

## 6.2 Ellipse Notes and Practice

**Warm-up**

Classify each of the following conic sections. On the line provided, write whether the given conic is a circle, ellipse, hyperbola, or parabola.

1.  $3x^2 + y^2 - 6x - 3 = 0$  \_\_\_\_\_
2.  $2x^2 - y^2 + 12x + 14 = 0$  \_\_\_\_\_
3.  $4y^2 - 16x - 12y - 23 = 0$  \_\_\_\_\_
4.  $2x^2 + 2y^2 - 3y - 1 = 0$  \_\_\_\_\_
5.  $2x^2 - 3y = 0$  \_\_\_\_\_
6.  $x^2 + y^2 + 2x - 2y - 2 = 0$  \_\_\_\_\_
7.  $2x^2 - 2y^2 + 60y - 63 = 0$  \_\_\_\_\_
8.  $4x^2 + 9y^2 - 16x + 72y + 124 = 0$  \_\_\_\_\_
9.  $16x^2 + 4y^2 + 64x - 12y + 57 = 0$  \_\_\_\_\_
10.  $y^2 - 4y - 5x - 1 = 0$  \_\_\_\_\_
11.  $25x^2 - 9y^2 + 150x + 36y - 36 = 0$  \_\_\_\_\_

**Definitions**

- **Ellipse** – If  $F_1(c, 0)$  and  $F_2(-c, 0)$  are two fixed points in a plane and  $a$  is a constant,  $0 < c < a$ , then the set of all points  $P$  in the plane such that  $PF_1 + PF_2 = 2a$  is an ellipse
- **Focus Point** (plural – foci) – the fixed points  $F_1$  and  $F_2$
- **Major Axis** – The longest diameter of an ellipse
- **Minor Axis** – The shortest diameter of an ellipse

**Algebraic Definition of Ellipse**

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1, \text{ where } b^2 = a^2 - c^2$$

## Ellipse Practice

1. Find the center, vertices, covertices, foci, length of major and minor axes, and sketch the graph.

a.  $\frac{(x-4)^2}{9} + \frac{(y+3)^2}{25} = 1$

*center:* \_\_\_\_\_

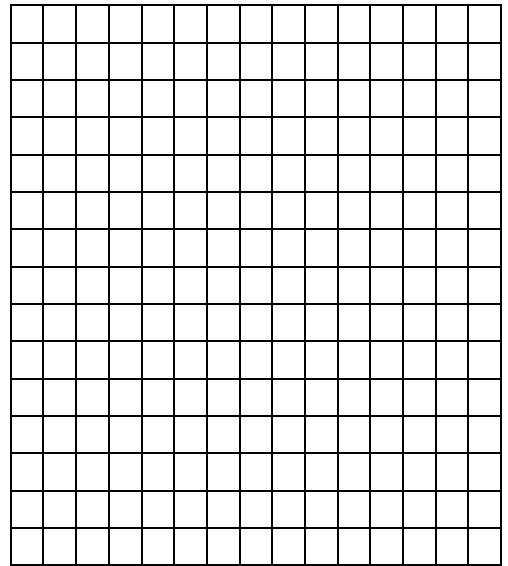
*major axis:* \_\_\_\_\_

*minor axis:* \_\_\_\_\_

*vertices:* \_\_\_\_\_

*covertices:* \_\_\_\_\_

*foci:* \_\_\_\_\_



b.  $\frac{(x-4)^2}{100} + \frac{(y-3)^2}{20} = 1$

*center:* \_\_\_\_\_

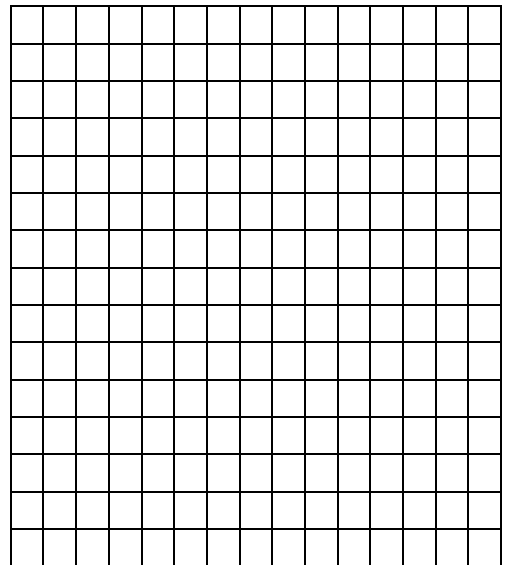
*major axis:* \_\_\_\_\_

*minor axis:* \_\_\_\_\_

*vertices:* \_\_\_\_\_

*covertices:* \_\_\_\_\_

*foci:* \_\_\_\_\_



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

*center:* \_\_\_\_\_

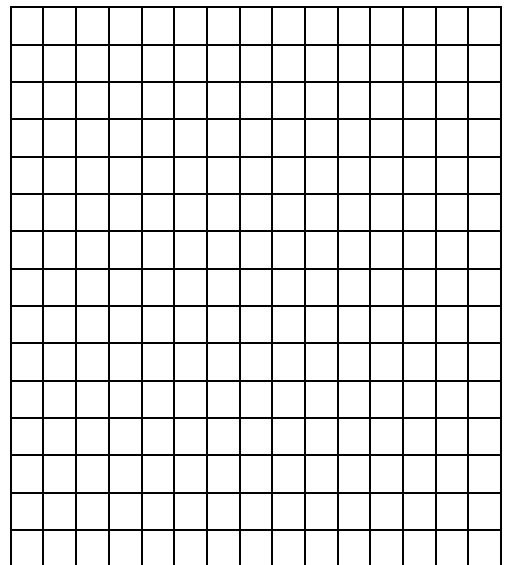
*major axis:* \_\_\_\_\_

*minor axis:* \_\_\_\_\_

*vertices:* \_\_\_\_\_

*covertices:* \_\_\_\_\_

*foci:* \_\_\_\_\_



d.  $\frac{(x-6)^2}{1} + \frac{(y+4)^2}{25} = 1$

**center:** \_\_\_\_\_

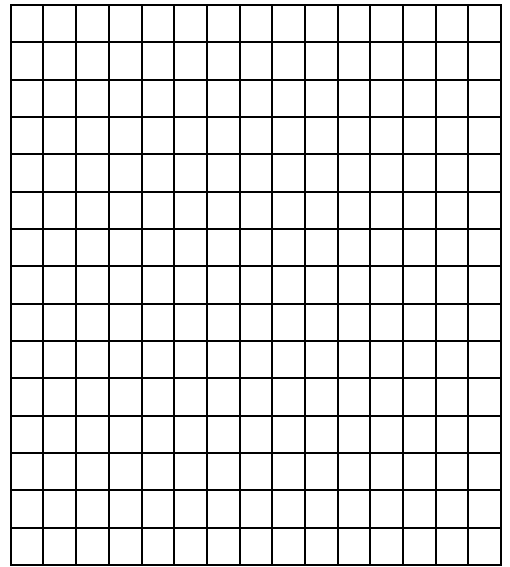
**major axis:** \_\_\_\_\_

**minor axis:** \_\_\_\_\_

**vertices:** \_\_\_\_\_

**covertices:** \_\_\_\_\_

**foci:** \_\_\_\_\_



2. Write the equation of an ellipse given the provided information.

a. Vertices at (3, 1) and (3, 9). Minor axis of length 6.

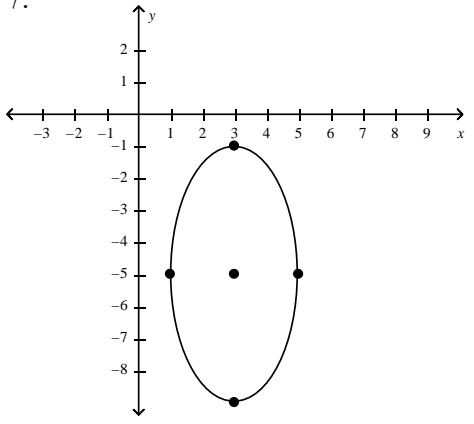
b. Vertices at (5, 0) and (5, 12). Covertices at (0, 6) and (10, 6)

c. Foci are at (1, 0) and (-1, 0) and the length of the major axis is 4.

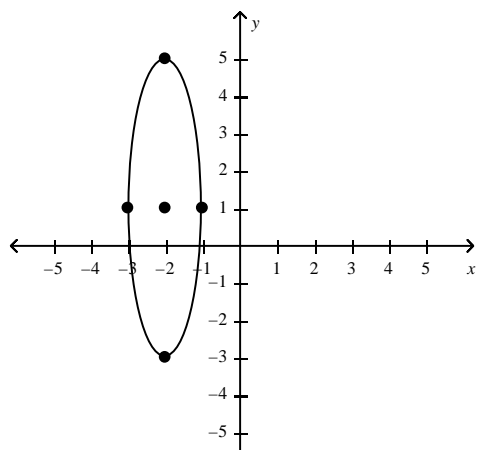
d. Vertical major axis is 10, minor axis is 6, and center is (3, 0).

- Write the equation for an ellipse with center  $(3,0)$ , vertical major axis of length 10 and minor axis of length 6.
- Write the equation for an ellipse with center  $(-1, -1)$  with horizontal major axis of length 16 and minor axis of length 4.
- Write the equation for an ellipse with foci  $(-1,0)$  and  $(1,0)$  and major axis of length 4.
- Write the equation for an ellipse with vertices at  $(6,0)$  and  $(-6,0)$  and foci at  $(2,0)$  and  $(-2,0)$

7.



8.



9.

