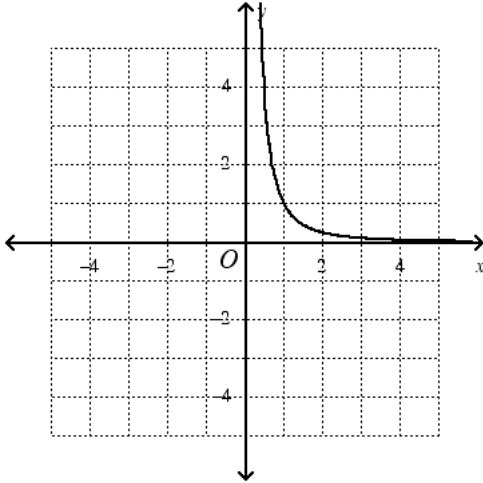


Sample Placement Test to Determine Placement in Algebra II or Pre-Calculus

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

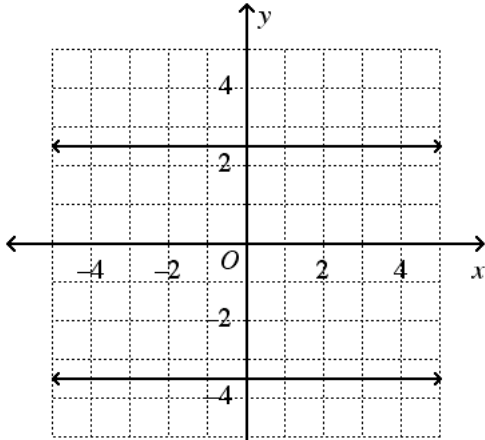
- _____ 1. Find the domain and range of the relation and determine whether it is a function.



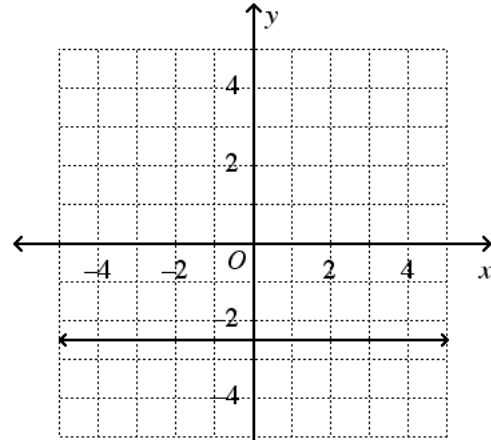
- a. Domain: all real numbers; range: all real numbers; yes, it is a function
- b. Domain: $x > 0$; range: $y > 0$; yes, it is a function.
- c. Domain: positive integers; range: positive integers; no, it is not a function.
- d. Domain: $x \geq 0$; range: $y \leq 0$; no, it is not a function.

2. Use the vertical-line test to determine which graph represents a function.

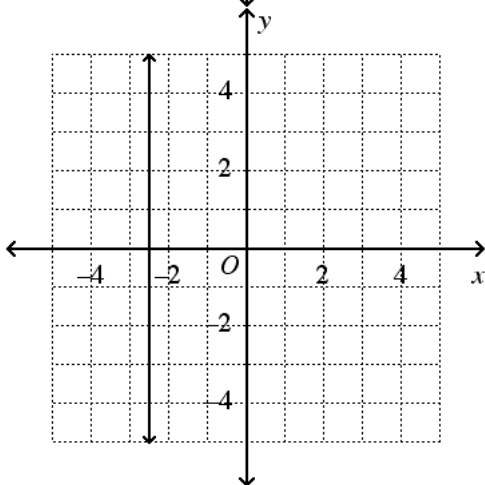
a.



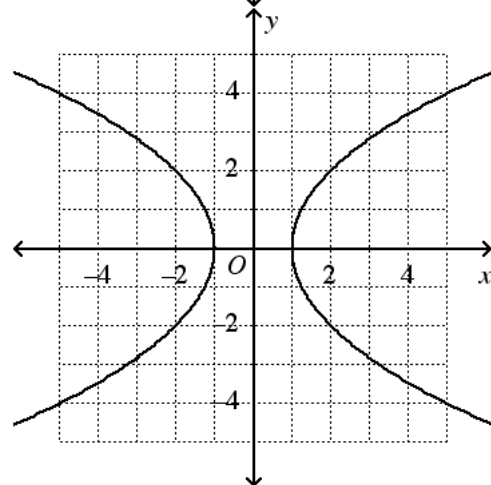
c.



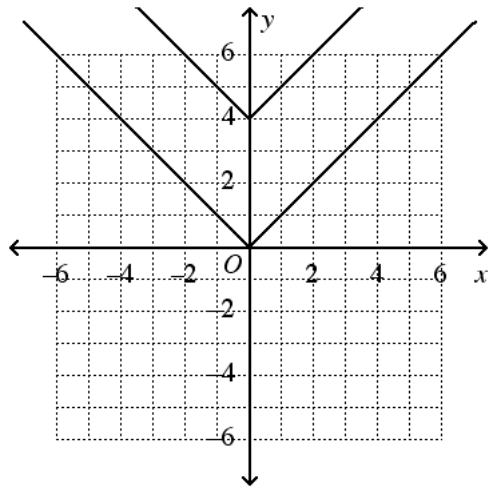
b.



d.



3. Write the equation for the translation of $y = |x|$.



a. $y = |x + 4|$

b. $y = |x| + 4$

c. $y = |x| - 4$

d. $y = |x - 4|$

_____ 4. Compare the graphs of the pair of functions. Describe how the graph of the second function relates to the graph of the first function.

$$y = -2|x| \text{ and } y = -2|x| - 3$$

- a. The second function is the graph of $y = -2|x|$ moved to the right 3 units.
- b. The second function is the graph of $y = -2|x|$ moved up 3 units.
- c. The second function is the graph of $y = -2|x|$ moved to the left 3 units.
- d. The second function is the graph of $y = -2|x|$ moved down 3 units.

Write an equation for the vertical translation.

_____ 5. $y = -\frac{2}{9}|x| - 7$; 2 units down

a. $y = -\frac{2}{9}|x| - 9$

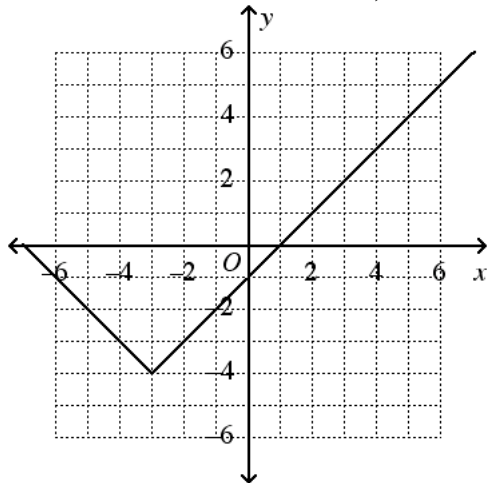
b. $y = -\frac{2}{9}|x| - 2$

c. $y = -\frac{2}{9}|x| - 2$

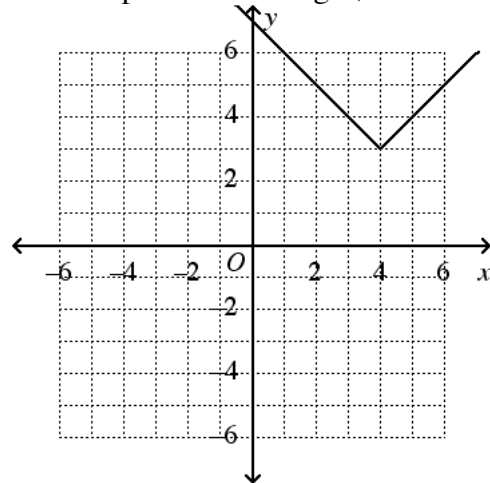
d. $y = -\frac{2}{9}|x| + 9$

6. Describe the relationship between the graph of $y = |x + 3| - 4$ and the graph of $y = |x|$ in terms of a vertical and a horizontal translation. Then graph $y = |x + 3| - 4$.

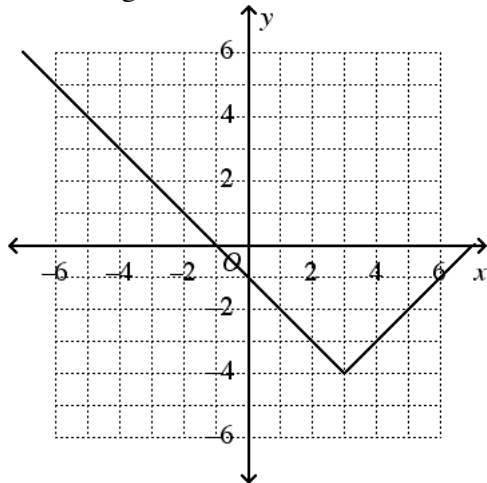
a. 3 units left and 4 units down;



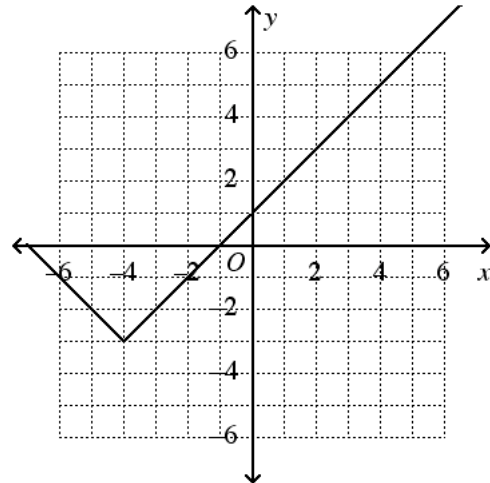
c. 3 units up and 4 units right;



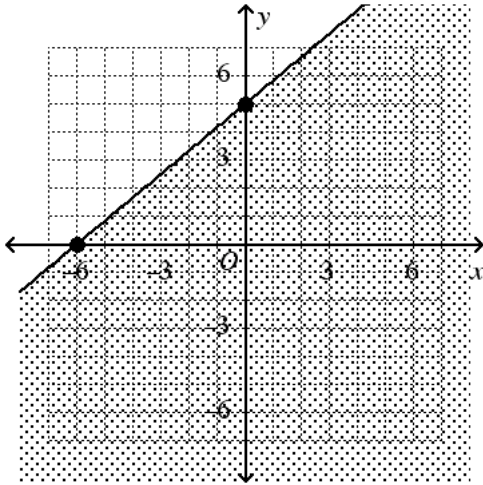
b. 3 units right and 4 units down;



d. 3 units down and 4 units left;



7. Write an inequality for the graph.

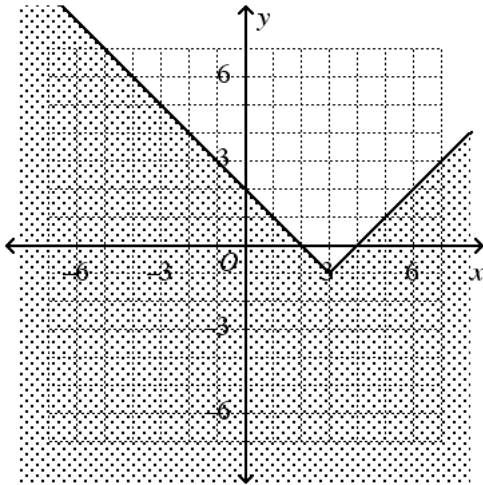


- a. $-6x + 5y \geq -30$
- b. $-6x + 5y \leq -30$

- c. $5x - 6y \leq -30$
- d. $5x - 6y \geq -30$

Write an inequality for the graph.

8.

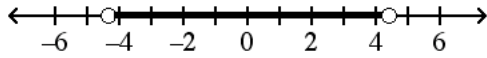


- a. $y \leq |x + 3| - 1$
- b. $y \leq |x - 3| + 1$

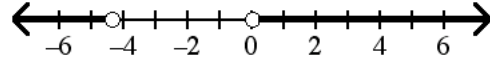
- c. $y \leq |x - 3| - 1$
- d. $y \geq |x - 3| - 1$

9. $2\left|x + \frac{1}{4}\right| < 9$

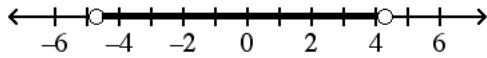
a. $-4\frac{3}{8} < x < 4\frac{3}{8}$



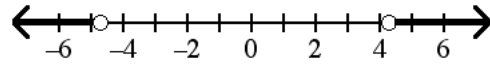
c. $x < -4\frac{3}{8}$ or $x > 4\frac{3}{8}$



b. $-4\frac{3}{4} < x < 4\frac{1}{4}$



d. $x < -4\frac{3}{4}$ or $x > 4\frac{1}{4}$



10. When Spheres-R-Us ships bags of golf balls, the number of balls in each bag must be within 6 balls of 300. Write an absolute value inequality and a compound inequality for an acceptable number of golf balls b in each bag.

a. $|b - 6| \leq 300$; $294 \leq b \leq 306$

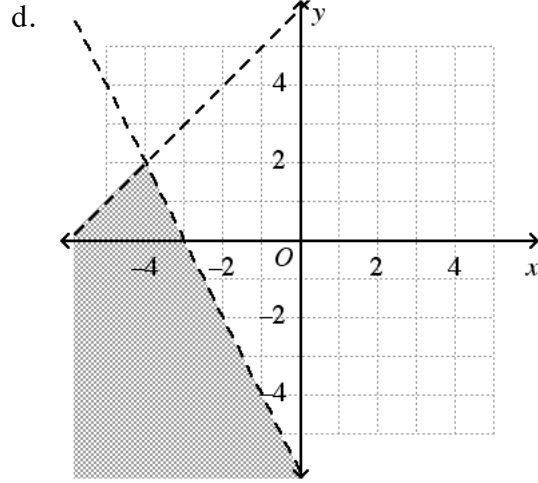
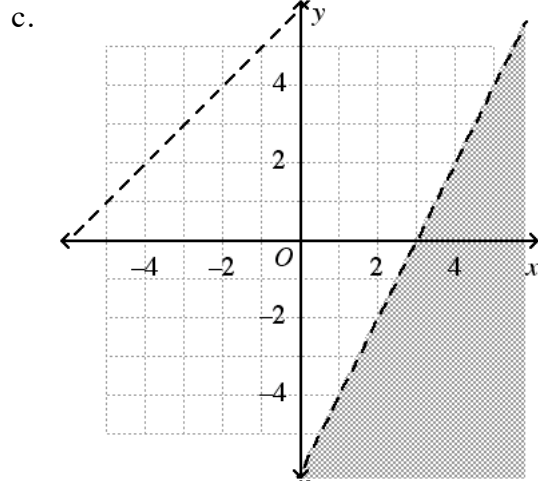
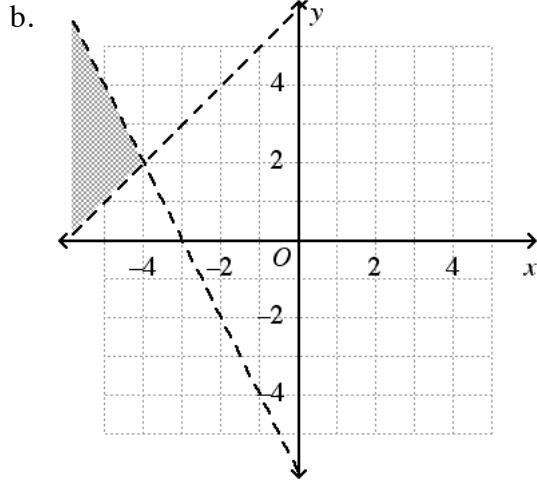
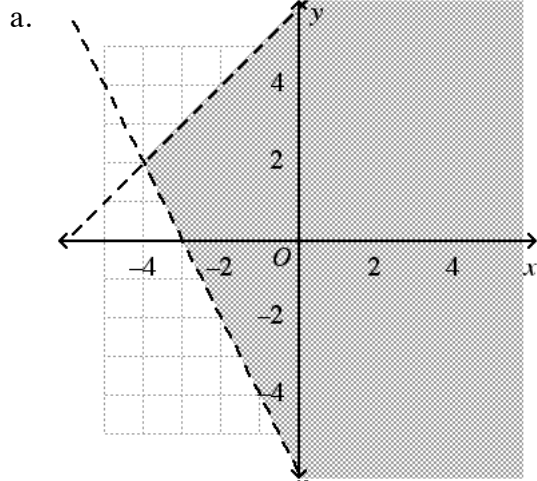
c. $|b - 300| \leq 6$; $294 \leq b \leq 306$

b. $|b - 3| \leq 300$; $297 \leq b \leq 303$

d. $|b - 300| \leq 6$; $294 \leq b \leq 306$

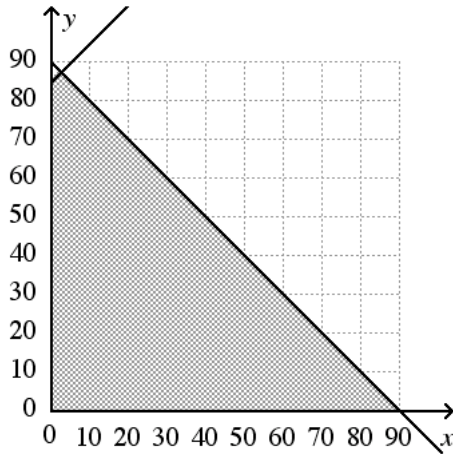
Solve the system of inequalities by graphing.

11.
$$\begin{cases} y < x + 6 \\ 2x + y < -6 \end{cases}$$

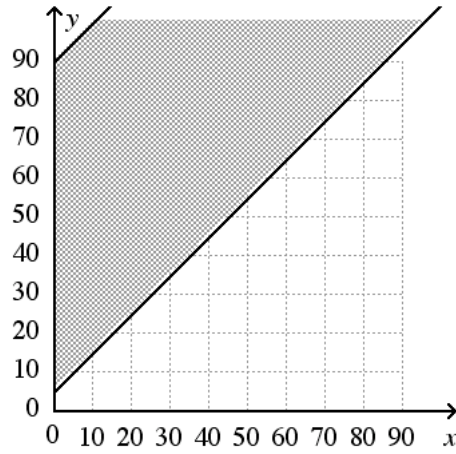


12. An exam consists of two parts, Section X and Section Y. There can be a maximum of 90 questions. There must be at least 5 more questions in Section Y than in Section X. Write a system of inequalities to model the number of questions in each of the two sections. Then solve the system by graphing.

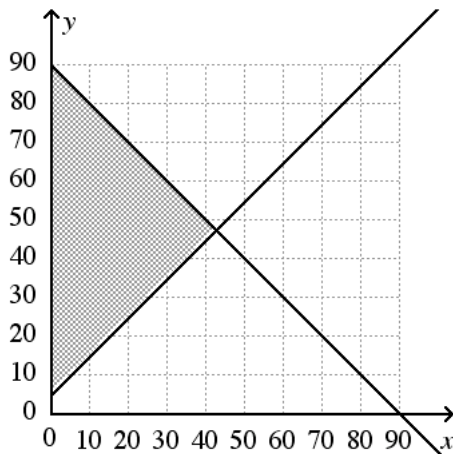
a.
$$\begin{cases} X \geq 0 \\ Y \geq 0 \\ X + Y \leq 90 \\ Y \geq X + 5 \end{cases}$$



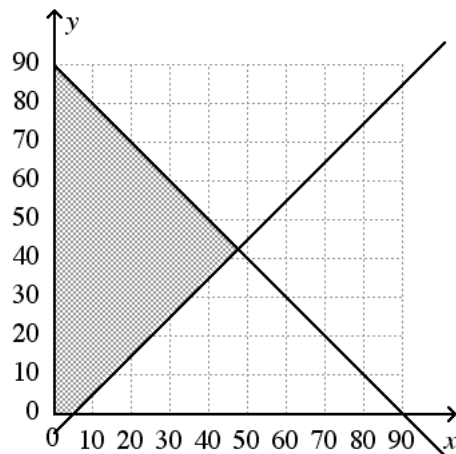
c.
$$\begin{cases} X \geq 0 \\ Y \geq 0 \\ X + Y \geq 90 \\ Y \geq X + 5 \end{cases}$$



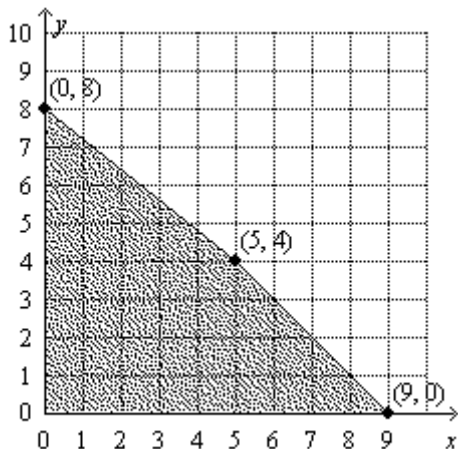
b.
$$\begin{cases} X \geq 0 \\ Y \geq 0 \\ X + Y \leq 90 \\ Y \geq X + 5 \end{cases}$$



d.
$$\begin{cases} X \geq 0 \\ Y \geq 0 \\ X + Y \leq 90 \\ Y \geq X - 5 \end{cases}$$



13. 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

14. Given the system of constraints, name all vertices. Then find the maximum value of the given objective function.

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ 6x - 2y \leq 12 \\ 4y \leq 4x + 8 \end{cases}$$

Maximum for $C = 4x - 3y$

- a. $(0, 2), (2, 0), (4, 6)$; maximum value of -6
 b. $(0, 2), (2, 0), (6, 4)$; maximum value of 12
 c. $(0, 2), (2, 0), (4, 2)$; maximum value of 10
 d. $(0, 2), (2, 0), (4, 6)$; maximum value of 8

15. A manufacturer determines that the number of drills it can sell is given by the formula $D = -3p^2 + 180p - 285$, where p is the price of the drills in dollars.

- a. At what price will the manufacturer sell the maximum number of drills?
 b. What is the maximum number of drills that can be sold?

- a. \$60; 285 drills
 b. \$30; 2,415 drills
 c. \$31; 2,418 drills
 d. \$90; 8,385 drills

16. Use a graphing calculator to solve the equation $8x^2 - 5x - 10 = 0$. If necessary, round to the nearest hundredth.

- a. 1.16, -1.16
 b. 1.47, -0.85
 c. 2.95, -1.7
 d. 0.85, -1.47

Solve the equation.

- _____ 17. $3|3x + 4| - 7 = 5$
a. $x = \frac{8}{9}$ or $x = -\frac{2}{9}$
b. $x = 0$ or $x = -2\frac{2}{3}$
c. $x = \frac{8}{9}$ or $x = -2\frac{2}{3}$
d. $x = \frac{8}{9}$ or $x = 0$
- _____ 18. $\sqrt{x + 10} - 7 = -5$
a. 14
b. -8
c. 4
d. -6
- _____ 19. $(x + 8)^{\frac{2}{3}} = 9$
a. 19; -35
b. 35; -35
c. 1
d. 17
- _____ 20. Write two linear equations you can use to graph the equation.

$$y = \left| \frac{3}{2}x + 6 \right| + 3$$

- a. $y = \begin{cases} \frac{3}{2}x + 3, & \text{if } x \geq -4 \\ -\frac{3}{2}x - 9, & \text{if } x < -4 \end{cases}$
b. $y = \begin{cases} \frac{3}{2}x + 9, & \text{if } x \geq -4 \\ -\frac{3}{2}x - 3, & \text{if } x < -4 \end{cases}$
c. $y = \begin{cases} \frac{3}{2}x + 9, & \text{if } x \leq -4 \\ -\frac{3}{2}x - 3, & \text{if } x > -4 \end{cases}$
d. $y = \begin{cases} -\frac{3}{2}x + 3, & \text{if } x \geq -4 \\ \frac{3}{2}x - 9, & \text{if } x < -4 \end{cases}$

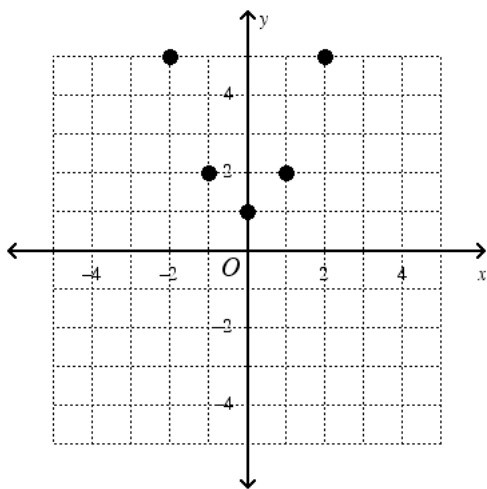
Write in standard form an equation of the line passing through the given point with the given slope.

- _____ 21. slope = -8; (-2, -2)
a. $8x + y = -18$
b. $-8x + y = -18$
c. $8x - y = -18$
d. $8x + y = 18$

Find any points of discontinuity for the rational function.

- _____ 22. $y = \frac{x - 8}{x^2 + 6x - 7}$
a. $x = 1, x = 7$
b. $x = 8$
c. $x = 1, x = -7$
d. $x = -1, x = 7$

- _____ 23. Describe the vertical asymptote(s) and hole(s) for the graph of $y = \frac{(x - 5)(x - 2)}{(x - 2)(x + 4)}$.
- asymptote: $x = -4$ and hole: $x = 2$
 - asymptotes: $x = -4$ and $x = 2$
 - asymptote: $x = -5$ and hole: $x = -4$
 - asymptote: $x = 4$ and hole: $x = -2$
- _____ 24. Write the ordered pairs for the relation. Find the domain and range.



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

Determine whether the function is linear or quadratic. Identify the quadratic, linear, and constant terms.

- _____ 25. $f(x) = (3x + 2)(-6x - 3)$
- | | |
|---|--|
| <ol style="list-style-type: none"> linear function
linear term: $-21x$
constant term: -6 quadratic function
quadratic term: $-18x^2$
linear term: $-21x$
constant term: -6 | <ol style="list-style-type: none"> quadratic function
quadratic term: $6x^2$
linear term: $24x$
constant term: -6 linear function
linear term: $-18x^2$
constant term: -6 |
|---|--|
- _____ 26. Write the expression $(x + 6)(x - 4)$ as a polynomial in standard form.
- | | |
|---|---|
| <ol style="list-style-type: none"> $x^2 - 10x + 2$ $x^2 + 10x - 24$ | <ol style="list-style-type: none"> $x^2 + 2x - 24$ $x^2 + 10x - 10$ |
|---|---|
- _____ 27. Write $4x^3 + 8x^2 - 96x$ in factored form.
- | | |
|--|---|
| <ol style="list-style-type: none"> $6x(x + 4)(x - 4)$ $4x(x - 4)(x + 6)$ | <ol style="list-style-type: none"> $4x(x + 6)(x + 4)$ $-4x(x + 6)(x + 4)$ |
|--|---|

- _____ 28. Over two summers, Ray saved \$1000 and \$600. The polynomial $1000x^2 + 600x$ represents her savings after three years, where x is the growth factor. (The interest rate r is $x - 1$.) What is the interest rate she needs to save \$1850 after three years?
- a. 9.3% b. 1.1% c. -269.3% d. 0.1%

Use Pascal's Triangle to expand the binomial.

- _____ 29. $(d + 3)^7$
- a. $d^7 + 21d^6 + 189d^5 + 945d^4 + 2835d^3 + 5103d^2 + 5103d + 2187$
 b. $d^7 - 7d^6 + 21d^5 - 35d^4 + 35d^3 - 20d^2 + 7d - 1$
 c. $d^7 + 7d^6 + 21d^5 + 35d^4 + 35d^3 + 20d^2 + 7d + 1$
 d. $d^7 - 21d^6 + 189d^5 - 945d^4 + 2835d^3 - 5103d^2 + 5103d - 2187$
- _____ 30. A manufacturer of shipping boxes has a box shaped like a cube. The side length is $5a + 4b$. What is the volume of the box in terms of a and b ?
- a. $a^3 + 3a^2b + 3ab^2 + b^3$ c. $125a^3 - 300a^2b + 240ab^2 - 64b^3$
 b. $125a^3 + 300a^2b + 240ab^2 + 64b^3$ d. $a^3 - 3a^2b + 3ab^2 - b^3$
- _____ 31. Use the Binomial Theorem to expand $(d - 3b)^3$.
- a. $d^3 - 3d^2b + 3db^2 - b^3$
 b. $d^3 + 3d^2b + 3db^2 + b^3$
 c. $d^3 + 9d^2b + 27db^2 + 27b^3$
 d. $d^3 - 9d^2b + 27db^2 - 27b^3$
- _____ 32. Determine the probability of getting four heads when tossing a coin four times.
- a. 0.5 b. 0.375 c. 0.25 d. 0.0625

Multiply and simplify if possible.

- _____ 33. $\sqrt{6} \cdot \sqrt{2}$
- a. $2\sqrt{3}$ b. $\sqrt{12}$ c. $3\sqrt{2}$ d. not possible
- _____ 34. $\sqrt[4]{3} \cdot \sqrt[4]{-3}$
- a. -3 b. 3 c. $3\sqrt[4]{-3}$ d. not possible
- _____ 35. $\sqrt{7x}(\sqrt{x} - 7\sqrt{7})$
- a. $x\sqrt{7} - 49\sqrt{x}$ c. $x\sqrt{7} - x\sqrt{49}$
 b. $\sqrt{7x} - 49x$ d. $-\sqrt{42x}$
- _____ 36. Simplify $\sqrt[3]{128a^{13}b^6}$. Assume that all variables are positive.
- a. $4a^4b^2\sqrt[3]{2a}$ c. $4a^4b^3\sqrt[3]{a}$
 b. $2a^4b^2\sqrt[3]{4a}$ d. none of these

Add if possible.

- ___ 37. $2^4\sqrt{2x} + 6^4\sqrt{2x}$
a. $8^4\sqrt{4x}$ c. $8^4\sqrt{2x}$
b. $16^4\sqrt{2x}$ d. not possible to simplify
- ___ 38. $4^3\sqrt{3x} + 5^3\sqrt{10x}$
a. $9^3\sqrt{13x}$ c. $27^3\sqrt{10x}$
b. $27^3\sqrt{3x}$ d. not possible to simplify

Subtract if possible.

- ___ 39. $4\sqrt{3} - 3\sqrt{4}$
a. $4\sqrt{3} - 6$ c. 1
b. $\sqrt{7}$ d. not possible to simplify

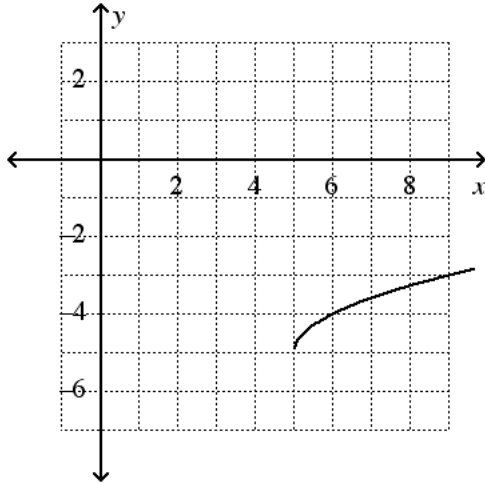
Simplify.

- ___ 40. $-\sqrt{5} - 3\sqrt{36} + 6\sqrt{5}$
a. $5\sqrt{5} - 18$ c. $-5\sqrt{5} - 18$
b. $5\sqrt{5} - 3\sqrt{36}$ d. none of these
- ___ 41. $20^{\frac{1}{2}} \cdot 20^{\frac{1}{2}}$
a. $20^{\frac{1}{4}}$ b. $\sqrt{20}$ c. 20 d. 1
- ___ 42. $\frac{\sqrt{90x^{18}}}{\sqrt{2x}}$
a. $3x^8\sqrt{5x}$ c. $5x\sqrt{3x^8}$
b. $\sqrt{18x^{17}}$ d. none of these
- ___ 43. Write the radical expression $\frac{8}{\sqrt[7]{x^{15}}}$ in exponential form.
a. $8x^{-\frac{7}{15}}$ b. $8x^{\frac{15}{7}}$ c. $8x^{-\frac{15}{7}}$ d. $8x^{\frac{7}{15}}$
- ___ 44. The area of a circular trampoline is 112.07 square feet. What is the radius of the trampoline? Round to the nearest hundredth.
a. 3.37 feet c. 5.97 feet
b. 10.59 feet d. 35.67 feet
- ___ 45. $(9x - 7)^{\frac{1}{5}} = (2 + 5x)^{\frac{1}{5}}$
a. $\frac{4}{9}$ b. $-\frac{5}{14}$ c. $\frac{9}{4}$ d. $\frac{12}{7}$

___ 46. Let $f(x) = 3x + 2$ and $g(x) = 7x + 6$. Find $f \cdot g$ and its domain.

- a. $6x^2 + 4x + 42$; all real numbers except $x = -\frac{2}{3}$
- b. $6x^2 + 4x + 42$; all real numbers
- c. $21x^2 + 32x + 12$; all real numbers
- d. $21x^2 + 32x + 12$; all real numbers except $x = -\frac{6}{7}$

___ 47. Which function matches the graph?



- a. $y = \sqrt{x + 5} + 5$
- b. $y = \sqrt{x - 5} - 5$
- c. $y = \sqrt{x + 5} - 5$
- d. $y = \sqrt{x - 5} + 5$

___ 48. Find the least common multiple of $x^3 - x^2 + x - 1$ and $x^2 - 1$. Write the answer in factored form.

- a. $(x + 1)^2(x - 1)$
- b. $(x + 1)(x - 1)(x^2 + 1)$
- c. $(x^3 - x^2 + x - 1)(x^2 - 1)$
- d. $(x + 1)(x - 1)(x^2 - 1)$

Add or subtract. Simplify if possible.

___ 49. $\frac{3}{m + 5} + \frac{8}{m^2 - 25}$

- a. $\frac{11}{(m - 5)(m + 5)}$
- b. $\frac{11}{m^2 + m - 20}$
- c. $\frac{3m - 7}{(m - 5)(m + 5)}$
- d. $\frac{3m + 23}{(m - 5)(m + 5)}$

Simplify the complex fraction.

_____ 50.
$$\frac{\frac{n-6}{n^2+11n+24}}{\frac{n+1}{n+3}}$$

a.
$$\frac{(n-6)(n+1)}{(n+3)^2(n+8)}$$

b.
$$\frac{(n-6)(n+8)}{(n+1)(n-8)}$$

c.
$$\frac{(n-6)(n+1)}{(n+3)(n+8)}$$

d.
$$\frac{n-6}{(n+1)(n+8)}$$

_____ 51. Use the Change of Base Formula to evaluate $\log_4 20$. Then convert $\log_4 20$ to a logarithm in base 3. Round to the nearest thousandth.

a. 2.161; $\log_3 15$

b. 2.996; $\log_3 10.741$

c. 1.301; $\log_3 15$

d. 2.161; $\log_3 10.741$

_____ 52. Solve $125^{9x-2} = 150$.

a. -1.8847

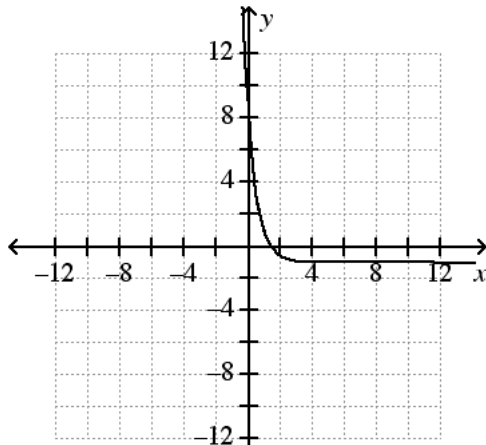
b. -0.1069

c. 0.3375

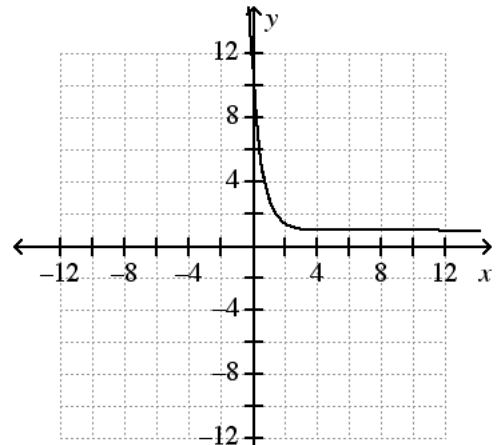
d. 1.0378

53. Graph $y = 2\left(\frac{1}{5}\right)^{x-1} + 1$.

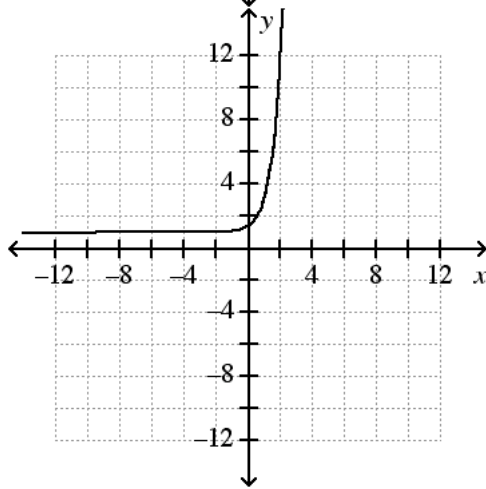
a.



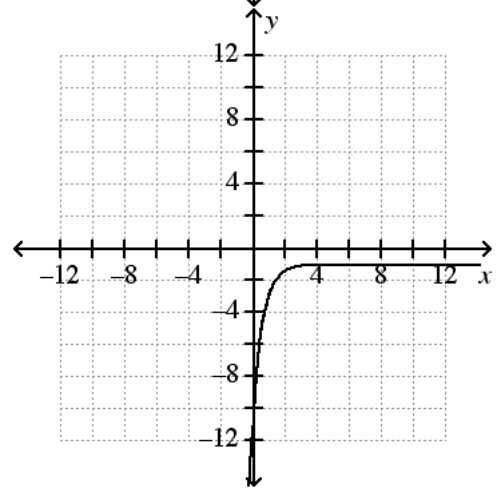
c.



b.



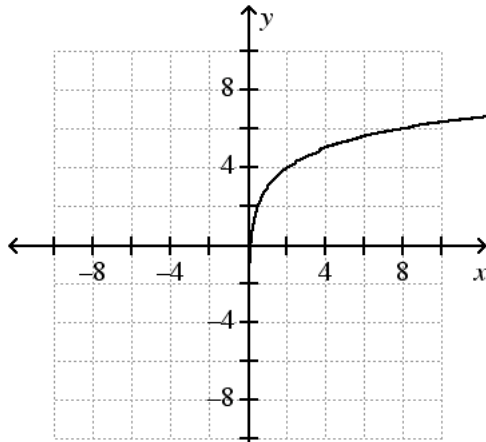
d.



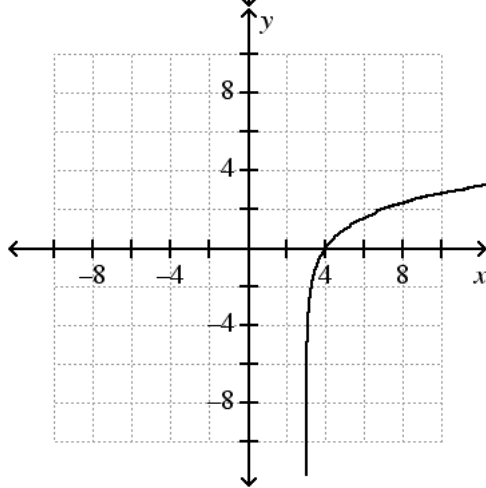
Graph the logarithmic equation.

54. $y = \log_2 x - 3$

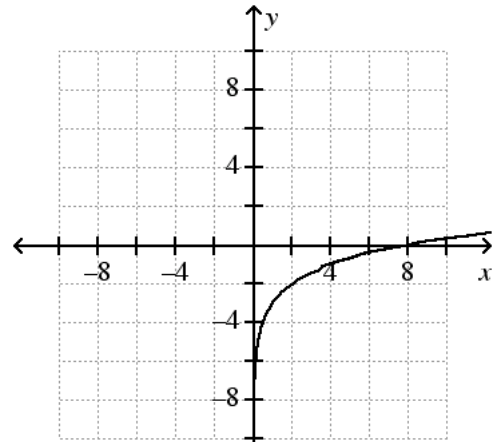
a.



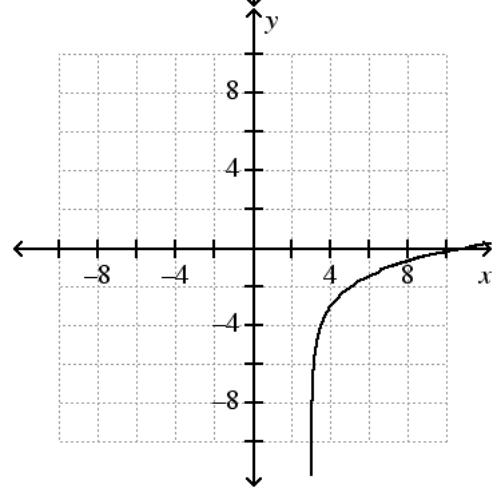
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c.

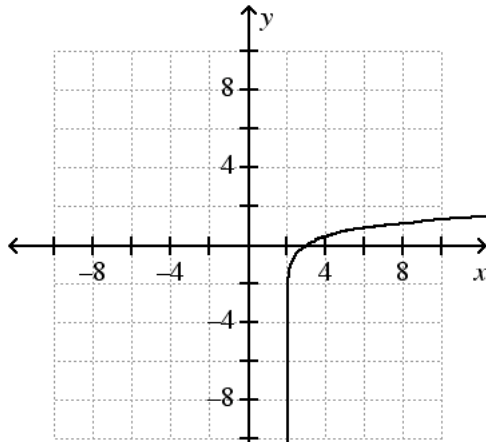


d.

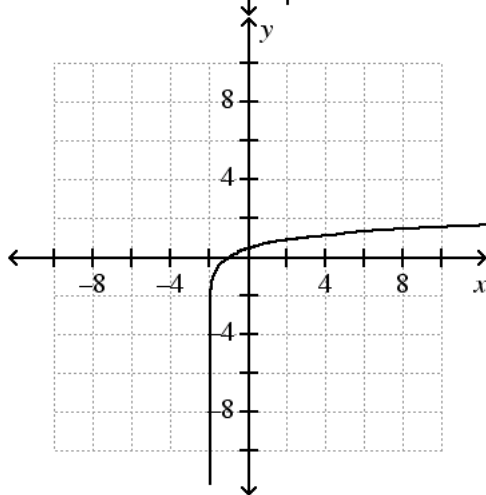


55. $y = \log_5(x - 2)$

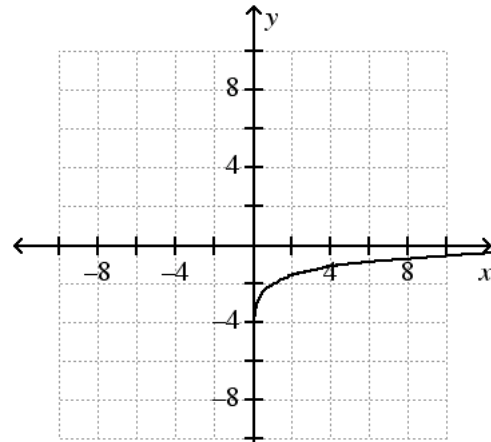
a.



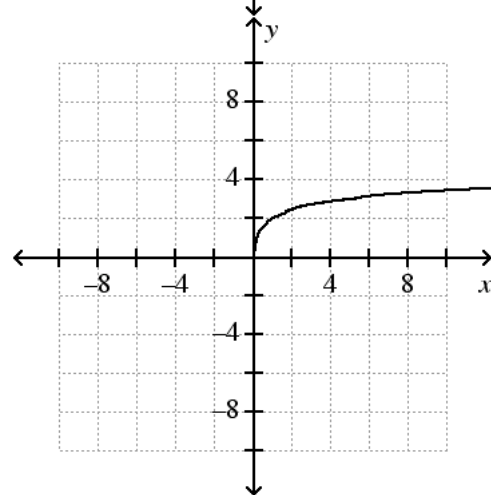
b.



c.



d.



Write the expression as a single logarithm.

56. $4 \log x - 6 \log(x + 2)$

a. $24 \log \frac{x}{x + 2}$

b. $\log x^4(x + 2)^6$

c. $\log x(x + 2)^{24}$

d. none of these

Expand the logarithmic expression.

57. $\log_3 11p^3$

a. $\log_3 11 \cdot 3 \log_3 p$

b. $\log_3 11 - 3 \log_3 p$

c. $\log_3 11 + 3 \log_3 p$

d. $11 \log_3 p^3$

- _____ 58. $\log_b \sqrt{\frac{57}{74}}$
- a. $\frac{1}{2} \log_b 57 + \frac{1}{2} \log_b 74$ c. $\sqrt{\log_b 57 - \log_b 74}$
- b. $\frac{1}{2} \log_b 57 - \frac{1}{2} \log_b 74$ d. $\log_b \frac{1}{2} (57 - 74)$
- _____ 59. Use the properties of logarithms to evaluate $\log_3 9 + \log_3 36 - \log_3 4$.
- a. 2 b. 4 c. 8 d. 41
- _____ 60. Solve $\frac{1}{16} = 64^{4x-3}$.
- a. $\frac{1}{12}$ b. $\frac{1}{4}$ c. $\frac{7}{12}$ d. $\frac{11}{12}$
- _____ 61. Use the Change of Base Formula to solve $2^{2x} = 90$. Round to the nearest ten-thousandth.
- a. 7.6133 b. 9.3658 c. 3.2459 d. 12.9837
- _____ 62. Use a graphing calculator. Solve $5^{4x} = 2115$ by graphing. Round to the nearest hundredth.
- a. 1.19 b. 0.83 c. 4.76 d. 3.33

Write the expression as a single natural logarithm.

- _____ 63. $3 \ln x - 2 \ln c$
- a. $\ln \frac{x^3}{c^2}$ b. $\ln(x^3 + c^2)$ c. $\ln(x^3 - c^2)$ d. $\ln x^3 c^2$
- _____ 64. The sales of lawn mowers t years after a particular model is introduced is given by the function $y = 5500 \ln(9t + 4)$, where y is the number of mowers sold. How many mowers will be sold 2 years after a model is introduced? Round the answer to the nearest whole number.
- a. 37,897 mowers c. 15,901 mowers
- b. 7,383 mowers d. 17,000 mowers

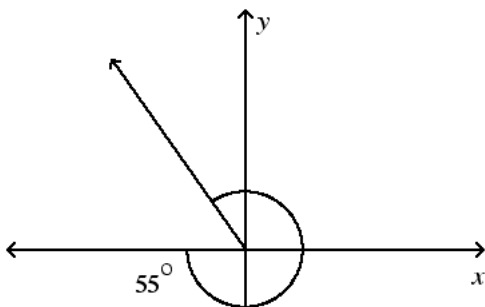
Use natural logarithms to solve the equation. Round to the nearest thousandth.

- _____ 65. $6e^{4x} - 2 = 3$
- a. -0.448 b. 0.327 c. 0.067 d. -0.046

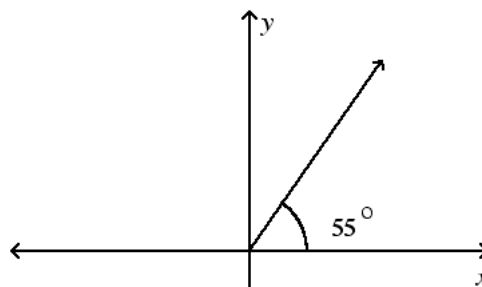
Sketch the angle in standard position.

66. 55°

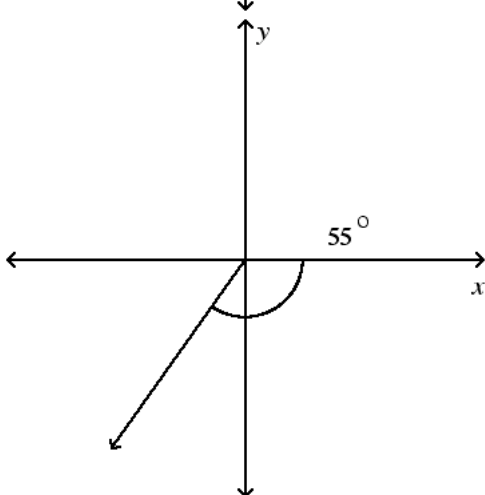
a.



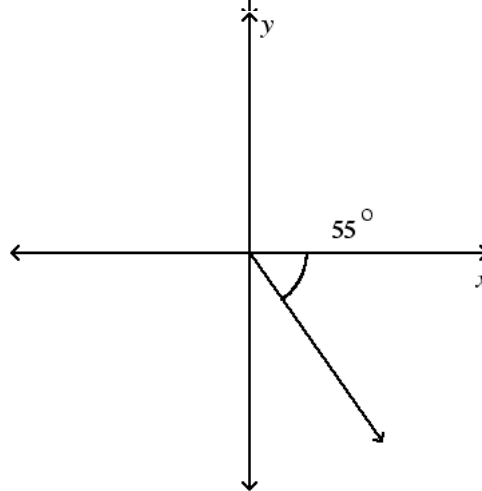
c.



b.



d.



67. In which quadrant does the terminal side of a 118° angle lie?

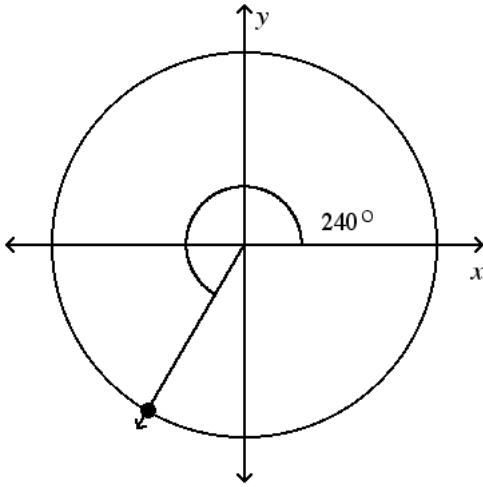
a. third quadrant

c. first quadrant

b. second quadrant

d. fourth quadrant

___ 68. Find the cosine and sine of 240° . Round your answers to the nearest hundredth if necessary.



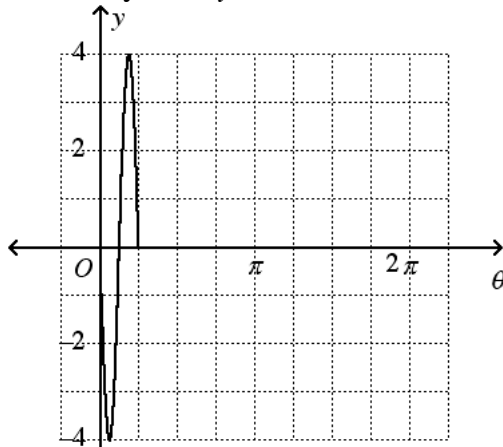
- a. $-0.5, -0.87$ b. $-0.87, -0.5$ c. $0, -1$ d. $-0.95, -0.55$

___ 69. For an angle in standard position measuring -163° , find the values of $\cos \theta$ and $\sin \theta$. Round your answers to the nearest hundredth.

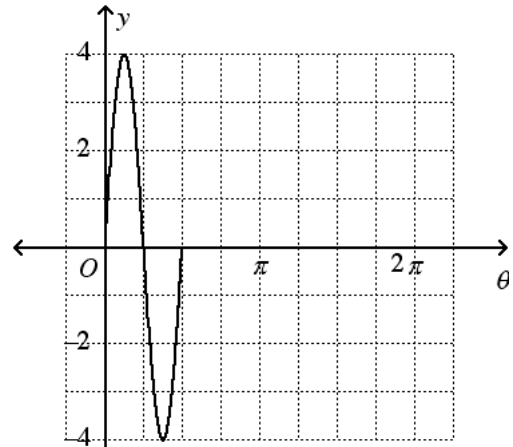
- a. $0.96, -0.29$ c. $-0.96, -0.29$
b. $0.96, 0.29$ d. $-0.96, 0.29$

70. Sketch one cycle of $y = 4 \sin 4\theta$.

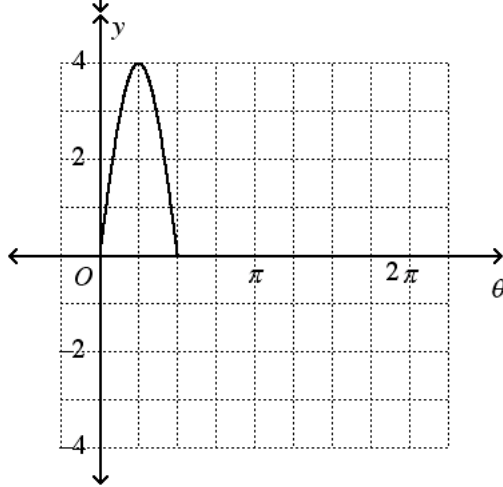
a.



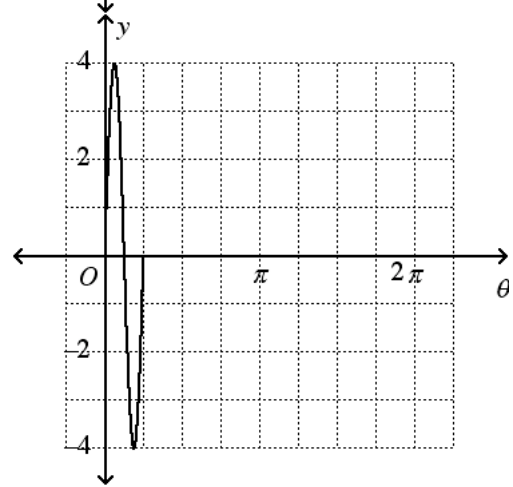
c.



b.



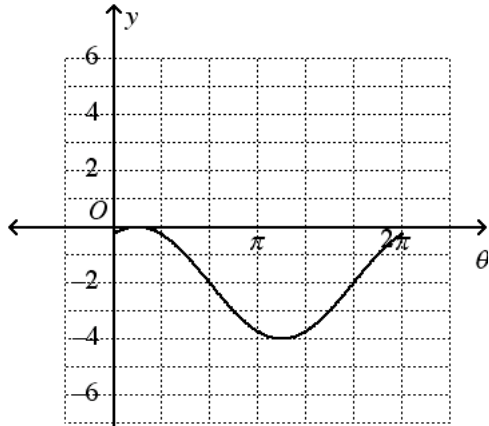
d.



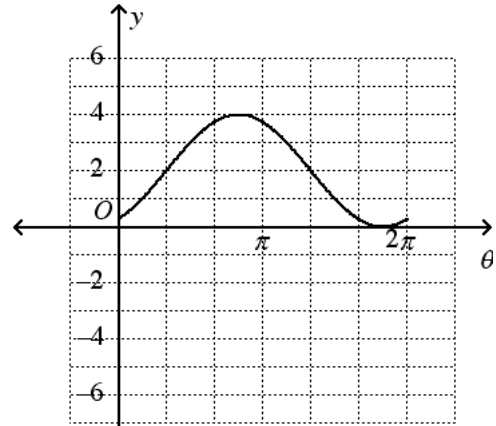
Graph the function in the interval from 0 to 2π .

71. $y = 2 \cos\left(x - \frac{\pi}{6}\right) + 2$

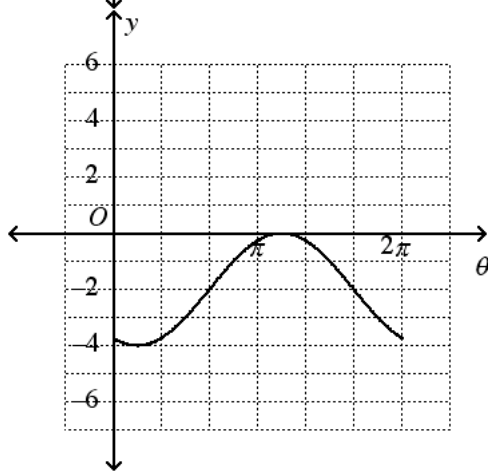
a.



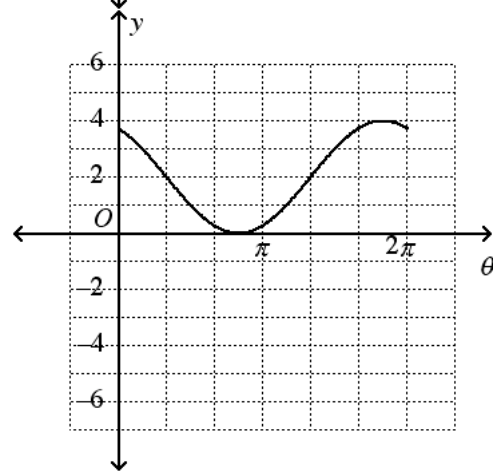
c.



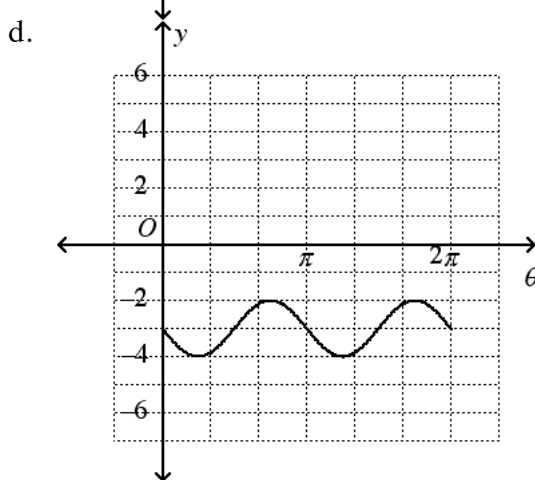
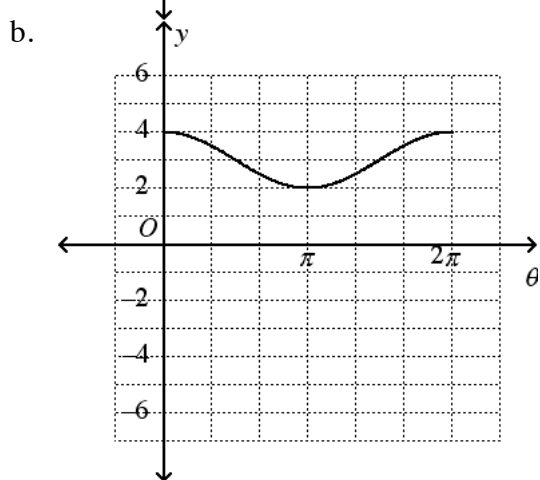
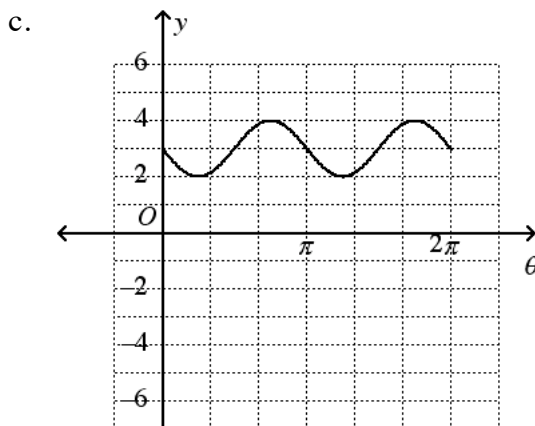
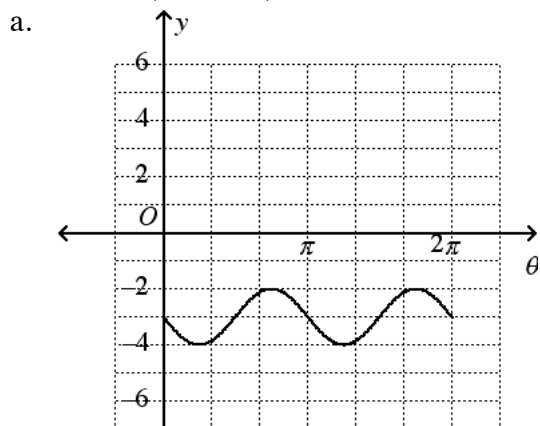
b.



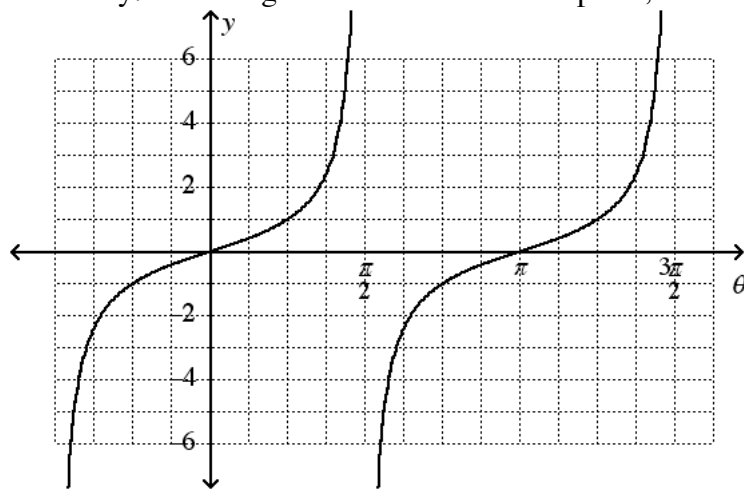
d.



72. $y = \sin 2\left(x + \frac{\pi}{2}\right) + 3$



73. Use the graph of $y = \tan x$ to find the value of $y = \tan \frac{1}{8}\pi$. Round to the nearest tenth if necessary. If the tangent is undefined at that point, write *undefined*.



a. 0

b. 1

c. 0.4

d. 2.4

- ___ 74. Suppose $\tan\theta = \frac{8}{15}$. Find $\cot\theta$.
- a. 120 b. $-\frac{15}{8}$ c. $-\frac{8}{15}$ d. $\frac{15}{8}$
- ___ 75. Find the exact value of $\csc 135^\circ$. If the expression is undefined, write *undefined*.
- a. 0 b. undefined c. $\frac{1}{2}$ d. $\sqrt{2}$
- ___ 76. Find the exact value of $\sec(-270^\circ)$. If the expression is undefined, write *undefined*.
- a. undefined b. 1 c. 0 d. -1
- ___ 77. Use a graphing calculator to solve the equation $-6 \cos \frac{\pi}{3} \theta = 4$ in the interval from 0 to 2π .
Round to the nearest hundredth.
- a. 2.41, 4.17 c. 2.30, 3.98
b. 2.20, 3.80 d. -3.80, -2.20, 2.20, 3.80
- ___ 78. Write an equation of the cosine function with amplitude 2 and period 4π .
- a. $y = -\frac{1}{2} \cos\left(\frac{1}{2}x\right)$ c. $y = 2 \cos\left(\frac{1}{2}x\right)$
b. $y = \frac{1}{2} \cos\left(\frac{1}{4}x\right)$ d. $y = -2 \cos\left(\frac{1}{4}x\right)$
- ___ 79. Identify the expression that completes the equation so that it is an identity.
- $$\frac{\sin^2\theta}{1 - \cos\theta} =$$
- a. $\frac{1 + \sec\theta}{\sec\theta}$ b. $\sin\theta$ c. $\frac{1 - \sin\theta}{\cos\theta}$ d. $\frac{1 + \sin\theta}{\cos\theta}$

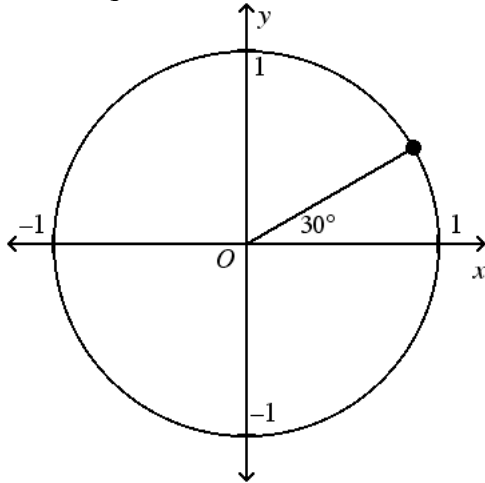
Simplify the trigonometric expression.

- ___ 80. $\sec\theta \cos\theta$
- a. $\tan\theta$ b. 1 c. $\cot\theta$ d. $\sin\theta$
- ___ 81. $\frac{1}{1 + \sin\theta} + \frac{1}{1 - \sin\theta}$
- a. $2 \cos^2\theta$ b. $2 \sec^2\theta$ c. $2 \csc^2\theta$ d. $2 \cot^2\theta$

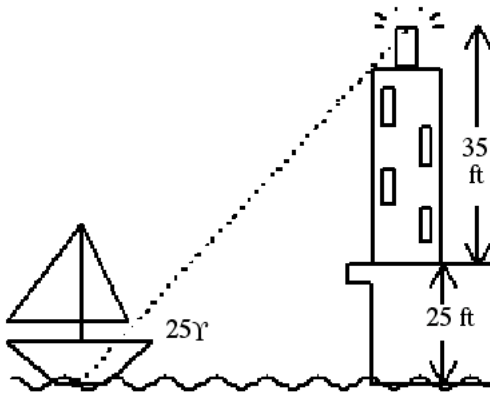
Solve the equation for $0 \leq \theta < 2\pi$. Write your answer as a multiple of π , if possible.

- ___ 82. $\tan^2\theta = -\frac{3}{2} \sec\theta$
- a. $\frac{\pi}{2}, \frac{5\pi}{2}$ b. $\frac{3\pi}{4}, \frac{5\pi}{4}$ c. $\frac{\pi}{3}, \frac{5\pi}{3}$ d. $\frac{2\pi}{3}, \frac{4\pi}{3}$

83. The equation $h = -3 \cos \frac{\pi}{2} t$ models the height h in centimeters after t seconds of a set of keys attached to the end of a spring that has been stretched and then released. When will the set of keys first be 3 inches above the resting position?
- a. 1.6 seconds b. 1 second c. 3.3 seconds d. 2 seconds
84. The diagram shows one solution to the equation $3 - \sin \theta = 5 \sin \theta$. Find the complete solution of the equation.



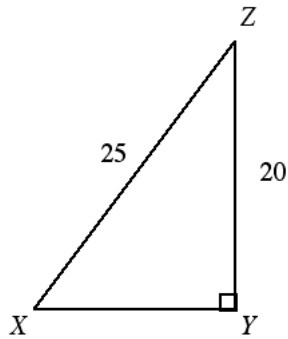
- a. $30^\circ + n \cdot 360^\circ, 150^\circ + n \cdot 360^\circ$ c. $30^\circ + n \cdot 360^\circ, 330^\circ + n \cdot 360^\circ$
 b. $30^\circ + n \cdot 360^\circ, 210^\circ + n \cdot 360^\circ$ d. $30^\circ + n \cdot 360^\circ, 120^\circ + n \cdot 360^\circ$
85. The line of sight from a small boat to the light at the top of a 35-foot lighthouse built on a cliff 25 feet above the water makes a 25° angle with the water. To the nearest foot, how far is the boat from the cliff?



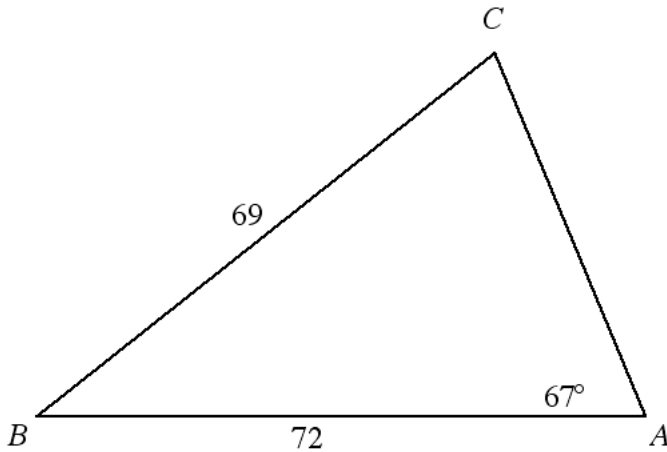
Drawing is not to scale.

- a. 141 feet b. 128 feet c. 27 feet d. 75 feet

86. In $\triangle XYZ$, $\angle Y$ is a right angle and $\sin X = \frac{20}{25}$. Find $\cos X$ in fraction and in decimal form. Round to the nearest hundredth, if necessary.

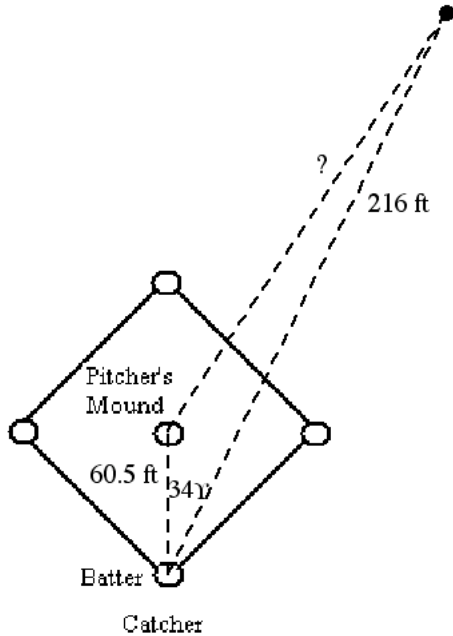


- a. $\frac{15}{20}$; 0.75 b. $\frac{25}{20}$; 1.25 c. $\frac{15}{25}$; 0.6 d. $\frac{25}{15}$; 1.67
87. Use the Law of Sines. Find $m\angle C$ to the nearest tenth.



- a. 106.2° b. 118.1° c. 61.9° d. 73.8°

88. On a baseball field, the pitcher's mound is 60.5 feet from home plate. During practice, a batter hits a ball 216 feet deep. The path of the ball makes a 34° angle with the line connecting the pitcher and the catcher, to the right of the pitcher's mound. An outfielder catches the ball and throws it to the pitcher. How far does the outfielder throw the ball?



- a. 207.4 ft b. 224.3 ft c. 169.3 ft d. 198.7 ft

Which expression completes the trigonometric identity?

89. $\csc(-\theta) =$
 a. $-\csc \theta$ b. $-\sin \theta$ c. $\sin \theta$ d. $\csc \theta$

Find the value of the trigonometric expression.

90. $\cos 150^\circ \cos 120^\circ - \sin 150^\circ \sin 120^\circ$
 a. $\frac{1}{2}$ b. 0 c. 1 d. -1

Use a double-angle identity to find the exact value of the expression.

91. $\tan 420^\circ$
 a. $-\sqrt{3}$ b. $\frac{\sqrt{3}}{3}$ c. $\sqrt{3}$ d. $-\frac{\sqrt{3}}{3}$

- _____ 92. Given $\sin \theta = \frac{12}{37}$ and $90^\circ \leq \theta \leq 180^\circ$, find the exact value of $\cos \frac{\theta}{2}$.
- a. $-\frac{\sqrt{37}}{37}$ b. $\frac{\sqrt{37}}{37}$ c. $\frac{1}{6}$ d. $\frac{6\sqrt{37}}{37}$

Short Answer

93. The area of a round plate is a function of the radius of the circle. Write a function to model the area of a round plate. Evaluate the function for a plate of radius 5.5 in.

94. Graph the relation.

$$\left\{ (0, 3), \left(2, 4\frac{1}{2}\right), \left(1\frac{1}{2}, 5\right), (4, -1), (-4, 4) \right\}$$

95. Is the relation $\{(3, 5), (-4, 5), (-5, 0), (1, 1), (4, 0)\}$ a function? Explain.

96. Find the slope of the line. Show your work.

$$Rx + Sy = T$$

97. The volume in cubic feet of a box can be expressed as $V(x) = x^3 - 6x^2 + 8x$, or as the product of three linear factors with integer coefficients. The width of the box is $2 - x$.

- Factor the polynomial to find linear expressions for the height and the width.
- Graph the function. Find the x -intercepts. What do they represent?
- Describe a realistic domain for the function.
- Find the maximum volume of the box.

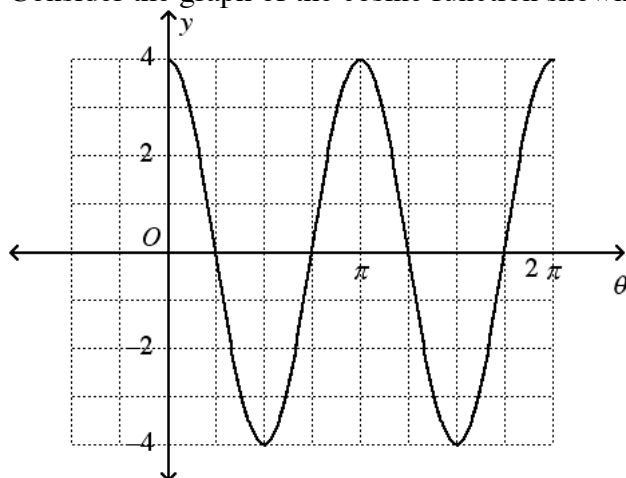
98. The velocity of sound in air is given by the equation $v = 20\sqrt{273 + t}$, where v is the velocity in meters per second and t is the temperature in degrees Celsius.

- Find the temperature when the velocity of sound in air is 318 meters per second. Round the answer to the nearest degree.
- Find the velocity of sound in meters per second when the temperature is 20°C . Round the answer to the nearest meter per second.

99. Consider $\log_{\frac{1}{4}} 31$.

- Use the Change of Base Formula to evaluate the expression. Explain your steps.
- Convert the expression to a logarithm in base 9.

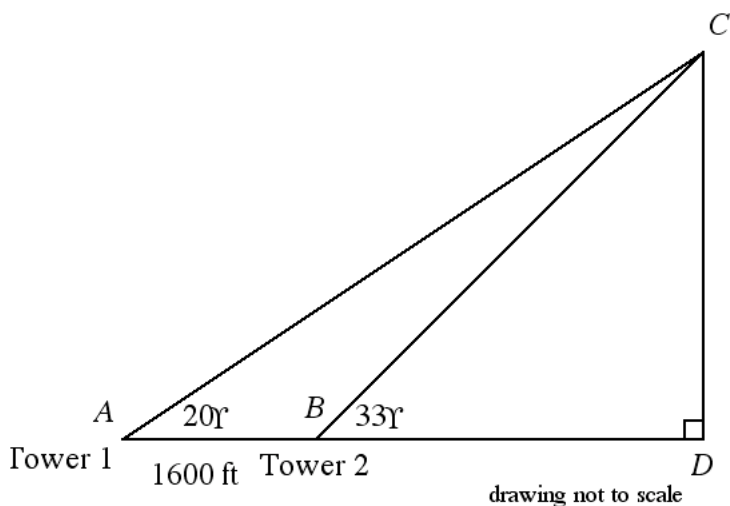
100. Consider the graph of the cosine function shown below.



- Find the period and amplitude of the cosine function.
- At what values of x for $0 \leq \theta \leq 2\pi$ do the maximum value(s), minimum value(s), and zeros occur?

101. Use a graphing calculator to solve the equation $-3 \cos t = 1$ in the interval from 0 to 2π . Round to the nearest hundredth.

102. A plane is located at C on the diagram. There are two towers located at A and B . The distance between the towers is 1,600 feet, and the angles of elevation are given.



- Find BC , the distance from Tower 2 to the plane, to the nearest foot.
 - Find CD , the height of the plane from the ground, to the nearest foot.
103. Use the definitions of the trigonometric ratios for a right triangle to derive a cofunction identity for $\tan(90^\circ - A)$. Show your steps.
104. Use an angle sum identity to verify the identity $\cos 2\theta = 2 \cos^2\theta - 1$.

Essay

105. A model for the height of a toy rocket shot from a platform is $y = -16x^2 + 145x + 7$, where x is the time in seconds and y is the height in feet.
- Graph the function.
 - Find the zeros of the function.
 - What do the zeros represent? Are they realistic?
 - About how high does the rocket fly before hitting the ground? Explain.
106. Suppose you invest \$580 at 10% compounded continuously.
- Write an exponential function to model the amount in your investment account.
 - Explain what each value in the function model represents.
 - In how many years will the total reach \$3600? Show your work.

Other

107. Consider system of equations.
- $$y = ax^2 + bx + c$$
- $$y = nx^2 + mx + p$$
- Suppose the two parabolas have the same axis of symmetry. How many possible solutions does the system have? Explain.
108. The time required to grow a certain bacteria in a culture beginning with 100 bacteria is $t = \frac{\ln B - \ln 100}{1.532}$, where B is the number of bacteria and t is the time in hours.
- How much time is required to grow a culture of 500 bacteria? Show the steps you used to find the number of hours. Round your answer to the nearest tenth.
 - How many bacteria will be in the culture in about 5.5 hours? Show the steps you used to find the number of bacteria. Round your answer to the nearest 100.
109. Sketch the graphs of $y = \sin x$, $y = \sin 2x$, and $y = 2 \sin x$. Describe how the graphs are alike and how they are different.
110. Waves with an amplitude of 2 feet pass a dock every 30 seconds. Write an equation for a cosine function to model the height of a water particle above and below the mean water line. Explain your steps.

Sample Placement Test to Determine Placement in Algebra II or Pre-Calculus Answer Section

MULTIPLE CHOICE

1. ANS: B DIF: L2 REF: 2-1 Relations and Functions
OBJ: 2-1.2 Identifying Functions
STO: KS 2.2.1, KS 2.3.1, KS 2.3.2, KS 2.3.7, KS 2.3.8, KS 2.3.12
TOP: 2-1 Example 5 KEY: domain,range,relation
MSC: NAEP A2b, NAEP A2e, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.PRA,
S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56
2. ANS: C DIF: L1 REF: 2-1 Relations and Functions
OBJ: 2-1.2 Identifying Functions
STO: KS 2.2.1, KS 2.3.1, KS 2.3.2, KS 2.3.7, KS 2.3.8, KS 2.3.12
TOP: 2-1 Example 5 KEY: graphing,vertical-line test
MSC: NAEP A2b, NAEP A2e, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.PRA,
S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56
3. ANS: B DIF: L1 REF: 2-6 Vertical and Horizontal Translations
OBJ: 2-6.1 Translating Graphs Vertically TOP: 2-6 Example 3
KEY: horizontal translation,vertical translation
MSC: NAEP A2d, CAT5.LV21/22.54, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14,
TV.LV21/22.16, TV.LVALG.56, TV.LVALG.58
4. ANS: D DIF: L1 REF: 2-6 Vertical and Horizontal Translations
OBJ: 2-6.1 Translating Graphs Vertically TOP: 2-6 Example 1
KEY: compare,absolute value,vertical translation
MSC: NAEP A2d, CAT5.LV21/22.54, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14,
TV.LV21/22.16, TV.LVALG.56, TV.LVALG.58
5. ANS: A DIF: L2 REF: 2-6 Vertical and Horizontal Translations
OBJ: 2-6.1 Translating Graphs Vertically TOP: 2-6 Example 3
KEY: vertical translation
MSC: NAEP A2d, CAT5.LV21/22.54, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14,
TV.LV21/22.16, TV.LVALG.56, TV.LVALG.58
6. ANS: A DIF: L3 REF: 2-6 Vertical and Horizontal Translations
OBJ: 2-6.2 Translating Graphs Horizontally TOP: 2-6 Example 8
KEY: translation,horizontal line
MSC: NAEP A2d, CAT5.LV21/22.54, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14,
TV.LV21/22.16, TV.LVALG.56, TV.LVALG.58
7. ANS: D DIF: L3 REF: 2-7 Two-Variable Inequalities
OBJ: 2-7.1 Graphing Linear Inequalities STO: KS 2.2.1, KS 2.2.3
TOP: 2-7 Example 1 KEY: graphing,inequality
MSC: NAEP A4c, NAEP A4d, CAT5.LV21/22.50, CAT5.LV21/22.53, CAT5.LV21/22.54,

IT.LV17/18.AM, IT.LV17/18.DI, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP,
S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.54,
TV.LVALG.56

8. ANS: C DIF: L1 REF: 2-7 Two-Variable Inequalities
OBJ: 2-7.2 Graphing Two-Variable Absolute Value Inequalities STO: KS 2.2.1, KS 2.2.3
TOP: 2-7 Example 4 KEY: absolute value
MSC: NAEP A4c, NAEP A4d, CAT5.LV21/22.50, CAT5.LV21/22.53, CAT5.LV21/22.54,
IT.LV17/18.AM, IT.LV17/18.DI, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP,
S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.54,
TV.LVALG.56
9. ANS: B DIF: L2 REF: 1-5 Absolute Value Equations and Inequalities
OBJ: 1-5.2 Absolute Value Inequalities STO: KS 2.2.3 TOP: 1-5 Example 5
KEY: absolute value, compound inequality containing AND
MSC: NAEP N1g, NAEP A4c, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS,
S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.54
10. ANS: D DIF: L2 REF: 1-5 Absolute Value Equations and Inequalities
OBJ: 1-5.2 Absolute Value Inequalities STO: KS 2.2.3
KEY: absolute value, compound inequality, word problem, problem solving, multi-part question
MSC: NAEP N1g, NAEP A4c, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS,
S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.54
11. ANS: D DIF: L1 REF: 3-3 Systems of Inequalities
OBJ: 3-3.1 Solving Systems of Inequalities
STO: KS 2.2.1, KS 2.2.3, KS 3.4.8 TOP: 3-3 Example 1
KEY: system of inequalities, graphing
MSC: NAEP A4g, CAT5.LV21/22.53, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.DI,
S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.12,
TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.54, TV.LVALG.55
12. ANS: B DIF: L2 REF: 3-3 Systems of Inequalities
OBJ: 3-3.1 Solving Systems of Inequalities
STO: KS 2.2.1, KS 2.2.3, KS 3.4.8 TOP: 3-3 Example 2
KEY: system of inequalities, graphing, word problem, problem solving
MSC: NAEP A4g, CAT5.LV21/22.53, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.DI,
S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.12,
TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.54, TV.LVALG.55
13. ANS: C DIF: L1 REF: 3-4 Linear Programming
OBJ: 3-4.1 Finding Maximum and Minimum Values
STO: KS 2.2.1, KS 2.2.3, KS 3.4.8 TOP: 3-4 Example 1
KEY: linear programming, maximize, maximum value
MSC: NAEP A4a, NAEP A4g, CAT5.LV21/22.53, CAT5.LV21/22.54, IT.LV17/18.AM,
IT.LV17/18.DI, IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA,
TV.LV21/22.14, TV.LV21/22.15, TV.LV21/22.16, TV.LV21/22.17, TV.LVALG.54,
TV.LVALG.55
14. ANS: D DIF: L2 REF: 3-4 Linear Programming
OBJ: 3-4.1 Finding Maximum and Minimum Values

- STO: KS 2.2.1, KS 2.2.3, KS 3.4.8 TOP: 3-4 Example 1
 KEY: linear programming, constraints, vertices, objective function, maximum value
 MSC: NAEP A4a, NAEP A4g, CAT5.LV21/22.53, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.DI, IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.14, TV.LV21/22.15, TV.LV21/22.16, TV.LV21/22.17, TV.LVALG.54, TV.LVALG.55
15. ANS: B DIF: L1 REF: 5-2 Properties of Parabolas
 OBJ: 5-2.2 Finding Maximum and Minimum Values
 STO: KS 2.2.3, KS 2.3.1, KS 2.3.11, KS 3.4.7 TOP: 5-2 Example 4
 KEY: maximum value, multi-part question, problem solving, word problem
 MSC: NAEP A2a, CAT5.LV21/22.54, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.PS, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.14, TV.LV21/22.16, TV.LV21/22.17, TV.LVALG.57
16. ANS: B DIF: L1 REF: 5-5 Quadratic Equations
 OBJ: 5-5.2 Solving by Graphing STO: KS 1.2.2, KS 2.2.3
 TOP: 5-5 Example 4 KEY: graphing calculator, round a number
 MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.17, TV.LVALG.56, TV.LVALG.57
17. ANS: B DIF: L1 REF: 1-5 Absolute Value Equations and Inequalities
 OBJ: 1-5.1 Absolute Value Equations STO: KS 2.2.3 TOP: 1-5 Example 2
 KEY: absolute value
 MSC: NAEP N1g, NAEP A4c, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.54
18. ANS: D DIF: L1 REF: 7-5 Solving Radical Equations
 OBJ: 7-5.1 Solving Radical Equations STO: KS 2.2.3 TOP: 7-5 Example 1
 KEY: radical equation,
 MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53
19. ANS: A DIF: L1 REF: 7-5 Solving Radical Equations
 OBJ: 7-5.1 Solving Radical Equations STO: KS 2.2.3 TOP: 7-5 Example 2
 KEY: radical equation, rational exponent
 MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53
20. ANS: B DIF: L2 REF: 2-5 Absolute Value Functions and Graphs
 OBJ: 2-5.1 Graphing Absolute Value Functions STO: KS 2.3.1, KS 2.3.5
 TOP: 2-5 Example 3 KEY: absolute value
 MSC: NAEP A2d, CAT5.LV21/22.50, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.56
21. ANS: A DIF: L1 REF: 2-2 Linear Equations
 OBJ: 2-2.2 Writing Equations of Lines
 STO: KS 2.2.1, KS 2.2.2, KS 2.3.4, KS 2.3.10, KS 2.3.14, KS 3.4.3, KS 3.4.4, KS 3.4.6

- TOP: 2-2 Example 4
 KEY: point-slope form, standard form of linear equation
 MSC: NAEP A1h, NAEP A2a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.14, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.54, TV.LVALG.56
22. ANS: C DIF: L1 REF: 9-3 Rational Functions and Their Graphs
 OBJ: 9-3.1 Properties of Rational Functions
 STO: KS 2.2.3, KS 2.3.1, KS 2.3.6 TOP: 9-3 Example 1
 KEY: rational function, point of discontinuity
 MSC: NAEP A2a, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.DI, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.15, TV.LV21/22.52, TV.LVALG.56
23. ANS: A DIF: L1 REF: 9-3 Rational Functions and Their Graphs
 OBJ: 9-3.1 Properties of Rational Functions
 STO: KS 2.2.3, KS 2.3.1, KS 2.3.6 TOP: 9-3 Example 2
 KEY: asymptote, vertical asymptote, rational function, graphing, hole in the graph of a function
 MSC: NAEP A2a, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.DI, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.15, TV.LV21/22.52, TV.LVALG.56
24. ANS: A DIF: L1 REF: 2-1 Relations and Functions
 OBJ: 2-1.1 Graphing Relations
 STO: KS 2.2.1, KS 2.3.1, KS 2.3.2, KS 2.3.7, KS 2.3.8, KS 2.3.12
 TOP: 2-1 Example 2 KEY: ordered pair, domain, range, relation
 MSC: NAEP A2b, NAEP A2e, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.PRA, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56
25. ANS: B DIF: L1 REF: 5-1 Modeling Data With Quadratic Functions
 OBJ: 5-1.1 Quadratic Functions and Their Graphs
 STO: KS 2.2.3, KS 2.3.1, KS 2.3.5, KS 2.4.2 TOP: 5-1 Example 1
 KEY: quadratic function, quadratic term, linear term, constant term
 MSC: NAEP A2e, NAEP A2g, CAT5.LV21/22.50, CAT5.LV21/22.53, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.DI, S9.TSK3.DSP, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.PRA, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56, TV.LVALG.57
26. ANS: C DIF: L1 REF: 6-2 Polynomials and Linear Factors
 OBJ: 6-2.1 The Factored Form of a Polynomial
 STO: KS 2.3.1, KS 2.3.6, KS 3.2.2 TOP: 6-2 Example 1
 KEY: polynomial, standard form of a polynomial
 MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53
27. ANS: B DIF: L1 REF: 6-2 Polynomials and Linear Factors
 OBJ: 6-2.1 The Factored Form of a Polynomial
 STO: KS 2.3.1, KS 2.3.6, KS 3.2.2 TOP: 6-2 Example 2
 KEY: factoring a polynomial, polynomial
 MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

28. ANS: A DIF: L2 REF: 6-4 Solving Polynomial Equations
OBJ: 6-4.1 Solving Equations by Graphing
STO: KS 2.2.3, KS 3.2.2 TOP: 6-4 Example 2
KEY: graphing, graphing calculator, polynomial function, problem solving, solving equations
MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56
29. ANS: A DIF: L1 REF: 6-8 The Binomial Theorem
OBJ: 6-8.1 Binomial Expansion and Pascal's Triangle STO: KS 2.1.1, KS 2.1.3
TOP: 6-8 Example 1 KEY: Pascal's Triangle, binomial expansion
MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.52, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.53
30. ANS: B DIF: L2 REF: 6-8 The Binomial Theorem
OBJ: 6-8.1 Binomial Expansion and Pascal's Triangle STO: KS 2.1.1, KS 2.1.3
TOP: 6-8 Example 2
KEY: binomial expansion, Pascal's Triangle, problem solving
MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.52, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.53
31. ANS: D DIF: L1 REF: 6-8 The Binomial Theorem
OBJ: 6-8.2 The Binomial Theorem STO: KS 2.1.1, KS 2.1.3
TOP: 6-8 Example 3 KEY: Pascal's Triangle, binomial expansion
MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.52, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.53
32. ANS: D DIF: L1 REF: 6-8 The Binomial Theorem
OBJ: 6-8.2 The Binomial Theorem STO: KS 2.1.1, KS 2.1.3
TOP: 6-8 Example 4
KEY: binomial expansion, Binomial Theorem, probability, problem solving
MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.52, CAT5.LV21/22.54, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12, TV.LV21/22.16, TV.LVALG.53
33. ANS: A DIF: L1
REF: 7-2 Multiplying and Dividing Radical Expressions
OBJ: 7-2.1 Multiplying Radical Expressions STO: KS 1.4.2
TOP: 7-2 Example 1
KEY: multiplying radical expressions, simplifying a radical expression
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.53
34. ANS: D DIF: L1
REF: 7-2 Multiplying and Dividing Radical Expressions
OBJ: 7-2.1 Multiplying Radical Expressions STO: KS 1.4.2
TOP: 7-2 Example 1
KEY: multiplying radical expressions, simplifying a radical expression

MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.53

35. ANS: A DIF: L3
REF: 7-2 Multiplying and Dividing Radical Expressions
OBJ: 7-2.1 Multiplying Radical Expressions STO: KS 1.4.2
TOP: 7-2 Example 3
KEY: multiplying radical expressions,simplifying a radical expression
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.53
36. ANS: A DIF: L1
REF: 7-2 Multiplying and Dividing Radical Expressions
OBJ: 7-2.1 Multiplying Radical Expressions STO: KS 1.4.2
TOP: 7-2 Example 2
KEY: multiplying radical expressions,simplifying a radical expression
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.53
37. ANS: C DIF: L1 REF: 7-3 Binomial Radical Expressions
OBJ: 7-3.1 Adding and Subtracting Radical Expressions STO: KS 1.4.2
TOP: 7-3 Example 1
KEY: binomial radical expressions,adding radical expressions,like radicals
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53
38. ANS: D DIF: L1 REF: 7-3 Binomial Radical Expressions
OBJ: 7-3.1 Adding and Subtracting Radical Expressions STO: KS 1.4.2
TOP: 7-3 Example 1
KEY: binomial radical expressions,adding radical expressions,like radicals
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53
39. ANS: D DIF: L1 REF: 7-3 Binomial Radical Expressions
OBJ: 7-3.1 Adding and Subtracting Radical Expressions STO: KS 1.4.2
TOP: 7-3 Example 1
KEY: binomial radical expressions,like radicals,subtracting radical expressions
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53
40. ANS: A DIF: L1 REF: 7-3 Binomial Radical Expressions
OBJ: 7-3.1 Adding and Subtracting Radical Expressions STO: KS 1.4.2
TOP: 7-3 Example 3 KEY: like radicals,simplifying a radical expression
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53

41. ANS: C DIF: L1 REF: 7-4 Rational Exponents
OBJ: 7-4.1 Simplifying Expressions with Rational Exponents STO: KS 1.4.2
TOP: 7-4 Example 1 KEY: rational exponent
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP,
S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12,
TV.LV21/22.52, TV.LVALG.53
42. ANS: A DIF: L1
REF: 7-2 Multiplying and Dividing Radical Expressions
OBJ: 7-2.2 Dividing Radical Expressions STO: KS 1.4.2 TOP: 7-2 Example 4
KEY: simplifying a radical expression,divide radical expressions,rationalize the denominator
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11,
TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.53
43. ANS: C DIF: L3 REF: 7-4 Rational Exponents
OBJ: 7-4.1 Simplifying Expressions with Rational Exponents STO: KS 1.4.2
TOP: 7-4 Example 2 KEY: rational exponent,radical form
MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP,
S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.12,
TV.LV21/22.52, TV.LVALG.53
44. ANS: C DIF: L1 REF: 7-5 Solving Radical Equations
OBJ: 7-5.1 Solving Radical Equations STO: KS 2.2.3 TOP: 7-5 Example 3
KEY: problem solving,radical equation
MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP,
S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52,
TV.LVALG.53
45. ANS: C DIF: L1 REF: 7-5 Solving Radical Equations
OBJ: 7-5.1 Solving Radical Equations STO: KS 2.2.3 TOP: 7-5 Example 5
KEY: extraneous solutions,radical equation,rational exponent
MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP,
S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52,
TV.LVALG.53
46. ANS: C DIF: L1 REF: 7-6 Function Operations
OBJ: 7-6.1 Operations with Functions STO: KS 2.3.13 TOP: 7-6 Example 2
KEY: operations with functions,multiplication and division of functions,domain
MSC: NAEP A1g, NAEP A3b, CAT5.LV21/22.49, CAT5.LV21/22.50, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.51,
TV.LV21/22.52, TV.LVALG.56
47. ANS: B DIF: L1 REF: 7-8 Graphing Radical Functions
OBJ: 7-8.1 Radical Functions STO: KS 2.2.3, KS 2.3.1
TOP: 7-8 Example 4
KEY: domain,graphing,range,radical function,translation
MSC: NAEP A2a, CAT5.LV21/22.53, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.DSP,
S9.TSK3.GM, S10.TSK3.DSP, S10.TSK3.GM, TV.LV21/22.14, TV.LV21/22.15, TV.LVALG.56
48. ANS: B DIF: L2
REF: 9-5 Adding and Subtracting Rational Expressions
OBJ: 9-5.1 Adding and Subtracting Rational Expressions STO: KS 1.4.2

- TOP: 9-5 Example 2 KEY: least common multiple, factored form
 MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53
49. ANS: C DIF: L1
 REF: 9-5 Adding and Subtracting Rational Expressions
 OBJ: 9-5.1 Adding and Subtracting Rational Expressions STO: KS 1.4.2
 TOP: 9-5 Example 3
 KEY: simplifying a rational expression, adding rational expressions
 MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53
50. ANS: D DIF: L1
 REF: 9-5 Adding and Subtracting Rational Expressions
 OBJ: 9-5.2 Simplifying Complex Fractions STO: KS 1.4.2
 TOP: 9-5 Example 5
 KEY: dividing rational expressions, simplifying a complex fraction
 MSC: NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53
51. ANS: D DIF: L1 REF: 8-5 Exponential and Logarithmic Equations
 OBJ: 8-5.1 Solving Exponential Equations STO: KS 2.3.1, KS 2.4.2
 TOP: 8-5 Example 2 KEY: Change of Base Formula, evaluating logarithms
 MSC: NAEP A2b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.56
52. ANS: C DIF: L2 REF: 8-5 Exponential and Logarithmic Equations
 OBJ: 8-5.1 Solving Exponential Equations STO: KS 2.3.1, KS 2.4.2
 TOP: 8-5 Example 3 KEY: Change of Base Formula, exponential equation
 MSC: NAEP A2b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.56
53. ANS: C DIF: L1 REF: 8-2 Properties of Exponential Functions
 OBJ: 8-2.1 Comparing Graphs STO: KS 1.3.1, KS 2.2.2
 TOP: 8-2 Example 2 KEY: exponential function, graphing
 MSC: NAEP A1e, NAEP A1h, CAT5.LV21/22.45, CAT5.LV21/22.50, CAT5.LV21/22.53, IT.LV17/18.AM, IT.LV17/18.DI, IT.LV17/18.DP, IT.LV17/18.PS, S9.TSK3.DSP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.DSP, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.15, TV.LV21/22.17, TV.LV21/22.47, TV.LV21/22.52, TV.LVALG.56
54. ANS: B DIF: L1 REF: 8-3 Logarithmic Functions as Inverses
 OBJ: 8-3.2 Graphing Logarithmic Functions STO: KS 2.3.1, KS 2.3.6
 TOP: 8-3 Example 6 KEY: graphing, logarithmic function
 MSC: NAEP A2a, NAEP A3a, NAEP A3b, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.56
55. ANS: A DIF: L1 REF: 8-3 Logarithmic Functions as Inverses

62. ANS: A DIF: L1 REF: 8-5 Exponential and Logarithmic Equations
 OBJ: 8-5.1 Solving Exponential Equations STO: KS 2.3.1, KS 2.4.2
 TOP: 8-5 Example 4 KEY: graphing,exponential equation
 MSC: NAEP A2b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.56
63. ANS: A DIF: L1 REF: 8-6 Natural Logarithms
 OBJ: 8-6.1 Natural Logarithms STO: KS 2.2.3 TOP: 8-6 Example 1
 KEY: simplifying a natural logarithm,properties of logarithms
 MSC: NAEP A3a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56
64. ANS: D DIF: L1 REF: 8-6 Natural Logarithms
 OBJ: 8-6.1 Natural Logarithms STO: KS 2.2.3 TOP: 8-6 Example 2
 KEY: simplifying a natural logarithm,logarithmic function,problem solving
 MSC: NAEP A3a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56
65. ANS: D DIF: L2 REF: 8-6 Natural Logarithms
 OBJ: 8-6.2 Natural Logarithmic and Exponential Equations STO: KS 2.2.3
 TOP: 8-6 Example 4 KEY: exponential equation,properties of logarithms
 MSC: NAEP A3a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56
66. ANS: C DIF: L1 REF: 13-2 Angles and the Unit Circle
 OBJ: 13-2.1 Working With Angles in Standard Position STO: KS 3.1.5
 TOP: 13-2 Example 2
 KEY: initial side of an angle,measure of an angle in standard position,standard position of an angle,terminal side of an angle
 MSC: CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S10.TSK3.GM, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.58
67. ANS: B DIF: L2 REF: 13-2 Angles and the Unit Circle
 OBJ: 13-2.1 Working With Angles in Standard Position STO: KS 3.1.5
 TOP: 13-2 Example 3
 KEY: measure of an angle in standard position,quadrant
 MSC: CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S10.TSK3.GM, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.58
68. ANS: A DIF: L1 REF: 13-2 Angles and the Unit Circle
 OBJ: 13-2.2 Using the Unit Circle STO: KS 3.1.5 TOP: 13-2 Example 4
 KEY: unit circle,cosine of an angle,sine of an angle
 MSC: CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S10.TSK3.GM, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.58
69. ANS: C DIF: L2 REF: 13-2 Angles and the Unit Circle
 OBJ: 13-2.2 Using the Unit Circle STO: KS 3.1.5 TOP: 13-2 Example 3
 KEY: cosine of an angle,measure of an angle in standard position,sine of an angle,unit circle
 MSC: CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM,

- S10.TSK3.GM, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.58
70. ANS: C DIF: L1 REF: 13-4 The Sine Function
OBJ: 13-4.2 Graphing Sine Functions STO: KS 2.3.1 TOP: 13-4 Example 6
KEY: amplitude,graphing,sine function,period
MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56
71. ANS: D DIF: L1 REF: 13-7 Translating Sine and Cosine Functions
OBJ: 13-7.1 Graphing Translations of Trigonometric Functions STO: KS 2.2.2
TOP: 13-7 Example 3 KEY: graphing,translation of a trigonometric
function
MSC: NAEP M1m, NAEP G2c, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.56
72. ANS: C DIF: L2 REF: 13-7 Translating Sine and Cosine Functions
OBJ: 13-7.1 Graphing Translations of Trigonometric Functions STO: KS 2.2.2
TOP: 13-7 Example 4
KEY: amplitude,period,parent function,graphing,translation of a trigonometric function
MSC: NAEP M1m, NAEP G2c, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.56
73. ANS: C DIF: L1 REF: 13-6 The Tangent Function
OBJ: 13-6.1 Graphing the Tangent Function STO: KS 2.3.1
TOP: 13-6 Example 1 KEY: tangent function,graphing
MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56
74. ANS: D DIF: L1 REF: 13-8 Reciprocal Trigonometric Functions
OBJ: 13-8.1 Evaluating Reciprocal Trigonometric Functions STO: KS 2.3.1, KS 2.3.3
TOP: 13-8 Example 1
KEY: cosecant,cotangent,secant,reciprocal trigonometric functions
MSC: CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS, TV.LV21/22.11,
TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56
75. ANS: D DIF: L1 REF: 13-8 Reciprocal Trigonometric Functions
OBJ: 13-8.1 Evaluating Reciprocal Trigonometric Functions STO: KS 2.3.1, KS 2.3.3
TOP: 13-8 Example 2 KEY: reciprocal trigonometric functions,cosecant
MSC: CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS, TV.LV21/22.11,
TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56
76. ANS: A DIF: L1 REF: 13-8 Reciprocal Trigonometric Functions
OBJ: 13-8.1 Evaluating Reciprocal Trigonometric Functions STO: KS 2.3.1, KS 2.3.3
TOP: 13-8 Example 2 KEY: reciprocal trigonometric functions,secant
MSC: CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM,
IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS, TV.LV21/22.11,
TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56

77. ANS: B DIF: L1 REF: 13-5 The Cosine Function
 OBJ: 13-5.2 Solving Trigonometric Equations STO: KS 2.3.1
 TOP: 13-5 Example 4 KEY: trigonometric function, graphing calculator
 MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
 IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
 TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56
78. ANS: C DIF: L1 REF: 13-5 The Cosine Function
 OBJ: 13-5.2 Solving Trigonometric Equations STO: KS 2.3.1
 TOP: 13-5 Example 4 KEY: amplitude, cosine function, period
 MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
 IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
 TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56
79. ANS: A DIF: L2 REF: 14-1 Trigonometric Identities
 OBJ: 14-1.1 Verifying Trigonometric Identities TOP: 14-1 Example 2
 KEY: trigonometric identities
 MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
 S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.14, TV.LV21/22.52,
 TV.LVALG.53
80. ANS: B DIF: L1 REF: 14-1 Trigonometric Identities
 OBJ: 14-1.1 Verifying Trigonometric Identities TOP: 14-1 Example 3
 KEY: trigonometric identities, simplifying trigonometric expressions
 MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
 S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.14, TV.LV21/22.52,
 TV.LVALG.53
81. ANS: B DIF: L2 REF: 14-1 Trigonometric Identities
 OBJ: 14-1.1 Verifying Trigonometric Identities TOP: 14-1 Example 3
 KEY: trigonometric identities, simplifying trigonometric expressions
 MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.56, IT.LV17/18.AM, S9.TSK3.GM,
 S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.14, TV.LV21/22.52,
 TV.LVALG.53
82. ANS: D DIF: L2
 REF: 14-2 Solving Trigonometric Equations Using Inverses
 OBJ: 14-2.2 Solving Trigonometric Equations STO: KS 2.2.3
 TOP: 14-2 Example 6
 KEY: radian measure, tangent function, inverse of a trigonometric equation
 MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.56, IT.LV17/18.AM,
 IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS,
 S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53
83. ANS: D DIF: L1
 REF: 14-2 Solving Trigonometric Equations Using Inverses
 OBJ: 14-2.2 Solving Trigonometric Equations STO: KS 2.2.3
 TOP: 14-2 Example 7 KEY: cosine function, problem solving, radian
 measure
 MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.56, IT.LV17/18.AM,
 IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS,
 S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53

84. ANS: A DIF: L2
REF: 14-2 Solving Trigonometric Equations Using Inverses
OBJ: 14-2.2 Solving Trigonometric Equations STO: KS 2.2.3
KEY: angle measure,inverse of a trigonometric equation
MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53
85. ANS: B DIF: L1 REF: 14-3 Right Triangles and Trigonometric Ratios
OBJ: 14-3.1 Finding the Lengths of Sides in a Right Triangle TOP: 14-3 Example 1
KEY: trigonometric ratios,tangent function,angle measure,problem solving
MSC: NAEP M1m, CAT5.LV21/22.46, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.FR, IT.LV17/18.PS, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58
86. ANS: C DIF: L1 REF: 14-3 Right Triangles and Trigonometric Ratios
OBJ: 14-3.1 Finding the Lengths of Sides in a Right Triangle TOP: 14-3 Example 2
KEY: trigonometric ratios,Pythagorean Theorem
MSC: NAEP M1m, CAT5.LV21/22.46, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.FR, IT.LV17/18.PS, S9.TSK3.GM, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58
87. ANS: D DIF: L1 REF: 14-4 Area and the Law of Sines
OBJ: 14-4.1 Area and the Law of Sines TOP: 14-4 Example 2
KEY: Law of Sines
MSC: NAEP A4e, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.PS, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58
88. ANS: C DIF: L2 REF: 14-5 The Law of Cosines
OBJ: 14-5.1 The Law of Cosines TOP: 14-5 Example 1
KEY: Law of Cosines,problem solving
MSC: NAEP A4e, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.PS, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58
89. ANS: A DIF: L2 REF: 14-6 Angle Identities
OBJ: 14-6.1 Angle Identities TOP: 14-6 Example 1
KEY: angle identities,cofunction identity
MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58
90. ANS: B DIF: L2 REF: 14-6 Angle Identities
OBJ: 14-6.2 Sum and Difference Identities TOP: 14-6 Example 5
KEY: angle identities,exact values of trigonometric functions,angle sum identities

MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58

91. ANS: C DIF: L2 REF: 14-7 Double-Angle and Half-Angle Identities
OBJ: 14-7.1 Double-Angle Identities TOP: 14-7 Example 1
KEY: angle identities,double-angle identities,tangent function,exact values of trigonometric functions,angle measure

MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58

92. ANS: B DIF: L1 REF: 14-7 Double-Angle and Half-Angle Identities
OBJ: 14-7.2 Half-Angle Identities TOP: 14-7 Example 4
KEY: angle identities,half-angle identities,exact values of trigonometric functions

MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58

SHORT ANSWER

93. ANS:

$$A(r) = \pi r^2; \text{ about } 95.03 \text{ in.}^2$$

DIF: L1 REF: 2-1 Relations and Functions

OBJ: 2-1.2 Identifying Functions

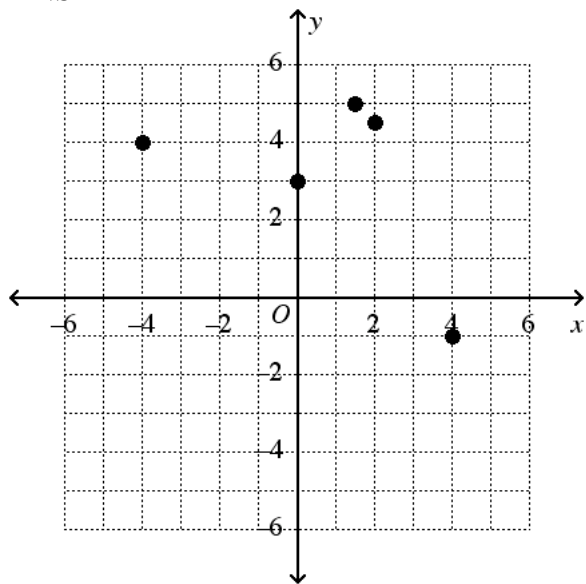
STO: KS 2.2.1, KS 2.3.1, KS 2.3.2, KS 2.3.7, KS 2.3.8, KS 2.3.12

TOP: 2-1 Example 6

KEY: function notation,circle,radius

MSC: NAEP A2b, NAEP A2e, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.PRA, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56

94. ANS:



DIF: L1 REF: 2-1 Relations and Functions OBJ: 2-1.1 Graphing
Relations

STO: KS 2.2.1, KS 2.3.1, KS 2.3.2, KS 2.3.7, KS 2.3.8, KS 2.3.12

TOP: 2-1 Example 1 KEY: relation, graphing, ordered pair

MSC: NAEP A2b, NAEP A2e, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.PRA,
S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56

95. ANS:

Yes; for each element in the domain there is exactly one element in the range.

DIF: L1 REF: 2-1 Relations and Functions OBJ: 2-1.1 Graphing
Relations

STO: KS 2.2.1, KS 2.3.1, KS 2.3.2, KS 2.3.7, KS 2.3.8, KS 2.3.12

TOP: 2-1 Example 4 KEY: relation, domain, range

MSC: NAEP A2b, NAEP A2e, CAT5.LV21/22.54, IT.LV17/18.AM, S9.TSK3.PRA,
S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.14, TV.LV21/22.16, TV.LVALG.56

96. ANS:

$$Rx + Sy = T$$

$$Sy = -Rx + T$$

$$y = \frac{-Rx + T}{S}$$

$$y = -\frac{R}{S}x + \frac{T}{S}$$

The slope of the line is $-\frac{R}{S}$.

DIF: L2 REF: 2-2 Linear Equations

OBJ: 2-2.2 Writing Equations of Lines

STO: KS 2.2.1, KS 2.2.2, KS 2.3.4, KS 2.3.10, KS 2.3.14, KS 3.4.3, KS 3.4.4, KS 3.4.6

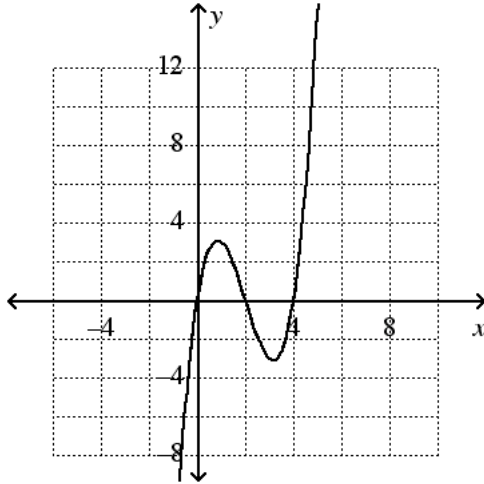
TOP: 2-2 Example 6 KEY: standard form of linear equation, slope

MSC: NAEP A1h, NAEP A2a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.54,
IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA,
TV.LV21/22.14, TV.LV21/22.16, TV.LV21/22.52, TV.LVALG.54, TV.LVALG.56

97. ANS:

a. $V(x) = x(2 - x)(4 - x)$

b.



x -intercepts: $x = 0, 2, 4$. These are the values of x that produce a volume of 0.

c. $0 < x < 2$

d. 3.08 cubic feet

DIF: L1 REF: 6-2 Polynomials and Linear Factors

OBJ: 6-2.1 The Factored Form of a Polynomial

STO: KS 2.3.1, KS 2.3.6, KS 3.2.2 TOP: 6-2 Example 3

KEY: factoring a polynomial, graphing calculator, polynomial function, x -intercept, problem solving, multi-part question, word problem

MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

98. ANS:

a. -20°C

b. 342 meters per second

DIF: L2 REF: 7-5 Solving Radical Equations

OBJ: 7-5.1 Solving Radical Equations STO: KS 2.2.3 TOP: 7-5 Example 1

KEY: radical equation, problem solving, multi-part question, word problem

MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.55, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

99. ANS:

a. $\log_{\frac{1}{4}} 31 = \frac{\log 31}{\log 0.25}$ Use the Change of Base Formula.
 ≈ -2.4771 Use a calculator.

- b. $\log_{\frac{1}{4}} 31 = \log_9 x$ Write an equation.
 $-2.477 \approx \log_9 x$ Substitute $\log_{\frac{1}{4}} 31 = -2.477$.
 $-2.477 \approx \frac{\log x}{\log 9}$ Use the Change of Base Formula.
 $-2.477 \cdot \log 9 = \log x$ Multiply each side by $\log 9$.
 $-2.3637 \approx \log x$ Simplify.
 $x \approx 10^{-2.3637}$ Write in exponential form.
 ≈ 0.0043 Use a calculator.

The expression $\log_{\frac{1}{4}} 31$ is approximately equal to $\log_9 0.0043$.

DIF: L2 REF: 8-5 Exponential and Logarithmic Equations
 OBJ: 8-5.1 Solving Exponential Equations STO: KS 2.3.1, KS 2.4.2
 TOP: 8-5 Example 2
 KEY: Change of Base Formula, evaluating logarithms, multi-part question
 MSC: NAEP A2b, CAT5.LV21/22.50, CAT5.LV21/22.51, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.56

100. ANS:

a. The period is π and the amplitude is 4.

b. maximum values: $0 : \pi : 2\pi$

minimum values: $\frac{1}{2}\pi : \frac{3}{2}\pi$

zeros: $\frac{1}{4}\pi : \frac{3}{4}\pi : \frac{5}{4}\pi : \frac{7}{4}\pi$

DIF: L1 REF: 13-5 The Cosine Function
 OBJ: 13-5.1 Graphing and Writing Cosine Functions STO: KS 2.3.1
 TOP: 13-5 Example 1 KEY: amplitude, multi-part question, period, graphing
 MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS, TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56

101. ANS:

1.91; 4.37

DIF: L2 REF: 13-5 The Cosine Function
 OBJ: 13-5.2 Solving Trigonometric Equations STO: KS 2.3.1
 TOP: 13-5 Example 4
 KEY: cosine of an angle, graphing, trigonometric function, cosine equation
 MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,

TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56

102. ANS:

a. about 2,433 feet

b. about 1,325 feet

DIF: L1

REF: 14-4 Area and the Law of Sines

OBJ: 14-4.1 Area and the Law of Sines TOP: 14-4 Example 4

KEY: Law of Sines,multi-part question,problem solving

MSC: NAEP A4e, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, IT.LV17/18.PS, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.17, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58

103. ANS:

In a right triangle, the acute angles are complementary. So $A + B = 90^\circ$ and $B = 90^\circ - A$, where A and B are the measures of the acute angles.

$$\tan(90^\circ - A) = \tan B$$

A and B are complementary angles.

$$= \frac{b}{a}$$

definition of tangent in a right triangle

$$= \cot A$$

definition of cotangent in a right triangle

DIF: L1

REF: 14-6 Angle Identities

OBJ: 14-6.1 Angle Identities

TOP: 14-6 Example 3

KEY: angle identities,cofunction identity

MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58

104. ANS:

$$\cos 2\theta = \cos(\theta + \theta)$$

Write as angle sum.

$$= \cos \theta \cos \theta - \sin \theta \sin \theta$$

Angle sum identity

$$= \cos^2 \theta - \sin^2 \theta$$

Simplify.

$$= \cos^2 \theta - (1 - \cos^2 \theta)$$

Pythagorean identity

$$= \cos^2 \theta - 1 + \cos^2 \theta$$

Distributive Property

$$= 2 \cos^2 \theta - 1$$

Simplify.

DIF: L1

REF: 14-7 Double-Angle and Half-Angle Identities

OBJ: 14-7.1 Double-Angle Identities TOP: 14-7 Example 2

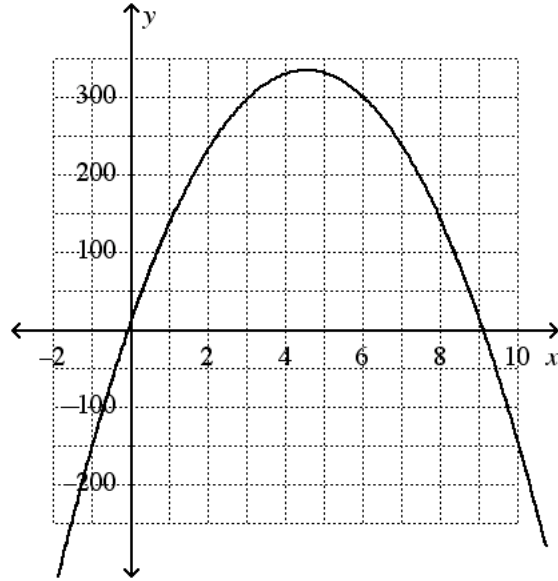
KEY: angle identities,double-angle identities

MSC: NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.55, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.13, TV.LV21/22.14, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.58

ESSAY

105. ANS:

[4] a.



b. $x \approx -0.05, x \approx 9.11$

c. The zeros represent the times at which the height of the rocket is 0. The time -0.05 seconds is not realistic. The time 9.11 seconds is the time at which the rocket lands.

d. about 336 feet; The height is the maximum value of the function.

[3] an error in one of the three parts of the question

[2] an error in two parts of the question

[1] one part missing and errors in answer or reasoning for one of the other parts

DIF: L2 REF: 6-2 Polynomials and Linear Factors

OBJ: 6-2.1 The Factored Form of a Polynomial

STO: KS 2.3.1, KS 2.3.6, KS 3.2.2 TOP: 6-2 Example 3

KEY: reasoning, graphing, graphing calculator, modeling data, polynomial function, problem solving, relative maximum, x-intercept, zeros of a polynomial function, extended response, rubric-based question, writing in math, word problem

MSC: NAEP A3b, NAEP A3c, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.10, TV.LV21/22.13, TV.LV21/22.52, TV.LVALG.53

106. ANS:

[4] a. $y = 580e^{0.1t}$

b. In the model, the coefficient of e is 580, the original investment. The formula for continuously compounded interest uses the number e raised to the power rt , where r is the rate as a decimal, in this case 0.1, and t is the time in years.

c. To find the number of years to reach \$3600, substitute 3600 into the model.

$$y = 580e^{0.1t}$$

$$3600 = 580e^{0.1t}$$

$$6.2 = e^{0.1t}$$

$$\ln 6.2 = 0.1t$$

$$t = \frac{\ln 6.2}{0.1}$$

Dividing and rounding to the nearest year, $t \approx 18$. The investment will reach \$3600 in about 18 years.

[3] one error in computation or incomplete explanation

[2] two errors in computation or no explanation

[1] one correct answer with no explanation

DIF: L3 REF: 8-6 Natural Logarithms

OBJ: 8-6.2 Natural Logarithmic and Exponential Equations STO: KS 2.2.3

KEY: compounding continuously, exponential function, exponential growth, extended response, graphing, interest rates, percent, problem solving, the number e , writing in math, rubric-based question

MSC: NAEP A3a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11, TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56

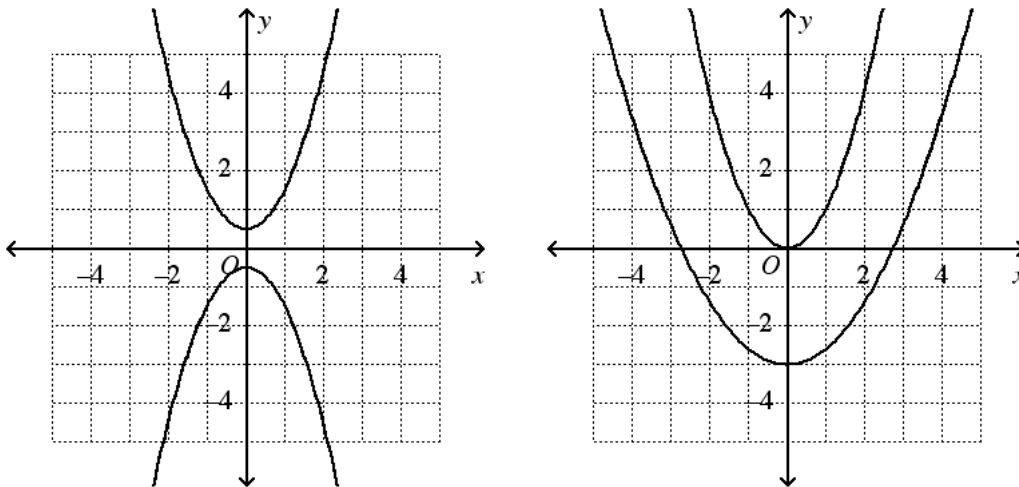
OTHER

107. ANS:

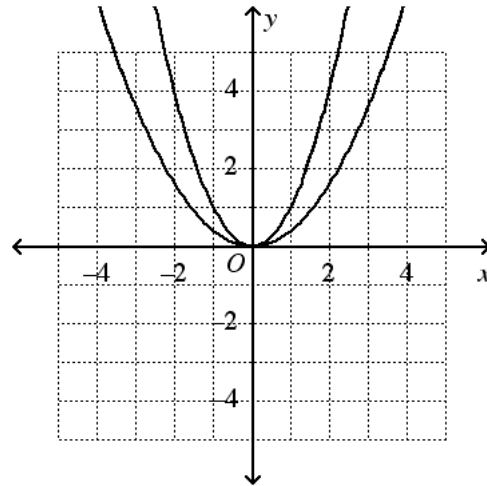
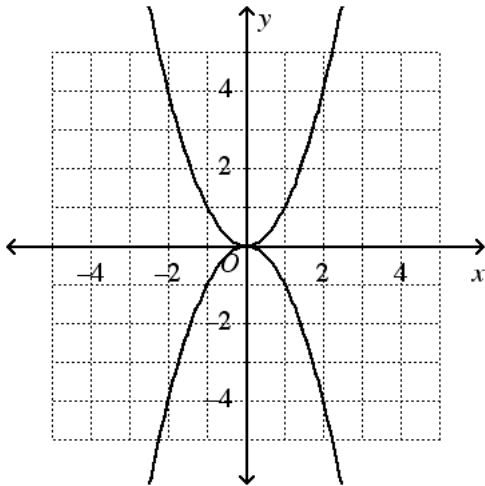
0, 1, 2 or infinitely many solutions

Explanations may vary. Sample:

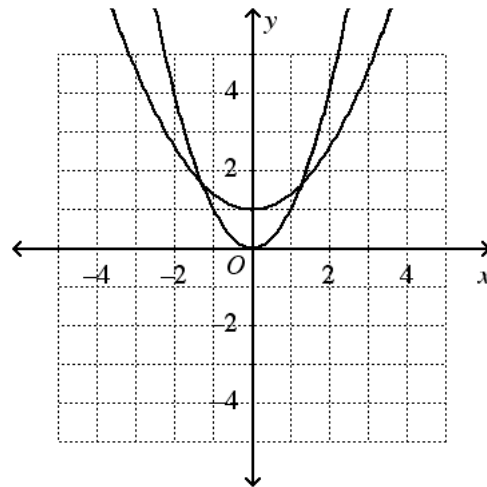
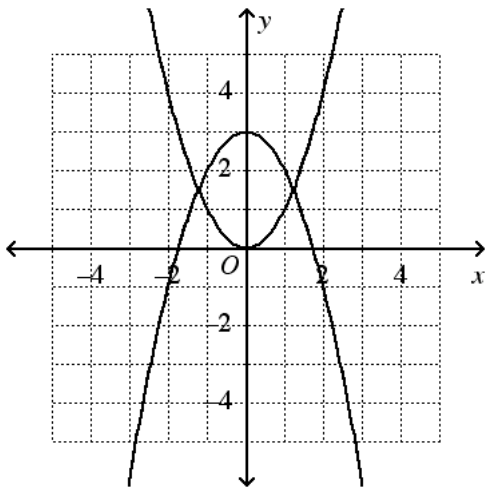
0 If a and n have opposite signs, and the vertex of the upward-opening parabola is above the downward-opening parabola, there is no point of intersection. This can also be true when a and n have the same sign.



1 If the parabolas have the same vertex but $a \neq n$, their graphs will only intersect at one point, the vertex.



- 2 If signs of a and n are different and the vertex of the upward-opening parabola is below the vertex of the downward-opening parabola, the graphs intersect at two points. This can also be true when a and n have the same sign.



Infinitely many solutions:

If the equations are equal there are infinitely many points of intersection.

DIF: L2

REF: 5-5 Quadratic Equations

OBJ: 5-5.2 Solving by Graphing

STO: KS 1.2.2, KS 2.2.3

KEY: parabola, quadratic function, reasoning, writing in math

MSC: NAEP A4a, CAT5.LV21/22.50, CAT5.LV21/22.52, CAT5.LV21/22.56, IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.PRA, S10.TSK3.GM, S10.TSK3.PRA, TV.LV21/22.12, TV.LV21/22.16, TV.LV21/22.17, TV.LVALG.56, TV.LVALG.57

108. ANS:

a.

$$t = \frac{\ln B - \ln 100}{1.532}$$

Original equation

$$t = \frac{\ln(500) - \ln 100}{1.532} \quad \text{Substitute 500 for } B.$$

$$t \approx 1.1 \quad \text{Use a calculator.}$$

The time required to grow a culture of 500 bacteria is about 1.1 hours.

b.

$$t = \frac{\ln B - \ln 100}{1.532} \quad \text{Original equation}$$

$$5.5 = \frac{\ln B - \ln 100}{1.532} \quad \text{Substitute 4 for } t.$$

$$8.426 = \ln B - \ln 100 \quad \text{Multiply each side by 1.532.}$$

$$8.426 + \ln 100 = \ln B \quad \text{Add } \ln 100 \text{ to each side.}$$

$$13.031 \approx \ln B \quad \text{Simplify.}$$

$$e^{13.031} \approx B \quad \text{Write in exponential form.}$$

$$B \approx 456,400 \quad \text{Simplify.}$$

There will be about 456,400 bacteria in 5.5 hours.

DIF: L3

REF: 8-6 Natural Logarithms

OBJ: 8-6.1 Natural

Logarithms

STO: KS 2.2.3 TOP: 8-6 Example 2

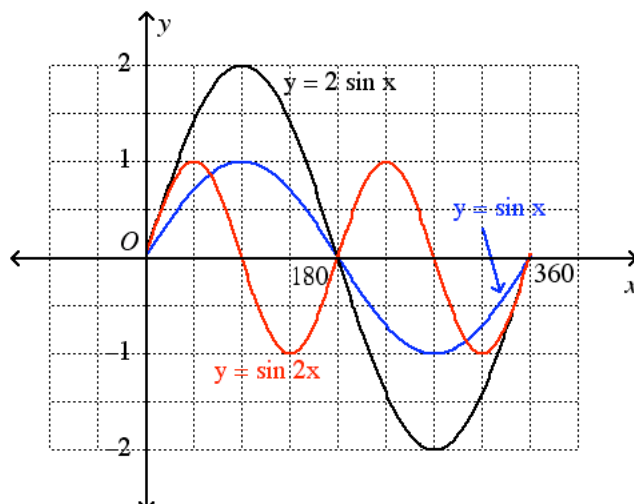
KEY: natural logarithmic function, logarithmic equation, properties of logarithms, problem solving, writing in math

MSC: NAEP A3a, CAT5.LV21/22.50, CAT5.LV21/22.51, CAT5.LV21/22.52, IT.LV17/18.AM,

IT.LV17/18.CP, S9.TSK3.NS, S9.TSK3.PRA, S10.TSK3.NS, S10.TSK3.PRA, TV.LV21/22.11,

TV.LV21/22.12, TV.LV21/22.52, TV.LVALG.53, TV.LVALG.56

109. ANS:



Answers may vary. Sample:

All three graphs pass through $(0^\circ, 0)$, $(180^\circ, 0)$ and $(360^\circ, 0)$. The graphs of $y = \sin x$ and $y = \sin 2x$ have amplitude 1 while the graph of $y = 2 \sin x$ has amplitude 2. The graphs of $y = \sin x$ and $y = 2 \sin x$ have a period of 360° , while the graph of $y = \sin 2x$ has a period of 180° .

DIF: L2 REF: 13-4 The Sine Function
 OBJ: 13-4.2 Graphing Sine Functions STO: KS 2.3.1 TOP: 13-4 Example 6
 KEY: amplitude, graphing, period, sine function, writing in math
 MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
 IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
 TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56

110. ANS:

The equation will have the form $y = a \cos b\theta$. The amplitude is given to be 2 feet, so $a = 2$ in the equation. Now find the period using the formula $\text{period} = \frac{2\pi}{b}$.

$$\text{period} = \frac{2\pi}{b} \quad \text{Use the formula for the period.}$$

$$30 = \frac{2\pi}{b} \quad \text{The period is given as 30, so substitute for period.}$$

$$b = \frac{2\pi}{30} \quad \text{Multiply each side by } \frac{b}{30}.$$

$$b = \frac{\pi}{15} \quad \text{Simplify.}$$

Substituting the values into the standard equation results in $y = 2 \cos \frac{\pi}{15} \theta$.

DIF: L2 REF: 13-5 The Cosine Function
 OBJ: 13-5.2 Solving Trigonometric Equations STO: KS 2.3.1
 TOP: 13-5 Example 3
 KEY: amplitude, cosine function, period, problem solving, writing in math, word problem
 MSC: NAEP M1m, CAT5.LV21/22.51, CAT5.LV21/22.55, CAT5.LV21/22.56,
 IT.LV17/18.AM, IT.LV17/18.CP, S9.TSK3.GM, S9.TSK3.NS, S10.TSK3.GM, S10.TSK3.NS,
 TV.LV21/22.11, TV.LV21/22.13, TV.LV21/22.14, TV.LVALG.56