Conics – Circles

I can identify a circle in both General and Standard Form.

I can convert the equation of a circle from General From to Standard Form.

I can graph a circle.

The General Form of a Circle:

The Standard Form of a Circle:

Converting the equation of a circle from General Form to Standard Form.

A) $x^2 + y^2 + 4x - 32y + 256 = 0$

B) $x^2 + y^2 + 12x - 8y + 27 = 0$

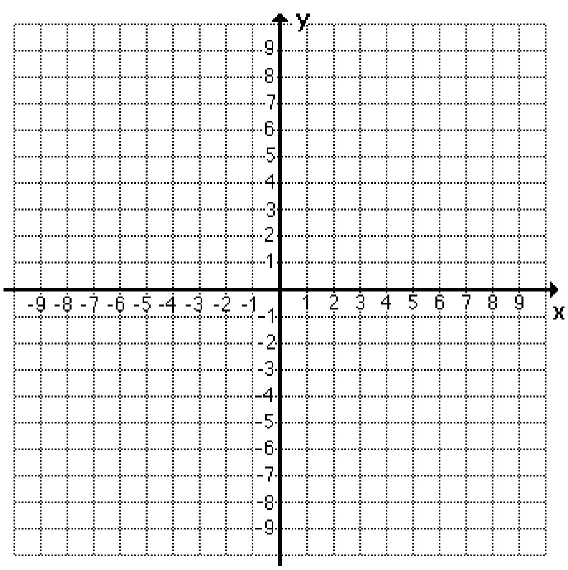
C) $3x^2 + 3y^2 + 18x - 48y - 24 = 0$

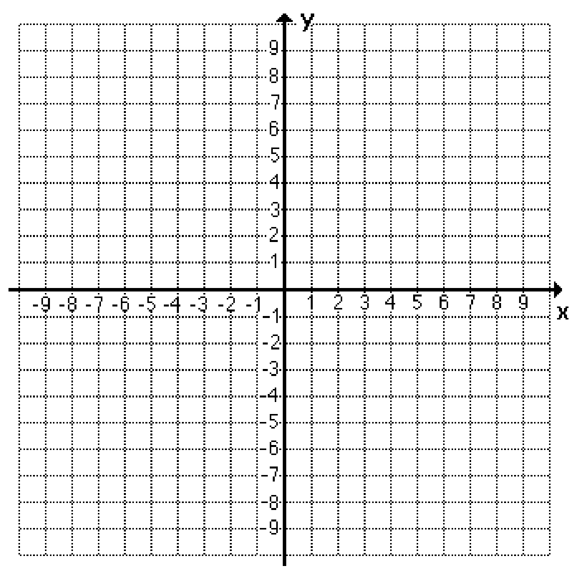
D) $x^2 + y^2 - 8x + 6y + 96 = 0$

Graph the following

E) $(x+4)^2 + (y+1)^2 = 4$

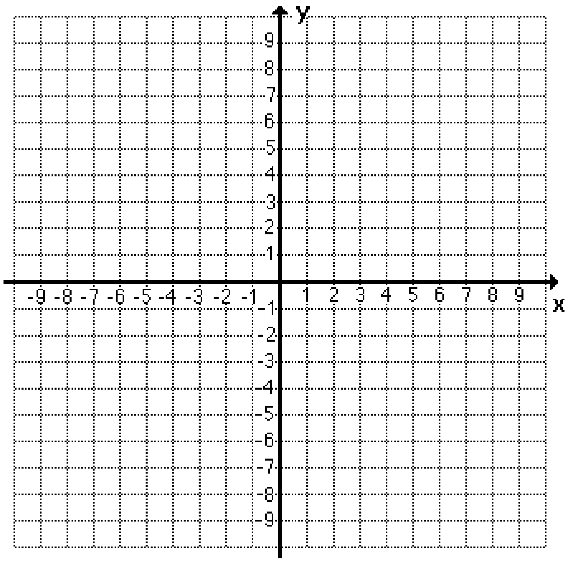
F) $(x-3)^2 + (y+2)^2 = 16$

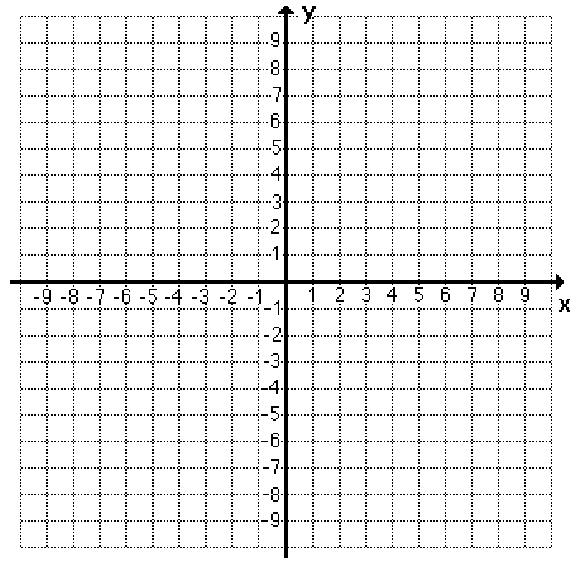




G) $(x-5)^2 + y^2 = 4$

H) $(x+2)^2 + (y-4)^2 = 12$





Circles – Continued

I can find the equation of a circle given the center of a circle and the radius of the circle.

I can find the equation of a circle given the center of the circle and a point on the circle.

I can find the equation of a circle given the two endpoints of the diameter of a circle.

Find the equation of the circle given the following:

A) The center is at $(-3,2)$ and a radius of $4\sqrt{2}$ units.

B) The center is at $(0,9)$ and a radius of $3\sqrt{5}$ units.

C) The center is at $(6,-3)$ and the point $(8,2)$ rests on the circle.

D) The center is at $(-4,0)$ and the point $(-1,3)$ rests on the circle.

E) A circle that has a diameter with endpoints of $(-17,-6)$ and $(1,-12)$.

F) A circle that has a diameter with endpoints of $(-4,-9)$ and $(12,15)$.

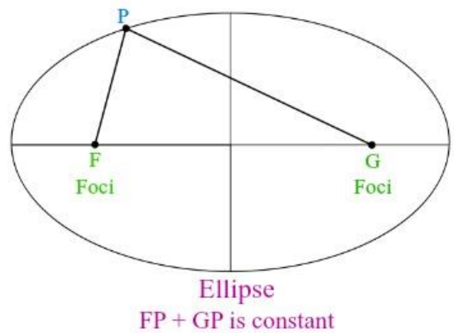
Conics – The Ellipse

I can identify the equation of an Ellipse in both General Form and Standard Form.

I can convert the equation on an Ellipse from General Form to Standard Form.

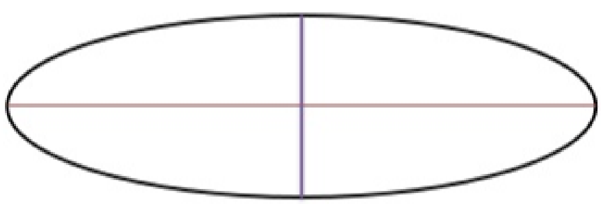
I can graph an Ellipse.

Definition: An ellipse is the set of all points (x,y) in a plane, such that the sum of the distances from two distinct fixed points (foci) is constant.



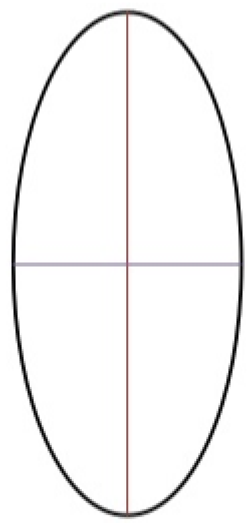
General Form of a conic: $ax^2 + by^2 + cx + dy + e = 0$

Standard Form of an Ellipse:



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

Horizontal Major Axis



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

Vertical Major Axis

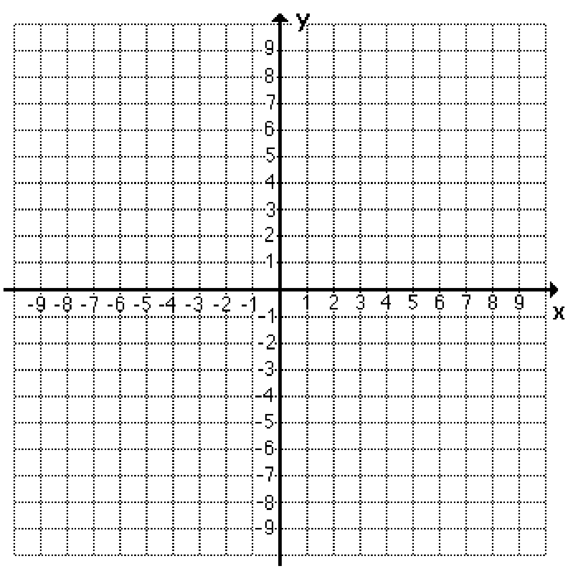
Convert the following to Standard Form.

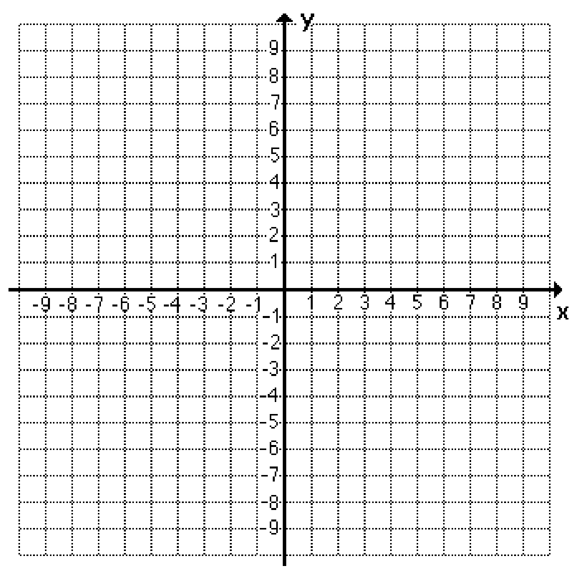
A) $25x^2+9y^2-50x+180y+25=0$

B) $4x^2+9y^2-48x-36y+36=0$

C) $\frac{(x+2)^2}{25}+\frac{(y+2)^2}{4}=1$

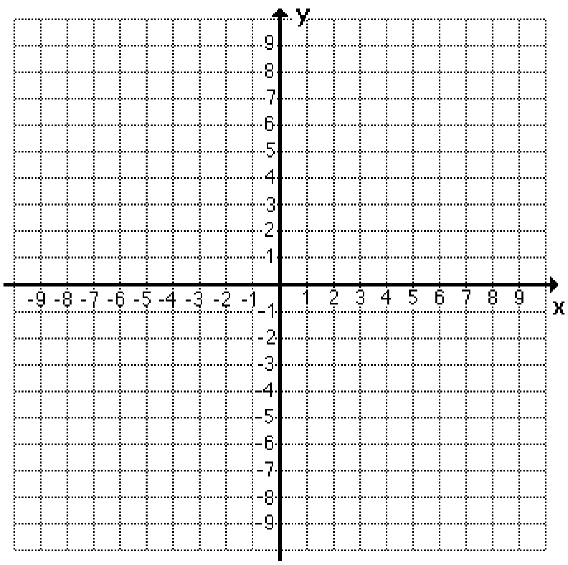
D) $\frac{(x-3)^2}{9}+\frac{(y-4)^2}{25}=1$

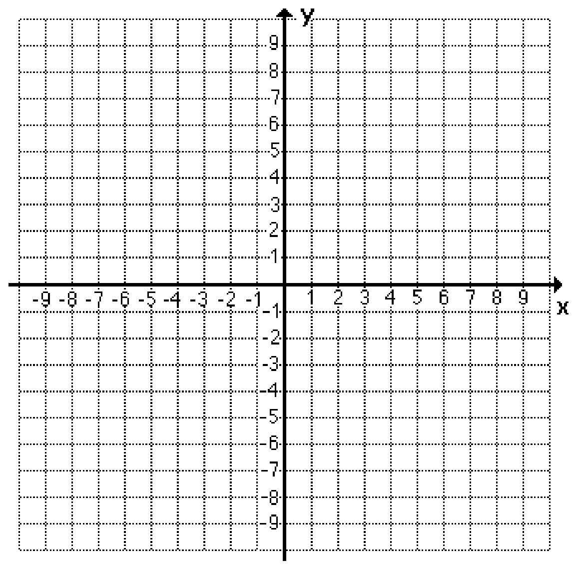




E) $\frac{(x-4)^2}{4}+\frac{(y+2)^2}{36}=1$

F) $\frac{(x-1)^2}{36}+\frac{(y-2)^2}{25}=1$





The Ellipse Continued

I can find the equation of an Ellipse.

Find the equation of the Ellipse.

Find the equation of the ellipse in standard from that has a center at $(-4,5)$, a vertical major axis of 14 units, and a horizontal minor axis of 10 units.

Find the equation of an ellipse that has vertices of $(0,-2)$, $(4,3)$, $(8,-2)$ and $(4,-7)$.

Find the equation of an ellipse that has vertices of $(3,-4)$, $(-3,-7)$, $(-9,-4)$ and $(-3,-1)$.

Find the equation of an ellipse that has foci of $(-2, 6)$ and $(6, 6)$ and the sum of the focal radii is 12.

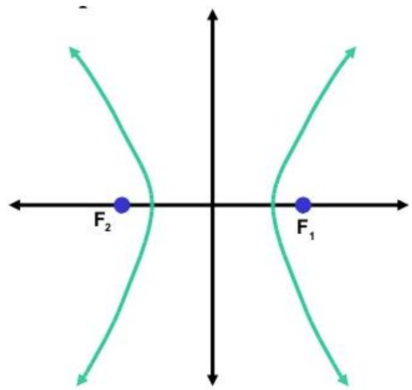
Conics – The Hyperbola

I can identify the equation of a Hyperbola in General Form.

I can convert the equation of a Hyperbola from General Form to Standard Form.

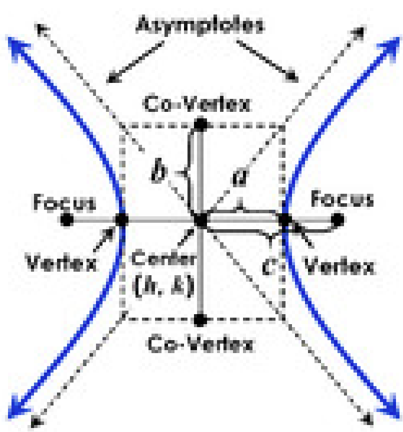
I can graph a Hyperbola.

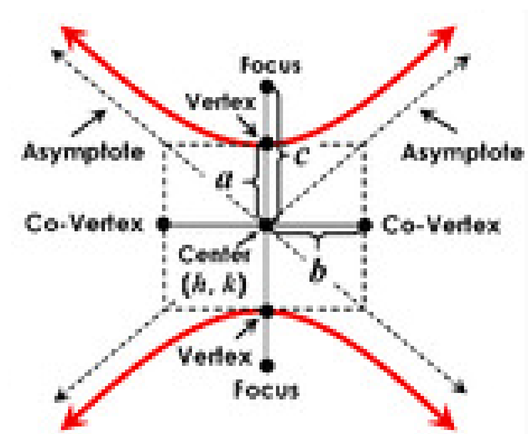
Definition: a hyperbola is the set of points in a plane, the absolute value of the difference of whose distances from two fixed points (the foci) is constant.



The General Form of a conic: $ax^2 + by^2 + cx + dy + e = 0$

The Standard Form of a Hyperbola:





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

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

Asymptotes: $y - k = \pm\frac{b}{a}(x-h)$

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

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

Asymptotes: $y - k = \pm\frac{a}{b}(x-h)$

Convert the Equation from General Form to Standard Form.

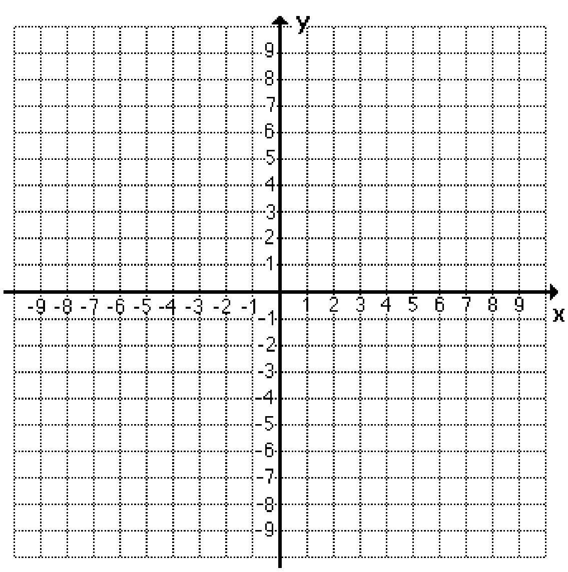
A) $x^2 - 4y^2 + 18x - 8y - 23 = 0$

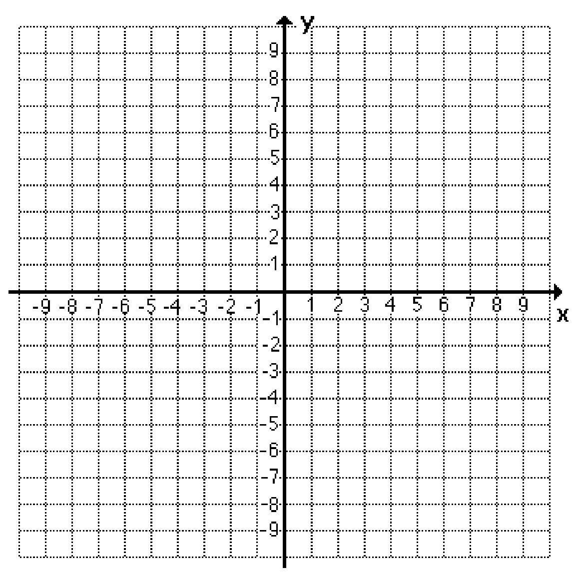
B) $-9x^2 + 4y^2 + 90x + 72y - 225 = 0$

Graph the following

C) $\dfrac{x^2}{9} - \dfrac{y^2}{16} = 1$

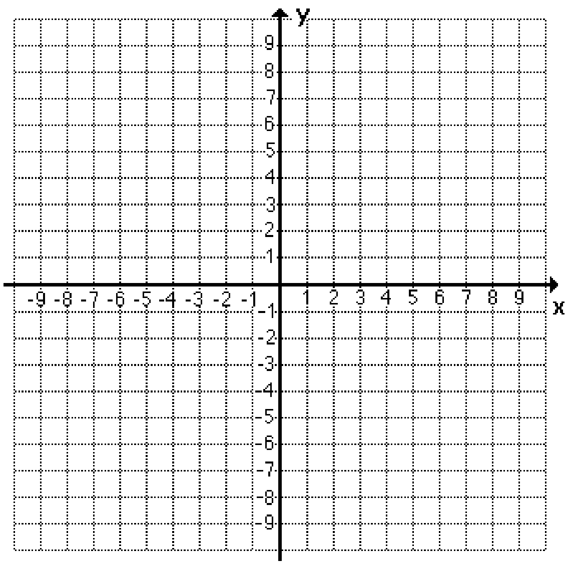
D) $\dfrac{(x-1)^2}{16} - \dfrac{(y-2)^2}{4} = 1$

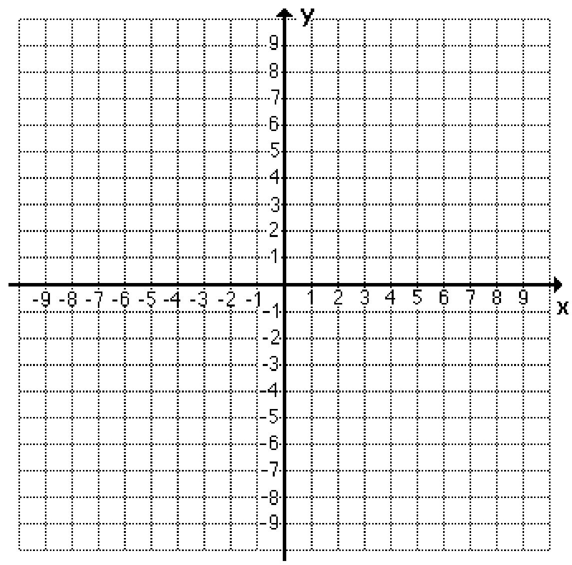




E) $\frac{(y+1)^2}{9} - \frac{(x-3)^2}{25} = 1$

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





Review

I can classify a conic as being either a circle, ellipse, hyperbola or parabola when it is in General Form.

General Form of a Conic: $ax^2 + by^2 + cx + dy + e = 0$

Identify each of the following as a circle, ellipse, hyperbola, line or parabola.

1. $3x^2 + 2x - y + 3 = 0$
2. $3x^2 + 3y^2 - 12x + 18y - 6 = 0$
3. $4x^2 + 3y^2 - 12x + 21y - 6 = 0$
4. $3x + 5y - 6 = 0$
5. $2x^2 - y^2 + 5x - 6y + 3 = 0$
6. $5x^2 + 5y^2 - 3x + 2y - 7 = 0$
7. $-2x^2 - 3y^2 + 7x - 8y + 2 = 0$
8. $x^2 - 3y + 4 = 0$
9. $x^2 - 2y^2 + 6x - 8y + 2 = 0$
10. $4x^2 - y^2 + 4x - 12y + 18 = 0$

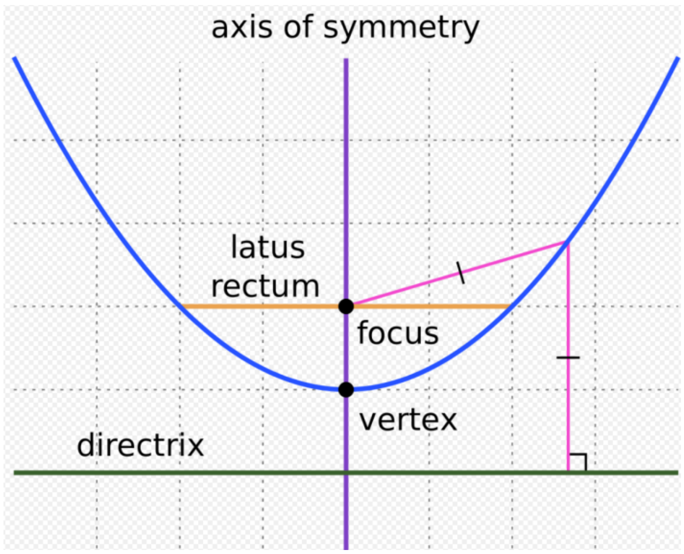
CONICS – THE PARABOLA

I can write the equation of a Parabola in Standard Form.

I can find the focus and directrix of a parabola

I can find the equation of a parabola.

Definition: A parabola is the locus of a point, whose distance from a fixed point (focus) is equal to perpendicular distance from a fixed straight line (directrix).



The General Form of a Parabola:

opens up/down $y = ax^2 + bx + c$ **opens left/right:** $x = ay^2 + by + c$

The Vertex Form of a Parabola:

opens up/down: $y = a(x-h)^2 + k$ **opens left/right:** $x = a(y-k)^2 + h$

The Standard Equation of a Parabola:

opens up/down

$$(x-h)^2 = 4p(y-k), \quad p \neq 0$$

opens left/right

$$(y-k)^2 = 4p(x-h), \quad p \neq 0$$

Identify the focus and directrix of each:

A) $y = 2(x - 4)^2 + 8$

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

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

D) $y^2-4y-4x=0$

Find the equation of the parabola that has a vertex of $(3, 6.5)$ and a focus of $(3, 6)$.

Find the Equation of a parabola that has a vertex of $(5, 2)$ and a focus of $(3, 2)$.