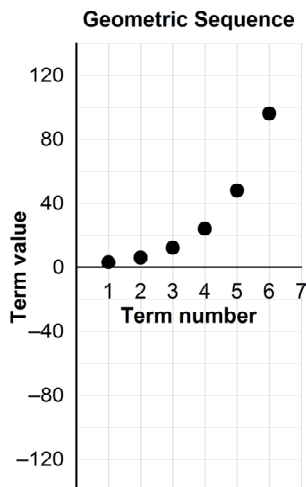


- _____ 8. Determine r and t_6 of this geometric sequence: 54, 18, 6, 2, ...
- A. $r = \frac{1}{3}, t_6 = \frac{2}{9}$ C. $r = 3, t_6 = \frac{2}{81}$
 B. $r = \frac{1}{6}, t_6 = \frac{2}{9}$ D. $r = \frac{1}{3}, t_6 = \frac{1}{144}$
- _____ 9. Determine the 1st and 6th terms of a geometric series that has these partial sums: $S_4 = -60, S_5 = -124, S_6 = -252$
- A. $t_1 = -8; t_6 = -128$ C. $t_1 = -4; t_6 = -64$
 B. $t_1 = -8; t_6 = -64$ D. $t_1 = -4; t_6 = -128$
- _____ 10. The sum of the first 10 terms of which geometric series is 73 810?
- A. $-3 - 27 + 81 - \dots + 59\,049$ C. $-2 + 6 - 18 + \dots + 39\,366$
 B. $-4 + 12 - 36 + \dots + 78\,732$ D. $-5 + 15 - 45 + \dots + 98\,415$
- _____ 11. Determine the sum of the first 11 terms of this geometric series: $5 - 7.5 + 11.25 - \dots$
 Write the sum to the nearest hundredth if necessary.
- A. 288 C. -174
 B. 113 D. 175
- _____ 12. Which geometric sequence could this graph represent?



- A. 3, 9, 27, 81, ... C. 3, 6, 12, 24, ...
 B. $3, \frac{1}{6}, \frac{1}{12}, \frac{1}{24}, \dots$ D. 3, -6, 12, -24, ...

- _____ 20. Simplify this radical, if possible: $\sqrt{8}$
 A. $\sqrt{2}$ C. $2\sqrt{2}$
 B. $\sqrt[3]{2}$ D. cannot be simplified
- _____ 21. Evaluate: $\sqrt{(-21 - (-3))^2}$
 A. 18 B. 4.24 C. 24 D. 324
- _____ 22. Identify the values of the variable for which each radical is defined, then simplify.
 $4\sqrt{2r^4s} - 4r\sqrt{2r^2s} - 3r^2\sqrt{2s}$
 A. $r \geq 0, s \geq 0; 11r^2\sqrt{2s}$ C. $r \leq 0, s \geq 0; -3r^2\sqrt{2s}$
 B. $r \in \mathbb{R}, s \leq 0; 11r^2\sqrt{2s}$ D. $r \in \mathbb{R}, s \geq 0; -3r^2\sqrt{2s}$
- _____ 23. Simplify this expression: $\frac{7\sqrt{5} + 3\sqrt{2}}{\sqrt{7} + 9}$
 A. $\frac{-7\sqrt{5} - 21\sqrt{70} + 27\sqrt{2}}{16}$
 B. $\frac{-7\sqrt{5} - 21\sqrt{70} + 27\sqrt{2}}{74}$
 C. $\frac{-7\sqrt{35} - 3\sqrt{14} + 63\sqrt{5} + 27\sqrt{2}}{74}$
 D. $\frac{-7\sqrt{35} - 3\sqrt{14} + 63\sqrt{5} + 27\sqrt{2}}{16}$
- _____ 24. Factor: $0.5x^2 - 0.02$
 A. $(0.5x + 0.1)(x - 0.1)$ C. $0.5(x + 0.1)(x - 0.1)$
 B. $(0.5x + 0.2)(x - 0.2)$ D. $0.5(x + 0.2)(x - 0.2)$
- _____ 25. Which statement is true for the equation $x = \sqrt{x + 12}$?
 A. 4 and -3 are roots.
 B. 4 and 3 are both extraneous roots.
 C. 3 is a root of the original equation and -4 is an extraneous root.
 D. 4 is a root of the original equation and -3 is an extraneous root.

- _____ 26. Solve this equation: $2 = \sqrt[5]{4x}$
A. $x = -8$ B. $x = 2$ C. $x = 8$ D. $x = -2$
- _____ 27. Which expression is a solution of the equation $2x^2 + 2x - 1 = 0$?
A. $\frac{-1 + \sqrt{3}}{2}$ C. $-1 + \sqrt{3}$
B. $\frac{1 + \sqrt{2}}{2}$ D. $-1 + 2\sqrt{2}$
- _____ 28. Solve: $-2x(2x + 3) = 0$
A. $x = -\frac{1}{2}$ or $x = -\frac{3}{2}$ C. $x = 0$ or $x = \frac{3}{2}$
B. $x = -\frac{1}{2}$ or $x = \frac{3}{2}$ D. $x = 0$ or $x = -\frac{3}{2}$
- _____ 29. Solve this quadratic equation: $4x^2 + 5x = 1$
A. $\frac{-5 \pm \sqrt{41}}{8}$ C. $\frac{5 \pm \sqrt{41}}{4}$
B. $\frac{5 \pm \sqrt{41}}{8}$ D. $\frac{-5 \pm \sqrt{41}}{4}$
- _____ 30. The coefficients of a quadratic equation are all integers. The discriminant is 0. Which statement best describes its roots?
A. Two rational roots C. One rational root
B. No real roots D. Two irrational roots
- _____ 31. The coefficients of a quadratic equation are all integers. Which discriminant indicates that the equation has two irrational roots?
A. 1.44 B. $\frac{144}{25}$ C. 14.4 D. 144
- _____ 32. The roots of any quadratic equation are: $x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$ and $x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$
Which expression represents the sum of these roots?
A. $\frac{b}{a}$ B. $-\frac{b}{2a}$ C. $-\frac{b}{a}$ D. $\frac{b}{2a}$

_____ 33. The roots of any quadratic equation are: $x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$ and $x = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$

Which expression represents the product of these roots?

- A. $\frac{2c}{a}$ B. $4ac$ C. $\frac{c}{a}$ D. $\frac{2b^2}{a}$

_____ 34. Identify the quadratic function that this table of values represents:

x	-4	-2	0	2	4
y	-81	-27	-5	-15	-57

- A. $y = 5x^2 + 3x + 4$ C. $y = -4x^2 + 3x - 5$
 B. $y = 3x^2 - 4x - 5$ D. $y = 4x^2 - 3x + 5$

_____ 35. Identify the quadratic function that this table of values represents, then determine the value of y when $x = 5$.

x	y
-1	0
0	-4
3	8

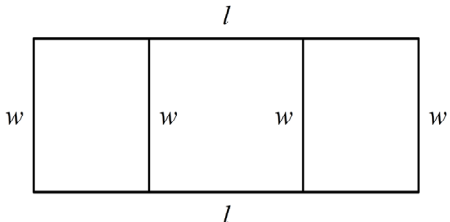
- A. $y = 2x^2 - 2x - 2; 40$ C. $y = -2x^2 + 2x + 4; -36$
 B. $y = -2x^2 + 2x - 4; -36$ D. $y = 2x^2 - 2x - 4; 36$

_____ 36. Which statement is NOT true for the graph of $y = ax^2$?

- A. When a is less than -1 , the graph is the image of the graph of $y = x^2$ after a vertical stretch and a reflection in the x -axis.
 B. The vertex of the graph is always at the origin.
 C. When a is greater than 1, the graph is the image of the graph of $y = x^2$ after a vertical stretch.
 D. When $0 < a < 1$, the graph is the image of the graph of $y = x^2$ after a vertical compression and a reflection in the x -axis.

_____ 37. Which of the following describes the translation that would be applied to the graph of $y = x^2$ to get the graph of $y = x^2 + 6$?

- A. Translate 6 units right C. Translate 6 units down
 B. Translate 6 units up D. Translate 6 units left

- _____ 38. Which statement is NOT true for the graph of $y = (x - p)^2$?
- The graph has the same size and shape as the graph of $y = x^2$.
 - When $p = 0$, the vertex is at the origin.
 - When p is negative, the vertex is on the negative x -axis.
 - As p increases, the graph moves to the left.
- _____ 39. Determine an equation of a quadratic function with the given characteristics of its graph: coordinates of the vertex: $V(0, -4)$; passes through $A(2, 16)$
- $y = 2x^2 - 4$
 - $y = 16x^2 + 4$
 - $y = 5x^2 + 4$
 - $y = 5x^2 - 4$
- _____ 40. Determine an equation of a quadratic function with the given characteristics of its graph: coordinates of the vertex: $V(2, -3)$; passes through $A(0, 5)$
- $y = 2(x + 2)^2 - 3$
 - $y = 5(x - 2)^2 + 3$
 - $y = 2(x - 2)^2 - 3$
 - $y = (x + 2)^2 - 3$
- _____ 41. Write $y = -x^2 + 60x - 400$ in standard form, then identify the coordinates of the vertex.
- $y = -(x - 60)^2 + 300$; vertex: $(30, 600)$
 - $y = -(x - 30)^2 + 500$; vertex: $(30, 500)$
 - $y = -(x - 60)^2 + 300$; vertex: $(60, 300)$
 - $y = -(x - 30)^2 + 500$; vertex: $(50, 300)$
- _____ 42. Three rectangular areas are to be fenced with 66 m of fencing. Which equation could be used to determine the dimensions that enclose the maximum area?
- 
- $A = -\frac{1}{2}l(l - 33)$
 - $A = -\frac{1}{3}l(l - 66)$
 - $A = -\frac{1}{4}l(l - 66)$
 - $A = -\frac{2}{3}l(l - 33)$
- _____ 43. Determine the coordinates of the vertex of the graph of this quadratic function: $y = 4x^2 + 6x + 2$
- $(1.5, -0.5)$
 - $(-0.75, -0.5)$
 - $(-0.75, -0.25)$
 - $(1.5, -0.25)$

- _____ 44. Which coordinates are a solution of the inequality $6x - 3y < -3$?
A. (3, 7) B. (0, 1) C. (2, 8) D. (5, 8)
- _____ 45. Which ordered pair is a solution of the quadratic inequality $y \leq 2x^2 + 1$?
A. (2, 7) B. (1, 5) C. (3, 20) D. (0, 4)
- _____ 46. Which ordered pair is a solution of the quadratic inequality $y > x^2 - 2$?
A. (3, 6) B. (5, 17) C. (1, -1) D. (4, 18)
- _____ 47. Which inequality do these 3 points satisfy?
(0, 2), (1, 2), (2, -3)
A. $y > -(x - 1)^2 + 3$ C. $y \leq (x - 1)^2 - 3$
B. $y > (x - 1)^2 - 3$ D. $y \leq -(x - 1)^2 + 3$
- _____ 48. Solve this quadratic-quadratic system algebraically.
 $y = 2x^2 - 4x - 8$
 $y = \frac{2}{5}(x - 3)^2 - 2$
A. (8, -2) and (-2, 3) C. (-2, 8) and (3, -2)
B. (2, 8) and (3, 2) D. (3, 8) and (-2, -2)
- _____ 49. A guy wire is attached to a tower at a point that is 5.8 m above the ground. The angle between the wire and the level ground is 52° . To the nearest tenth of a metre, how far from the base of the tower is the wire anchored to the ground?
A. 4.5 m B. 7.4 m C. 7.4 m D. 3.6 m
- _____ 50. In $\triangle DEF$, $DE = 10.5$ cm and $EF = 8.5$ cm. For which measure of $\angle D$ is it possible to draw two scalene triangles?
A. 53° B. 90° C. 64° D. 57°
- _____ 51. Which of the following are the non-permissible values for this rational expression?
$$\frac{p^2 - 4p + 3}{p^3 - 2p^2 - 3p}$$

A. $p = 0$ and $p = -1$ C. $p = 0$, $p = 3$, and $p = -1$
B. $p = 0$, $p = -3$, and $p = 1$ D. $p = 0$ and $p = 1$

_____ 52. Determine the possible coordinates (x, y) of a terminal point for the angle 300° in standard position. The value of r is 3, where $r = \sqrt{x^2 + y^2}$.

A. $\left(-\frac{2}{3\sqrt{3}}, \frac{2}{3}\right)$

C. $\left(-\frac{3\sqrt{3}}{2}, \frac{3}{2}\right)$

B. $\left(-\frac{2}{3}, \frac{2}{3\sqrt{3}}\right)$

D. $\left(\frac{3}{2}, -\frac{3\sqrt{3}}{2}\right)$

_____ 53. Identify the non-permissible value of the variable for this rational expression:

$$\frac{z^2 - 4}{z^2 + 4}$$

A. $z = -2$

C. $z = -4$

B. $z = 2$

D. all values are permissible

_____ 54. Determine the non-permissible values of the variable for this rational expression:

$$\frac{7x}{x^2 - 16}$$

A. $x = -16$

C. $x = 16$ and $x = -16$

B. $x = 4$ and $x = -4$

D. $x = -4$

_____ 55. Simplify this rational expression and state the non-permissible values of the variable.

$$\frac{m^2 - 16}{m^2 - m - 20}$$

A. $\frac{m+4}{m-5}; m = -4$ and $m = -5$

C. $\frac{m+4}{m-5}; m = -4$ and $m = 5$

B. $\frac{m-4}{m-5}; m = -4$ and $m = 5$

D. $\frac{m-4}{m-5}; m = 4$ and $m = -5$

_____ 56. Simplify this expression:

$$\frac{2x+4}{x} \div \frac{2}{x-6}$$

A. $\frac{(x+2)(x-6)}{x}, x \neq 0, x \neq 6$

C. $2x^2 - 8x - 24, x \neq 0, x \neq 6$

B. $\frac{x-12}{x}, x \neq 0, x \neq 6$

D. $\frac{4(x+2)}{x(x-6)}, x \neq 0, x \neq 6$

____ 57. Simplify this expression:

$$\frac{5p}{2} \cdot \frac{4p}{p}$$

- A. $10p, p \neq -2$ B. $\frac{9p}{2}, p \neq 0$ C. $\frac{5p}{8}, p \neq 0$ D. $10p, p \neq 0$

____ 58. Which expression is equivalent to $\frac{mn^2+1}{mn} - \frac{2n-1}{2}$?

- A. $\frac{mn^2-2n}{mn-2}, mn \neq 2$ C. $\frac{mn^2-2n}{2mn}, m \neq 0, n \neq 0$
B. $\frac{mn+2}{2mn}, m \neq 0, n \neq 0$ D. $\frac{2-mn}{2mn}, m \neq 0, n \neq 0$

____ 59. Simplify.

$$\frac{6}{h} + \frac{7}{5}$$

- A. $\frac{13}{5h}, h \neq 0$ C. $\frac{7h+30}{h+5}, h \neq -5$
B. $\frac{7h+30}{5h}, h \neq 0$ D. $\frac{13}{h+5}, h \neq -5$

____ 60. Simplify.

$$\frac{8}{7b} - \frac{7}{4b}$$

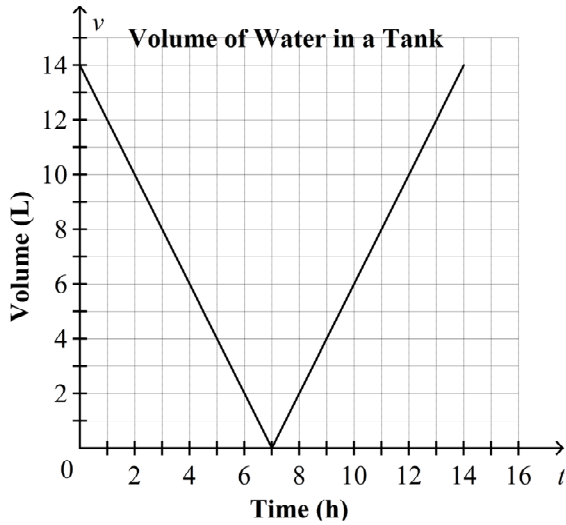
- A. $\frac{1}{3}, b \neq 0$ C. $\frac{1}{3b}, b \neq 0$
B. $\frac{1}{28b}, b \neq 0$ D. $\frac{-17}{28b}, b \neq 0$

____ 61. Simplify.

$$\frac{3}{m+4} - \frac{1}{(m+4)^2}$$

- A. $\frac{2}{m+4}, m \neq -4$ C. $\frac{3m+11}{(m+4)^2}, m \neq -4$
B. $\frac{2}{(m+4)^2}, m \neq -4$ D. $\frac{3m+11}{m+4}, m \neq -4$

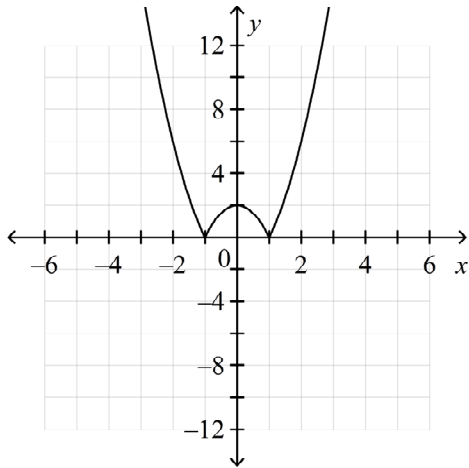
- ___ 62. This graph represents the volume of water in a 14-L tank over a period of time.



What is the volume of water in the tank after 12 h?

- A. -10 L B. 10 L C. 14 L D. 12 L

- ___ 63. Which absolute value function is represented by this graph?

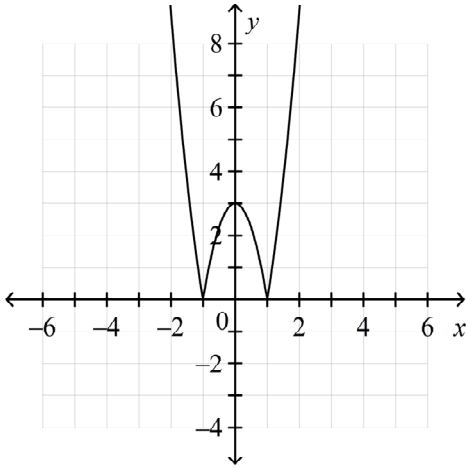


- A. $y = |2x^2 - 2x|$ C. $y = |2x - 2|$
 B. $y = |-x^2 - 2|$ D. $y = |2x^2 - 2|$

- ___ 64. Which statement about the absolute value function $y = |x - 3|$ is NOT true?

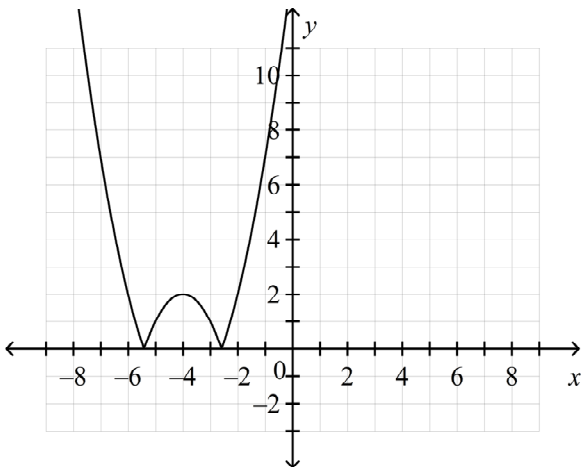
- A. Its graph is the same as the graph of $y = -x + 3$ when $x \leq 3$.
 B. Its graph is the same as the graph of $y = -(x - 3)$ when $x \leq 3$.
 C. Its graph is the same as the graph of $y = x - 3$ when $x \leq 3$.
 D. Its graph is the same as the graph of $y = x - 3$ when $x \geq 3$.

___ 65. Which absolute value function is represented by this graph?



- A. $f(x) = |-3x^2 - 3|$ C. $f(x) = |3x^2 - 3|$
 B. $f(x) = |3x - 3|$ D. $f(x) = |x^2 - 3|$

___ 66. This is the graph of the absolute value of a function $f(x)$. What is an equation for $f(x)$?



- A. $f(x) = (x + 4)^2 - 2$ C. $f(x) = x^2 - 2$
 B. $f(x) = -2x^2 + 4$ D. $f(x) = 4x - 2$

___ 67. Which absolute value function has these characteristics?

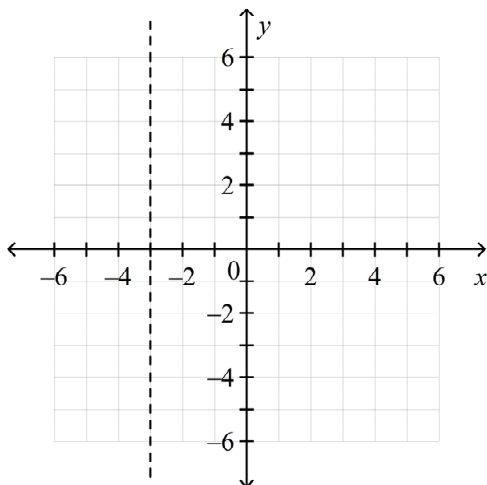
The graph of the absolute value function has x -intercept $\frac{5}{3}$ and y -intercept 5.

The domain of the function is $x \in \mathbb{R}$ and the range is $y \geq 0$.

- A. $y = |5x^2 - 5|$ C. $y = |-3x + 5|$
 B. $y = |-3x^2 + 5|$ D. $y = |5x - 3|$

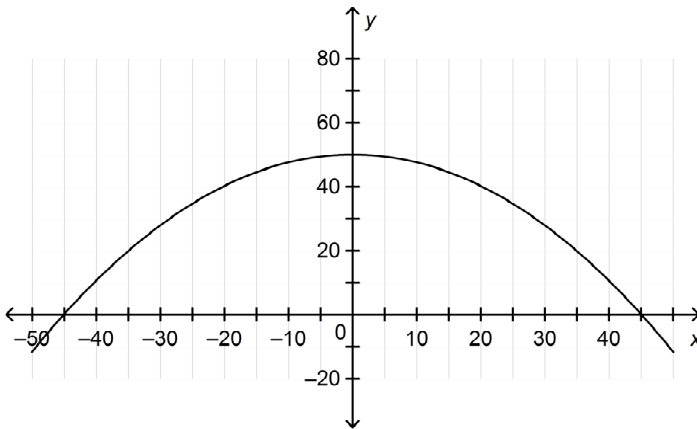
- ___ 73. Without graphing, predict the number of vertical asymptotes of the graph of $y = \frac{1}{9x^2 - 15}$.
- A. 1
B. 2
C. 0
D. cannot be determined from the equation

- ___ 74. The graph of the reciprocal of a linear function has this vertical asymptote. What is the linear function?



- A. $y = x + 3$
B. $y = x - 3$
C. $y = x + 2$
D. $y = -x + 2$
- ___ 75. Without graphing, predict the number of vertical asymptotes of the graph of $y = \frac{1}{-x^2 + 2}$.
- A. 1
B. 2
C. 0
D. cannot be determined from the equation
- ___ 76. Without graphing, determine the equations of the vertical asymptotes of the graph of $y = \frac{1}{-11x^2}$.
- A. $x = \sqrt{11}$ and $x = -\sqrt{11}$
B. $x = 0$
C. $x = 11$ and $x = -11$
D. no vertical asymptotes
- ___ 77. Identify the vertical asymptotes of the graph of the reciprocal of the quadratic function $y = (x - 3)^2 - 1$.
- A. $x = -1$
B. $y = 4$ and $y = -4$
C. $x = 4$ and $x = 2$
D. no vertical asymptotes

83. A science museum wants to build an outdoor patio. The patio will be bordered on one side by a wall of the museum and the other 3 sides by 36 m of fencing. Determine the area of the largest patio possible.
84. How is a linear-quadratic system different from a quadratic-quadratic system in terms of the number of solutions the system may have?
85. This is a graph of the quadratic function $y = -\frac{2}{81}x^2 + 50$. Identify:
- the vertex
 - the equation of the axis of symmetry
 - the intercepts



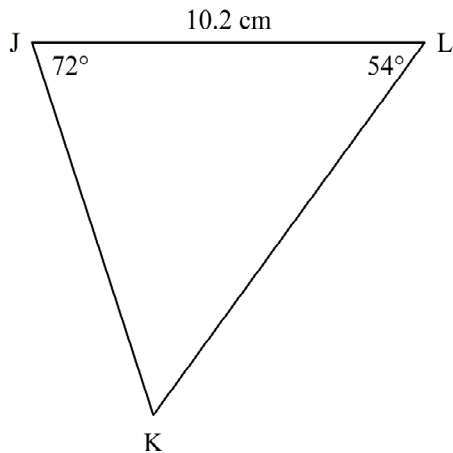
86. A 2.7-m cable is attached to a sign. The cable is anchored to the ground 1.5 m from the base of the sign. What is the angle of inclination of the cable to the nearest tenth of a degree?
87. a) Determine the reference angle for the angle 173° in standard position.
b) Determine the other angles between 0° and 360° that have the same reference angle.
88. Simplify.

$$\frac{m-3}{4mn} + \frac{m^2-9}{n^3}$$

89. Simplify.

$$\frac{-4}{7x+21} + \frac{7}{6x+4}$$

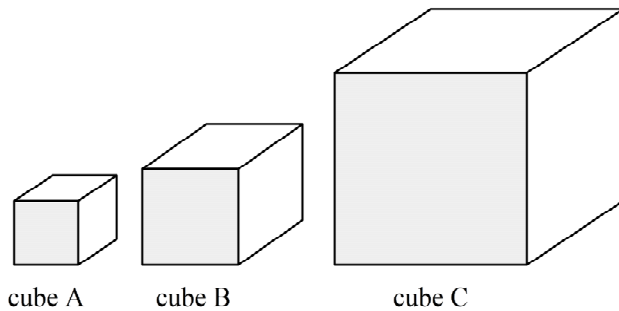
90. For $\triangle JKL$, can the Sine Law be used to determine the length of KL ? If your answer is yes, determine the length of KL to the nearest tenth of a centimetre. If your answer is no, explain why.



Problem

91. The seating chart for a concert hall shows that a section of seats has 10 rows. Tickets in the first section sell for \$85 each. Tickets in each consecutive section are \$8 cheaper than the tickets in the preceding section. The concert hall has 80 rows. Joe wants to buy 1 ticket from each section to give to charity. How much money will he have to spend?
92. a) What is the sum of the first 196 multiples of 7?
b) What is the value of t_{196} ?
93. a) A geometric sequence has these terms:
 $t_4 = 3, t_5 = \frac{3}{5}, t_6 = \frac{3}{25}$
State the common ratio, then write the first 3 terms of the sequence.
b) Identify the sequence as convergent or divergent. Explain.

94. Consider the polynomial $5x^2 + kx - 4$. Determine a value for k so that $5x - 2$ is a factor of the polynomial. Explain your strategy.
95. The length of a rectangular garden is 5 m greater than its width. The area of the garden is at least 45 m^2 . What are possible dimensions of the garden, to the nearest tenth of a metre? Show your work. Verify the solution.
96. The surface area of cube A is M square units. The surface area of cube B is twice the surface area of cube A. Cube C has a surface area 9 times that of cube A. Determine the edge lengths of cube B and cube C in terms of M . Show your work.



97. Two numbers are related in this way:
The sum of 5 times the first number and 6 times the second number is 0.
When twice the second number is subtracted from the square of the first number, the result is equal to 20 minus the first number.
- Create a system of equations to represent this relationship.
 - Solve the system to determine the numbers. Explain the strategy you used.
98. A coast guard patrol boat is due west of the Carmanah lighthouse. An overturned fishing boat is due north of the lighthouse. The patrol boat travels 8.1 km directly to the fishing boat. The angle between due east and the patrol boat's path is 57° . To the nearest tenth of a kilometre, determine the distance between the fishing boat and the lighthouse. Explain your work.
99. Ginelle is a master carpenter, and Tonya is her apprentice. It takes Tonya 12 h longer to install a subfloor for a new home than it takes Ginelle. Working together, they can install a subfloor in 8 h. How long would it take each person to install a subfloor working alone? Explain your solution.
100. a) How can you tell without graphing whether the graphs of $y = \frac{1}{x-3}$ and $y = \frac{1}{-3x+5}$ intersect?
b) Determine the coordinates of any points of intersection.