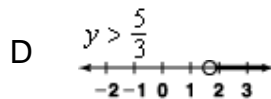
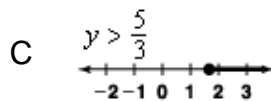
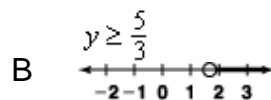
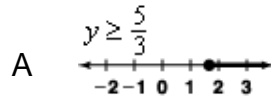


- 1 Solve the compound inequality.

$$6y > 2 \text{ and } y - 5 \geq -2y$$

Graph the solution.



- 2 A publisher estimates that the cost of publishing a book is from \$980,000 to \$1,240,000. So far, \$824,150 has been spent. Which inequality describes the amount A the publisher can still spend while remaining within the estimate?

- A $\$148,550 \leq A \leq \$422,750$
B $\$155,850 \leq A \leq \$415,850$
C $\$138,650 \leq A \leq \$418,950$
D $\$152,640 \leq A \leq \$417,540$

- 3 For the statements below, y varies directly with x . Find y when $x = -0.3$.

$$y = 2 \text{ when } x = -\frac{1}{2}$$

- A $\frac{10}{3}$
B 1.2
C $-\frac{10}{3}$
D -1.2

- 4 For the statements below, y varies directly with x . Find y when $x = -0.3$.

$$y = \frac{2}{3} \text{ when } x = 0.2$$

- A 1
- B -0.04
- C -1
- D 0.04

- 5 Write an equation for the translation.

$$y = |x|, \text{ 4 units up, 2 units right}$$

- A $y = |x + 4| - 2$
- B $y = |x - 4| + 2$
- C $y = |x + 3| - 4$
- D $y = |x - 2| + 4$

- 6 Solve using elimination.

$$\begin{cases} 2x + y = 13 \\ x - y = -4 \end{cases}$$

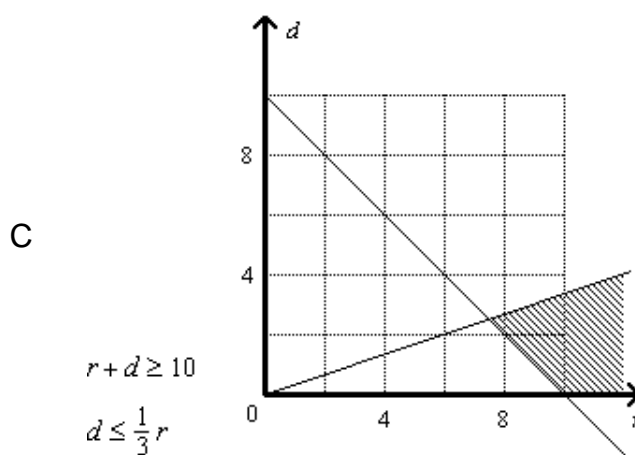
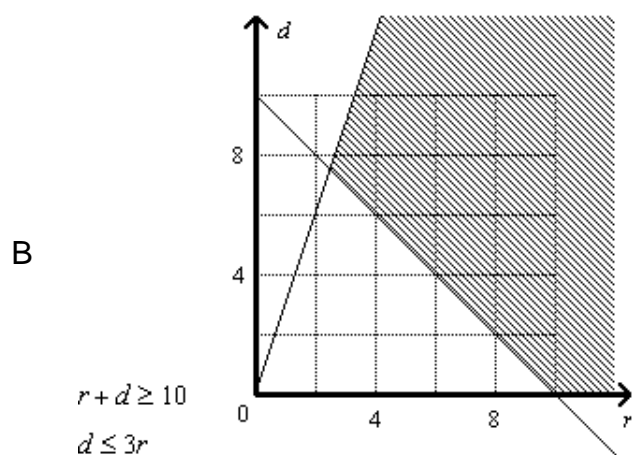
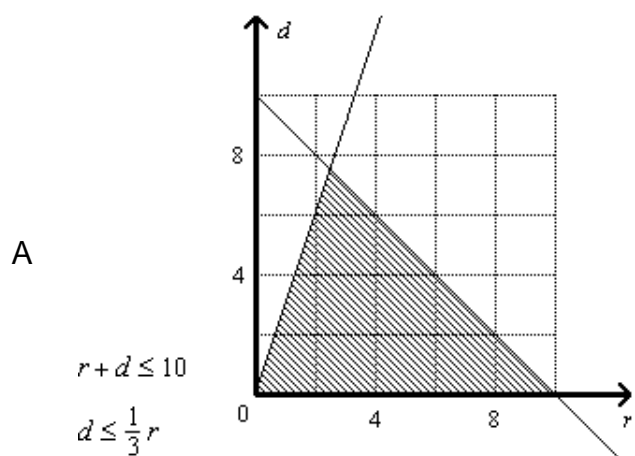
- A $(3, 7)$
- B $(2, 6)$
- C $(4, 8)$
- D no solution

- 7 Solve using elimination.

$$\begin{cases} 2x + 3y = 4 \\ 4x + 6y = 9 \end{cases}$$

- A $(-1, 2)$
- B $(-8, 4)$
- C $(-2, 5)$
- D no solution

- 8 For a community breakfast there should be at least three times as much regular coffee(r) as decaffeinated coffee (d). A total of 10 gallons of coffee is sufficient for the breakfast. Model this situation with a system of inequalities. Graph to solve the system.



- 9 Find the point of intersection of the two equations, if possible.

$$\begin{cases} x + 2y = 15 \\ 2x + 4y = 30 \end{cases}$$

- A no unique solution
- B (11, 2)
- C (9, 3)
- D (7, 4)

- 10 Simplify the expression.

$$-4 - \sqrt{-1}$$

- A $i - 4$
- B $-i - (-4)$
- C $-4 - i$
- D $4 - i$

- 11 Simplify the expression.

$$\sqrt{-27}$$

- A $27i$
- B $3\sqrt{3i}$
- C $-3\sqrt{3}$
- D $3i\sqrt{3}$

- 12 Solve the equation by completing the square.

$$2x^2 + 3x = 8$$

- A 2, -2
- B $2i, -2i$
- C $-\frac{3}{4} + \frac{\sqrt{73}}{4}, -\frac{3}{4} - \frac{\sqrt{73}}{4}$
- D $\frac{3}{4} + \frac{\sqrt{73}}{4}, \frac{3}{4} - \frac{\sqrt{73}}{4}$

- 13 Solve the equation by completing the square.

$$4x^2 - x - 3 = 0$$

- A $-3, -1$
- B $3, 1$
- C $\frac{3}{4}, 1$
- D $-\frac{3}{4}, 1$

- 14 Write a polynomial function in standard form with the given zeros.

1, 1, 2

- A $f(x) = 4x^3 - 4x^2 - 2x + 1$
- B $f(x) = 2x^3 - 4x^2 - 2x$
- C $f(x) = x^3 - 4x^2 + 4x + 1$
- D $f(x) = x^3 - 4x^2 + 5x - 2$

- 15 Write a polynomial function in standard form with the given zeros.

$-2, -2, -2$

- A $f(x) = x^3 + 2x^2 - 2x$
- B $f(x) = -2x^3 + 2x^2 - 2x + 2$
- C $f(x) = -2x^3 - 2x^2 - 2x - 8$
- D $f(x) = x^3 + 6x^2 + 12x + 8$

- 16 Let $f(x) = x^2$ and $g(x) = x - 3$. Evaluate the expression.

$$(g \circ f)(-2)$$

- A 1
- B -7
- C 25
- D -1

- 17 Let $f(x) = x^2$ and $g(x) = x - 3$. Evaluate the expression.

$$(g \circ g)(7)$$

- A 1
- B 7
- C 16
- D 0

- 18 Find the inverse of the function. Is the inverse a function?

$$y = 6x + 2$$

- A $y = 6x - 2$; yes
- B $y = \frac{1}{6}x - \frac{1}{3}$; yes
- C $y = 2x - 6$; yes
- D $y = \frac{1}{6}x - 2$; yes

- 19 Find the inverse of the function. Is the inverse a function?

$$y = \sqrt{x + 2}$$

- A $y = x^2 - 2$; yes
- B $y = (x + 2)^2$; yes
- C $y = (x - 2)^2$; yes
- D $y = x^2 + 2$; yes

- 20 Describe how the graph of the function relates to the graph of its parent function.

$$y = -3^x + 1$$

- A $y = 3^x$ reflected over the y-axis and translated up 1 unit.
- B $y = 3^x$ reflected over the x-axis and translated up 1 unit.
- C $y = 3^x$ reflected over the x-axis and translated down 1 unit.
- D $y = -3^x$ reflected over the y-axis and translated down 1 unit.

- 21 Describe how the graph of the function relates to the graph of its parent function.

$$y = 2(2)^{x+1} + 3$$

- A $y = 2(2)^x$ translated left 1 unit and up 3 units.
- B $y = 2(2)^x$ translated left 3 unit and up 1 units.
- C $y = (2)^x$ translated left 1 unit and up 3 units.
- D $y = 2(2)^x$ reflected over the y -axis and translated left 1 unit and up 3 units.

- 22 Write the logarithmic expression as a single logarithm.

$$\log 8 + \log 3$$

- A $\log 11$
- B $\log 24$
- C $\log 5$
- D $\log \frac{8}{3}$

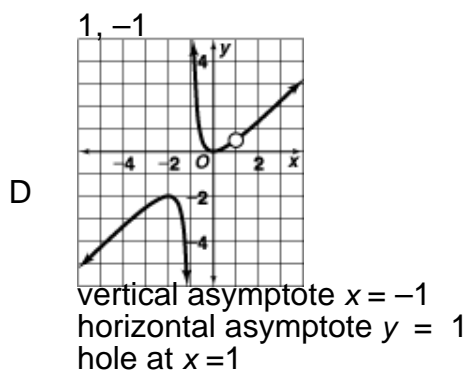
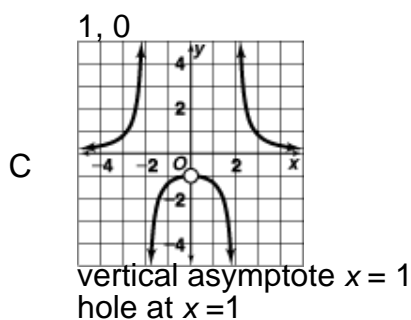
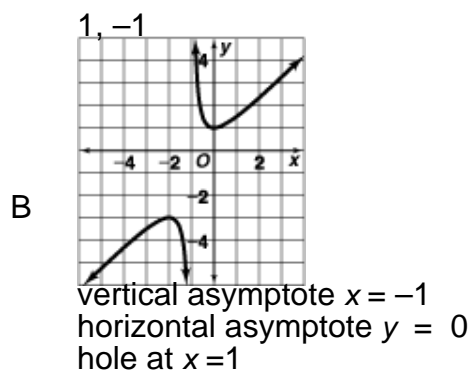
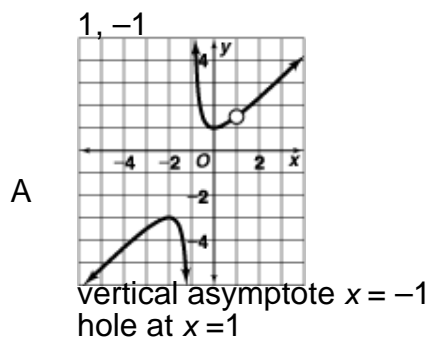
- 23 Write the logarithmic expression as a single logarithm.

$$\log z - \log y$$

- A $\log \frac{z}{y}$
- B $\log (z - y)$
- C $\log zy$
- D $\log (z + y)$

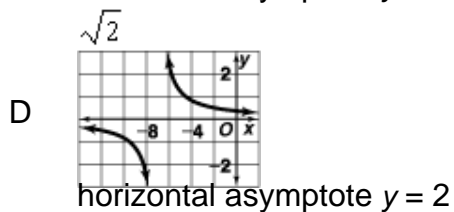
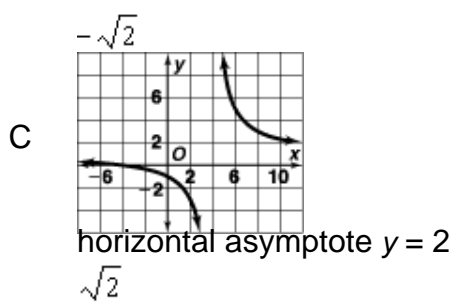
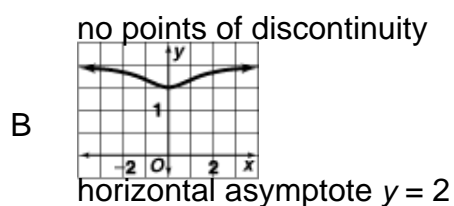
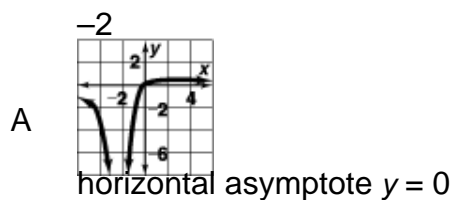
- 24 Find any points of discontinuity for the rational function. Sketch the graph. Describe any vertical or horizontal asymptotes and any holes.

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



- 25 Find any points of discontinuity for the rational function. Sketch the graph. Describe any vertical or horizontal asymptotes and any holes.

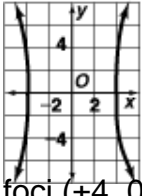
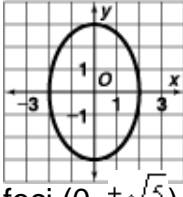
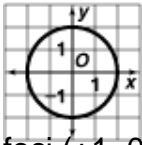
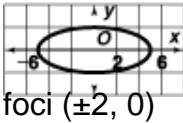
$$y = \frac{2x^2 + 3}{x^2 + 2}$$



- 26 Graph the equation.

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

Name the foci.

- A 
foci $(\pm 4, 0)$
- B 
foci $(0, \pm \sqrt{5})$
- C 
foci $(\pm 1, 0)$
- D 
foci $(\pm 2, 0)$

- 27 Write an equation in standard form of the circle with the given center and radius.

center $(0, 0)$, radius 4

- A $(x - 4)^2 + y^2 = 1$
 B $x^2 + y^2 = 16$
 C $x^2 + y^2 = 8$
 D $x^2 + (y - 4)^2 = 1$

- 28 Write an equation in standard form of the circle with the given center and radius.

center $(8, 1)$, radius 5

- A $(x - 1)^2 + (y - 8)^2 = 25$
 B $(x - 8)^2 + (y - 1)^2 = 25$
 C $(x + 1)^2 + (y + 8)^2 = 10$
 D $(x + 8)^2 + (y + 1)^2 = 10$

- 29 Factor the expression on the left side of the equation. Then solve the equation.

$$x^3 - 2x^2 - 5x = 0$$

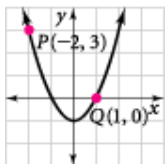
- A $x(x - 3)(x - 2)$; 0, 3, 2
- B $x(x - 2.5)^2$; 0, 2.5
- C $x(x^2 - 7x - 5)$; 0, $\frac{7 \pm 4i}{2}$
- D $x(x^2 - 2x - 5)$; 0, $1 \pm \sqrt{6}$

- 30 Factor the expression on the left side of the equation. Then solve the equation.

$$x^6 + 16x^3 + 64 = 0$$

- A $(x^3 + 8)^2$; -2
- B $(x + 2)^2(x^2 - 2x + 4)^2$; -2, $1 \pm i\sqrt{3}$
- C $(x - 2)^2(x^2 + 2x - 4)^2$; 2, $-1 \pm i\sqrt{3}$
- D $(x + 2)^6$; -2

- 31 Identify the vertex, the axis of symmetry, and the points corresponding to P and Q .



- A (0, -1), $x = 0$, (2, 3) and (-1, 0)
- B (0, 0), $x = 0$, (-2, 3) and (-1, 0)
- C (0, -1), $x = -1$, (2, 3) and (-1, 0)
- D (0, -1), $x = -1$, (-2, 3) and (1, 0)

- 32 Use the formula below where L is loudness measured in decibels, I is intensity of sound, and I_0 is the lowest-intensity sound that the average human ear can detect.

$$L = 10 \log \frac{I}{I_0}$$

Suppose the sound intensity of a fan must be reduced by one third. By how many decibels would the loudness be decreased? *Hint:* Let I_1 = present intensity, I_2 = reduced intensity, L_1 = present loudness, and L_2 = reduced loudness.

- A about 1.76 dB
 B about 2.24 dB
 C about 0.25 dB
 D about 1.35 dB
- 33 The table below shows the number of shelves needed to display a certain number of movies at a video store. Which equation models the relationship in the table if s represents the number of shelves and m represents the number of movies?

| Video Store Stock | |
|-------------------|------------------|
| Number of Shelves | Number of Movies |
| 1 | 12 |
| 2 | 24 |
| 3 | 36 |
| 4 | 48 |

- A $m + s = 12$
 B $m - s = 12$
 C $m = 12s$
 D $\frac{m}{s + m} = 12$

- 34 A biologist took a count of the number of migrating waterfowl at a particular lake, and recounted the lake's population of waterfowl on each of the next six weeks.

| Week | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|------------|-----|-----|-----|-----|-----|-------|-------|
| Population | 585 | 582 | 629 | 726 | 873 | 1,070 | 1,317 |

| | |
|-----------|--|
| a. | Find a quadratic function that models the data as a function of x , the number of weeks. |
| b. | Use the model to estimate the number of waterfowl at the lake on week 8. |

- A $P(x) = 25x^2 - 28x + 585$; 1,614 waterfowl
B $P(x) = 30x^2 + 28x + 535$; 2,679 waterfowl
C $P(x) = 25x^2 - 28x + 585$; 1,961 waterfowl
D $P(x) = 30x^2 + 28x + 535$; 2,201 waterfowl

- 35 Miguel is designing shipping boxes that are rectangular prisms. One shape of box with height h in feet, has a volume defined by the function.

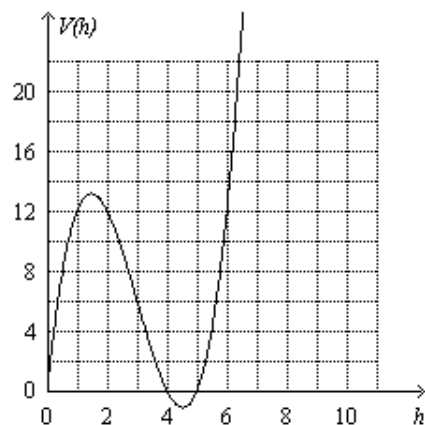
$$V(h) = h(h - 10)(h - 8)$$

What is the maximum volume for the domain below?

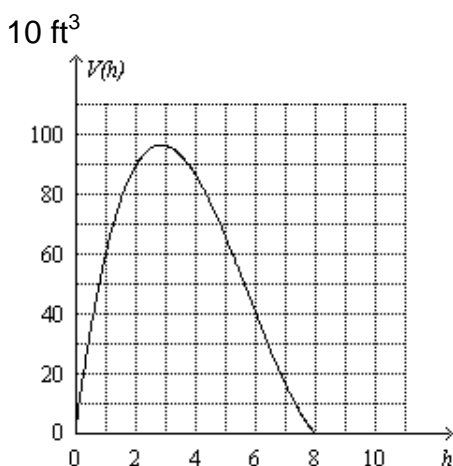
$$0 < h < 10$$

Round to the nearest cubic foot.

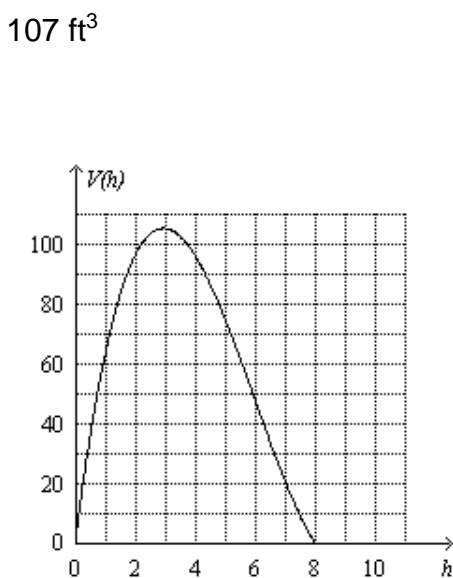
A

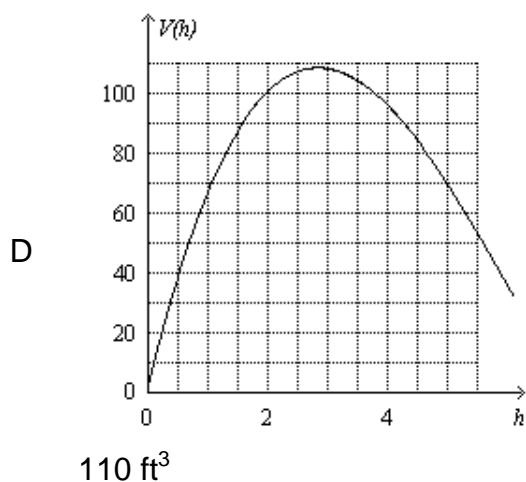


B

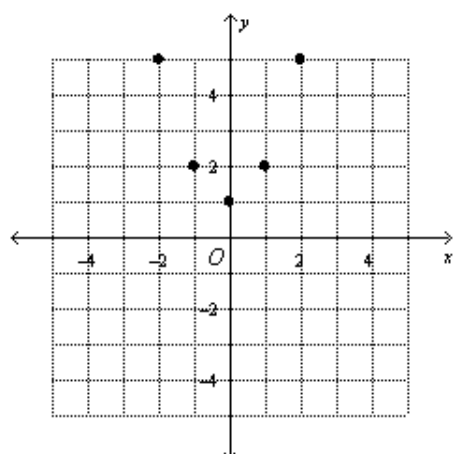


C





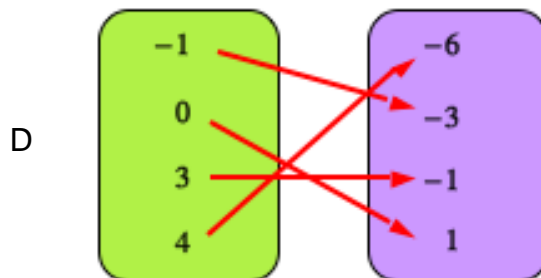
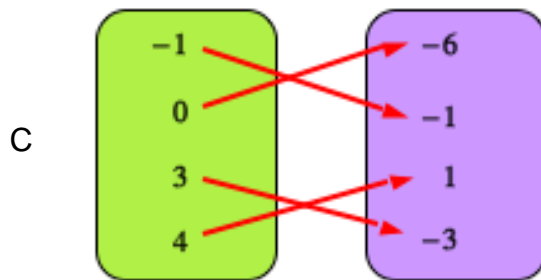
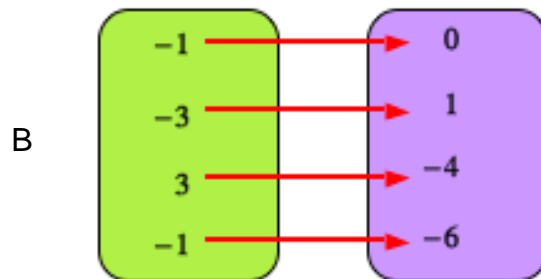
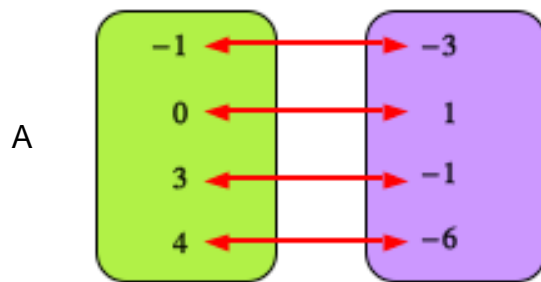
- 36 For the relation below, choose the coordinates for the points shown. Find the domain and range.



- A $\{(-2, 5), (-1, 2), (0, 1), (1, 2), (2, 5)\}$; domain: $\{-2, -1, 0, 1, 2\}$; range: $\{1, 2, 5\}$
 B $\{(5, -2), (2, -1), (1, 0), (2, 1), (5, 2)\}$; domain: $\{-2, -1, 0, 1, 2\}$; range: $\{1, 2, 5\}$
 C $\{(-2, 5), (-1, 2), (0, 1), (1, 2), (2, 5)\}$; domain: $\{1, 2, 5\}$; range: $\{-2, -1, 0, 1, 2\}$
 D $\{(5, -2), (2, -1), (1, 0), (2, 1), (5, 2)\}$; domain: $\{1, 2, 5\}$; range: $\{-2, -1, 0, 1, 2\}$

37 Choose the correct mapping diagram for the relation.

$$\{(-1, -3), (0, 1), (3, -1), (4, -6)\}$$



- 38 Simplify the complex fraction.

$$\frac{\frac{3}{4y} - \frac{2}{y}}{\frac{1}{y} + \frac{3}{2y}}$$

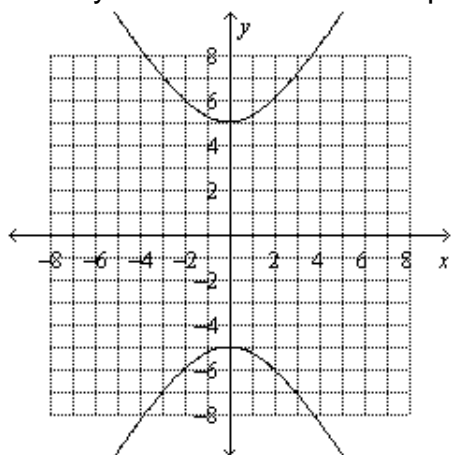
- A $\frac{20}{3}$
- B $-\frac{1}{2}$
- C -2
- D $\frac{3}{20}$

- 39 Solve the equation. Check the solution.

$$\frac{6}{x^2 - 9} - \frac{1}{x - 3} = 1$$

- A -4
- B 2
- C $\frac{-1 \pm \sqrt{73}}{2}$
- D 3 or -4

- 40 Identify the center and intercepts of the conic section. Then find the domain and the range.

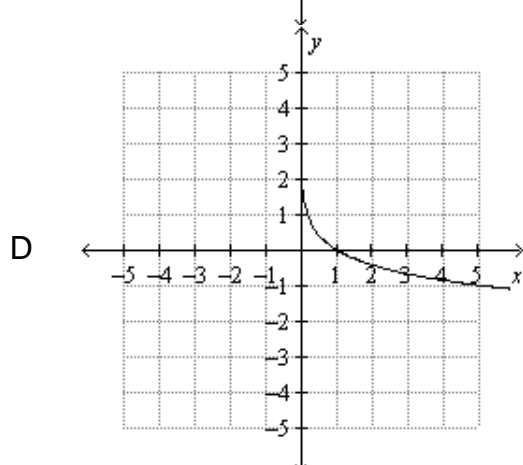
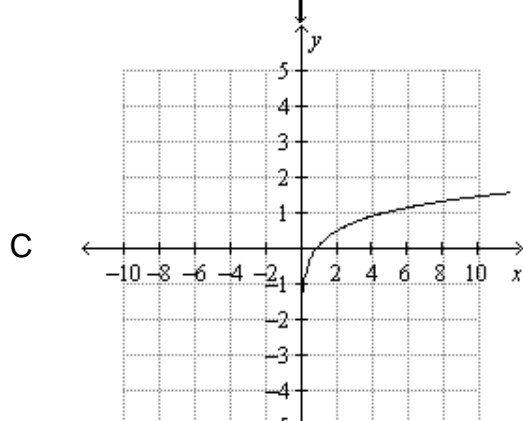
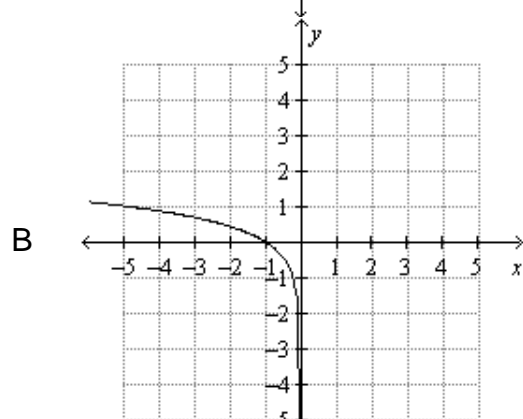
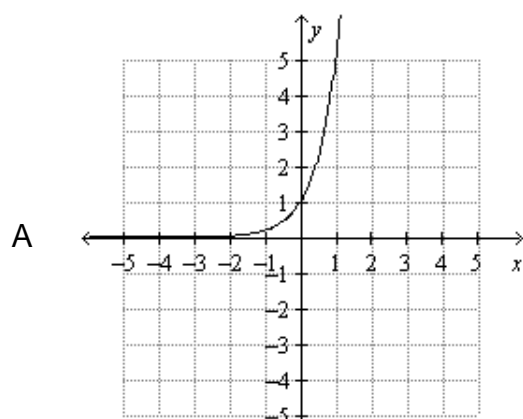


- A The center of the hyperbola is $(0, 0)$. The y -intercepts are $(0, 5)$ and $(0, -5)$. The domain is all real numbers. The range is $\{y \mid y \geq -5 \text{ or } y \leq 5\}$.
- B The center of the hyperbola is $(0, 0)$. The x -intercepts are $(0, 5)$ and $(0, -5)$. The domain is all real numbers. The range is $\{y \mid y \leq -5 \text{ or } y \geq 5\}$.
- C The center of the hyperbola is $(0, 0)$. The y -intercepts are $(0, 5)$ and $(0, -5)$. The domain is all real numbers. The range is $\{y \mid y \leq -5 \text{ or } y \geq 5\}$.
- D The center of the hyperbola is $(0, 0)$. The x -intercepts are $(0, 5)$ and $(0, -5)$. The domain is all real numbers. The range is $\{x \mid x \leq -5 \text{ or } x \geq 5\}$.

- 41 What is the equation for a graph that is the set of all points in the plane that are equidistant from the point $F(6, 0)$ and the line $x = -6$?
- A $x = \frac{1}{24}y^2$
- B $x = -\frac{1}{36}y^2$
- C $x = \frac{1}{36}y^2$
- D $x = -\frac{1}{24}y^2$
- 42 Describe the pattern in the sequence. Find the next three terms.
13, 15, 17, 19, ...
- A Add 2; 23, 25, 27.
- B Multiply by 2; 38, 76, 152.
- C Add -2 ; 17, 15, 13.
- D Add 2; 21, 23, 25.
- 43 A large asteroid crashed into a moon of a planet, causing several boulders from the moon to be propelled into space toward the planet. Astronomers were able to measure the speed of one of the projectiles. The distance (in feet) that the projectile traveled each second, starting with the first second, was given by the arithmetic sequence 26, 44, 62, 80, Find the total distance that the projectile traveled in seven seconds.
- A 534 feet
- B 560 feet
- C 212 feet
- D 426 feet
- 44 What are the real zeros of the function $y = (x - 2)^3 + 4$?
- A 3
- B 2
- C 1
- D 0

45 What is the graph of the logarithmic equation?

$$y = \log_5 x$$



- 46 Choose the property of real numbers illustrated by the equation.

$$-2(x + 11) = -2x - 22$$

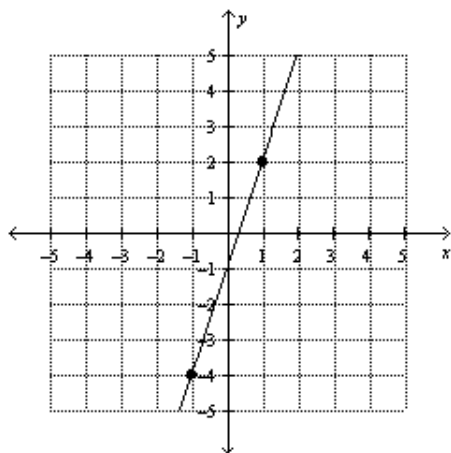
- A Associative Property of Multiplication
- B Distributive Property
- C Commutative Property of Addition
- D Associative Property of Addition

- 47 Solve the equation.

$$11 = -d + 15$$

- A 11
- B -4
- C 4
- D 6

- 48 Choose the correct slope-intercept form of the equation for the line.



- A $y = 3x - 1$
- B $y = -3x - 1$
- C $y = \frac{1}{3}x + 1$
- D $y = \frac{7}{3}x - 1$

- 49 The table shows the height of a plant as it grows.
- Choose the equation that models the data.
 - Based on the model, predict the height of the plant at 12 months.

| Time (months) | Plant Height (cm) |
|---------------|-------------------|
| 3 | 9 |
| 5 | 15 |
| 7 | 21 |
| 9 | 27 |

- A $y - 3 = \frac{3}{2}(x - 9)$; 39 cm
B $y - 9 = 3(x - 3)$; 36 cm
C $y - 9 = \frac{3}{2}(x - 3)$; 18 cm
D The relationship cannot be modeled.

- 50 Write the explicit formula for the sequence. Then find the fifth term in the sequence.

$$a_1 = 120, r = 0.3$$

- A $a_n = 120 \cdot (0.3)^n$; 0.2916
B $a_n = a_{n-1} \cdot 0.3$; 0.2916
C $a_n = 120 \cdot (0.3)^n$; 0.972
D $a_n = 120 \cdot (0.3)^{n-1}$; 0.972

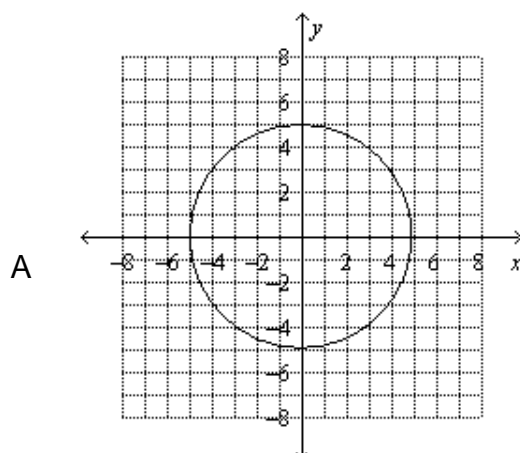
- 51 Does the infinite geometric series diverge or converge? Explain.

$$\frac{1}{2} + \frac{1}{10} + \frac{1}{50} + \frac{1}{250} + \dots$$

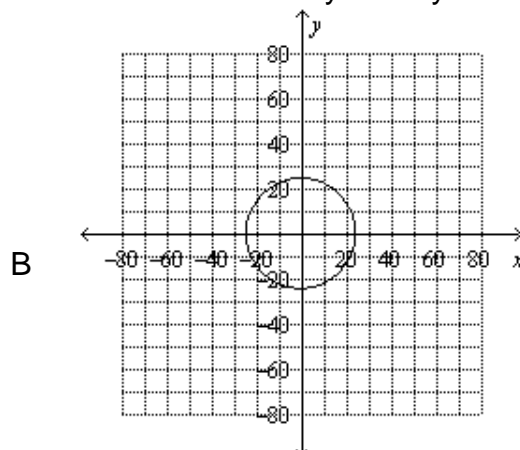
- A It diverges; it does not have a sum.
B It converges; it does not have a sum.
C It converges; it has a sum.
D It diverges; it has a sum.

- 52 Graph the equation. Describe the graph and its lines of symmetry.

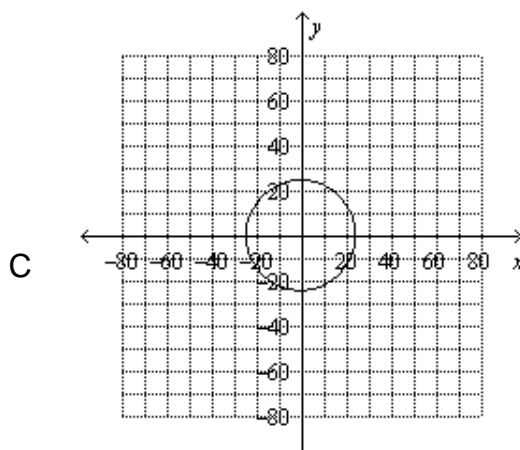
$$x^2 + y^2 = 25$$



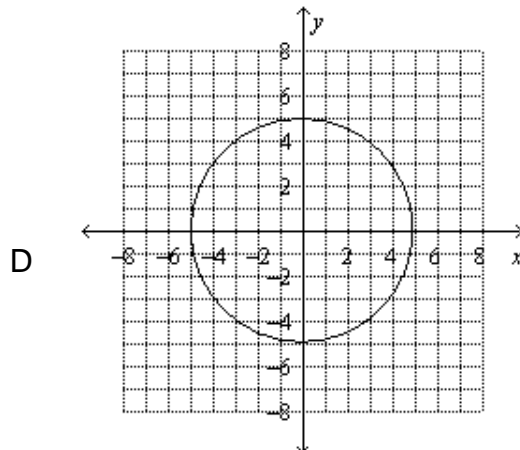
The graph is a circle of radius 5. Its center is at the origin. The y -axis and the x -axis are lines of symmetry.



The graph is a circle of radius 25. Its center is at the origin. The y -axis and the x -axis are lines of symmetry.



The graph is a circle of radius 25. Its center is at the origin. Every line through the center is a line of symmetry.



The graph is a circle of radius 5. Its center is at the origin. Every line through the center is a line of symmetry.

53 What are the rational roots of $4x^3 - 2x^2 + 4x + 10 = 0$?

- A $-1, 2$
- B $\pm 1, \pm 2, \pm 5, \pm 10, \pm \frac{1}{4}, \pm \frac{1}{2}, \pm \frac{5}{4}, \pm \frac{5}{2}$
- C $\pm 1, \pm 2, \pm 4, \pm 5, \pm 10$
- D -1

54 The pair of points are on the graph of an inverse variation. Find the missing value.

$(9, x)$ and $(3, 12)$

- A -18
- B 36
- C 4
- D 2.25

55 The pair of points are on the graph of an inverse variation. Find the missing value.

$(4, 2.65)$ and $(y, 4.24)$

- A 1.5
- B 2.5
- C 3.5
- D 4

- 56 Simplify the rational expression. State any restrictions on the variable.

$$\frac{t^2 + 2t - 48}{t + 8}$$

- A $-t - 6; t \neq 8$
- B $t + 6; t \neq 8$
- C $-t + 6; t \neq -8$
- D $t - 6; t \neq -8$

- 57 Find all the real square roots of $-\frac{9}{16}$.

- A no real root
- B $-\frac{3}{4}$
- C $-\frac{3}{4}$ and $\frac{3}{4}$
- D $\frac{81}{256}$

- 58 Divide and simplify. Assume that all variables are positive.

$$\frac{\sqrt[3]{405x^{29}}}{\sqrt[3]{5x}}$$

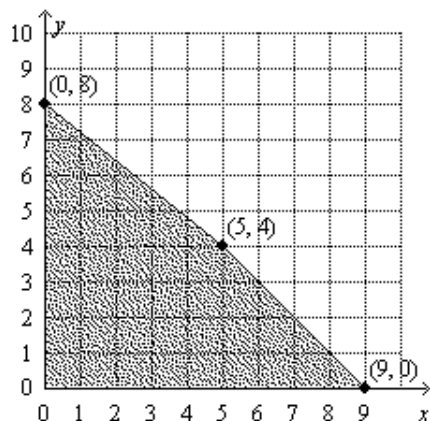
- A $\sqrt[3]{135x^{28}}$
- B $3x^9\sqrt[3]{3x}$
- C $3x^9\sqrt{135x}$
- D $3x\sqrt[3]{3x^9}$

- 59 Solve the system using either substitution or elimination.

$$\begin{cases} x + 2y + z = 5 \\ 3x + y + 2z = 2 \\ 2x - y + z = -5 \end{cases}$$

- A (6, 5, -8)
- B (-6, -5, -8)
- C no solution
- D (6, -5, 8)

- 60 Find the values of x and y that maximize the objective function $P = 3x + 2y$ for the graph. What is the maximum value?



- A maximum value at (5, 4); 32
- B maximum value at (0, 8); 16
- C maximum value at (9, 0); 27
- D maximum value at (0, 0); 0

- 61 Solve the matrix equation for matrix X .

$$\begin{bmatrix} 7 & -1 \\ 0 & 8 \end{bmatrix} + X = \begin{bmatrix} 4 & 9 \\ -3 & 11 \end{bmatrix}$$

A $\begin{bmatrix} 11 & 8 \\ -3 & 19 \end{bmatrix}$

B $\begin{bmatrix} 3 & -10 \\ -3 & -3 \end{bmatrix}$

C $\begin{bmatrix} -3 & 10 \\ -3 & 3 \end{bmatrix}$

D $\begin{bmatrix} 28 & -10 \\ 0 & 88 \end{bmatrix}$

- 62 Given the matrices below, find $R - 2T$.

$$R = \begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix} \quad T = \begin{bmatrix} 5 & -2 \\ 3 & 6 \end{bmatrix}$$

A $\begin{bmatrix} -9 & 7 \\ -8 & -8 \end{bmatrix}$

B $\begin{bmatrix} -4 & 5 \\ -5 & -2 \end{bmatrix}$

C $\begin{bmatrix} 4 & -5 \\ 5 & 2 \end{bmatrix}$

D $\begin{bmatrix} 7 & -9 \\ -8 & -8 \end{bmatrix}$

- 63 Suppose you roll a red number cube and a blue number cube. What is the probability that you will roll a 5 on the red cube and a 1 or 2 on the blue cube?

A $\frac{1}{6}$
B $\frac{1}{18}$
C $\frac{1}{3}$
D $\frac{1}{12}$

- 64 Use the following set of values.

13, 12, 15, 18, 14, 16, 18, 12, 13, 14, 14, 17, 15, 8, 17, 16, 12, 16, 14, 15, 13, 13, 17, 15, 14, 18, 16, 12, 12, 13

- a) At what percentile is 15?
b) Identify the outlier.

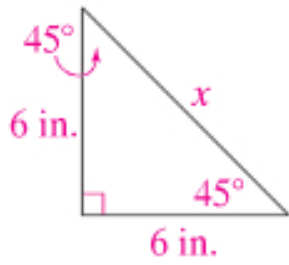
A 49th percentile, 19
B 53rd percentile, 8
C 59th percentile, 11
D 64th percentile, 18

- 65 The measure θ of an angle in standard position is given. Choose the equivalent degree measure. Then find the exact values of $\cos \theta$ and $\sin \theta$ for the angle measure.

2π radians

A 360° ; 0, 1
B 180° ; 1, 0
C 180° ; 0, 1
D 360° ; 1, 0

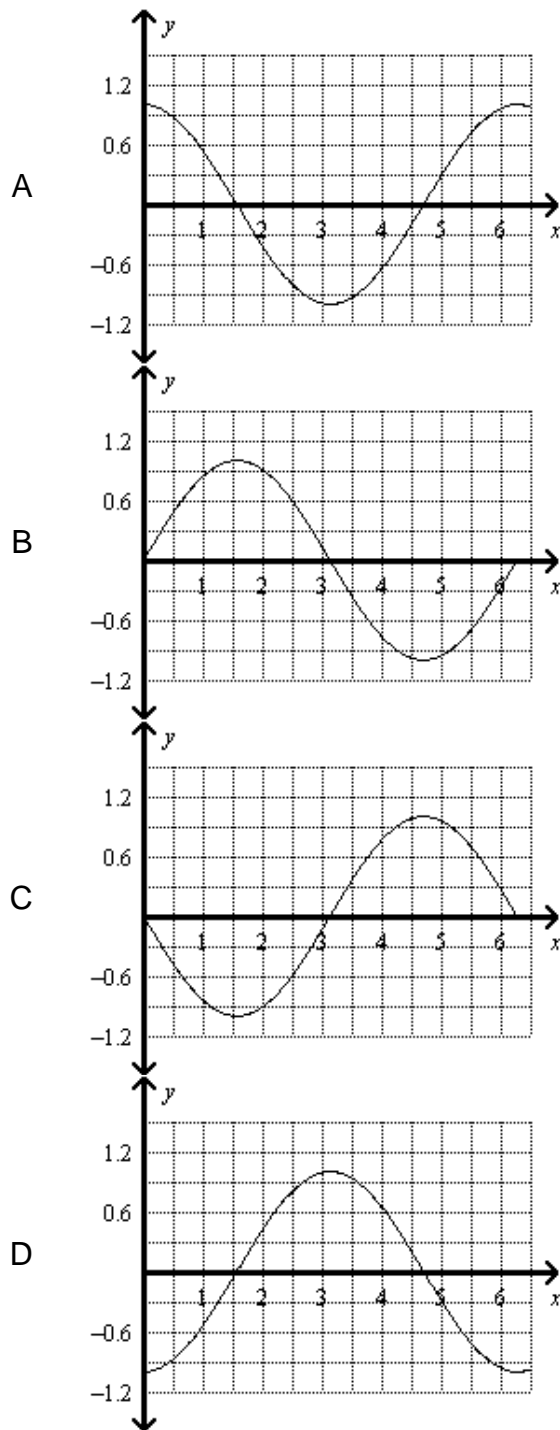
- 66 What is the exact value of x ?



- A $6\sqrt{2}$ in.
B $3\sqrt{2}$ in.
C $6\sqrt{3}$ in.
D 12 in.
- 67 Use a unit circle and 30° - 60° - 90° triangles to find $\tan 60^\circ$.

- A $\frac{\sqrt{3}}{3}$
B $\sqrt{3}$
C $\frac{\sqrt{3}}{2}$
D $\frac{1}{2}$

68 Which graph represents $\sin x$?



- 69 Use an inverse matrix to solve the equation.

$$\begin{bmatrix} -6 & 0 \\ 7 & 1 \end{bmatrix} X = \begin{bmatrix} -12 & -6 \\ 17 & 9 \end{bmatrix}$$

A $\begin{bmatrix} -6 & -6 \\ 10 & 8 \end{bmatrix}$

B $\begin{bmatrix} 6 & 6 \\ -10 & -8 \end{bmatrix}$

C $\begin{bmatrix} -2 & -1 \\ -3 & -2 \end{bmatrix}$

D $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$

- 70 Simplify.

$$\frac{\cos \theta}{\sin \theta \cot \theta}$$

A $\tan \theta$

B 1

C $\cos \theta$

D $\cot \theta$