

## Practice Test Questions: All answers as simplified exact answers

## I. Identify as Parabola, Circle, Ellipse, or Hyperbola

1.  $(x + 2)^2 - (y - 4)^2 = 10$
2. The difference of the distances to the foci is a constant.
3. Formed by slicing a cone perpendicular to the base.
4.  $x^2 - 7x - y = 10$
5. Anything emitted from one focus reflects off the conic and through the other focus.
6. Formed by slicing a cone parallel to the base.
7. Set of points equidistant from a center point.
8. Eccentricity is greater than 0 but less than 1.
9. Distance from center to the foci is greater than the distance from the center to the vertices.
10. This conic is used in the kidney stone "crusher" in the process called Lithotripsy.
11. These are found in the headlights of cars.
12.  $x^2 + (y - 5)^2 = 49$

## II. Analysis

13. Write two equations of a parabola in standard form with a vertex at  $(-3, -2)$  and through the point  $(-1, 18)$ . One must open vertically, the other horizontally.

Given:  $x = \frac{1}{2}(y - 2)^2$

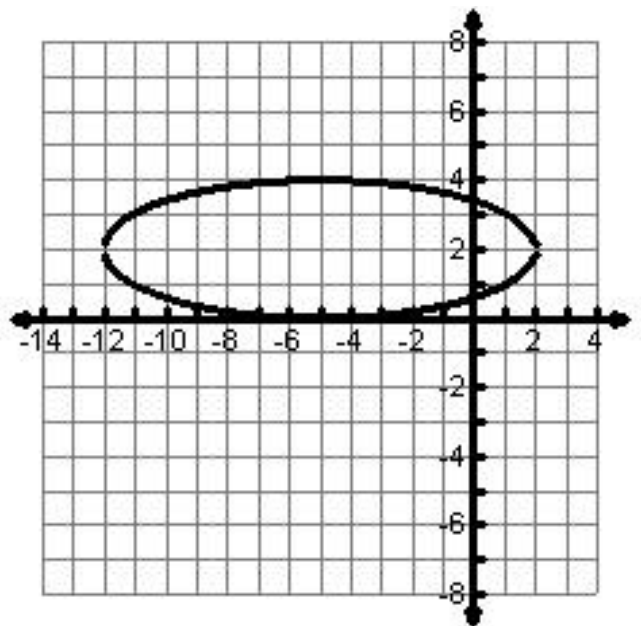
14. Identify and sketch the graph. Show the focus and directrix.
15. Find the coordinates of the focus.
16. Find the equation of the directrix.
17. Find the equation of the axis of symmetry.
18. Find the eccentricity.

Given the graph at the right

19. Identify and write the equation of the conic in standard form.
20. How long is the major axis?
21. What is the distance from the center to the foci?
22. What is the eccentricity?

Given:  $(x - 7)^2 + (y + 2)^2 = 18$

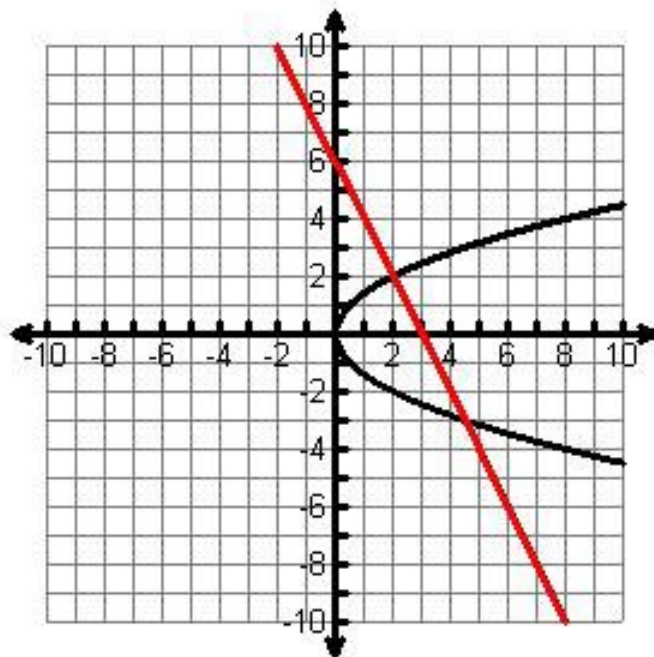
23. Find the center and radius of the circle.



Given:  $36(y - 2)^2 - 9x^2 = 324$

24. In which direction does this hyperbola open? Vertically or Horizontally? Why?
25. How long is the transverse axis?
26. What are the coordinates of the foci?
27. What are the equations of the slant asymptotes (in either point-slope or slope-intercept form)?

28. What are the solutions to the system of equations graphed at the right? Assume the line passes through  $(0,6)$  &  $(3,0)$  and the parabola passes through  $(8,4)$  with vertex at the origin.



Given: 
$$\begin{cases} x^2 - 2y^2 = 8 \\ x^2 + 2y^2 = 10 \end{cases}$$

29. Identify and sketch a graph of the two conics.
30. What are the solutions to the system? List the solutions as ordered pairs.

Given: 
$$\begin{cases} x^2 - 2y^2 = 68 \\ x = y^2 - 6 \end{cases}$$

31. Identify and sketch a graph of the two conics.
32. What are the solutions to the system? List the solutions as ordered pairs.
33. Given the parabola,  $x = -y^2 - 6y - 5$ , Write the equation in standard/vertex form, sketch the graph. Be sure to show the focus and the directrix. Then LIST the coordinates of the vertex, foci, and the equations of the directrix and axis of symmetry.

Bonus:

An ellipsoid is formed by rotating the ellipse  $x^2 + 4y^2 = 16$  about the  $y$ -axis. A cylinder is inscribed in the ellipsoid with its vertical axis along the  $y$ -axis and its two bases touching the ellipsoid. Find the radius  $r$ , height  $h$ , and the volume  $V$  of the cylinder of maximum volume.

$(V_{cylinder} = \pi r^2 h)$