

Conic Circles: Graphing and Finding Equations

Remember : Vocabulary

Circle- Set of all points (x, y) equidistant from fixed point (center).

Equations of Circles

Standard Form

Center at the origin: $x^2 + y^2 = r^2$
 Center: (0, 0)
 Radius: r

Center translated: $(x - h)^2 + (y - k)^2 = r^2$
 Center: (h, k)
 Radius: r

General Form

Center at the origin: $x^2 + y^2 = r^2$
 Center: (0, 0)
 Radius: r

Center translated
 $x^2 + y^2 + Ax + By + C = 0$
 A, B, and C are constants

Example 1: Identify the center and the radius of the following.

A: $x^2 + y^2 = 9$ Center: (0, 0) $\sqrt{r^2} = \sqrt{9}$ Radius: 3	B: $(x + 7)^2 + (y - 5)^2 = 100$ Center: (-7, 5) $r^2 = 100$ Radius: 10
C: $x^2 + y^2 = 48$ Center: (0, 0) $\sqrt{r^2} = \sqrt{48}$ Radius: exact $4\sqrt{3}$ $r = \sqrt{48}$ approx: 7.9	D: $(x - 6)^2 + (y + 3)^2 = 64$ Center: (6, -3) $\sqrt{r^2} = \sqrt{64}$ Radius: 8 $r = 8$

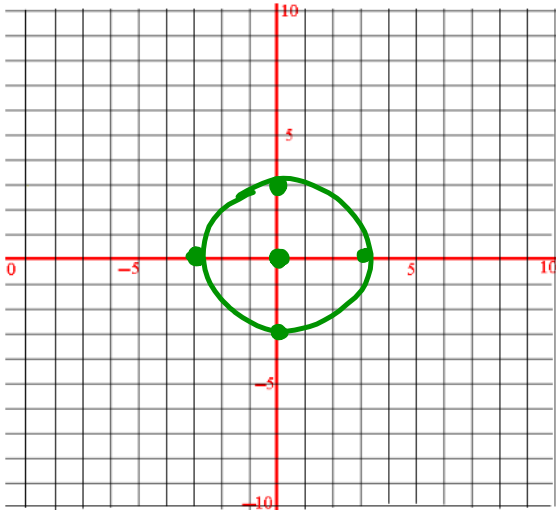
Example 2: Write the equation of a circle given the following

A: Center: Origin, radius: $(8)^2 = 64$ (0, 0) $x^2 + y^2 = 64$	B: Center: (-3, 9), radius: $\sqrt{10}$ $(x - (-3))^2 + (y - 9)^2 = (\sqrt{10})^2$ $(x + 3)^2 + (y - 9)^2 = 10$
C: Center: (6, -2), diameter: $2\sqrt{6}$ $(x - 6)^2 + (y - (-2))^2 = (\sqrt{6})^2$ $(x - 6)^2 + (y + 2)^2 = 6$	D: Center: (0, 11), diameter: $\sqrt{14}$ $(x - 0)^2 + (y - 11)^2 = (\frac{1}{2}\sqrt{14})^2$ $x^2 + (y - 11)^2 = \frac{7}{2}$ 3.5

Example 3: Graph the circles given

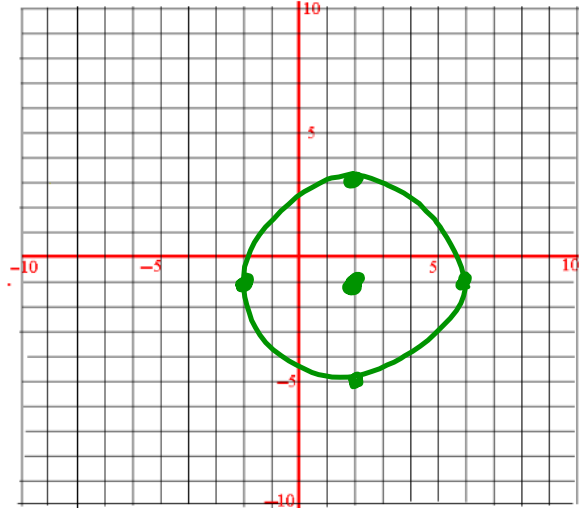
- Plot the center.
- Count radius left, right, up, down

a) $x^2 + y^2 = 9$ $C:(0,0)$ $R:3$

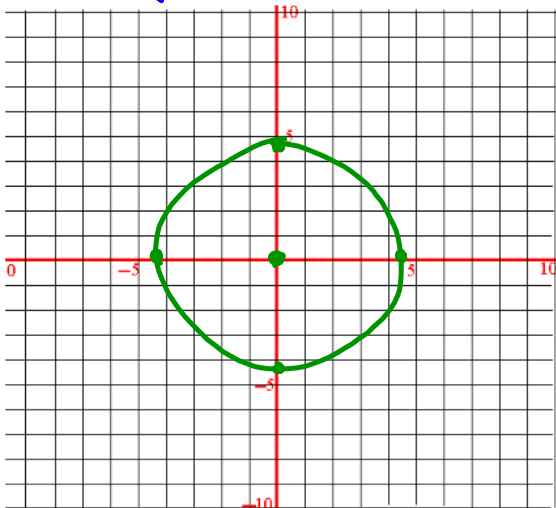


$C:(2,-1)$ $R:4$

b) $(x-2)^2 + (y+1)^2 = 16$

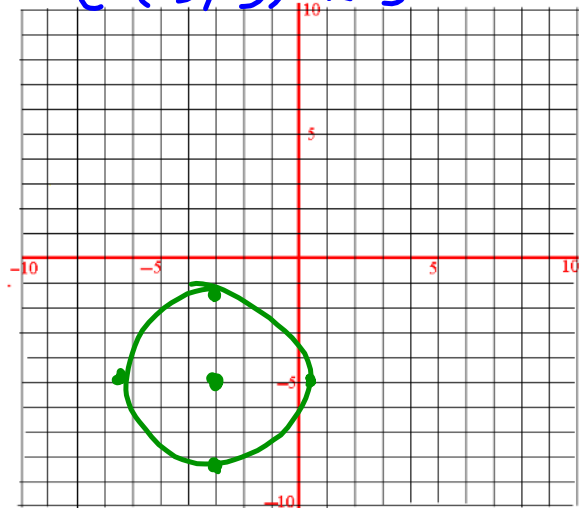


c) $x^2 + y^2 = 20$
 $C:(0,0)$ $R \approx 4.5$



d) $(x+3)^2 + (y+5)^2 = 12$

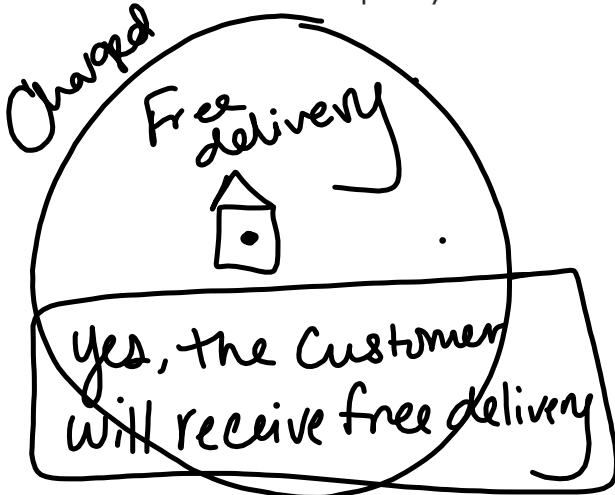
$C:(-3,-5)$ $R:3.5$



Application of Circles

(Ex 1) "Real-life" Example

A furniture store advertises free delivery up to a 50 mile radius from the store. If a customer lives 28 miles east and 41 miles north of the store, does the customer qualify for free delivery?



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

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

$$x^2 + y^2 \leq 2500$$

$$(28)^2 + (41)^2 \leq 2500$$

$$784 + 1681 \leq 2500$$

$$2465 \leq 2500$$

(EX 2) Write the equation of a circle with center $F(2, -1)$ that passes through $(10, 5)$.

Option 1
distance formula

$$d = \sqrt{(10-2)^2 + (5-(-1))^2}$$

$$d = \sqrt{64 + 36}$$

$$d = \sqrt{100} \quad d = 10$$

Option 2

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

$$(10-2)^2 + (5+1)^2 = r^2$$

$$64 + 36 = r^2$$

$$100 = r^2$$

$$(x-2)^2 + (y+1)^2 = 100$$

(EX 3) Determine whether Point A $(5, 3)$ lies on the circle whose center is Point C $(1, 1)$ and which contains the Point P $(-2, 5)$.

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

$$(-2-1)^2 + (5-1)^2 = r^2$$

$$9 + 16 = r^2$$

$$25 = r^2$$

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

$(5, 3)$

$$(5-1)^2 + (3-1)^2 = 25$$

$$16 + 4 = 25$$

$$20 \neq 25$$

Point A is not on the circle

$$\textcircled{4} \quad (x+2)^2 + (y-4)^2 = 64$$

$$\textcircled{5} \quad (x-5)^2 + y^2 = 7$$

$$\textcircled{6} \quad (x+2)^2 + (y-4)^2 = 50$$

$$\textcircled{7} \quad (x-5)^2 + y^2 = 20$$

