

10 Chapter Review

1. $y^2 = -16x$
This is a parabola.

$a = 4$
Vertex: (0, 0)
Focus: (-4, 0)
Directrix: $x = 4$

2. $16x^2 = y \rightarrow x^2 = \frac{1}{16}y$
This is a parabola.

$a = \frac{1}{64}$
Vertex: (0, 0)
Focus: $(0, \frac{1}{64})$
Directrix: $y = -\frac{1}{64}$

3. $\frac{x^2}{25} - y^2 = 1$

This is a hyperbola.

$a = 5, b = 1$. Find the value of c :

$c^2 = a^2 + b^2 = 25 + 1 = 26 \rightarrow c = \sqrt{26}$
Center: (0, 0)
Vertices: (5, 0), (-5, 0)
Foci: $(\sqrt{26}, 0), (-\sqrt{26}, 0)$
Asymptotes: $y = \frac{1}{5}x; y = -\frac{1}{5}x$

4. $\frac{y^2}{25} - x^2 = 1$

This is a hyperbola.

$a = 5, b = 1$. Find the value of c :

$c^2 = a^2 + b^2 = 25 + 1 = 26 \rightarrow c = \sqrt{26}$
Center: (0, 0)
Vertices: (0, 5), (0, -5)
Foci: $(0, \sqrt{26}), (0, -\sqrt{26})$
Asymptotes: $y = 5x; y = -5x$

5. $\frac{y^2}{25} + \frac{x^2}{16} = 1$

This is an ellipse.

$a = 5, b = 4$. Find the value of c :

$c^2 = a^2 - b^2 = 25 - 16 = 9 \rightarrow c = 3$
Center: (0, 0)
Vertices: (0, 5), (0, -5)
Foci: (0, 3), (0, -3)

6. $\frac{x^2}{9} + \frac{y^2}{16} = 1$

This is an ellipse.

$a = 4, b = 3$. Find the value of c :

$c^2 = a^2 - b^2 = 16 - 9 = 7 \rightarrow c = \sqrt{7}$
Center: (0, 0)
Vertices: (0, 4), (0, -4)
Foci: $(0, \sqrt{7}), (0, -\sqrt{7})$

7. $x^2 + 4y = 4$

This is a parabola.

Write in standard form:

$x^2 = -4y + 4$
 $x^2 = -4(y - 1)$

$a = 1$

Vertex: (0, 1)
Focus: (0, 0)
Directrix: $y = 2$

10. $9x^2 + 4y^2 = 36$

This is an ellipse.

Write in standard form:

$\frac{x^2}{4} + \frac{y^2}{9} = 1$

$a = 3, b = 2$. Find the value of c :

$c^2 = a^2 - b^2 = 9 - 4 = 5 \rightarrow c = \sqrt{5}$
Center: (0, 0)
Vertices: (0, 3), (0, -3)
Foci: $(0, \sqrt{5}), (0, -\sqrt{5})$

8. $3y^2 - x^2 = 9$

This is a hyperbola.

Write in standard form:

$\frac{y^2}{3} - \frac{x^2}{9} = 1$

$a = \sqrt{3}, b = 3$. Find the value of c :

$c^2 = a^2 + b^2 = 3 + 9 = 12 \rightarrow c = \sqrt{12} = 2\sqrt{3}$
Center: (0, 0)
Vertices: $(0, \sqrt{3}), (0, -\sqrt{3})$
Foci: $(0, 2\sqrt{3}), (0, -2\sqrt{3})$
Asymptotes: $y = \frac{\sqrt{3}}{3}x; y = -\frac{\sqrt{3}}{3}x$

9. $4x^2 - y^2 = 8$

This is a hyperbola.

Write in standard form:

$\frac{x^2}{2} - \frac{y^2}{8} = 1$

$a = \sqrt{2}, b = \sqrt{8} = 2\sqrt{2}$. Find the value of c :

$c^2 = a^2 + b^2 = 2 + 8 = 10 \rightarrow c = \sqrt{10}$
Center: (0, 0)
Vertices: $(-\sqrt{2}, 0), (\sqrt{2}, 0)$
Foci: $(-\sqrt{10}, 0), (\sqrt{10}, 0)$
Asymptotes: $y = 2x; y = -2x$

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

This is a parabola.

Write in standard form:

$x^2 - 4x + 4 = 2y + 4$

$(x - 2)^2 = 2(y + 2)$

$a = \frac{1}{2}$

Vertex: (2, -2)
Focus: $(2, -\frac{3}{2})$
Directrix: $y = -\frac{5}{2}$

12. $2y^2 - 4y = x - 2$
 This is a parabola.
 Write in standard form:
 $2(y^2 - 2y + 1) = x - 2 + 2$
 $(y - 1)^2 = \frac{1}{2}x$

$a = \frac{1}{8}$
 Vertex: (0, 1)
 Focus: $(\frac{1}{8}, 1)$
 Directrix: $x = -\frac{1}{8}$

13. $y^2 - 4y - 4x^2 + 8x = 4$
 This is a hyperbola.
 Write in standard form:

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

$a = 2, b = 1$. Find the value of c :
 $c^2 = a^2 + b^2 = 4 + 1 = 5 \rightarrow c = \sqrt{5}$
 Center: (1, 2)
 Vertices: (1, 0), (1, 4)
 Foci: $(1, 2 - \sqrt{5}), (1, 2 + \sqrt{5})$
 Asymptotes: $y - 2 = 2(x - 1); y - 2 = -2(x - 1)$

14. $4x^2 + y^2 + 8x - 4y + 4 = 0$
 This is an ellipse.
 Write in standard form:
 $4(x^2 + 2x + 1) + (y^2 - 4y + 4) = -4 + 4 + 4$
 $4(x + 1)^2 + (y - 2)^2 = 4$
 $\frac{(x + 1)^2}{1} + \frac{(y - 2)^2}{4} = 1$

$a = 2, b = 1$. Find the value of c :
 $c^2 = a^2 - b^2 = 4 - 1 = 3 \rightarrow c = \sqrt{3}$
 Center: (-1, 2)
 Vertices: (-1, 0), (-1, 4)
 Foci: $(-1, 2 - \sqrt{3}), (-1, 2 + \sqrt{3})$

15. $4x^2 + 9y^2 - 16x - 18y = 11$
 This is an ellipse.
 Write in standard form:
 $4x^2 + 9y^2 - 16x - 18y = 11$
 $4(x^2 - 4x + 4) + 9(y^2 - 2y + 1) = 11 + 16 + 9$
 $4(x - 2)^2 + 9(y - 1)^2 = 36$
 $\frac{(x - 2)^2}{9} + \frac{(y - 1)^2}{4} = 1$

$a = 3, b = 2$. Find the value of c :
 $c^2 = a^2 - b^2 = 9 - 4 = 5 \rightarrow c = \sqrt{5}$
 Center: (2, 1)
 Vertices: (-1, 1), (5, 1)
 Foci: $(2 - \sqrt{5}, 1), (2 + \sqrt{5}, 1)$

16. $4x^2 + 9y^2 - 16x + 18y = 11$
 This is an ellipse.
 Write in standard form:
 $4x^2 + 9y^2 - 16x + 18y = 11$
 $4(x^2 - 4x + 4) + 9(y^2 + 2y + 1) = 11 + 16 + 9$
 $4(x - 2)^2 + 9(y + 1)^2 = 36$
 $\frac{(x - 2)^2}{9} + \frac{(y + 1)^2}{4} = 1$

$a = 3, b = 2$. Find the value of c :
 $c^2 = a^2 - b^2 = 9 - 4 = 5 \rightarrow c = \sqrt{5}$
 Center: (2, -1)
 Vertices: (-1, -1), (5, -1)
 Foci: $(2 - \sqrt{5}, -1), (2 + \sqrt{5}, -1)$

17. $4x^2 - 16x + 16y + 32 = 0$
 This is a parabola.
 Write in standard form:
 $4(x^2 - 4x + 4) = -16y - 32 + 16$
 $4(x - 2)^2 = -16(y + 1)$
 $(x - 2)^2 = -4(y + 1)$

$a = 1$
 Vertex: (2, -1)
 Focus: (2, -2)
 Directrix: $y = 0$

18. $4y^2 + 3x - 16y + 19 = 0$
 This is a parabola.
 Write in standard form:
 $4(y^2 - 4y + 4) = -3x - 19 + 16$
 $4(y - 2)^2 = -3(x + 1)$
 $(y - 2)^2 = -\frac{3}{4}(x + 1)$

$a = -\frac{3}{16}$
 Vertex: (-1, 2)
 Focus: $(-\frac{19}{16}, 2)$
 Directrix: $x = -\frac{13}{16}$

19. $9x^2 + 4y^2 - 18x + 8y = 23$
 This is an ellipse.
 Write in standard form:
 $9(x^2 - 2x + 1) + 4(y^2 + 2y + 1) = 23 + 9 + 4$
 $9(x - 1)^2 + 4(y + 1)^2 = 36$
 $\frac{(x - 1)^2}{4} + \frac{(y + 1)^2}{9} = 1$
 $a = 3, b = 2$. Find the value of c :
 $c^2 = a^2 - b^2 = 9 - 4 = 5 \rightarrow c = \sqrt{5}$
 Center: (1, -1)
 Vertices: (1, -4), (1, 2)
 Foci: $(1, -1 - \sqrt{5}), (1, -1 + \sqrt{5})$

20. $x^2 - y^2 - 2x - 2y = 1$

This is a hyperbola.

Write in standard form:

$$(x^2 - 2x + 1) - (y^2 + 2y + 1) = 1 + 1 - 1$$

$$(x - 1)^2 - (y + 1)^2 = 1$$

$a = 1$, $b = 1$. Find the value of c :

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

Center: $(1, -1)$

Vertices: $(0, -1), (2, -1)$

Foci: $(1 + \sqrt{2}, -1), (1 - \sqrt{2}, -1)$

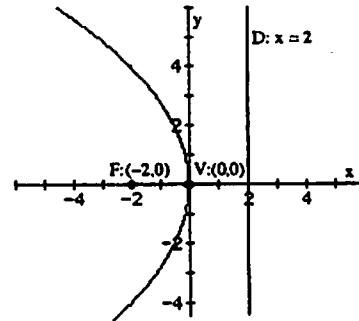
Asymptotes: $y + 1 = x - 1; y + 1 = -(x - 1)$

21. Parabola: The focus is $(-2, 0)$ and the directrix is $x = 2$. The vertex is $(0, 0)$. $a = 2$ and since $(-2, 0)$ is to the left of $(0, 0)$, the parabola opens to the left. The equation of the parabola is:

$$y^2 = -4ax$$

$$y^2 = -4 \cdot 2 \cdot x$$

$$y^2 = -8x$$

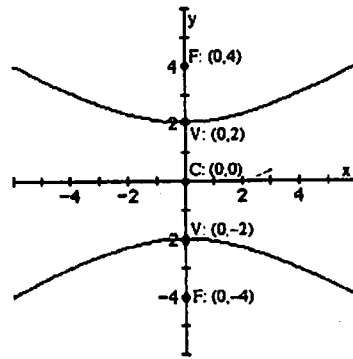


23. Hyperbola: Center: $(0, 0)$; Focus: $(0, 4)$; Vertex: $(0, -2)$; Transverse axis is the y -axis; $a = 2$; $c = 4$. Find b :

$$b^2 = c^2 - a^2 = 16 - 4 = 12$$

$$b = \sqrt{12} = 2\sqrt{3}$$

Write the equation: $\frac{y^2}{4} - \frac{x^2}{12} = 1$

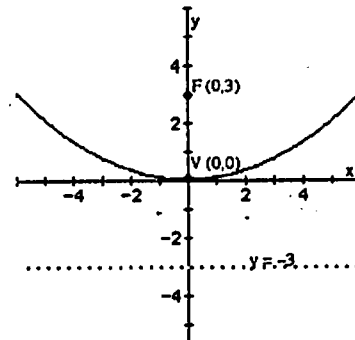


24. Parabola: Vertex: $(0, 0)$; Directrix: $y = -3$; $a = 3$. The graph opens up. The equation of the parabola is:

$$x^2 = 4ay$$

$$x^2 = 4(3)y$$

$$x^2 = 12y$$

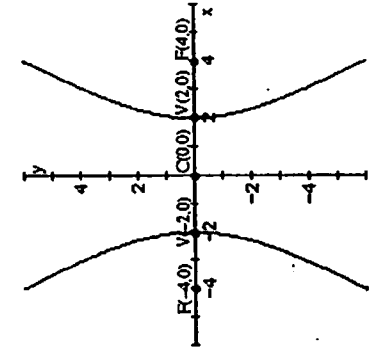
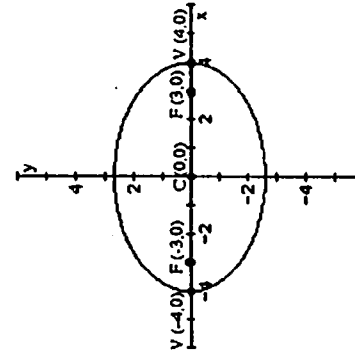
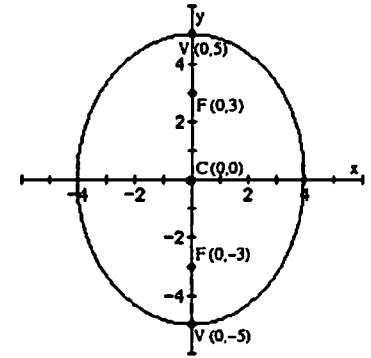


22. Ellipse: The center is $(0, 0)$, a focus is $(0, 3)$, and a vertex is $(0, 5)$. The major axis is $x = 0$. $a = 5$, $c = 3$. Find b : $b^2 = a^2 - c^2 = 25 - 9 = 16$. So, $b = 4$. The equation of the ellipse is:

$$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$$

$$\frac{x^2}{4^2} + \frac{y^2}{5^2} = 1$$

$$\frac{x^2}{16} + \frac{y^2}{25} = 1$$



25. Ellipse: Foci: $(-3, 0), (3, 0)$; Vertex: $(4, 0)$; Center: $(0, 0)$; Major axis is the x -axis; $a = 4$; $c = 3$. Find b :

$$b^2 = a^2 - c^2 = 16 - 9 = 7$$

$$b = \sqrt{7}$$

Write the equation: $\frac{x^2}{16} + \frac{y^2}{7} = 1$

26. Hyperbola: Vertices: $(-2, 0), (2, 0)$; Focus: $(4, 0)$; Center: $(0, 0)$; Transverse axis is the x -axis; $a = 2$; $c = 4$. Find b :

$$b^2 = c^2 - a^2 = 16 - 4 = 12$$

$$b = \sqrt{12} = 2\sqrt{3}$$

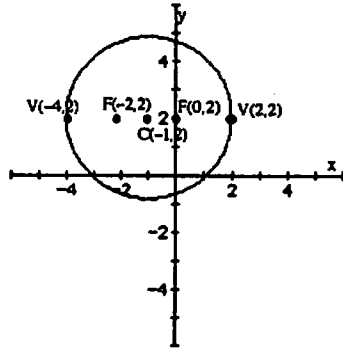
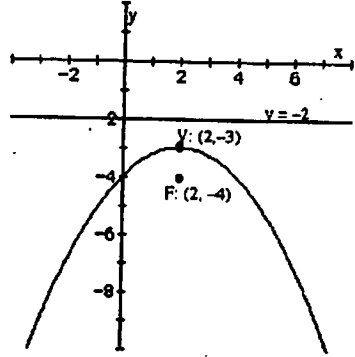
Write the equation: $\frac{x^2}{4} - \frac{y^2}{12} = 1$

27. Parabola: The focus is $(2, -4)$ and the vertex is $(2, -3)$. Both lie on the vertical line $x = 2$. $a = 1$ and since $(2, -4)$ is below $(2, -3)$, the parabola opens down. The equation of the parabola is:

$$(x - h)^2 = -4a(y - k)$$

$$(x - 2)^2 = -4 \cdot 1 \cdot (y - (-3))$$

$$(x - 2)^2 = -4(y + 3)$$



28. Ellipse: Center: $(-1, 2)$; Focus: $(0, 2)$; Vertex: $(2, 2)$. Major axis: $y = 2$. $a = 3$; $c = 1$. Find b :

$$b^2 = a^2 - c^2 = 9 - 1 = 8$$

$$b = \sqrt{8} = 2\sqrt{2}$$

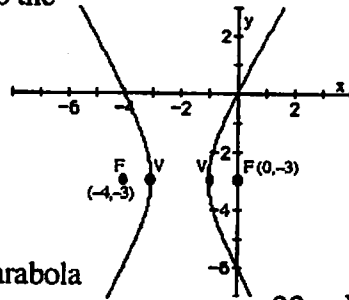
Write the equation: $\frac{(x+1)^2}{9} + \frac{(y-2)^2}{8} = 1$

29. Hyperbola: Center: $(-2, -3)$; Focus: $(-4, -3)$; Vertex: $(-3, -3)$; Transverse axis is parallel to the x -axis; $a = 1$; $c = 2$. Find b :

$$b^2 = c^2 - a^2 = 4 - 1 = 3$$

$$b = \sqrt{3}$$

Write the equation: $\frac{(x+2)^2}{1} - \frac{(y+3)^2}{3} = 1$

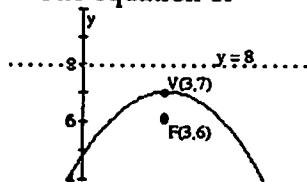


30. Parabola: Focus: $(3, 6)$; Directrix: $y = 8$; Parabola opens down. Vertex: $(3, 7)$ $a = 1$. The equation of the parabola is:

$$(x - h)^2 = -4a(y - k)$$

$$(x - 3)^2 = -4(1)(y - 7)$$

$$(x - 3)^2 = -4(y - 7)$$

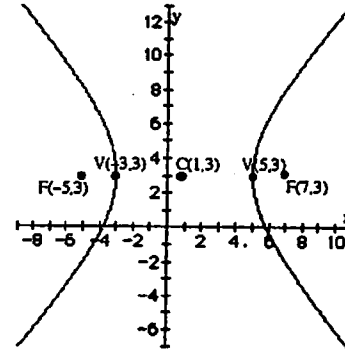
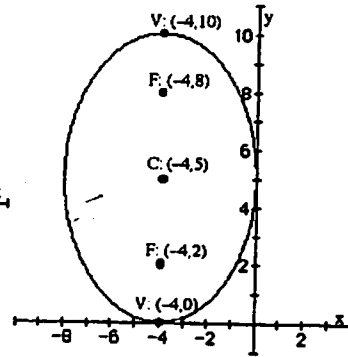


31. Ellipse: Foci: $(-4, 2)$, $(-4, 8)$; Vertex: $(-4, 10)$; Center: $(-4, 5)$; Major axis is parallel to the y -axis; $a = 5$; $c = 3$. Find b :

$$b^2 = a^2 - c^2 = 25 - 9 = 16$$

$$b = 4$$

Write the equation: $\frac{(x+4)^2}{16} + \frac{(y-5)^2}{25} = 1$

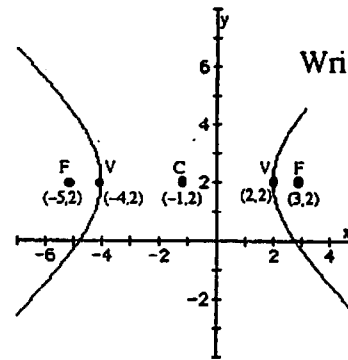


32. Hyperbola: Vertices: $(-3, 3)$, $(5, 3)$; Focus: $(7, 3)$; Center: $(1, 3)$; Major axis is parallel to the x -axis; $a = 4$; $c = 6$. Find b :

$$b^2 = c^2 - a^2 = 36 - 16 = 20$$

$$b = \sqrt{20} = 2\sqrt{5}$$

Write the equation: $\frac{(x-1)^2}{16} - \frac{(y-3)^2}{20} = 1$



33. Hyperbola: Center: $(-1, 2)$; $a = 3$; $c = 4$; Transverse axis parallel to the x -axis; Find b :

$$b^2 = c^2 - a^2 = 16 - 9 = 7$$

$$b = \sqrt{7}$$

Write the equation: $\frac{(x+1)^2}{9} - \frac{(y-2)^2}{7} = 1$

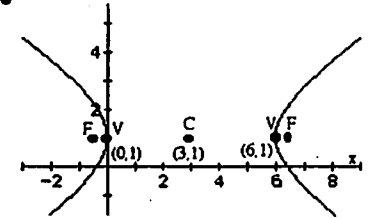
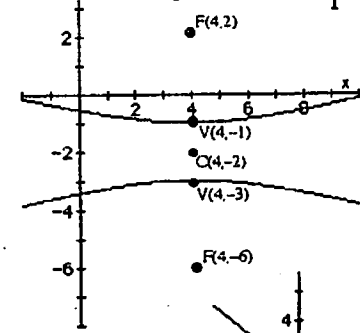
34.

- Hyperbola: Center: $(4, -2)$; $a = 1$; $c = 4$; Transverse axis parallel to the y -axis; Find b :

$$b^2 = c^2 - a^2 = 16 - 1 = 15$$

$$b = \sqrt{15}$$

Write the equation: $\frac{(y+2)^2}{1} - \frac{(x-4)^2}{15} = 1$

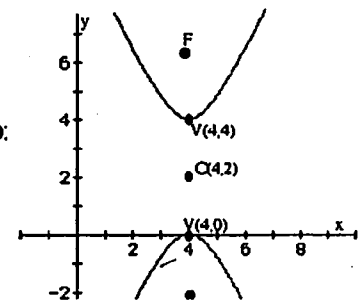


35. Hyperbola: Vertices: $(0, 1)$, $(6, 1)$; Asymptote: $3y + 2x - 9 = 0$; Center: $(3, 1)$; Transverse axis is parallel to the x -axis; $a = 3$; The slope of the asymptote is $-\frac{2}{3}$; Find b :

$$\frac{-b}{a} = \frac{-b}{3} = \frac{-2}{3} \rightarrow -3b = -6 \rightarrow b = 2$$

Write the equation: $\frac{(x-3)^2}{9} - \frac{(y-1)^2}{4} = 1$

- Hyperbola: Vertices: $(4, 0)$, $(4, 4)$; Asymptote: $y + 2x - 10 = 0$; Center: $(4, 2)$; Transverse axis is parallel to the y -axis; $a = 2$; slope of the asymptote is -2 ; Find b :



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