

Mat 150 Ch. 5 Test
Open Book/Notes

Name _____

True/False. Write “True” or “False” in the blanks to the left for each statement.

1. _____ The conic sections are the result of the intersection of a plane and a right circular cone.
2. _____ The distances from a point on a parabola to both the focus and the directrix line are equal.
3. _____ The equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ represents a hyperbola.
4. _____ We place the bulb of a flashlight at the focus of a paraboloid in order to ensure that all the reflecting light rays travel parallel to the axis of symmetry.
5. _____ A circle is just a special case of an ellipse.

Short answer. State things as exact as possible.

6. What are the three ways to write a solution set?

7. What are the three main conic sections?

8. What is a whispering gallery?

9. Give three examples where conics are used in the *real-world*.

10. Draw a picture of the only conic that we would classify as a “function” at the math 150 level.

#11. **Parabola:** Consider the parabola: $(y + 1)^2 = -4(x - 2)$

A. What is the VERTEX POINT? _____

B. What is the “a” value? _____

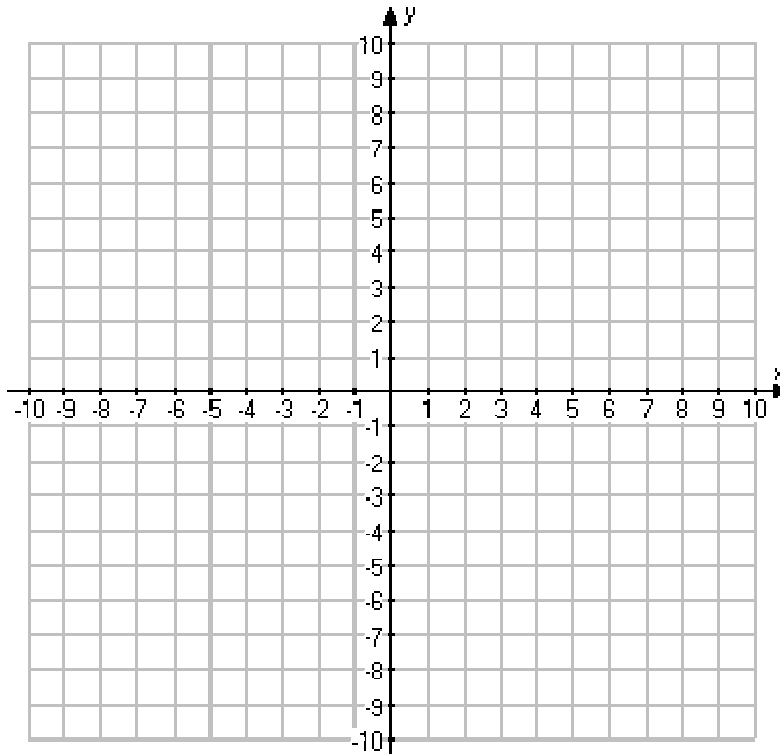
C. What is the FOCUS POINT? _____

D. What is the axis of symmetry? _____

E. What is the DIRECTRIX? _____

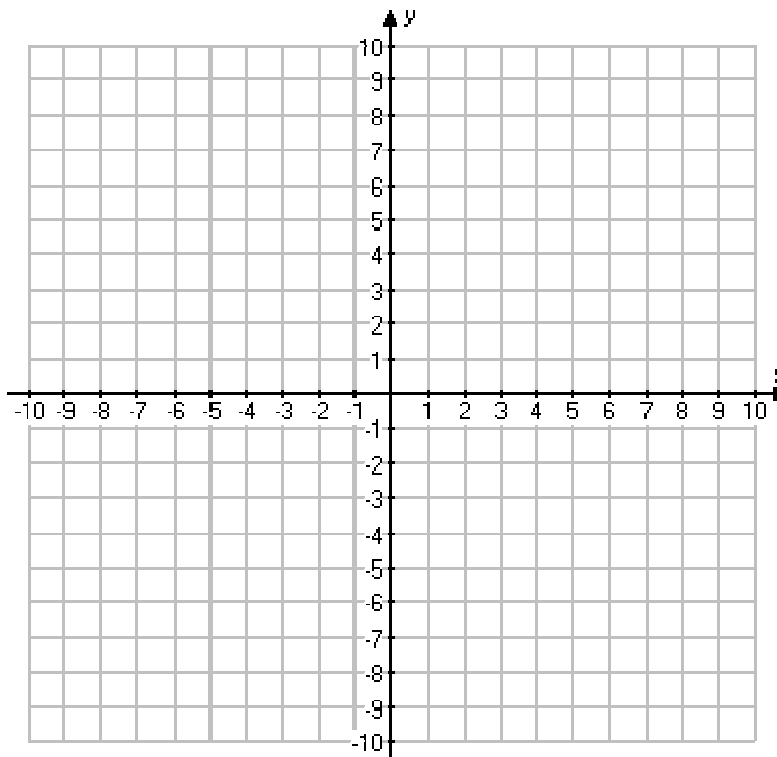
F. How long is the LATUS RECTUM? _____

G. Graph the conic. **Label the vertex, focus, also include the directrix, axis-of-symmetry, and the latus rectum.**



#12. **Ellipse.** Consider the ellipse: $\frac{(x+4)^2}{9} + \frac{(y+2)^2}{4} = 1$

- A. What is the CENTER POINT? _____
- B. What are the two FOCI POINTS? _____
- C. What is the length of the MAJOR AXIS? _____
- D. What is the length of the MINOR AXIS? _____
- E. What are the VERTEX POINTS? _____
- F. Graph the conic. **Label the center point, foci, vertices, and draw the major and minor axes.**



#13. **Hyperbola:** Consider the hyperbola: $\frac{(x-2)^2}{4} - \frac{(y+3)^2}{9} = 1$

G. What is the CENTER POINT? _____

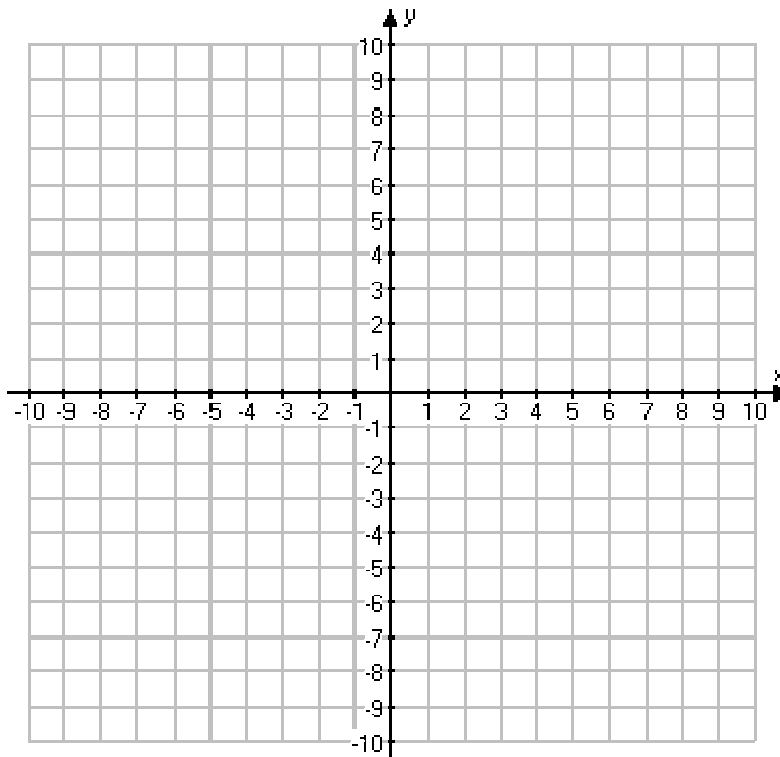
H. What are the two FOCI POINTS? _____

I. What is the CONJUGATE AXIS? _____

J. What is the TRANSVERSE AXIS? _____

K. What are the VERTEX POINTS? _____

L. Graph the conic. **Label the center point, foci, vertices, and draw the transverse and conjugate axes along with the two asymptotes.**



#14. Complete the square on each conic shown in standard form and classify it as **Parabola**, **Ellipse**, or **Hyperbola**. *You must complete the square and simplify correctly to get credit.*

A. $4x^2 + 3y^2 + 8x - 6y = 5$

B. $y^2 - 4x^2 - 4y - 8x - 4 = 0$

C. $x^2 + 6x - 4y + 1 = 0$

#15. An arch in the form of half an ellipse is 40 feet wide and 15 feet high at the center. Find the height of the arch *10 feet off-center*.



#16. A flashlight is a paraboloid of revolution. It has a diameter of 6 cm and a depth of 2 cm. How far from the vertex should the bulb be placed to emit a beam that is parallel to the axis of symmetry?



BONUS! Read carefully.

A **single lane divided highway** passes under an arch in the shape of a semi-**ellipse where the height at the center is equal to the width**. A rectangular shaped truck that is 6 feet wide and 12 feet tall approaches the arch to try to pass under it. What is the lowest arch under which the truck can pass?

