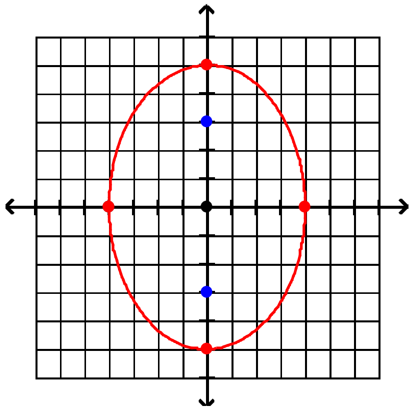
2) ________________



3) **Graph the ellipse: $4(x - 1)^2 + 9(y + 2)^2 = 36$** 3) ______________

Divide both sides of the equation by 36.

$\frac{(x - 1)^2}{9} + \frac{(y + 2)^2}{4} = 1$ **h = 1 and k = –2 → The center is:(1, –2).**

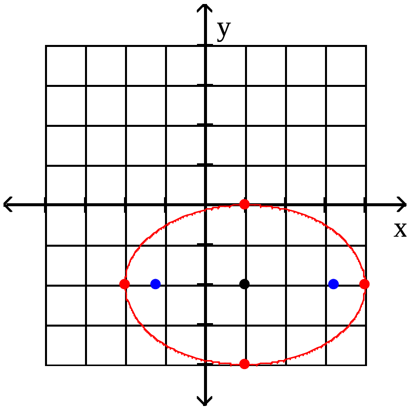
$a^2 = 9 \rightarrow a = 3$ $b^2 = 4 \rightarrow b = 2$

The vertices are: (–2, –2) and (4, –2).

The endpoints of the minor axis are: (1, 0) and (1,–4).

$c^2 = a^2 - b^2 = 9 - 4 = 5 \rightarrow c = \sqrt{5}$

The foci are $(1 - \sqrt{5}, -2)$ and $(1 + \sqrt{5}, -2)$.



4) **Graph the ellipse: $9(x + 1)^2 + 4(y - 1)^2 = 36$** 4) ______________

Divide both sides of the equation by 36.

$\frac{(x + 1)^2}{4} + \frac{(y - 1)^2}{9} = 1$ **h = –1 and k = 1 → The center is: (–1, 1).**

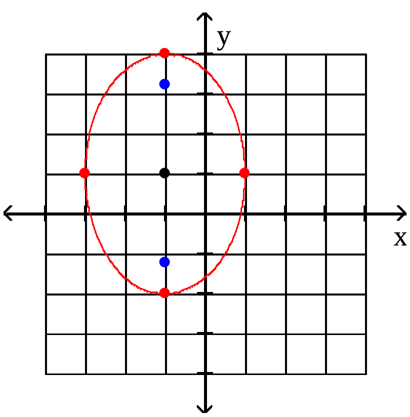
$a^2 = 9 \rightarrow a = 3$ $b^2 = 4 \rightarrow b = 2$

The vertices are: (–1, –2) and (–1, 4).

The endpoints of the minor axis are: (–3, 1) and (1, 1).

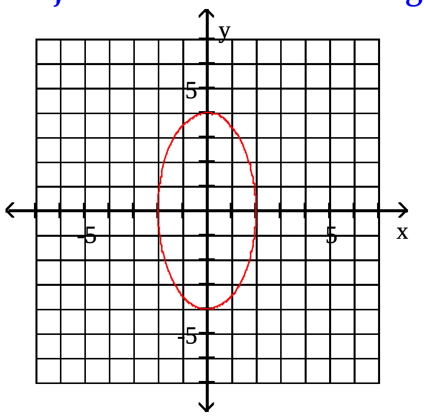
$c^2 = a^2 - b^2 = 9 - 4 = 5 \rightarrow c = \sqrt{5}$

The foci are $(-1, 1 - \sqrt{5})$ and $(-1, 1 + \sqrt{5})$.



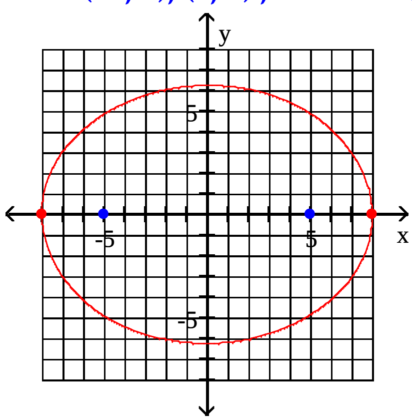
Find the standard form of the equation of the ellipse.

5) **Major axis vertical with length 8 ; length of minor axis = 4 ; center (0, 0).** 5) _______________



$2a = 8 \rightarrow a = 4$ $2b = 4 \rightarrow b = 2$ The equation is: $\frac{x^2}{4} + \frac{y^2}{16} = 1$

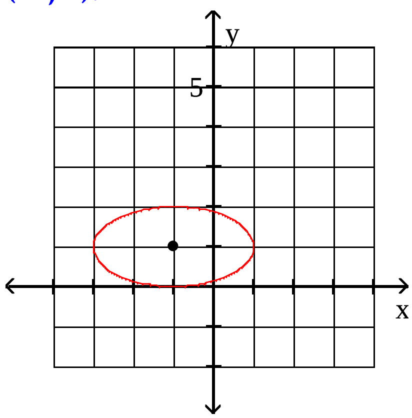
6) **Foci: (–5, 0), (5, 0) ; vertices: (–8, 0), (8, 0).** 6) _______________



$2a = 16 \rightarrow a = 8$; $c = 5$

$c^2 = a^2 - b^2 \rightarrow b^2 = a^2 - c^2 = 64 - 25 = 39$ The equation is: $\frac{x^2}{64} + \frac{y^2}{39} = 1$

7) **Major axis horizontal with length 4 ; length of minor axis = 2 ; center (−1, 1).** 7) ______________



$2a = 4 \rightarrow a = 2$ $2b = 2 \rightarrow b = 1$ **The equation is:** $\frac{(x+1)^2}{4} + \frac{(y-1)^2}{1} = 1$

9.1 Practice Exercises pg 930 (13, 15, 39, 49) (27, 32, 33)

9.2 The Hyperbola

8) **Graph the hyperbola: $16x^2 - 25y^2 = 400$** 8) ______________

Divide both sides of the equation by 400.

$\frac{x^2}{25} - \frac{y^2}{16} = 1$ **The center is: (0, 0).**

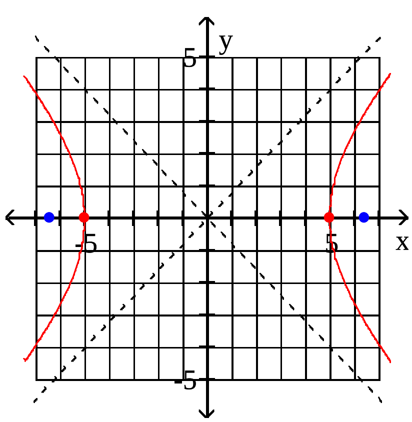
$a^2 = 25 \rightarrow a = 5$ $b^2 = 16 \rightarrow b = 4$

The vertices are: (−5, 0) and (5, 0).

$c^2 = a^2 + b^2 = 25 + 16 = 41 \rightarrow c = \sqrt{41}$

The foci are $(-\sqrt{41}, 0)$ and $(\sqrt{41}, 0)$.

The equations of the asymptotes are $y = \pm \frac{4}{5}x$.



9) **Graph the hyperbola:** $9y^2 - 4x^2 = 36$ 9) ______________

Divide both sides of the equation by 36.

$\frac{y^2}{4} - \frac{x^2}{9} = 1$ **The center is: (0, 0).**

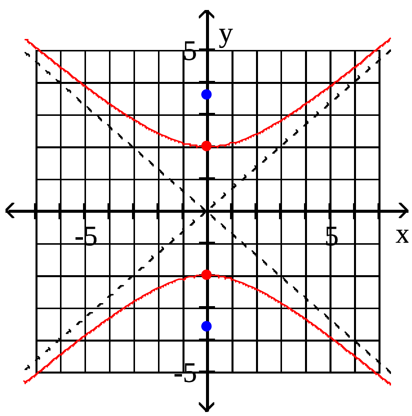
$a^2 = 4 \rightarrow a = 2$ $b^2 = 9 \rightarrow b = 3$

The vertices are: (0, –2) and (0, 2).

$c^2 = a^2 + b^2 = 4 + 9 = 13 \rightarrow c = \sqrt{13}$

The foci are $(0, -\sqrt{13})$ **and** $(0, \sqrt{13})$.

The equations of the asymptotes are $y = \pm\frac{2}{3}x$.



10) **Graph the hyperbola:** $9(x - 2)^2 - 16(y - 3)^2 = 144$ 10) ______________

Divide both sides of the equation by 36.

$\frac{(x - 2)^2}{16} - \frac{(y - 3)^2}{9} = 1$ **h = 2 and k = 3 → The center is: (2, 3).**

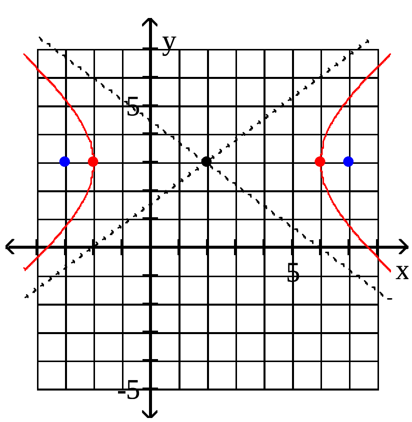
$a^2 = 16 \rightarrow a = 4$ $b^2 = 9 \rightarrow b = 3$

The vertices are: (–2, 3) and (6, 3).

$c^2 = a^2 + b^2 = 16 + 9 = 25 \rightarrow c = 5$

The foci are (–3, 3) and (7, 3).

The equations of the asymptotes are $y - 3 = \pm\frac{3}{4}(x - 2)$.



11) **Graph the hyperbola: $(y - 3)^2 - 9(x - 1)^2 = 9$** 11) ______________

Divide both sides of the equation by 9.

$$\frac{(y-3)^2}{9} - \frac{(x-1)^2}{1} = 1$$ **$h = 1$ and $k = 3 \rightarrow$ The center is: (1, 3).**

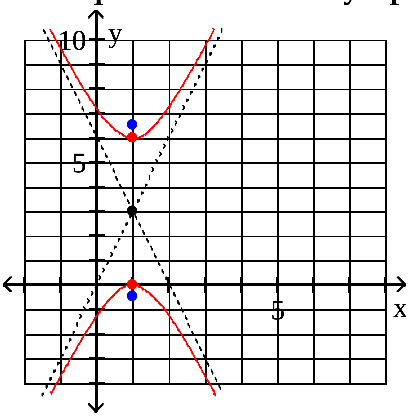
$a^2 = 9 \rightarrow a = 3$ $b^2 = 1 \rightarrow b = 1$

The vertices are: (1, 0) and (1, 6).

$c^2 = a^2 + b^2 = 9 + 1 = 10 \rightarrow c = \sqrt{10}$

The foci are $(1, 3 - \sqrt{10})$ and $(1, 3 + \sqrt{10})$.

The equations of the asymptotes are $y - 3 = \pm 3(x - 1)$.



Find the standard form of the equation of the hyperbola satisfying the given conditions.

12) **Foci: (−4, 0), (4, 0) ; vertices: (−3, 0), (3, 0)** 12) ______________

$a = 3$; $c = 4$

$c^2 = a^2 + b^2 \rightarrow b^2 = c^2 - a^2 = 16 - 9 = 7$

The equation is: $\frac{x^2}{9} - \frac{y^2}{7} = 1$

13) **Center: (4, −2) ; Focus: (7, −2) ; Vertex: (6, −2)** 13) ______________

$a = (h + a) - h = 6 - 4 = 2$.

$c = (h + c) - h = 7 - 4 = 3$.

$c^2 = a^2 + b^2 \rightarrow b^2 = c^2 - a^2 = 9 - 4 = 5$.

The transverse axis is horizontal.

The equation is: $\frac{(x-4)^2}{4} - \frac{(y+2)^2}{5} = 1$

9.2 Practice Exercises pg 945 (15, 17, 33, 37) (5, 12)

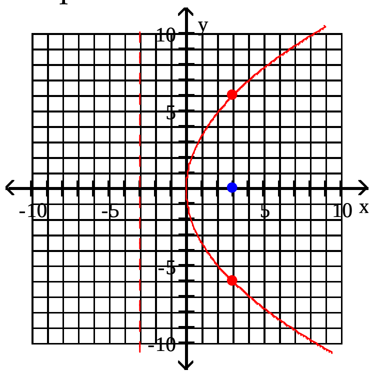
9.3 The Parabola

14) **Graph the parabola:** $y^2 = 12x$ 14) ______________

$4p = 12 \rightarrow p = 3$ The focus is (3, 0). The directrix is $x = -3$.

The length of the latus rectum is $|4p| = |12| = 12$.

The latus rectum extends 6 units below and 6 units above the focus. The endpoints of the latus rectum are (3, 6) and (3, −6).

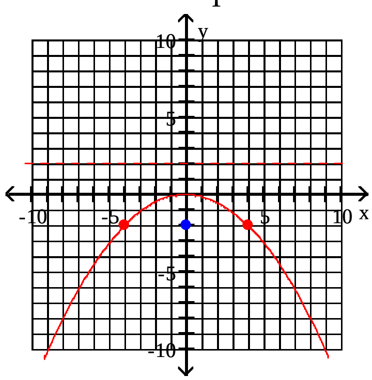


15) **Graph the parabola:** $x^2 = -8y$ 15) ______________

$4p = -8 \rightarrow p = -2$ The focus is (0, −2). The directrix is $y = 2$.

The length of the latus rectum is $|4p| = |-8| = 8$.

The latus rectum extends 4 units to the right and 4 units to the left of the focus. The endpoints of the latus rectum are (−4,−2) and (4, −2).



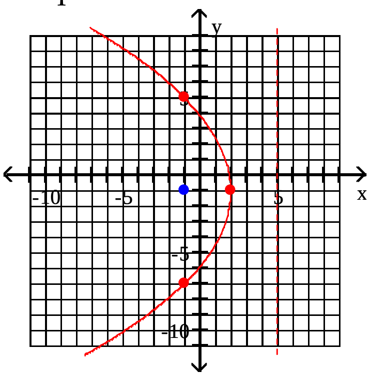
16) **Graph the parabola:** $(y + 1)^2 = -12(x - 2)$ 16) ____________

h = 2 and k = −1 The vertex is (2, −1).

4p = −12 → p = −3 The focus is (−1, −1). The directrix is x = 5.

The length of the latus rectum is |4p| = |−12| = 12.

The latus rectum extends 6 units above and 6 units below the focus. The endpoints of the latus rectum are (−1, 5) and (−1, −7).



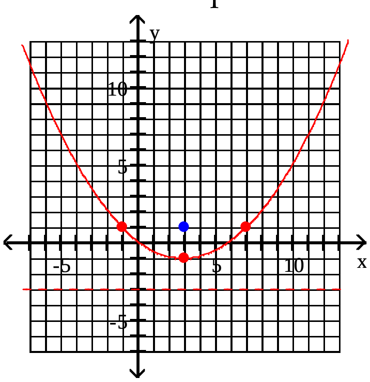
17) **Graph the parabola:** $(x - 3)^2 = 8(y + 1)$ 17) ____________

h = 3 and k = −1 The vertex is (3, −1).

4p = 8 → p = 2 The focus is (3, 1). The directrix is y = −3.

The length of the latus rectum is |4p| = |8| = 8.

The latus rectum extends 4 units to the right and 4 units to the left of the focus. The endpoints of the latus rectum are (−1, 1) and (7, 1).



Find the standard form of the equation of the parabola using the information given.

18) **Focus: (0, 15) ; Directrix: y = –15.** **p = 15 ; $x^2 = 4py \rightarrow x^2 = 60y$** 18) ____________

19) **Vertex: (2, –3); Focus: (2, –5).** 19) ____________

Axis of symmetry is vertical. p = (k + p) – k = –5 + 3 = –2

$(x - h)^2 = 4p(y - k) \rightarrow (x - 2)^2 = -8(y + 3)$

20) **Focus: (3, 2); Directrix: x = –1.** **Axis of symmetry is horizontal.** 20) ____________

h – p = –1 and h + p = 3 → 2h = 2 → h = 1 ; p = 3 – h = 3 – 1 = 2

$(y - k)^2 = 4p(x - h) \rightarrow (y - 2)^2 = 8(x - 1)$

9.3 Practice Exercises pg 958 (7, 9, 37, 39) (17, 26, 29)