Hyperbolas

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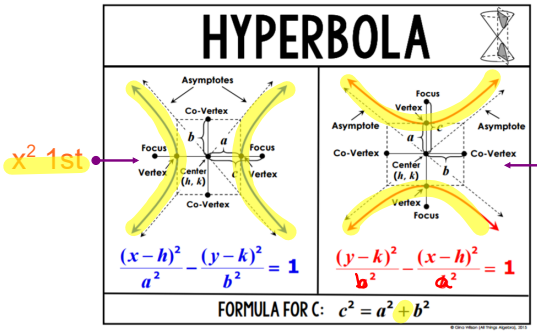

x^2 1st

y^2 1st

You need to find:

- center (h, k)
- 2 vertices (only the ones you used in the graph
- 2 foci ($c^2 = a^2 + b^2$ and then add c to the coordinate of the center based on which variable is listed 1st in the problem)
- 2 asymptotes: $(y-k) = \pm\frac{b}{a}(x-h)$

Steps for graphing hyperbolas:

1. Plot the center
2. Plot points using a & b
3. Draw a box using those 4 points
4. Draw diagonals (asymptotes) through the corners of box
5. Sketch branches of hyperbola using vertices & asymptotes

x^2 1st

y^2 1st

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Graph. List center, vertices, foci & asymptotes.

1. $\frac{(y-4)^2}{36} - \frac{(x-3)^2}{9} = 1$ (b^2, a^2)

y^2 1st so

center: (3, 4)

a = 3 left/right

b = 6 up/down

vertices: (3, 10) & (3, −2)

foci: $(3, 4 \pm 3\sqrt{5})$

$c^2 = a^2 + b^2$

$c^2 = 9 + 36$

$\sqrt{c^2} = \sqrt{45}$ (2.5) $c = \pm 3\sqrt{5}$

asymptotes: $(y-4) = \pm\frac{6}{3}(x-3)$

$(y-4) = \pm 2(x-3)$

2. $\frac{x^2}{9} - \frac{(y+2)^2}{25} = 1$ (a^2, b^2)

x^2 1st

center (0, −2)

a = 3 L/R

b = 5 ↑/↓

vertices: (−3, −2) & (3, −2)

foci: $(0 \pm \sqrt{34}, -2)$

$c^2 = 9 + 25$

$c^2 = 34$

$c = \pm\sqrt{34}$

asymptotes:

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Rewrite the hyperbola in standard form 26

1. $4x^2 - 25y^2 - 8x + 250y - 721 = 0$

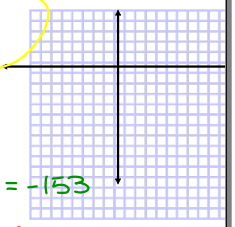
$(4x^2-8x\ ) + (-25y^2+250y\ ) = 721$

$4(x^2-2x+1) - 25(y^2-10y+25) = 721+4-625$

$(-2/2)^2=(-1)^2 \qquad (-10/2)^2=(-5)^2$

$\frac{4(x-1)^2}{100} - \frac{25(y-5)^2}{100} = \frac{100}{100}$

$\frac{(x-1)^2}{25} - \frac{(y-5)^2}{4} = 1$



2. $9y^2 - 4x^2 - 90y - 24x = -153$

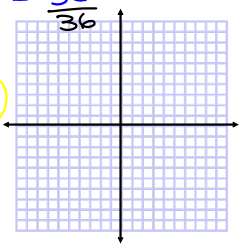
$(9y^2-90y\ ) + (-4x^2-24x\ ) = -153$

$9(y^2-10y+25) - 4(x^2+6x+9) = -153+225-36$

$(-10/2)^2=(-5)^2 \qquad (6/2)^2=(3)^2$

$\frac{9(y-5)^2}{36} - \frac{4(x+3)^2}{36} = \frac{36}{36}$

$\frac{(y-5)^2}{4} - \frac{(x+3)^2}{9} = 1$



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Classify Conics in General Form 27

1) circle → Same leading coefficients with same sign

ex: $4x^2 + 4y^2 - 3x + 7y - 9 = 0$

2) ellipse → different leading coefficients but same sign

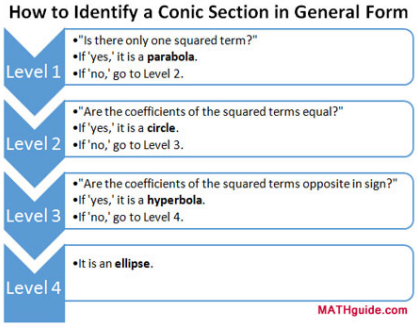
ex: $4x^2 + 5y^2 - 3x + 7y - 9 = 0$

3) parabola → Only 1 variable is squared

ex: $4y^2 - 3x + 7y - 9 = 0$

4) hyperbola → leading coefficients are opposite signs

ex: $4x^2 - 5y^2 - 3x + 7y - 9 = 0$



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Quiz	INB
#1-2	p. 16
#3-4	p. 22
#5-6	p.19
#7/8/9	p. 20/17/23
#10-11	p. 16
#12	p. 23
#13-14	p. 20
#15	p. 23

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