

Algebra 3 Final Exam Review: Matrices

For #1-3, state the dimensions of the matrix.

1. $\begin{bmatrix} 1 & 4 & -6 \\ 2 & -3 & -3 \end{bmatrix}$

2. $\begin{bmatrix} 9 \\ -8 \\ 2 \end{bmatrix}$

3. $\begin{bmatrix} -2 & 3 & -1 \\ 0 & 0 & 2 \\ -1 & 8 & 2 \end{bmatrix}$

For #4-6, determine if each matrix product is possible. If so, state the dimensions of the product.

4. $A_{1 \times 5} \cdot B_{5 \times 7}$

5. $A_{2 \times 5} \cdot B_{2 \times 5}$

6. $A_{3 \times 2} \cdot B_{2 \times 4}$

For #7-9, determine the dimensions of matrix M.

7. $A_{1 \times 3} \cdot M = B_{1 \times 4}$

8. $A_{2 \times 4} \cdot M = B_{2 \times 1}$

9. $A_{3 \times 3} \cdot M = B_{3 \times 5}$

For #10 -20, use matrices A-H.

$$A = \begin{bmatrix} 1 & 4 & -6 \\ 2 & -3 & -3 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 0 & 6 \\ 4 & -3 & 8 \end{bmatrix} \quad C = \begin{bmatrix} 5 & 2 \\ 2 & -1 \\ 5 & 4 \end{bmatrix} \quad D = \begin{bmatrix} -2 & 2 \\ 0 & -1 \\ -5 & 7 \end{bmatrix} \quad E = \begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix}$$
$$F = \begin{bmatrix} -2 & 3 & -1 \\ 0 & 0 & 2 \\ -1 & 8 & 2 \end{bmatrix} \quad G = \begin{bmatrix} 5 & 3 & 0 \\ 0 & 4 & -1 \\ 3 & -5 & 0 \end{bmatrix} \quad H = \begin{bmatrix} 9 \\ -8 \\ 2 \end{bmatrix}$$

10. $2A - \frac{1}{3}B$

11. $C - D$

12. $D \cdot A$

13. E^{-1} (By hand)

14. F^{-1} (By calculator)

15. $-2F + G$

16. $C \cdot D$

17. $G \cdot H$

18. $B \cdot D$

19. Determinant of F

20. Determinant of E

21. Find AB

$$A = \begin{bmatrix} 5 & 6 \\ 2 & 3 \\ -4 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 8 & 0 & -3 \\ 2 & 6 & 4 \end{bmatrix}$$

22. Find the determinant by hand of

$$A = \begin{bmatrix} 5 & -3 & 2 \\ 6 & 10 & -1 \\ 1 & -2 & 0 \end{bmatrix}$$

For #23 – 26, solve the systems using matrices. Show the matrix equation you used.

$$23. \begin{cases} -3x - 4y = 9 \\ 9x + 10y = -3 \end{cases}$$

$$24. \begin{cases} x + 2y = 2 \\ 3x + 6y = 6 \end{cases}$$

$$25. \begin{cases} 2x - y + 2z = 12 \\ x + 2y - 2z = -11 \\ 2x + y + 3z = 12 \end{cases}$$

$$26. \begin{cases} -2x - 4z = 2 \\ -3y + 5z = -14 \\ x + 2y = 7 \end{cases}$$

Algebra 3 Final Exam Review: Chapter 3

For #1-4, rewrite each polynomial in standard form. Then identify the leading coefficient, degree and number of terms. Name each polynomial.

1. $7x^2 + 4x^5 - 3$ _____
Leading coefficient _____
Degree ____ Number of Terms ____
Name _____

2. $2 + 6x^3 + 2x - x$ _____
Leading coefficient _____
Degree ____ Number of Terms ____
Name _____

3. $10x - 3 - 2x^2 - 9x^3$ _____
Leading coefficient _____
Degree ____ Number of Terms ____
Name _____

4. $-7x^2 - 4x$ _____
Leading coefficient _____
Degree ____ Number of Terms ____
Name _____

For #5-7, add or subtract. Write your answer in standard form.

5. $(4x^2 + 3) + (5x^2 + 4)$ 6. $(10x^3 - 7x^2) - (3x^3 + 2x^2 + 4)$ 7. $(2 + 2x^4 - x) - (7 + x^4 + 3x)$

For #8-16, find each product.

8. $3y(2x^2 + 5xy)$

9. $8(2x + 2)$

10. $(a + b)(4ab + b^2)$

11. $(8m + 2)(7m - 3)$

12. $\left(3x + \frac{1}{4}\right)^2$

13. $(3x - 2)(2x^3 - x^2 + 4x + 4)$

14. $(p^2 - p + 1)(6p^2 - 8p - 3)$

15. $(b - 5)^3$

16. $(x + 3y)^3$

For #17-24, factor each polynomial completely.

17. $3x^3 + 6x^2 + 5x + 10$

18. $21v^3 + 56v^2 - 12v - 32$

19. $12a^3 - 20a^2 + 21a - 35$

20. $21x^3 - 7x^2 + 6x - 2$

21. $125 + 8u^3$

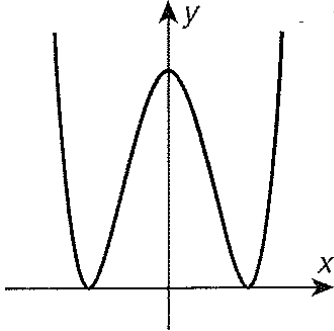
22. $374x^4 + 81x$

23. $125 - 27u^3$

24. $8x^4 + x$

For #25-27, identify whether the function graphed has an even or odd degree, positive or negative leading coefficient and the end behavior of the function.

25.

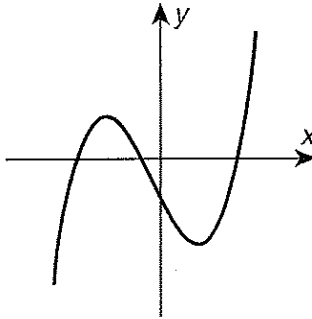


Odd or Even?

Negative or Positive?

As $x \rightarrow \infty, f(x) \rightarrow$ _____As $x \rightarrow -\infty, f(x) \rightarrow$ _____

26.

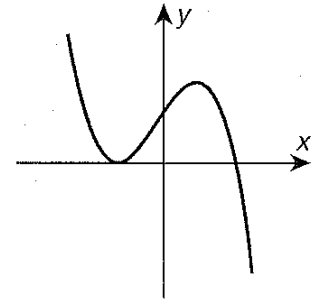


Odd or Even?

Negative or Positive?

As $x \rightarrow \infty, f(x) \rightarrow$ _____As $x \rightarrow -\infty, f(x) \rightarrow$ _____

27.



Odd or Even?

Negative or Positive?

As $x \rightarrow \infty, f(x) \rightarrow$ _____As $x \rightarrow -\infty, f(x) \rightarrow$ _____**Divide using long division**

28. $(6x^2 + 7x - 2) \div (x + 4)$

29. $(2x^2 - 9x + 10) \div (2x + 1)$

Divide using synthetic division

30. $(3x^3 + 4x^2 - 8) \div (x - 2)$

31. $(2x^3 + 3x^2 - 6x - 4) \div (x - 1)$

Identify the roots of each equation.

32. $x^3 + 15x^2 + 75x + 125 = 0$

33. $x^3 - x^2 - 32x + 96 = 0$

34. $8x^3 - 12x^2 + 6x - 1 = 0$

35. $4x^3 + 16x^2 - 25x - 100 = 0$

Algebra 3 Final Exam Review: Chapter 4

Find the inverse of each function.

1. $f(x) = 15x$

2. $f(x) = 3x + 2$

3. $f(x) = 5 - \frac{3}{4}x$

Write each exponential equation in logarithmic form.

4. $3^5 = 243$

5. $2^{-3} = \frac{1}{8}$

6. $16^{1.5} = 64$

Write each logarithmic equation in exponential form.

7. $\log_{64} 512 = 1.5$

8. $\log_2 8 = 3$

9. $\log_4 \frac{1}{16} = -2$

Simplify each expression.

10. $\log_2 10 + \log_2 12.8$

11. $\log_4 8 + \log_4 2$

12. $\log_6 144 - \log_6 4$

13. $\log 10,000 - \log 100$

14. $\log_8 64^3$

15. $\log_3 3^{2x}$

Solve each equation.

16. $3^{x+1} = 9^4$

17. $32^{x-2} = 8^x$

18. $9^x = 12$

19. $\log_6(4x - 9) = \log_6(x)$

20. $\log_7(10x + 13) = 3$

21. $\log(20x) - \log 4 = 2$

22. $\log_9 x^3 = 8$

23. $\log x + \log(2x - 1) = 1$

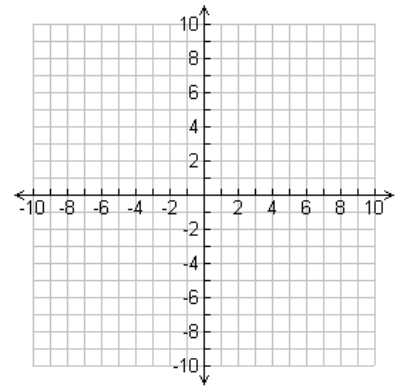
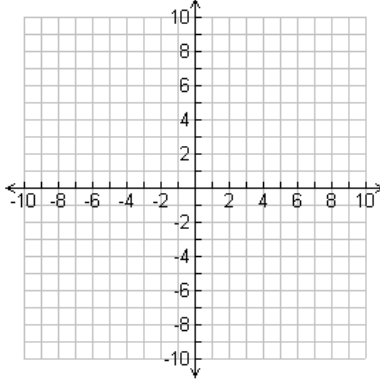
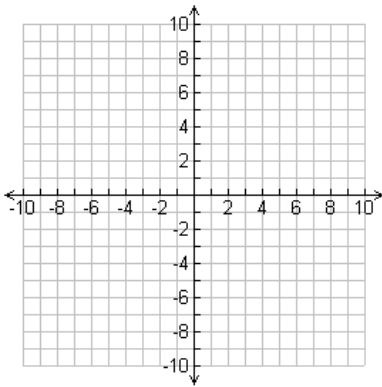
24. $\log_3 \left(\frac{2}{x}\right) + 2 = 0$

Graph each function.

25. $f(x) = e^x - 1$

26. $f(x) = -\frac{1}{2}(3^x)$

27. $f(x) = -4 \log x$



Algebra 3 Final Exam Review: Chapter 5

Simplify. Identify any x-values for which the expression is undefined.

1. $\frac{6x^3}{27x^2+12x}$

2. $\frac{x^2-x-2}{3x-6}$

3. $\frac{-x^2+16}{-x^2-9x-20}$

4. $\frac{4xy^3}{5x^2} \cdot \frac{20x^3y^2}{-16xy^7}$

5. $\frac{x^2-9}{2x+10} \cdot \frac{x+5}{x-3}$

6. $\frac{x-4}{2x^2} \cdot \frac{x}{x^2-x-12}$

7. $\frac{3x^3}{4x+4} \div \frac{9x}{x+1}$

8. $\frac{12x^3y^6}{9xy} \div \frac{6y^2}{3x}$

9. $\frac{x^2-16}{x^2+4x+3} \div \frac{x-4}{x+1}$

Add or Subtract. Identify any x-values for which the expression is undefined.

10. $\frac{x+9}{2x+1} + \frac{3x+6}{2x+1}$

11. $\frac{2}{x+3} + \frac{4x}{x^2-9}$

12. $\frac{1}{x^2+6x+8} + \frac{1}{x^2-6x-16}$

13. $\frac{x-6}{x+5} - \frac{8x+7}{x+5}$

14. $\frac{x}{x+1} - \frac{3}{x+4}$

15. $\frac{7}{x-9} - \frac{2x-6}{x^2-13x+36}$

Simplify.

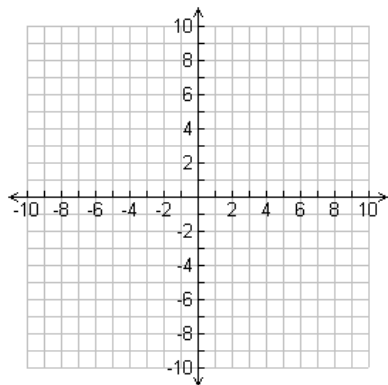
16. $\frac{\frac{3x}{3x+21}}{\frac{9x^2}{x+7}}$

17. $\frac{\frac{x}{x-1}}{\frac{10x^2}{-4x+4}}$

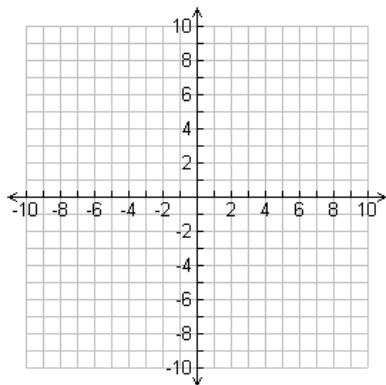
18. $\frac{\frac{1}{x-2}}{\frac{x+3}{x^2-4}}$

Using the graph of $f(x) = \frac{1}{x}$ as a guide, describe the transformation and graph each function.

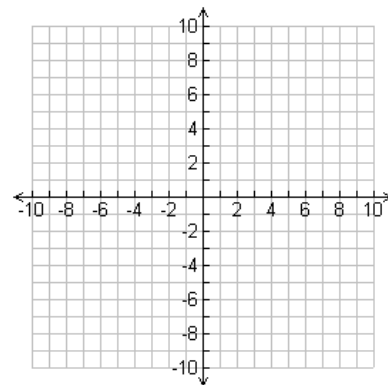
19. $g(x) = \frac{1}{x-4}$



20. $g(x) = \frac{1}{x} + 6$

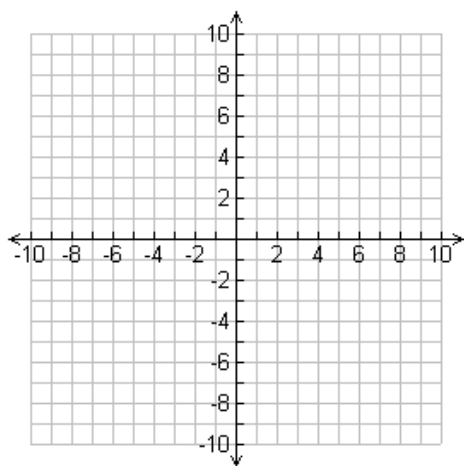


21. $g(x) = \frac{1}{x+2} - 5$

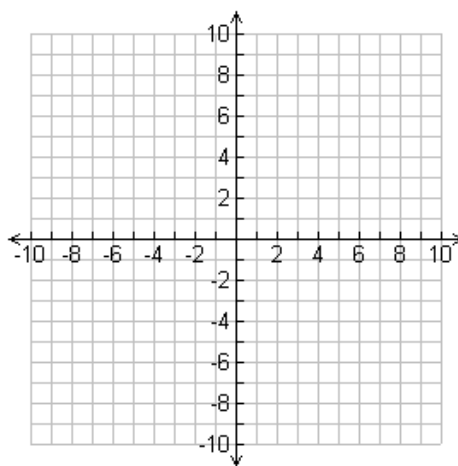


Identify the zeros, asymptotes and holes of each function. Then graph each function.

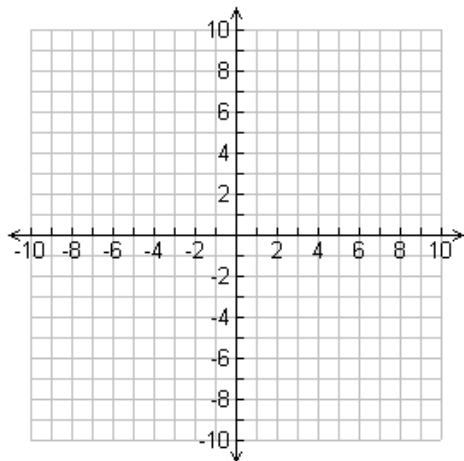
22. $f(x) = \frac{x^2-5x-24}{2x+1}$



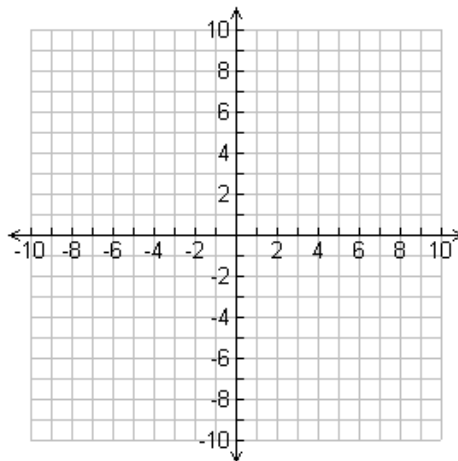
23. $f(x) = \frac{2x^2-3x-2}{x-4}$



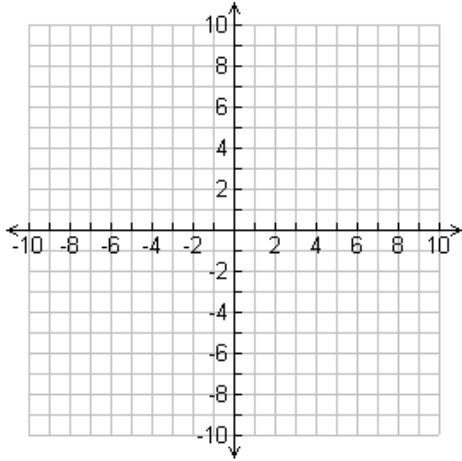
24. $f(x) = \frac{-3x^2+8x-4}{x^2-25}$



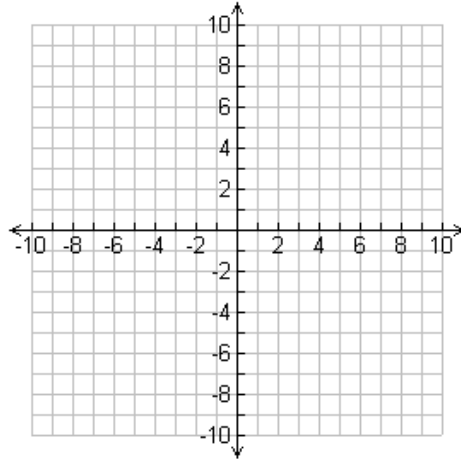
25. $f(x) = \frac{x^2-4x-21}{x+3}$



$$26. f(x) = \frac{x^2 - 4x - 5}{x^2 - 25}$$



$$27. f(x) = \frac{x^2 - 3x}{4x - 12}$$



Solve each equation.

$$28. 12 + \frac{2}{3x} = 6$$

$$29. x - \frac{1}{x} = \frac{35}{x}$$

$$30. \frac{x}{x+1} + \frac{x}{4} = \frac{3x}{4x+4}$$

$$31. \frac{x-1}{x-4} = \frac{x+6}{x}$$

$$32. \frac{6x}{x+5} = \frac{2x-20}{x+5}$$

$$33. \frac{4}{x-4} = -\frac{x}{x-4} + \frac{x}{2}$$

Solve each inequality

$$34. \frac{2x+1}{x} \geq 3$$

$$35. \frac{10}{x-2} < 2$$

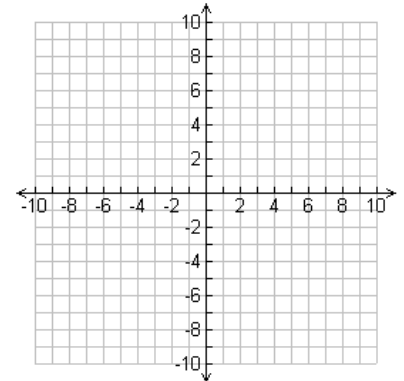
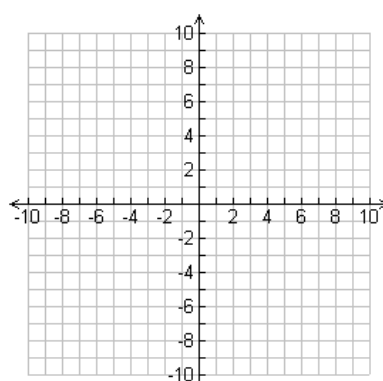
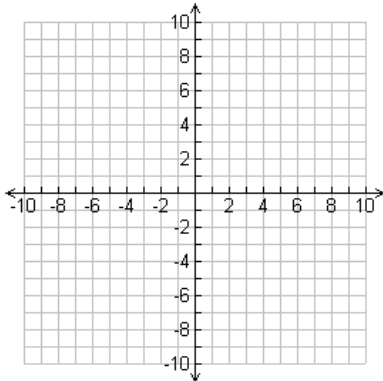
$$36. \frac{15}{x+3} \leq 1$$

Graph each function. Identify the domain and range.

$$37. f(x) = \sqrt{x-4} + 1$$

$$38. f(x) = -\frac{1}{2}\sqrt{x}$$

$$39. f(x) = 2\sqrt[3]{x+2}$$



Using the graph of $f(x) = \sqrt{x}$ as a guide, describe the transformations.

$$40. g(x) = \sqrt{x-8}$$

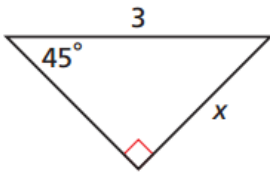
$$41. g(x) = -6\sqrt{x}$$

$$42. g(x) = \frac{1}{3}\sqrt{x} + 2$$

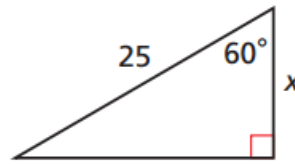
Algebra 3 Final Exam Review: Chapter 10

Use a trig function to solve for x .

1.

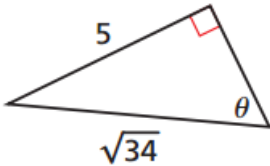


2.

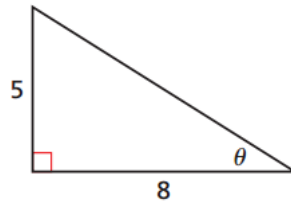


Find the values of the six trig functions of θ .

3.



4.



Find the measures of a positive and a negative angle that are coterminal with the given angle.

5. $\theta = 20^\circ$

6. $\theta = 400^\circ$

7. $\theta = -125^\circ$

Find the measure of the reference angle for each given angle.

8. $\theta = -120^\circ$

9. $\theta = 175^\circ$

10. $\theta = 110^\circ$

P is a point on the terminal side of θ in the standard position. Find the exact value of the all six trig functions for θ .

11. $P(2, 3)$

12. $P(-1, 4)$

Covert from degrees to radians or radians to degrees.

13. -125°

14. 10°

15. $\frac{\pi}{10}$

16. $-\frac{\pi}{18}$

Use the unit circle to find the exact value of each trig function.

17. $\cos 150^\circ$

18. $\tan \frac{7\pi}{4}$

19. $\sin \frac{7\pi}{6}$

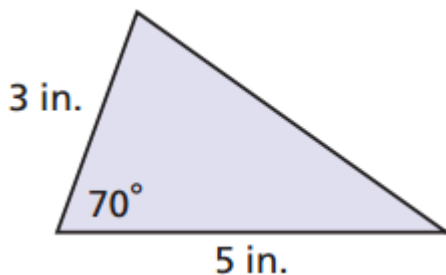
20. $\sin \frac{2\pi}{3}$

21. $\cos 270^\circ$

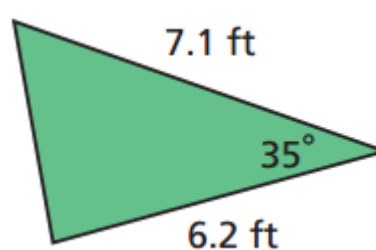
22. $\csc 225^\circ$

Find the area of each triangle. Round to the nearest tenth.

23.

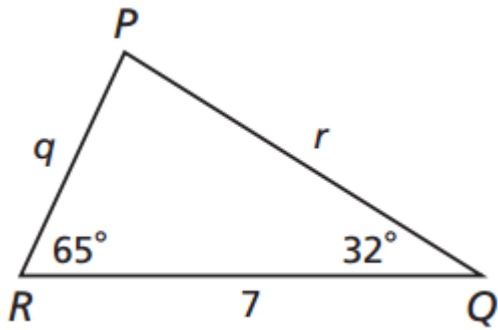


24.

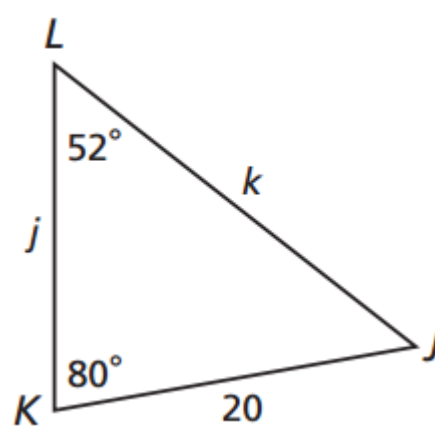


Solve each triangle. Round to the nearest tenth.

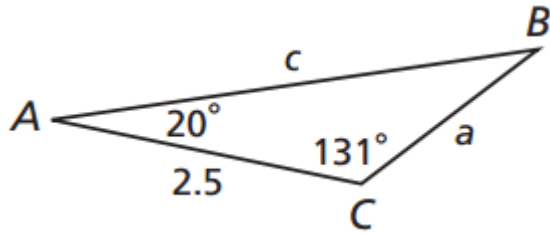
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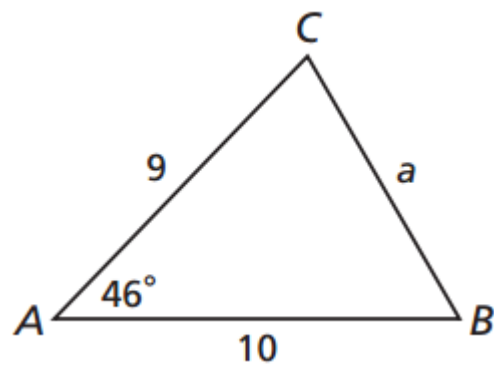
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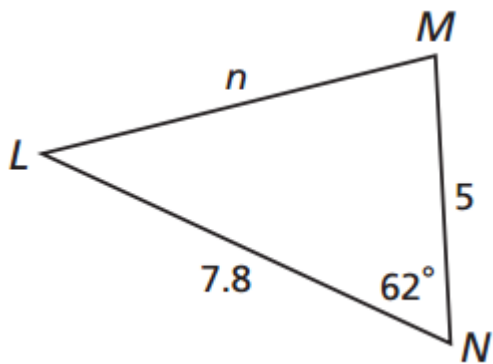
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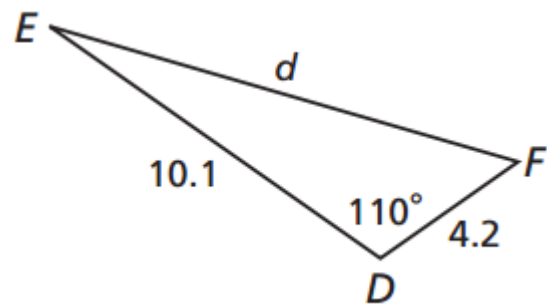
28.



29.



30.



Algebra 3 Final Exam Review: Chapter 12 Conics

Classify each conic section

1. $x^2 + y^2 = 30$

2. $x^2 + y^2 = 36$

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

4. $x = y^2$

5. $x = (y + 4)^2$

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

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

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

Classify each conic section and write its equation in standard form

1. $-x^2 + 10x + y - 21 = 0$

2. $-2y^2 + x - 20y - 49 = 0$

3. $x^2 + 2x + y - 1 = 0$

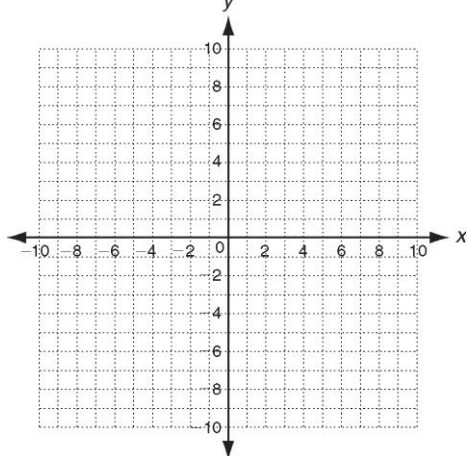
4. $x^2 + y^2 + 6x - 2y + 9 = 0$

5. $x^2 - y^2 - 2x - 8 = 0$

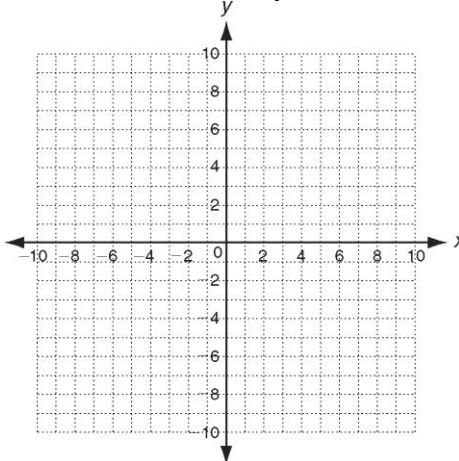
6. $3x^2 + 30x + y + 79 = 0$

Identify the center, vertices, co-vertices, foci and asymptotes for each hyperbola. Then sketch the graph.

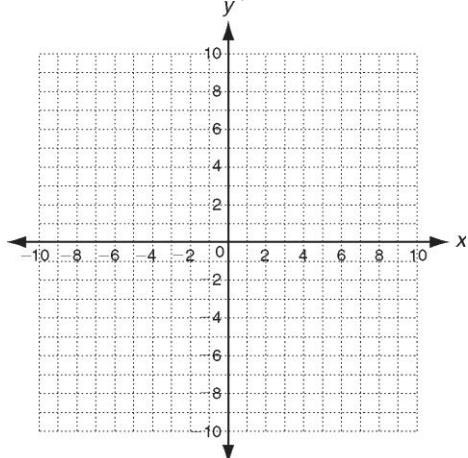
$$1. \frac{(y+1)^2}{16} - \frac{x^2}{9} = 1$$



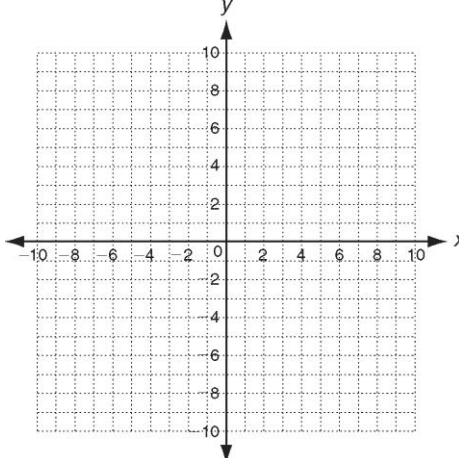
$$2. (x+2)^2 - \frac{(y-2)^2}{9} = 1$$



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



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



Identify the foci, vertices and co-vertices of each ellipse. Round to the nearest tenth if necessary.

$$1. \frac{(x+4)^2}{25} + \frac{(y-8)^2}{81} = 1$$

$$2. \frac{(x-1)^2}{256} + \frac{(y+7)^2}{9} = 1$$

$$3. \frac{(x+7)^2}{9} + \frac{(y-6)^2}{100} = 1$$

$$4. \frac{(x-1)^2}{196} + \frac{(y-7)^2}{169} = 1$$

Write the equation of an ellipse in standard form with the center at (0,0) with the given information.

1. Vertex (15, 0) Foci (9,0)

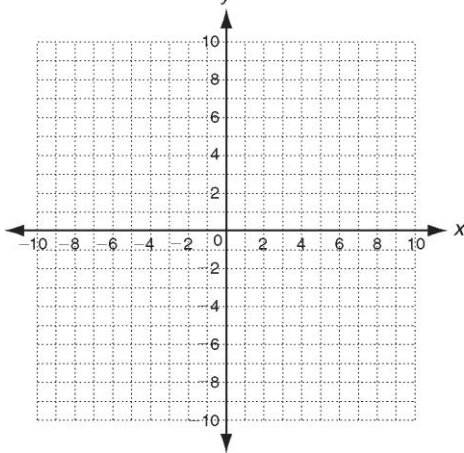
2. Co-vertex (0, -21), focus (-75, 0)

3. Co-vertex (-20, 0), focus (0, 48)

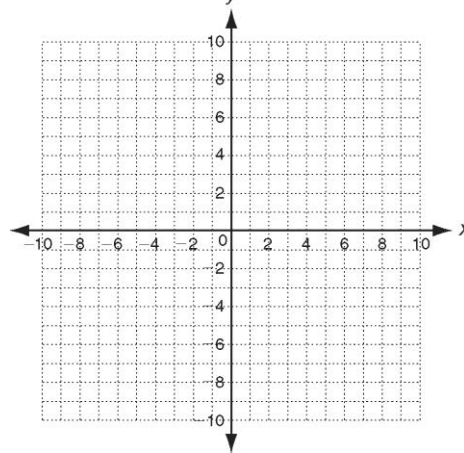
4. Vertex (61, 0), focus (60, 0)

Find the vertex, axis of symmetry, focus and directrix. Then graph each parabola.

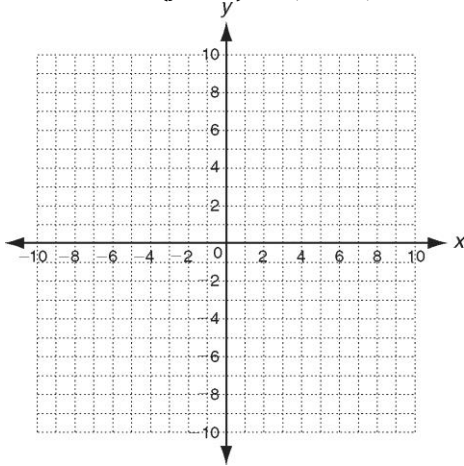
$$1. 12(y - 3) = (x - 4)^2$$



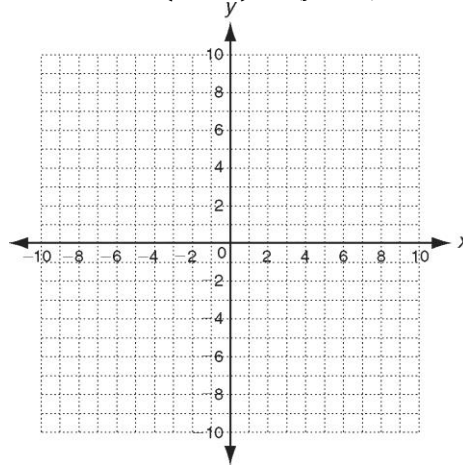
$$2. 16(y - 3) = (x + 2)^2$$



3. $-12(y + 6) = (x - 2)^2$



4. $-20(x + 3) = (y + 3)^2$



- 1 Give an equation of the parabola with focus (1, 1) and directrix $y = 3$. Then draw the curve with the focus and directrix.
- 2 Give an equation of the parabola passing through (0, -2) that has vertex (-1, 2) and axis $y = 2$. Draw the curve with its focus and directrix.
- 3 Give an equation of the ellipse that has foci $F_1(0,2)$ and $F_2(4,2)$ and vertices $V_1(-1, 2)$ and $V_2(5, 2)$. Then sketch it with its foci .
- 4 Sketch the hyperbola $x^2 - 9y^2 - 4x - 18y = 14$. Show its foci and asymptotes
- 5 Find an equation for the parabola with axis of symmetry $x = 0$ that passes through the points (1, 4) and (2, 7).
- 6 Find an equation for the hyperbola with foci (3, 0) and (-3, 0) and asymptotes $y = \pm x$.
- 7 Find an equation for the hyperbola with foci (0, 5) and (0, -5) and asymptotes $y = \pm \frac{3}{4}x$.
- 8 Find the area of the region inside the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.