Bellwork   1-11-16

1. Write the equation for an ellipse with a center at (-7, 2), a major axis parallel to the y-axis, a major axis length of 8, and a minor axis length of 10.
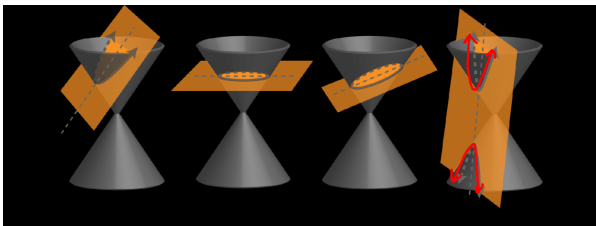
$$\frac{(x+7)^2}{25} + \frac{(y-2)^2}{16} = 1$$

2. Write the equation for an ellipse with a center at (0, 6), a major axis parallel to the x-axis, a major axis length of 14, and a minor axis length of 2.

$$\frac{x^2}{49} + \frac{(y-6)^2}{1} = 1$$

Dec 19-10:06 PM

Conics - Hyperbolas   1-12-15

A conic section is formed when you intersect a plane with with cones. There are 4 conic sections...

parabola   circle   ellipse   hyperbola

Dec 19-10:09 PM

Today, we'll be working with hyperbolas...

3 Things You Need to be Able to do with Hyperbolas:
- determine whether an equation is that of a hyprbola
- determine the directions of opening by looking at an equation
- determine the distance left/right or up/down for the vertices by looking at an equation

Dec 20-12:06 PM

Equation of a Hyperbola

** Must have both variables squared (x^2 AND y^2)**

x^2 and y^2 must be different signs

$$\frac{(y+1)^2}{25} - \frac{(x-3)^2}{16} = 1$$

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

$$\frac{(x+5)^2}{4} - \frac{y^2}{100} = 1 \qquad -\frac{(x+2)^2}{16} + \frac{(y+7)^2}{4} = 1$$

$$\frac{x^2}{16} - \frac{y^2}{4} = 1 \qquad \frac{y^2}{16} - x^2 = 1$$

$$4x^2 + 3x - 9y^2 + 8y = 1$$

Dec 20-12:07 PM

The equation for a horizontal hyperbola

that opens left and right

is

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

where (h, k) is the center and

a(under the x) is the distance left & right from the center

Dec 19-10:10 PM

The equation for a vertical hyperbola

that opens up and down

is

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

where (h, k) is the center and

a(under the y) is the distance up & down from the center

Dec 19-10:10 PM

Here's the graph of $\frac{(y + 1)^2}{25} - \frac{(x - 3)^2}{16} = 1$

What's the center? $(3, -1)$

What are the directions of opening?

up/down

Here's the graph of $\frac{(x - 3)^2}{16} - \frac{(y + 1)^2}{25} = 1$

What's the center? $(3, -1)$

What are the directions of opening?

left/right

Dec 20-11:31 AM

Directions of Openings of a Hyperbola

Determining Directions of Opening:

- if the x^2 comes 1st, the hyperbola will be horizontal opening left & right (b/c the x-axis runs horizontally)
- if the y^2 comes 1st, the hyperbola will be vertical opening up & down (b/c the y-axis runs vertically)

Dec 20-12:19 PM

Determine the center and directions of opening for the hyperbola.

1. $\dfrac{(x-3)^2}{16} - \dfrac{(y+1)^2}{25} = 1$ $(3,-1)$ R/L

2. $\dfrac{x^2}{16} - \dfrac{y^2}{4} = 1$ $(0,0)$ R/L

3. $\dfrac{(y-2)^2}{25} - \dfrac{(x+7)^2}{16} = 1$ $(-7,2)$ Up/down

4. $\dfrac{(x+5)^2}{4} - \dfrac{y^2}{100} = 1$ $(-5,0)$ R/L

5. $\dfrac{y^2}{16} - x^2 = 1$ $(0,0)$ Up/down

Jan 6-12:52 PM

Here's the graph of $\dfrac{(y+1)^2}{25} - \dfrac{(x-3)^2}{16} = 1$

What's the center? $(3,-1)$

How far up and down are the vertices? $(3,4)(3,-6)$ 5

Here's the graph of $\dfrac{(x-3)^2}{16} - \dfrac{(y+1)^2}{25} = 1$

What's the center? $(3,-1)$ 4

How far left and right are the vertices? $(-1,-1)(7,-1)$

Dec 20-11:31 AM

Vertices of Hyperbola

Determining Vertices of a Hyperbola:

- If x^2 is first, square root 1st denominator and go left and right from the center that distance. Label points.

- If y^2 is first, square root 1st denominator and go up and down from the center that distance. Label points.

Dec 20-12:25 PM

Determine the center and vertices for each hyperbola. Then sketch the graph.   Asymptote

1. $\dfrac{(y+8)^2}{\sqrt{36}} - \dfrac{(x-3)^2}{4} = 1$ 6

Center = $(3,-8)$ up/down

Vertices = $(3,-2)(3,-14)$

2. $\dfrac{(x+1)^2}{\sqrt{9}} - \dfrac{(y+7)^2}{\sqrt{100}} = 1$

Center = $(-1,-7)$ R/L

Vertices = $(-4,-7)(2,-7)$

Jan 6-12:52 PM

3

Conclusion

1. How do you tell if you have the equation of a hyperbola?
   $x^2 + y^2$ Diff. signs
2. How do you tell which directions it opens?
   x^2 1st R/L y^2 1st Up/Down
3. How do you get the vertices?
   $\sqrt{a^2}$ count from center
4. Questions???

Jan 6-3:19 PM

Assignment

Hyperbola Wkst

Dec 20-11:53 AM