Name: _____ Period: _____ Date: _____

Ellipses and Circles Assignment

Identify the center, vertices, co-vertices and foci of each ellipse. Also graph the ellipse.

1. $\frac{(x+1)^2}{9} + \frac{y^2}{49} = 1$

2. $\frac{(x+4)^2}{9} + \frac{(y+3)^2}{4} = 1$

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Ellipses and Circles Assignment

Write an equation for each ellipse, given its characteristics.

1. vertices $(-7,-3),(13,-3)$; foci $(-5,-3)$, $(11,-3)$.

2. vertices $(4,3),(4,-9)$; length of minor axis is 8.

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Ellipses and Circles Assignment

Write an equation for a circle that satisfies the conditions given. Also graph the circle.

1. center $(3, 0)$, radius 2

2. Center $(-1, 6)$, Diameter 6.

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Ellipses and Circles Assignment

Answers

Identify the center, vertices, co-vertices and foci of each ellipse. Also graph the ellipse.

1. $\frac{(x+1)^2}{9} + \frac{y^2}{49} = 1$

Comparing with general equation of ellipse,

$\rightarrow h = -1 \;\; ; \;\; k = 0 \;\; ; \;\; a = 7 \;\; ; \;\; b = 3$

Ellipse is vertical, since a is with $y - term$.

$c = \sqrt{a^2 - b^2} = \sqrt{7^2 - 3^2} = \sqrt{40}$

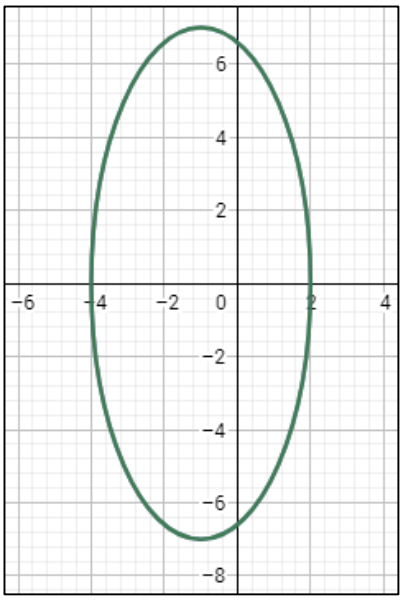
Center $(h, k) = (-1, 0)$

Vertices $(h, k \pm a) = (-1, 7)\ and\ (-1, -7)$

Co-vertices $(h \pm b, k) = (2, 0)\ and\ (-4, 0)$

Foci $(h, k \pm c) = \left(-1, \sqrt{40}\right)\ and\ \left(-1, -\sqrt{40}\right)$

Graph:



2. $\frac{(x+4)^2}{9} + \frac{(y+3)^2}{4} = 1$

Comparing with general equation of ellipse,

$\rightarrow h = -4 \;\; ; \;\; k = -3 \;\; ; \;\; a = 3 \;\; ; \;\; b = 2$

Ellipse is horizontal, since a is with $x - term$.

$c = \sqrt{a^2 - b^2} = \sqrt{3^2 - 2^2} = \sqrt{5}$

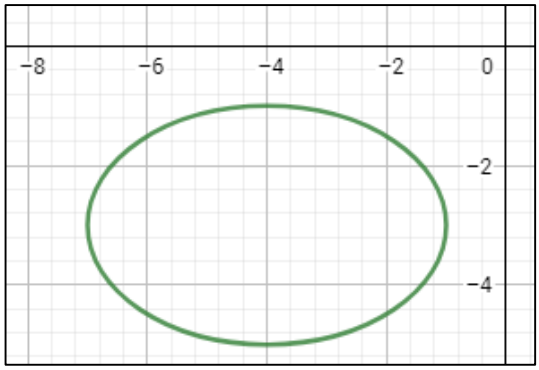
Center $(h, k) = (-4, -3)$

Vertices $(h \pm a, k) = (-1, -3)\ and\ (-7, -3)$

Co-vertices $(h, k \pm b) = (-4, -1)\ and\ (-4, -5)$

Foci $(h \pm c, k) = \left(-4 \pm \sqrt{5}, -3\right)$

Graph:



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Ellipses and Circles Assignment

Write an equation for each ellipse, given its characteristics.

1. vertices $(-7,-3),(13,-3)$; foci $(-5,-3)$, $(11,-3)$.

Because the $y-coordinates$ of the vertices are the same, the major axis is horizontal.

$$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$$

Center is the midpoint of the segment between the vertices. $\left(\frac{13-7}{2},\frac{-3-3}{2}\right)=(3,-3)$

Here $h=3,k=-3$

The distance between the vertices is equal to $2a$.

$2a=20 \rightarrow a=10 \rightarrow a^2=100$

The distance between the foci is equal to $2c$.

$2c=16 \rightarrow c=8 \rightarrow c^2=64$

$$c^2=a^2-b^2$$

$$b^2=100-64=36$$

The equation of ellipse is,

$$\frac{(x-3)^2}{100}+\frac{(y+3)^2}{36}=1$$

2. vertices $(4,3),(4,-9)$; length of minor axis is 8.

Because the $x-coordinates$ of the vertices are the same, the major axis is vertical.

$$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$$

Center is the midpoint of the segment between the vertices. $\left(\frac{4+4}{2},\frac{-9+3}{2}\right)=(4,-3)$

Here $h=4,k=-3$

The distance between the vertices is equal to $2a$.

$2a=12 \rightarrow a=6 \rightarrow a^2=36$

The length of minor axis is $2b=8 \rightarrow b=4$.

$\rightarrow b^2=16$

The equation of ellipse is,

$$\frac{(x-4)^2}{16}+\frac{(y+3)^2}{36}=1$$

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Ellipses and Circles Assignment

Write an equation for a circle that satisfies the conditions given. Also graph the circle.

1. center $(3, 0)$, radius 2

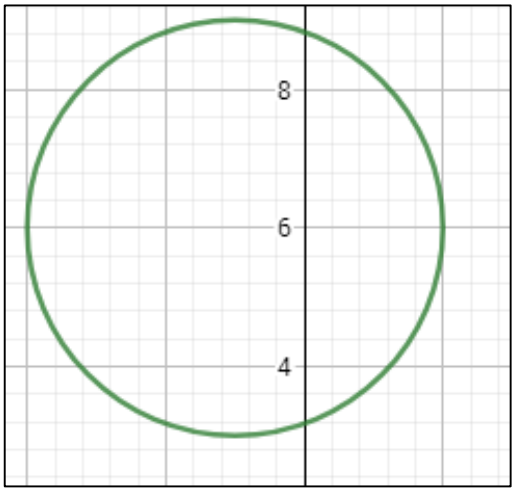
The equation of circle is,

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

Here $h=3,\ k=0\ , r=2$

→ $(x-3)^2+y^2=4$

Graph:



2. Center $(-1, 6)$, Diameter 6.

The equation of circle is,

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

Here $h=-1,\ k=6\ ;\ r=\frac{d}{2}=\frac{6}{2}=3$

→ $(x+1)^2+(y-6)^2=9$

Graph: