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Trigonometry
Conics (Part 2) Review

Graph the equation, then answer the question.

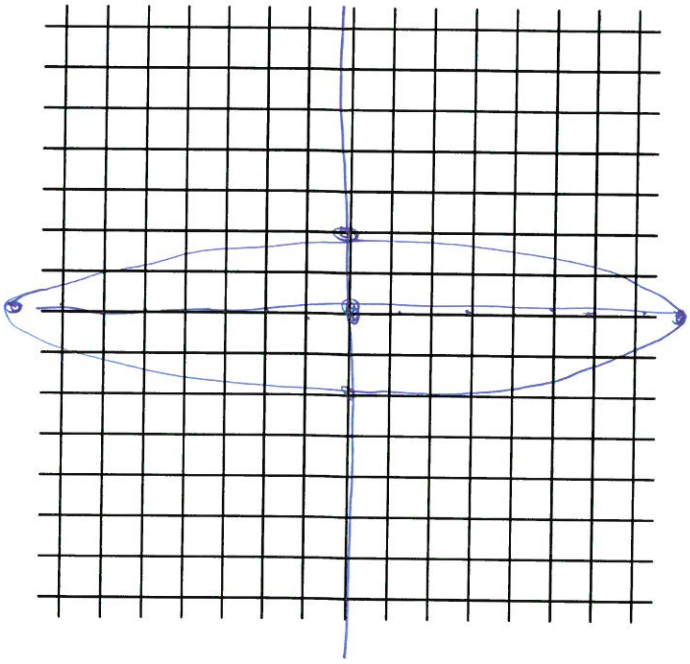
1. $x^2 + 16y^2 = 64$ $\frac{x^2}{64} + \frac{y^2}{4} = 1$

a. The graph is an ellipse. The center is at the origin. It has two lines of symmetry, the x-axis and the y-axis.

b. The graph is a circle. The center is at the origin. Every line through the origin is a line of symmetry.

c. The graph is a parabola. The vertex is at the origin. It has one line of symmetry, the y-axis.

d. The graph is a parabola. The vertex is at the origin. It has one line of symmetry, the x-axis.



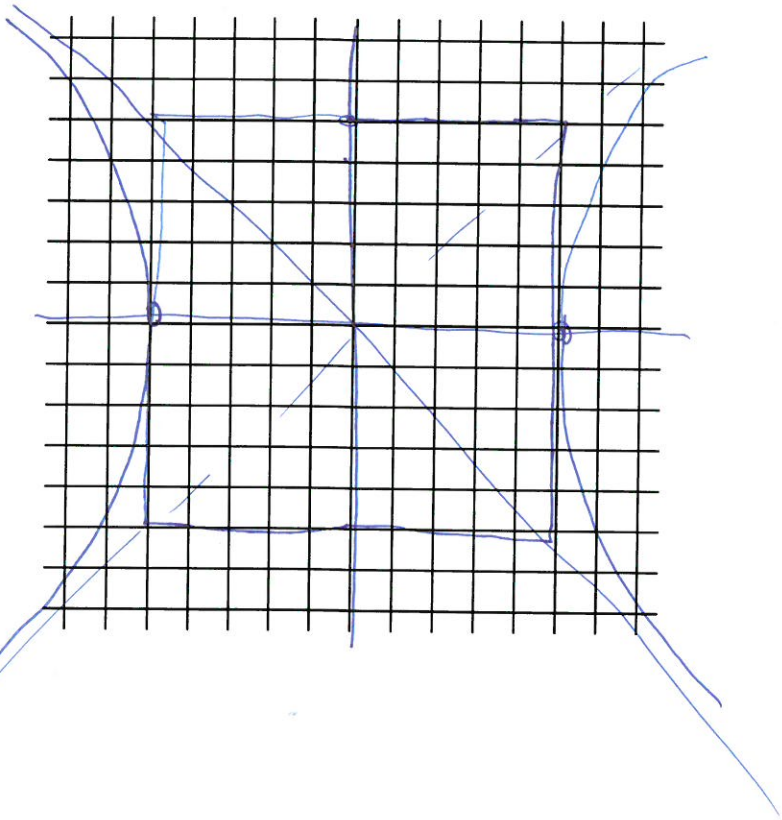
2. $x^2 - y^2 = 25$ $\frac{x^2}{25} - \frac{y^2}{25} = 1$

a. The graph is a circle with radius 5. Its center is at the origin. Every line through the center is a line of symmetry.

b. The graph is a hyperbola that consists of two branches. Its center is at the origin. It has four lines of symmetry, the x-axis, the y-axis, y = x, and y = –x.

c. The graph is a hyperbola that consists of two branches. Its center is at the origin. It has four lines of symmetry, the x-axis, the y-axis, y = x, and y = –x.

d. The graph is a hyperbola that consists of two branches. Its center is at the origin. It has two lines of symmetry, the x-axis and the y-axis.



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

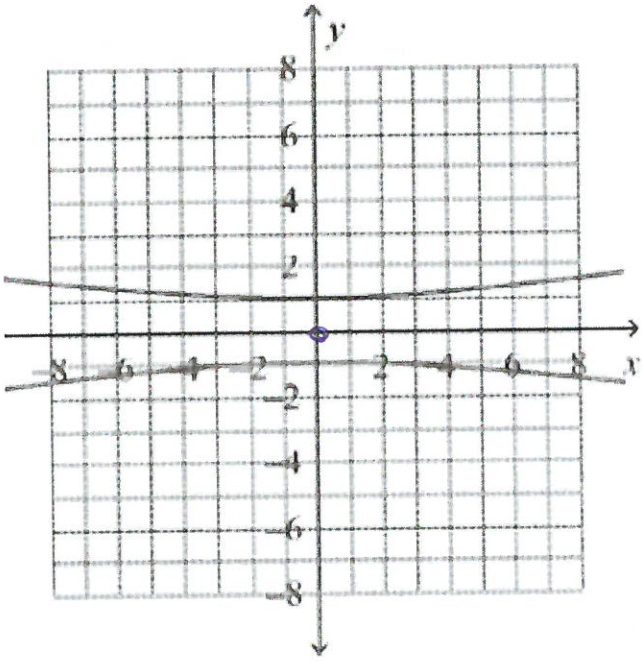
3. Identify the center and intercepts of the conic section.

a. The center of the hyperbola is (0, 0). The x-intercepts are (0, 1) and (0, –1).

b. The center of the hyperbola is (0, 0). The x-intercepts are (1, 0) and (-1, 0).

c. The center of the hyperbola is (0, 0). The y-intercepts are (0, 1) and (0, –1).

d. The center of the hyperbola is (0, 0). The y-intercepts are (1, 0) and (-1, 0).



4. Identify the vertex, focus and the directrix of the graph of $x^2 - 4x - 12y + 40 = 0$.

a. vertex (–2, 3), focus(2, 0), directrix at y = 6

b. vertex (–2, –3), focus(0, 3), directrix at y = 3

c. vertex (2, –3), focus(2, 6), directrix at y = 6

d. vertex (2, 3), focus(2, 6), directrix at y = 0

$x^2 - 4x + 4 = 12y - 40 + 4$

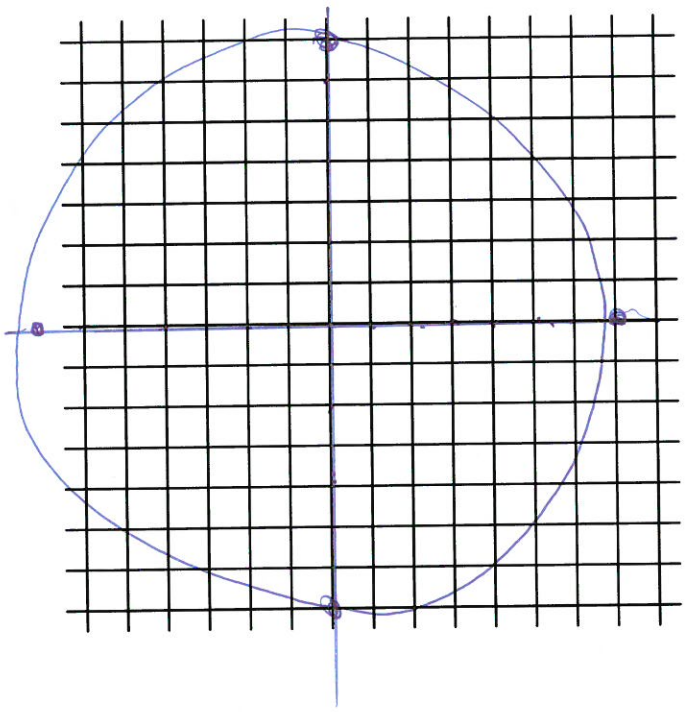
$(x-2)^2 = 12y - 36$

$(x-2)^2 = 12(y-3)$

$V(2,3)$ $\quad p = 3$

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

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



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6. Write an equation in standard form of an ellipse that has a vertex at (0, 2), a co-vertex at (-1, 0), and is centered at the origin.

C (0,0)
V (0, ±2)

$\frac{x^2}{1} + \frac{y^2}{4} = 1$

7. Find the foci of the ellipse with the equation $\frac{x^2}{49} + \frac{y^2}{64} = 1$

$c^2 = a^2 - b^2$
$c^2 = 64 - 49$
$c^2 = 15$
$c = \sqrt{15}$

$F(0, \pm\sqrt{15})$

8. Write an equation of the ellipse with foci at $(0, \pm 5)$ and vertices at $(0, \pm 13)$.

C = 5
a = 13
$c^2 = a^2 - b^2$
$25 = 169 - b^2$
$144 = b^2$

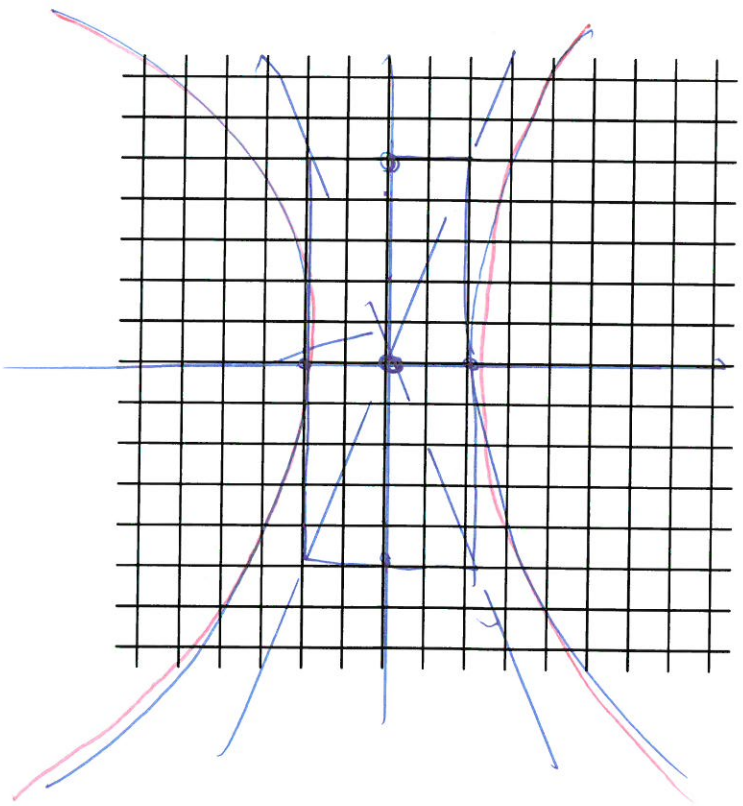
C = (0,0)

$\frac{x^2}{144} + \frac{y^2}{169} = 1$

9. Graph $25x^2 - 4y^2 = 100$

$\frac{25x^2}{100} - \frac{4y^2}{100} = \frac{100}{100}$

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



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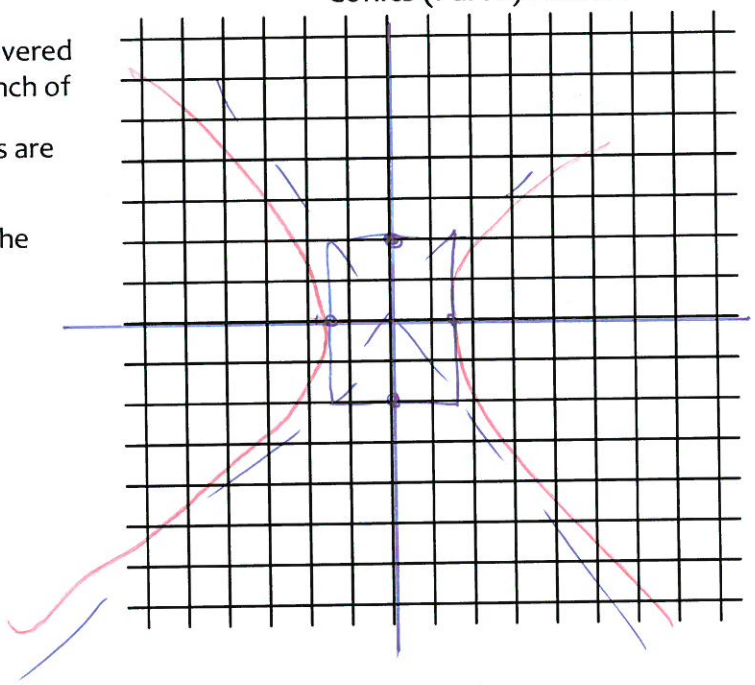
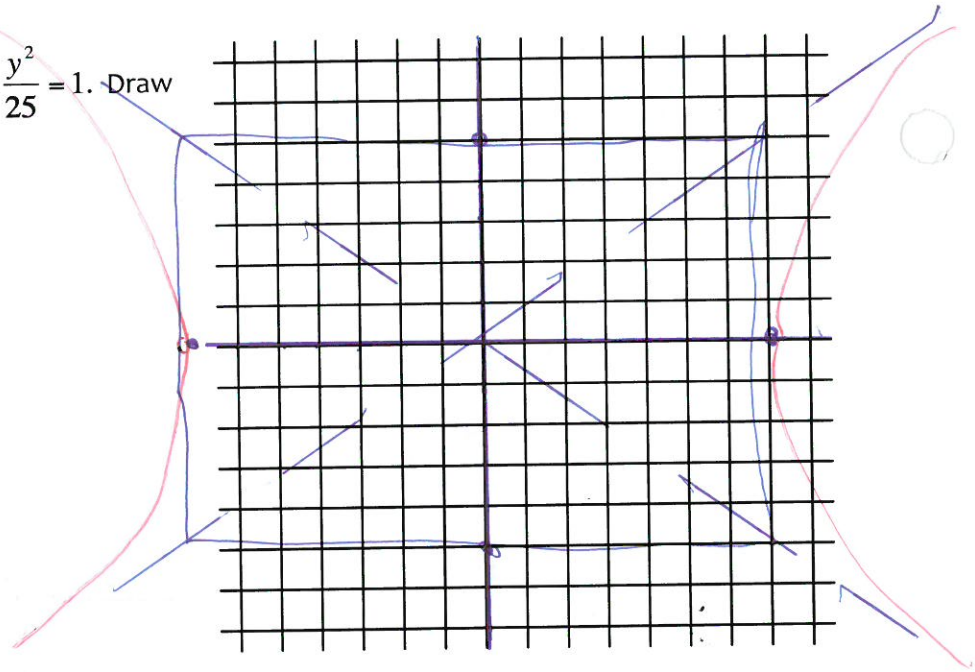
10. Suppose that the path of a newly discovered comet could be modeled by using one branch of the equation $\frac{x^2}{2} - \frac{y^2}{4} = 1$, where distances are measured in astronomical units. Name the vertices of the hyperbola and then graph the hyperbola.



$(\pm\sqrt{2}, 0)$

11. Find the foci of the graph $\frac{x^2}{49} - \frac{y^2}{25} = 1$. Draw the graph.



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

$c^2 = 49 + 25$

$c^2 = 74$

$c = \sqrt{74}$

$(\pm\sqrt{74}, 0)$

12. Write an equation of an ellipse with the center $(5,5)$, vertical major axis of length 8 and minor axis of length of 4.

$$\frac{(x-5)^2}{16} + \frac{(y-5)^2}{64} = 1$$

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13. Write an equation of a hyperbola with vertices $(4,-4)$ and $(-8,-4)$, and a focus at $(8,4)$.

C $(-2,-4)$

$a = 6$

$c = 10$ $\quad 10^2 = 6^2 + b^2$

$b = 8$

$$\frac{(x+2)^2}{36} - \frac{(y+4)^2}{64} = 1$$

For each of the following, classify each conic section. Write it in standard form. Graph and identify all the major features.

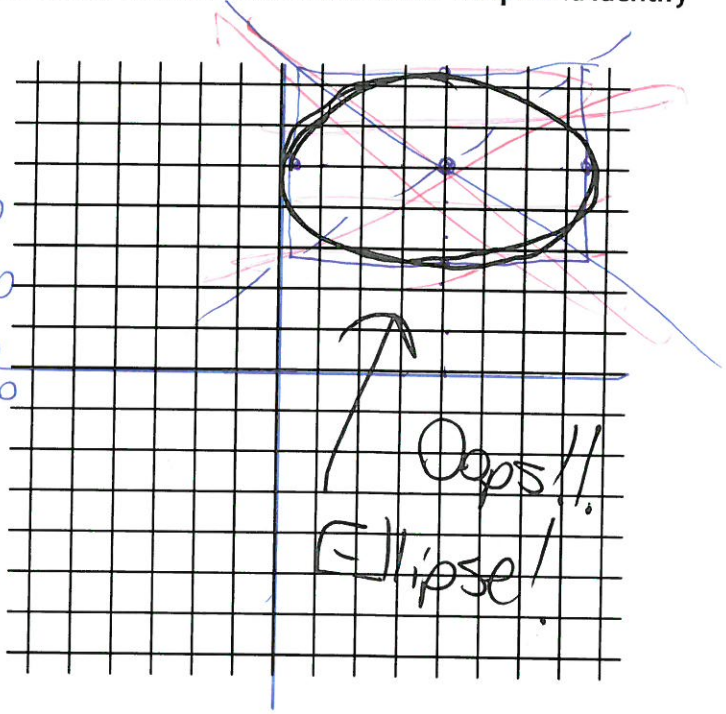
14. $5x^2 + 12y^2 - 40x - 120y + 320 = 0.$

$5x^2 - 40x \quad +12y^2 - 120y = -320$

$5(x^2 - 8x + 16) + 12(y^2 - 10y + 25) = -320$ $\quad +80 \quad +300$

$5(x-4)^2 + 12(y-5)^2 = 60$

$$\frac{(x-4)^2}{12} + \frac{(y-5)^2}{5} = 1$$



15. $-2y^2 + x - 4y + 1 = 0$

$2y$

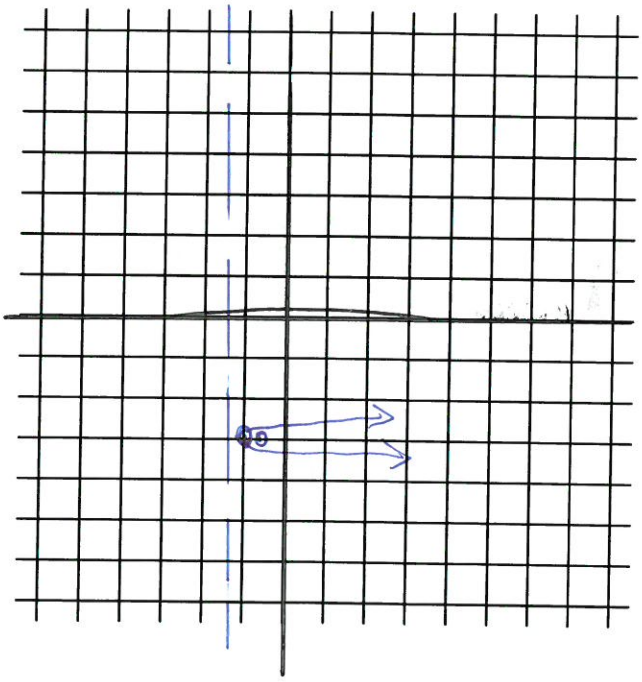
$x + 1 = 2y^2 + 4y$

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

$+2$

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

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



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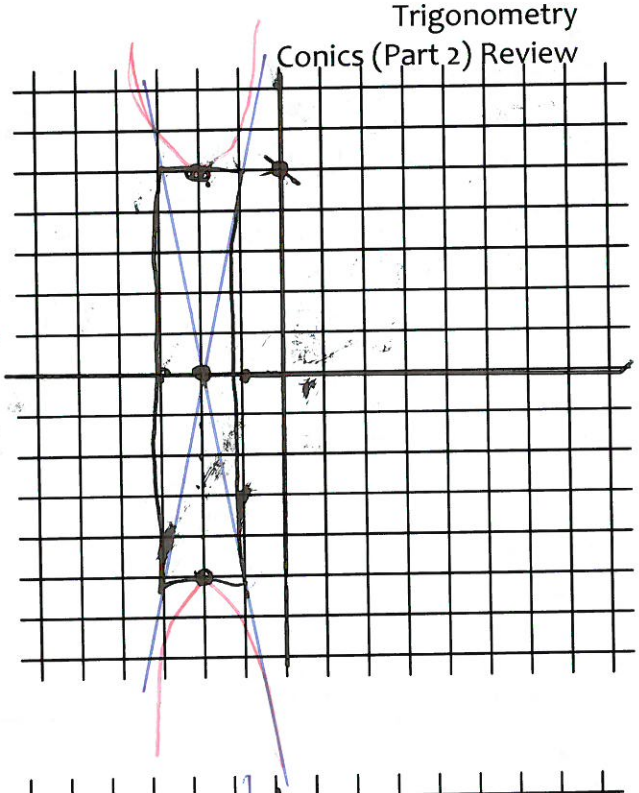
16. $-25x^2 + y^2 - 100x - 125 = 0$

$y^2 - 25x^2 - 100x = 125$

$y^2 - 25(x^2 + 4x + 4) = 125 - 100$

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

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



17. $y^2 + x + 10y + 26 = 0$

$y^2 + 10y + 25 = -x - 26 + 25$

$(y+5)^2 = -x - 1$

$(y+5)^2 = -1(x+1)$

$p = \frac{-1}{4}$