Precalculus

8.4 Conic Sections-Hyperbolas

Name_____ Date_____ Per_____

For each hyperbola, list the center, vertices, foci, and equations of the asymptotes. Then draw the graph (including the foci, center box, and asymptotes).

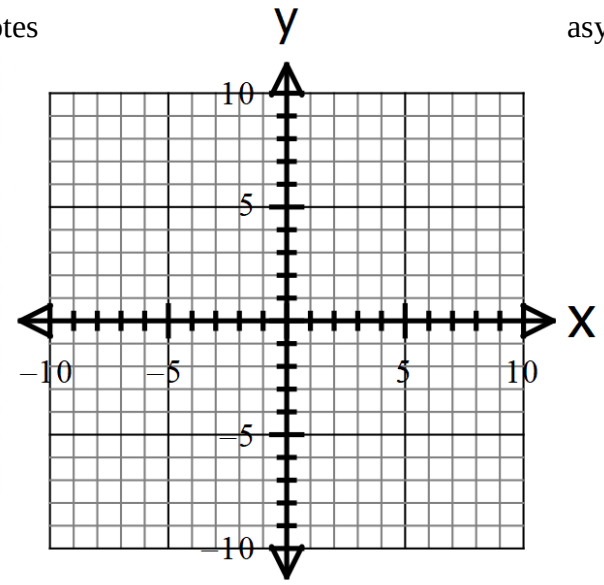
1. $\frac{x^2}{49}-\frac{y^2}{9}=1$

center

vertices

foci

asymptotes



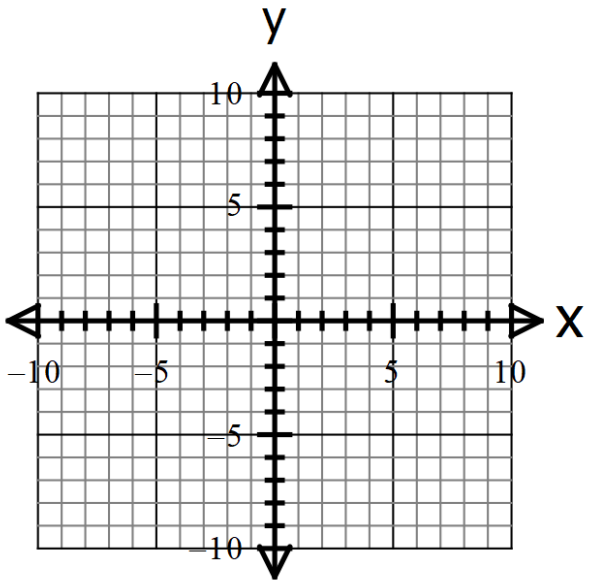
2. $\frac{y^2}{4}-\frac{x^2}{36}=1$

center

vertices

foci

asymptotes



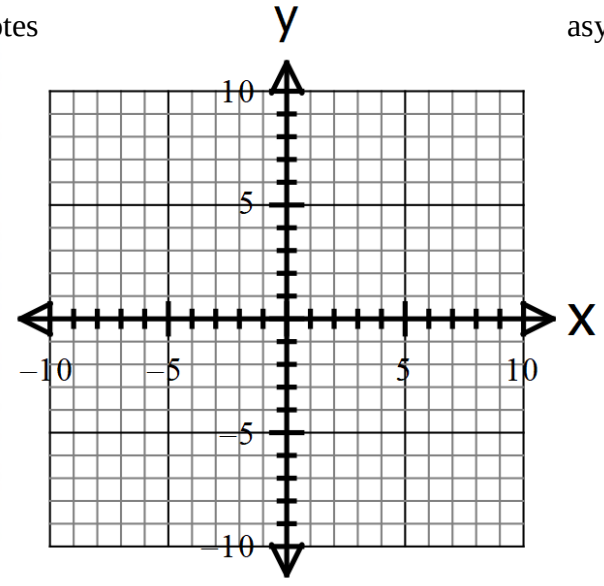
3. $4y^2-x^2=16$

center

vertices

foci

asymptotes



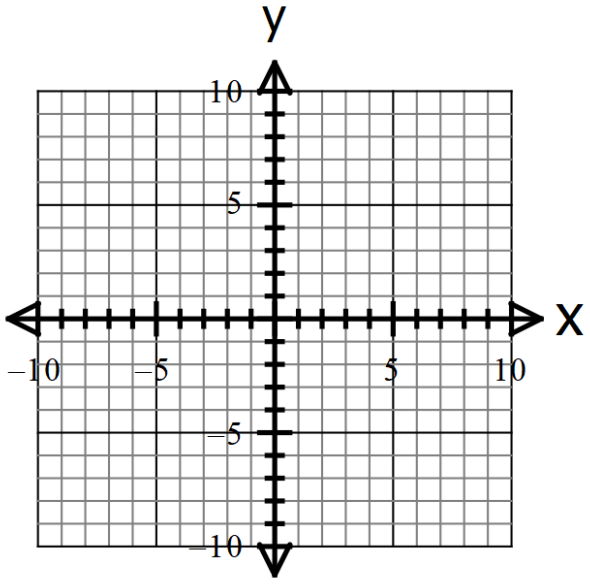
4. $9x^2-y^2=9$

center

vertices

foci

asymptotes



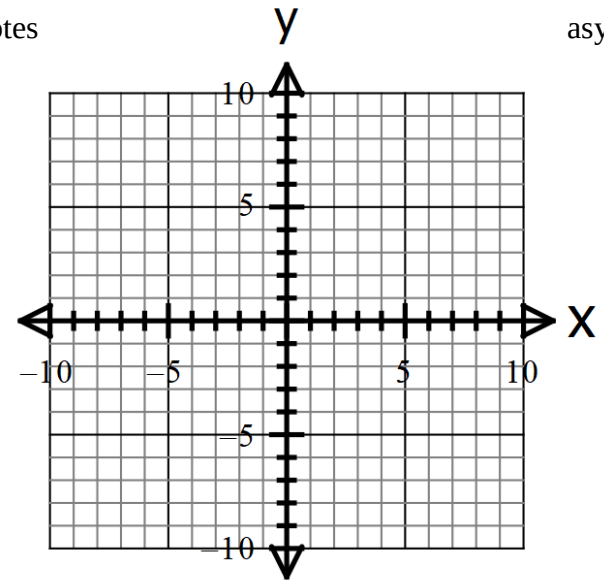
5. $\frac{(x-5)^2}{4}-\frac{y^2}{4}=1$

center

vertices

foci

asymptotes



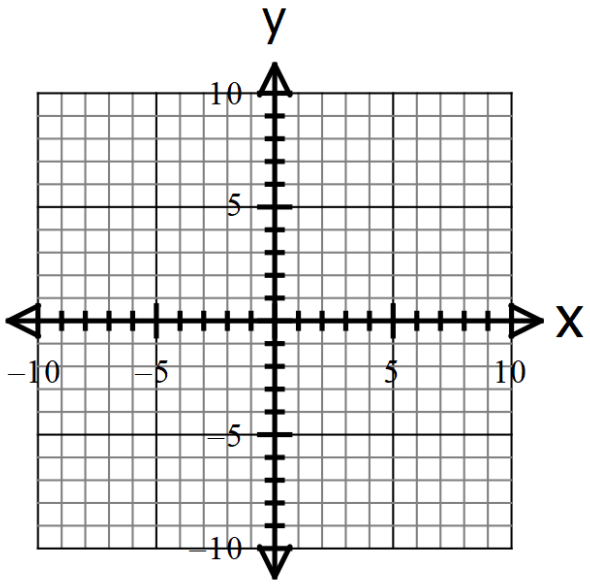
6. $\frac{(y-1)^2}{49}-x^2=1$

center

vertices

foci

asymptotes



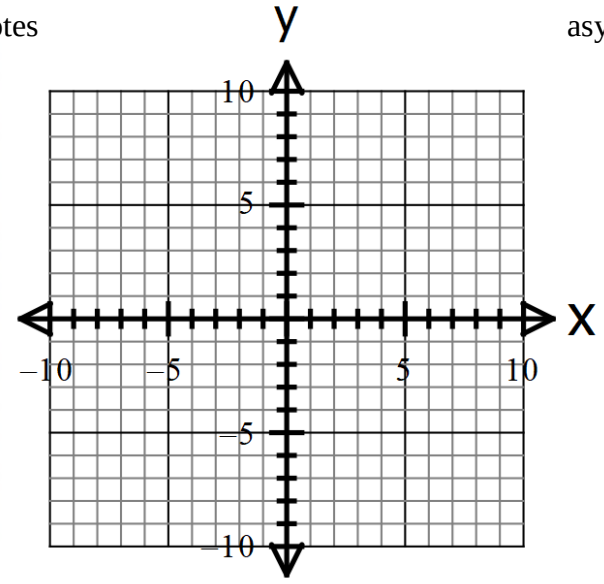
7. $4(y+4)^2-(x-2)^2=36$

center

vertices

foci

asymptotes



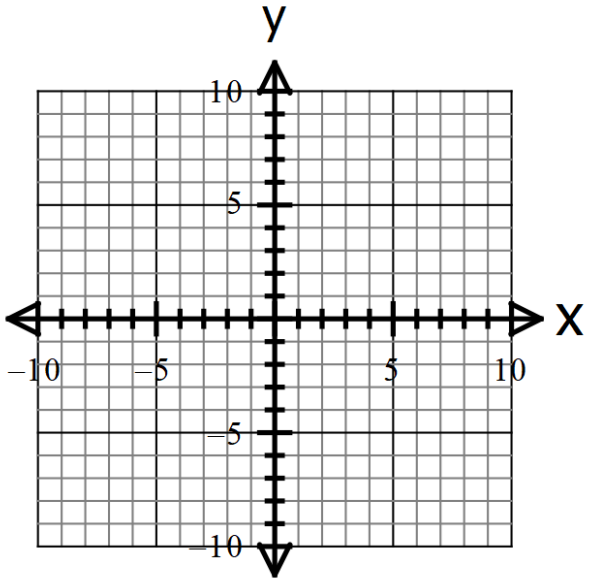
8. $4(x-1)^2-25(y+3)^2=100$

center

vertices

foci

asymptotes



Convert each equation to standard form by completing the square. Identify the center, vertices, foci, and equations of the asymptotes. You do NOT need to draw the graph.

9. $x^2 - 4y^2 - 18x + 24y - 55 = 0$

center

vertices

foci

asymptotes

10. $-x^2 + 16y^2 + 16x + 128y + 48 = 0$

center

vertices

foci

asymptotes

11. $-121x^2 + 4y^2 + 40y - 384 = 0$

center

vertices

foci

asymptotes

12. $9x^2 - 4y^2 + 126x - 8y + 113 = 0$

center

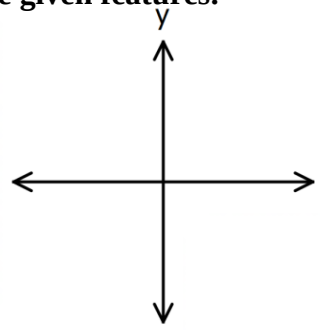
vertices

foci

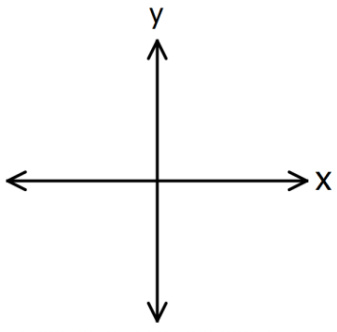
asymptotes

Find an equation in standard form for the hyperbola with the given features.

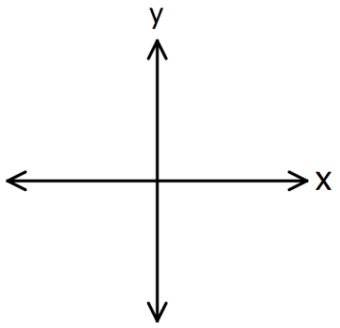
13. Center: $(4,-1)$; Focus: $(7,-1)$; Vertex: $(6,-1)$



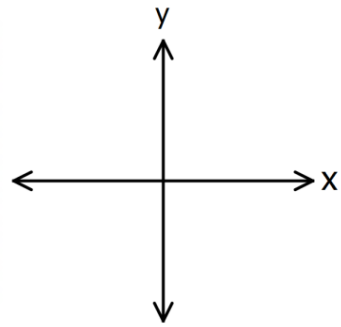
14. Center: $(-3,-4)$; Focus: $(-3,-8)$; Vertex: $(-3,-2)$



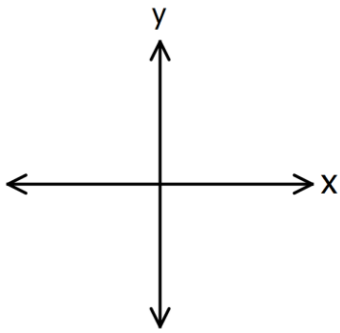
15. Foci: $(3,7)$ and $(7,7)$; Vertex: $(6,7)$



16. Vertices: $(-4,0)$ and $(4,0)$; Asymptote: $y = 2x$



17. Vertices: $(1,-3)$ and $(1,1)$; Asymptote: $y+1=\frac{2}{3}(x-1)$



Solve the problem.

18. Some nuclear power plants utilize "natural draft" cooling towers in the shape of a ***hyperboloid,*** a solid obtained by rotating a hyperbola about its conjugate axis. Suppose that such a cooling tower has a base diameter of 400 feet and the diameter at its narrowest point, 360 feet above the ground, is 200 feet. If the diameter at the top of the tower is 300 feet, how tall is the tower?