = r^2$$

$$65 = r^2$$

 $\therefore \text{ON}$
b) $(6, -6)$

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

$$36 + 36 = r^2$$

$$72 = r^2$$

 $\therefore \text{Outside}$
c) $(8, -1)$

$$8^2 + (-1)^2 = r^2$$

$$64 + 1 = r^2$$

$$65 = r^2$$

 $\therefore \text{ON}$
d) $(-3, 6)$

$$(-3)^2 + 6^2 = r^2$$

$$9 + 36 = r^2$$

$$45 = r^2$$

 $\therefore \text{Inside}$

4. Given the circle $x^2 + y^2 = 49$:

a) Determine the radius

$$r^2 = 49$$

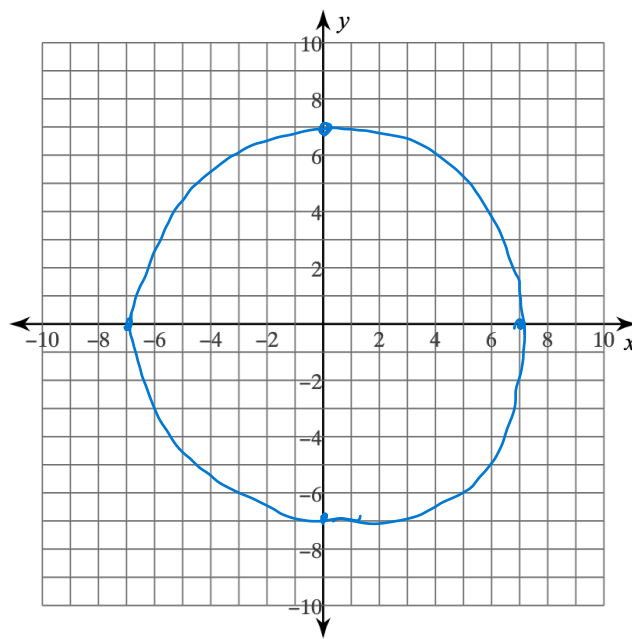
$$r = 7$$

b) State the x and y intercepts

$$x: (-7, 0) \text{ and } (7, 0)$$

$$y: (0, -7) \text{ and } (0, 7)$$

c) Sketch the circle on the graph.



5. Points $(a, 5)$ and $(9, b)$ are on the circle $x^2 + y^2 = 125$. Determine the possible values of a and b . Round to one decimal place if necessary.

$$a^2 + 5^2 = 125$$

$$a^2 = 125 - 25$$

$$a^2 = 100$$

$$\therefore (10, 5)$$

$$a = 10$$

$$\text{or } (-10, 5)$$

$$9^2 + b^2 = 125$$

$$81 + b^2 = 125$$

$$b^2 = 44$$

$$b = 6.6$$

$$\therefore (9, 6.6)$$

$$\text{or } (9, -6.6)$$

6. A satellite orbits Earth on a path with $x^2 + y^2 = 45,000,000$. Another satellite, in the same place, is currently located at $(12504, 16050)$. Explain how you would determine whether the second satellite is inside or outside the orbit of the first satellite (and is it inside or outside?). NOTE: This question is made up as objects go around Earth using an elliptical orbit, not circular.

$$12504^2 + 16050^2 = r^2$$

$$156350016 + 257602500 = r^2$$

$$413952516 = r^2$$

Much bigger than 45,000,000
 $\therefore$ Outside. Phew.