Math 11

Fundamentals **1st**
LEARNING CENTRE

Complete Workbook

★ Aligned with Alberta curriculum
★ Contains Math 20-1 practice questions and answers

2020 EDITION

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Absolute Value and Reciprocal Functions

1. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\frac{x + 5}{x^2 + 7x + 10} + \frac{x + 3}{x^2 + 5x}$$

A) $\frac{2x^2 + 10x + 6}{x(x^2 + 7x + 10)}$, $x \neq 0, -2, -5$

B) $\frac{2x^2 + 10x + 6}{x(x^2 + 7x + 10)}$, $x \neq 0$

C) $\frac{2x + 8}{2x^2 + 12x + 10}$, $x \neq 0, -1, -5$

D) $[(x + 5)(x^2 + 5x)] + [(x + 3)(x^2 + 7x + 10)]$, $x \neq 0, -5, -3, -2$

2. Simplify the following expression

$$\frac{18ab + 21b}{6ab^2}$$

A) $\frac{6a + 7}{2ab}$

B) $\frac{6ab + 7b}{2ab^2}$

C) 5

D) $\frac{3ab + 21b}{b}$

3. If the simplified rational expression $\frac{6x + 14}{3x^2}$ has non-permissible values of 0 and 3, the original rational expression must have had a:
A) factor of $(x + 3)$ in the denominator only.
B) factor of $(x - 3)$ in the denominator only.
C) common factor of $(x + 3)$ in the numerator and denominator.
D) common factor of $(x - 3)$ in the numerator and denominator.

4. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\frac{3(2x - 1)}{(x + 3)} \times \frac{5x}{x(2x - 1)}$$

A) $\frac{30x^2 - 15x}{2x^3 + 6x^2 - x - 3}$, $x \neq -\frac{1}{2}, -3$

B) $\frac{15x}{x + 3}$, $x \neq -3$

C) $\frac{15x}{x(x + 3)}$, $x \neq 0, -3$

D) $\frac{15}{x + 3}$, $x \neq 0, \frac{1}{2}, -3$

5.

$$\frac{x}{x+8} - \frac{2}{x} = 1$$

A student is asked to solve the rational equation shown here. One of the first steps in solving is to multiply:
A) both sides of the equation by x only.
B) both sides of the equation by x $(x + 8)$.
C) the right side of the equation by x only.
D) the right side of the equation by x $(x + 8)$.

6. The non-permissible values of the rational expression $\dfrac{x^2 - 4}{x^2 - 25}$ are:
A) non-existent because the variable x is squared.

B) $x = \pm 5$ because these values make the expression $\dfrac{21}{0}$.

C) $x = \pm 2$ because these values make the expression $\dfrac{0}{-21}$.

D) $x = \pm 2$ and $x = \pm 5$ because these

values make the expression $\dfrac{0}{0}$.

7. Solve $\dfrac{x-3}{10} = 4x$
A) $\dfrac{3}{41}$
B) $-\dfrac{1}{13}$
C) $-\dfrac{3}{41}$
D) 3

8.

Sam is given two rational expressions with an operation symbol between the two. To perform the operation, Sam erases the operation symbol and the second rational expression and replaces the second rational expression with its reciprocal.

Assuming Sam has begun to correctly perform the given operation, the student should replace the original operation symbol with:
A) +
B) −
C) ×
D) ÷

3

9. Reduced to its lowest terms, the
   rational expression $\dfrac{y^2 - 9x^2}{3x^2 - 2xy - y^2}$ is:

   A) $\dfrac{3x}{y}$

   B) $-6x^2 - 2xy$

   C) $(y + 3x)^2(y - 3x)(x - y)$

   D) $\dfrac{y - 3x}{x - y}$

10.

$$\frac{2}{x^2 - 6x + 8} - \frac{x}{x - 2} = \frac{1}{x - 4}$$

   Solve the rational equation shown.
   A) $x = 4$
   B) $x = -1$
   C) $x = -1, 4$
   D) There is no solution.

11. The solution set for the equation $|2x - 5| = 5 - 3x$ is
   A) Ø
   B) (2)
    C) (0)
    D) (0, 2)
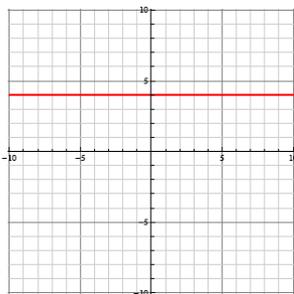
12. If the graph shown *above* is $= f(x)$,
    the graph of the reciprocal function
    is

A)

B)

C)

D)

4
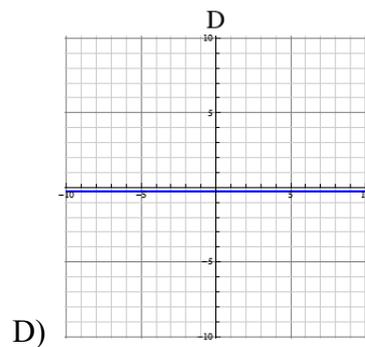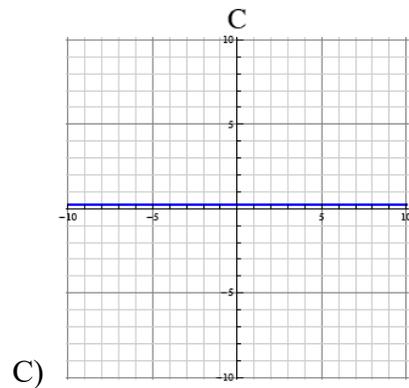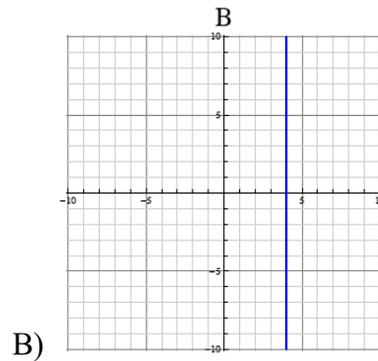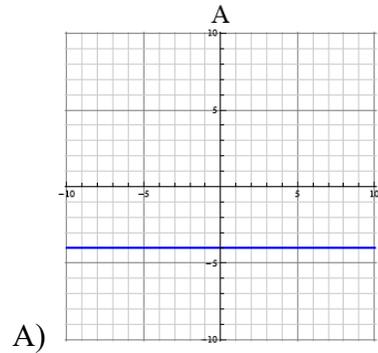
13. Four expressions, labelled 1 - 4, are shown below.
    Each is to be evaluated for $x = -2$.
    a. $-|2x - 5|$
    b. $\sqrt{|x^2|}$
    c. $5 - 3|x - 7|$
    d. $\underline{|5 - x|}$
        -0.1

    When the expressions are arranged in order, from smallest to largest, their LABELS can be used to form a 4-digit number. That 4-digit number is _____.
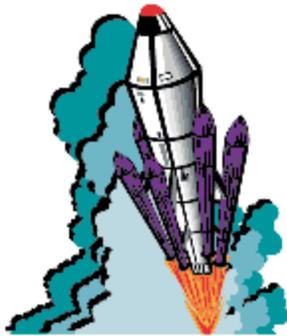
14.

Scientists determine that the launch of a particular experimental rocket has a window of 07:00 to 11:00, Central Standard Time.
A launch at any time in this window is acceptable.
The equation whose solution represents the earliest and latest acceptable times for launch is
A) $|t - 9| = 2$
B) $|t - 9| = -2$
C) $|t - 2| = 9$
D) $|t - 2| = -9$
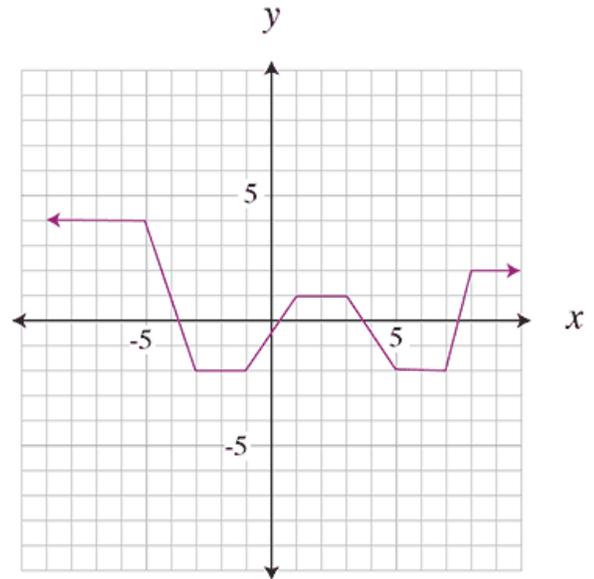
15.
A Grade 11 Math class was challenged with this question:
A function, $f(x)$, is graphed, as shown above.
$g(x)$ is the reciprocal function of $f(x)$
The number of vertical asymptotes that $g(x)$ has is
A) 1
B) 2
C) 3
D) 4

16. The vertical asymptotes of
$$y = \frac{1}{2x^2 - 7x - 4}$$ are:
A) $y = 0$ and $x = 0$
B) $x = -0.5$ and $x = 4$
C) $x = -0.5$ and $y = 4$
D) $x = 0.5$ and $x = -4$

17. The equation which has *no solution* is

    A) $|2x - 7| + 4 = 4$
    B) $|2x - 7| - 3 = 2$
    C) $|2x - 7| + 4 = -7$
    D) $|2x - 7| - 3 = -2$

18. A student used algebra to solve the equation $|x - 10| = x^2 - 10x$
    They found the equation had an extraneous root when $x =$

    A) -1
    B) 1
    C) 10
    D) 21

19. The domain of $y = \dfrac{1}{x^2 + 1}$ is:

    A) $\{x \mid x \in \Re\}$
    B) $\{y \mid y \in \Re\}$
    C) $\{y \mid y \in \Re, y \neq -1\}$
    D) $\{x \mid x \in \Re, x \neq -1\}$

20. An absolute value function has the form $f(x) = |ax + b|$ where $a \neq 0$ and $b \neq 0$, and $a, b \in \Re$
   The function $f(x)$ has:
    i) a domain of $\{x \mid x \in \Re\}$
    ii) a range of $\{y \mid y \geq 0, y \in \Re\}$
    iii) an x - intercept occuring at $(4, 0)$
    iv) a y - intercept of $(0, 6)$
    Using this information, the values of a and b in the equation $f(x) = |ax + b|$ can be determined.
    The product $a\, b$ has a value of
   _____.

21.

$y = f(x)$ $y = g(x)$

    What is the relationship between $y = f(x)$ and $y = g(x)$?
   A) $g(x) = 1 / f(x)$
    B) $g(x) = f(-x)$
    C) $g(x) = |f(x)|$
    D) $g(x) = f(|x|)$

22.

> The graph of $y = f(x)$ is shown below:

D)

Which graph illustrates $y = |f(x)|$?

A)

B)

C)

23. The value of x in the equation $|3x - 1| = 4$ is:

A) $x = \dfrac{5}{3}$

B) $x = -1, -\dfrac{5}{3}$

C) $x = -\dfrac{5}{3}$

D) $x = -1, \dfrac{5}{3}$

24. Four points lie on the graph of $y = Q(x)$.
The points have coordinates $A(5, -1)$, $B(1, 5)$, $C(-4, 1)$, $D(-1, 0)$
The point that lies on both the graph of $y = Q(x)$ and the graph of $y = \dfrac{1}{Q(x)}$ is

A) A
B) B
C) C
D) D

25. To answer this question, give the word that completes the statement below.
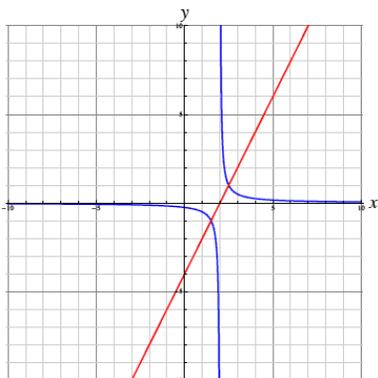
The diagram above shows the graph of a function $f(x)$ in red, and its reciprocal, in blue.

When $f(x)$ is negative, $\dfrac{1}{f(x)}$ is _____.

26. Consider the function $f(x) = \dfrac{1}{x^2 + 5x + 6}$

The *minimum* value of $\dfrac{1}{f(x)}$ is
A) -2.5
B) -0.25
C) 0.25
D) 2.5

27. Given:
$f(x) = x^2 + 2$
The number of vertical asymptotes that the reciprocal function has is
A) 0
B) 1
C) 2
D) 3
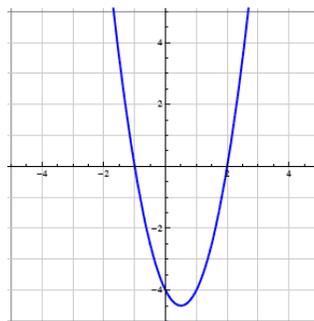
28.

If the graph shown *above* is $= f(x)$, the graph of the reciprocal function is

A)

B)

C)

D)

M

29.

A

T

H
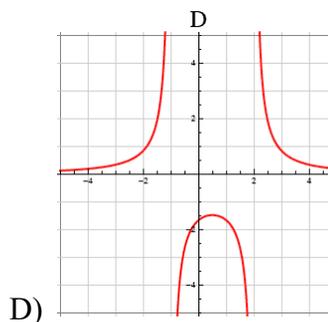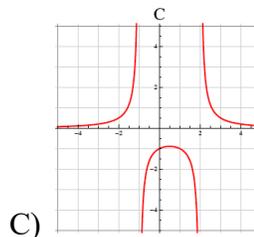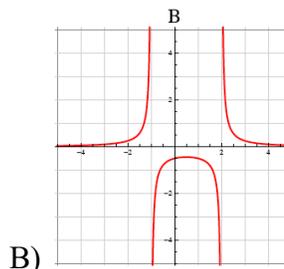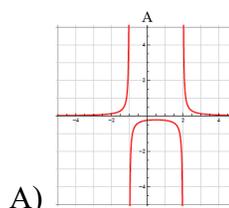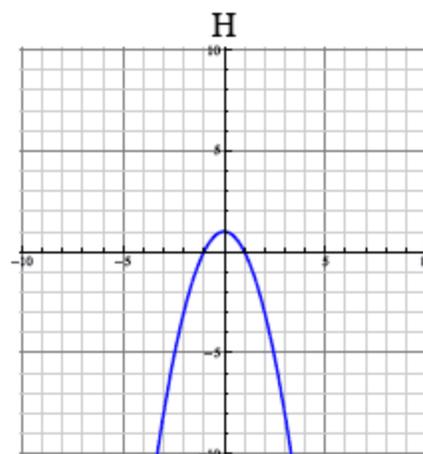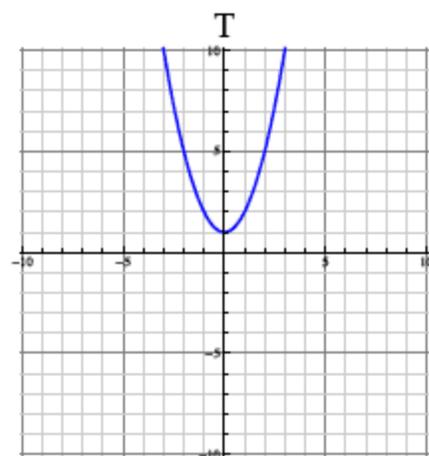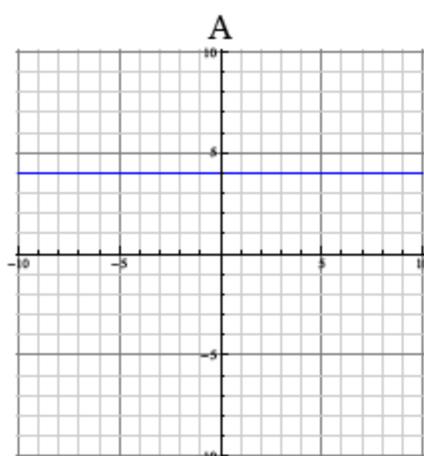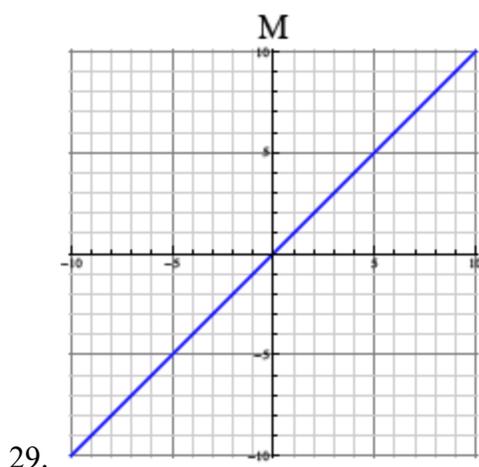
The graphs of 4 functions are shown above.

The graphs of the *reciprocal* functions may have vertical asymptotes.

If M represents the number of vertical asymptotes for the graph labelled M, A represents the number of vertical asymptotes for graph A, and so on, the 4-digit number MATH would be _____.

30. Determine the vertical asymptote of

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

A) $x = 0$

B) $x = -1$

C) $x = 1$ or -1

D) There is no vertical asymptote

9
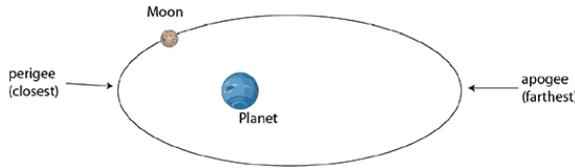
31.

Moons that move around planets travel in elliptical orbits (with the planet at one focus of the ellipse). The distance between the moon and the planet varies.

The point in an orbit closest to the planet is called *perigee*, and the point in an orbit farthest from the planet is called *apogee*.

For a particular planet and moon, these distances, d, in kilometres, can be found using:

$|d - 245\,980| = 24\,250$

The distance of apogee, in km, is

_____

32. To answer this question, give the word that completes the statement below.
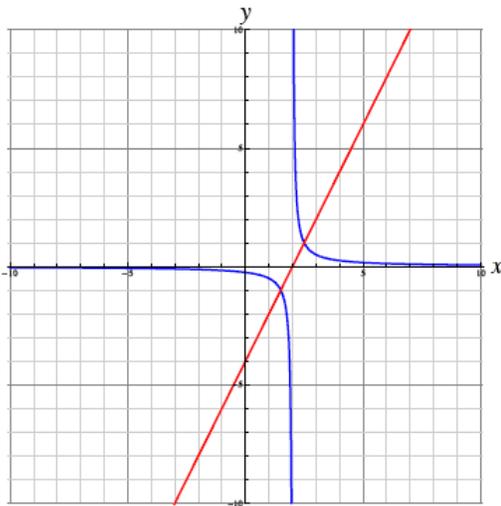
The diagram above shows the graph of a function $f(x)$ in red, and its reciprocal, in blue.

When $f(x) = 0$, the graph of $y = \dfrac{1}{f(x)}$ has a _____ asymptote.

33. Given:

$f(x) = x^2 + 2$

The number of vertical asymptotes that the reciprocal function has is

A) 0

B) 1

C) 2

D) 3

34. $y = f(x)$ is a linear function whose range is $-8 \leq y \leq 1$

The range of $y = \dfrac{1}{f(x)}$ is

A) $-\dfrac{1}{8} \leq y \leq 1, y \neq 0$

B) $-8 \leq y \leq 1, y \neq 0$

C) $y \leq -8, y \geq 1$

D) $y \leq -\dfrac{1}{8}, y \geq 1$

35. A student's work for the solution of an absolute value equation is shown below.
Each step has been labelled with a number.

$3 - 8|-6-x| = -5$ 0

$-5|-6-x| = -5$ 1

$|-6-x| = 1$ 2

Case 1: $x \le \overline{6}$ 3

$-6-x = 1$ 4

$x = -7$ 5

Case 2: $x \, 7-6$ 6

$6+x = 1$ 7

$x = -5$ 8

Which statement below best describes the student's solution?
A) The first error is made in line 2 and the solutions are both incorrect.
B) The first error is made in line 2 but the solutions are both correct.
C) The first error is made in line 1 and the solutions are both incorrect.
D) The first error is made in line 1 but the solutions are both correct.

36.
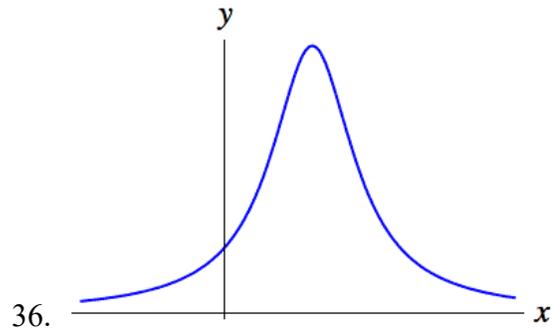
The partial graph of $g(x) = \dfrac{1}{f(x)}$ is shown.
The maximum point of $g(x)$ is at $(3,3)$.
The y - intercept of $g(x)$ is 0.75.
Given that $f(x)$ is a quadratic function, the equation of $f(x)$ can be written in the form $y = a(x - p)^2 + q$.
The value of $a + p + q$, to the nearest tenth, is _____.
(Report your answer, correctly rounded, to ONE decimal place)

37. A quadratic inequality which satisfies the condition $x < -\dfrac{1}{4}$ and $x > 3$ is:
A) $4x^2 - 11x - 3 \le 0$
B) $4x^2 - 11x - 3 > 0$
C) $4x^2 - 11x - 3 = 0$
D) $4x^2 + 13x + 3 > 0$

38. A student used algebra to solve the equation $|x - 10| = x^2 - 10x$
They found the equation had an extraneous root when $x =$
A) -1
B) 1
C) 10
D) 21

39. A graph of the function $|2x + 1| = 2$ is best represented by which of the graphs shown below?

A)

B)

C)

D)
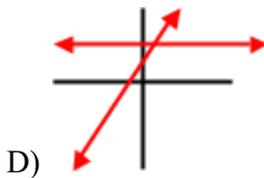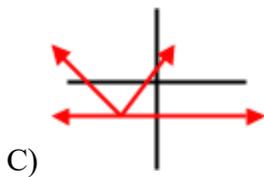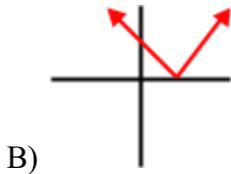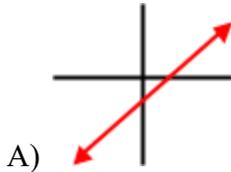
40. A student was working to find the solution of the absolute value equation $|3 + 7x| = 73$
Their work is shown below.

$|3 + 7x| = 73$

Case 1: $x < 0$ i

$-(3 + 7x) = 73$ ii

$-3 - 7x = 73$ iii

$-7x = 76$ iv

The *first* error the student makes is in

line
A) i
B) ii
C) iii
D) iv

41. Four expressions, labelled 1 - 4, are shown below.
Each is to be evaluated for $x = -2$.

    a. $-|2x - 5|$

    b. $\sqrt{|x^2|}$

    c. $5 - 3|x - 7|$

    d. $\underline{|5 - x|}$

        -0.1

When the expressions are arranged in order, from smallest to largest, their LABELS can be used to form a 4-digit number. That 4-digit number is _____.

42. An absolute value function has the form $f(x) = |ax + b|$ where $a \neq 0$ and $b \neq 0$, and $a, b \in \mathfrak{R}$
The function $f(x)$ has:
i) a domain of $\{ x \mid x \in \mathfrak{R} \}$
ii) a range of $\{ y \mid y \geq 0, y \in \mathfrak{R} \}$
iii) an x - intercept occuring at $(4, 0)$
iv) a y - intercept of $(0, 6)$
Using this information, the values of a and b in the equation $f(x) = |ax + b|$ can be determined.
The product $a\,b$ has a value of

_____.

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43. A student was using algebra to solve the equation $|x^2 - 4x| = 4$
They found that the equation had three solutions, and all three solutions *did* satisfy the original equation.
The *sum* of the three solutions is

_____.

44. The range of $y = \dfrac{1}{x^2 + 1}$ is:
   A) $\{x \mid x \in \Re\}$
   B) $\{y \mid y \in \Re\}$
   C) $\{y \mid y \in \Re, y \neq 0\}$
   D) $\{y \mid y \in \Re, y > 0\}$

45. Determine the vertical asymptote of
   $y = \dfrac{1}{x^2 + 1}$
   A) $x = 0$
   B) $x = -1$
   C) $x = 1$ or -1
   D) There is no vertical asymptote

46.

y = f(x)   y = g(x)
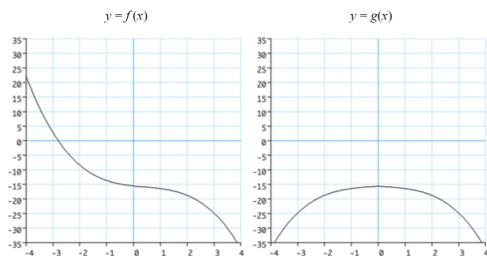
   What is the relationship between $y = f(x)$ and $y = g(x)$?
   A) $g(x) = 1 / f(x)$
   B) $g(x) = f(-x)$
   C) $g(x) = |f(x)|$

D) $g(x) = f(|x|)$

47. $g(x) = \dfrac{1}{2x^2 + 7x - 15}$ is a rational function and will have two vertical asymptotes.
The vertical asymptotes will occur at the non-permissible values of the function.
The non-permissible values are
   A) $\dfrac{3}{2}$ and 5
   B) $\dfrac{3}{2}$ and -5
   C) $-\dfrac{3}{2}$ and 5
   D) $-\dfrac{3}{2}$ and -5
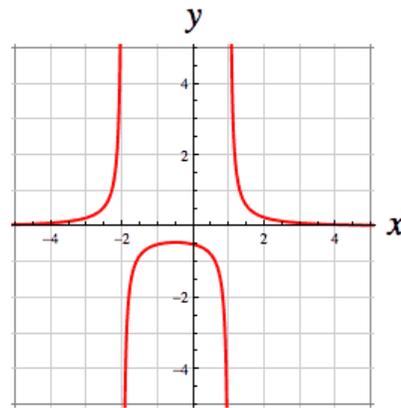
48.
   The graph shown above represents the reciprocal of which quadratic function?
   A) $f(x) = x^2 - x - 2$
   B) $f(x) = x^2 - x + 2$
   C) $f(x) = x^2 + x - 2$
   D) $f(x) = x^2 + 3x - 2$

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49. A student was working to find the solution of the absolute value equation $|3 + 7x| = 73$
Their work is shown below.

$$|3+7x| = 73$$

Case 1: x < 0   i

$-(3+7x) = 73$ ii

$-3-7x = 73$ iii

$-7x = 76$ iv

The *first* error the student makes is in line

A) i
B) ii
C) iii
D) iv

50.
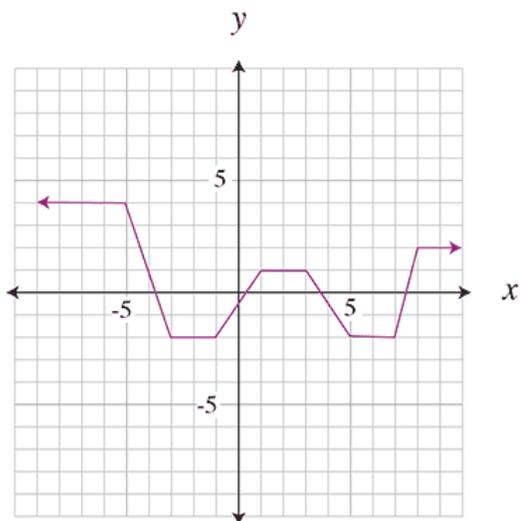
A Grade 11 Math class was challenged with this question:
A function, $f(x)$, is graphed, as shown above.
$g(x)$ is the reciprocal function of $f(x)$
The number of vertical asymptotes that $g(x)$ has is

A) 1
B) 2
C) 3
D) 4

51. Consider the function $f(x) =$
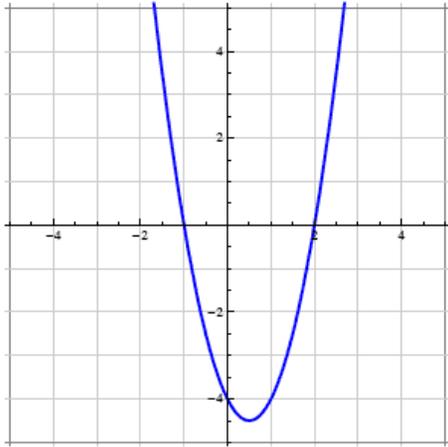
$$\frac{1}{x^2 + 5x + 6}$$

The *minimum* value of $\frac{1}{f(x)}$ is

A) -2.5
B) -0.25
C) 0.25
D) 2.5

14

C)

D)

52.

If the graph shown *above* is $= f(x)$, the graph of the reciprocal function is

A

A)

B

B)

53.

$y = f(x)$ $y = g(x)$
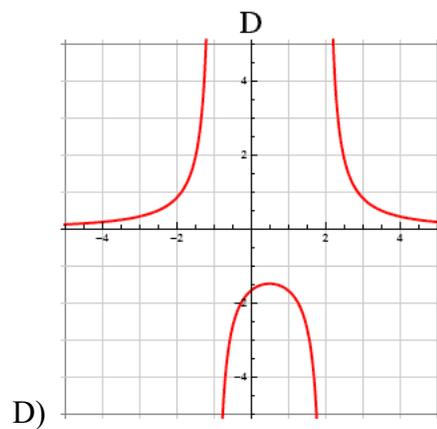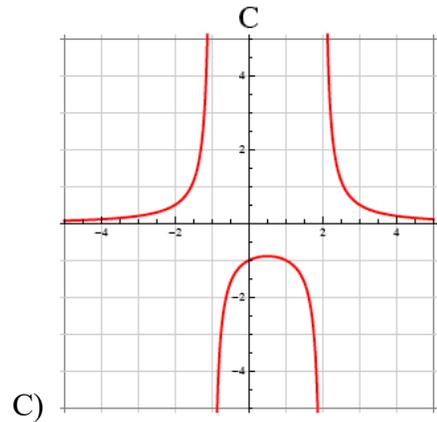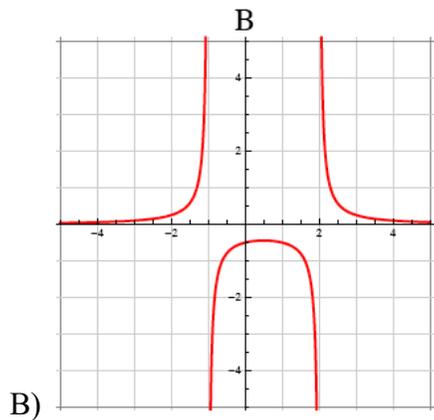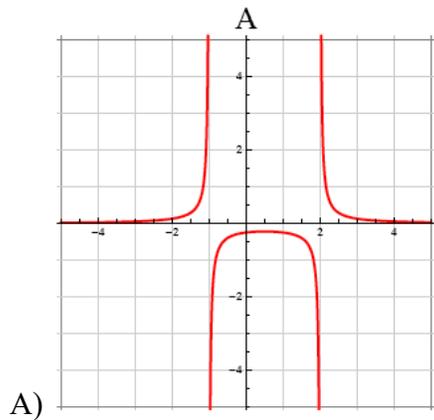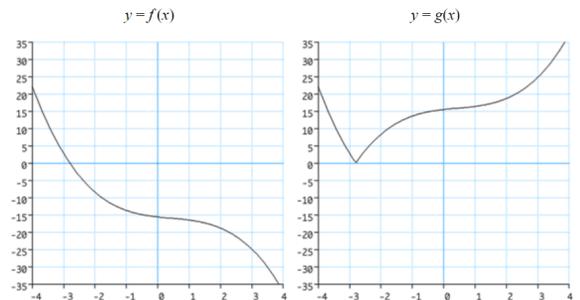
What is the relationship between $y = f(x)$ and $y = g(x)$?

A) $g(x) = 1 / f(x)$
B) $g(x) = f(-x)$
C) $g(x) = |f(x)|$
D) $g(x) = f(|x|)$

54. In order to compare the graph of a function and its reciprocal, a table of values was created.
The partially completed table is shown below.

x	$y = f(x)$	$y = \dfrac{1}{f(x)}$
−5	1	i
−1	12000	ii
0	20	iii
2	0	iv

The entry that would illustrate a vertical asymptote for the reciprocal function would be
A) i
B) ii
C) iii
D) iv

55. Refer to the information in question 4.
The entry that would illustrate an invariant point of the function and its reciprocal is
A) i
B) ii
C) iii
D) iv

56. The following graph represents $f(x)$.
Sketch the graph of $y = 1 / f(x)$

A)

B)

C)

D)

B
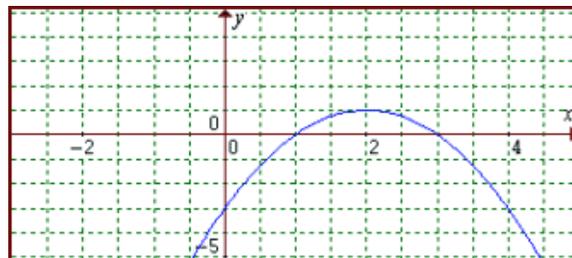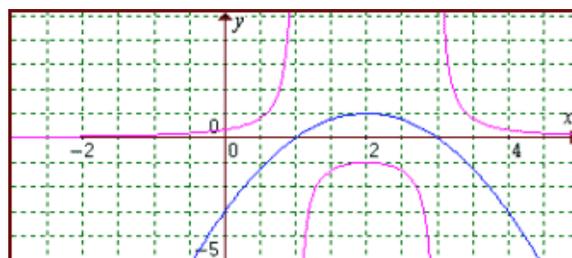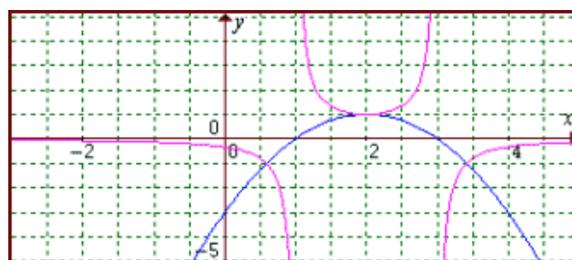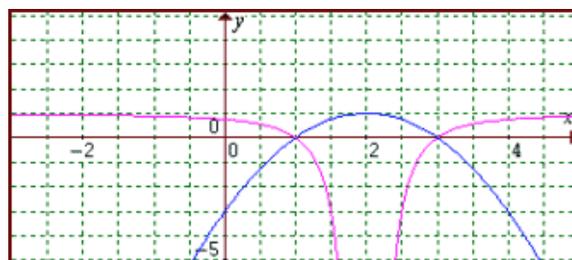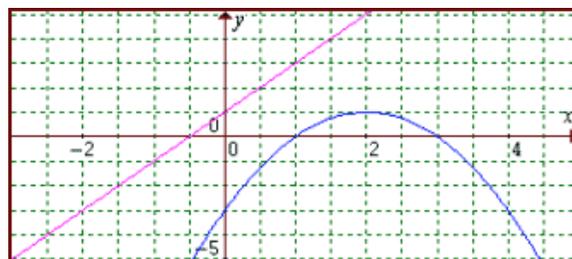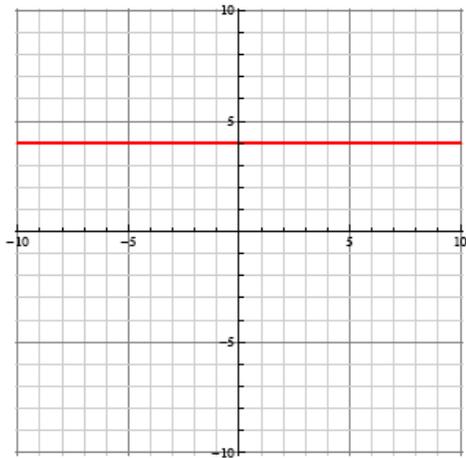
57.
If the graph shown *above* is = f(x),
the graph of the reciprocal function
is

A

C

A)

B)

C)

D)
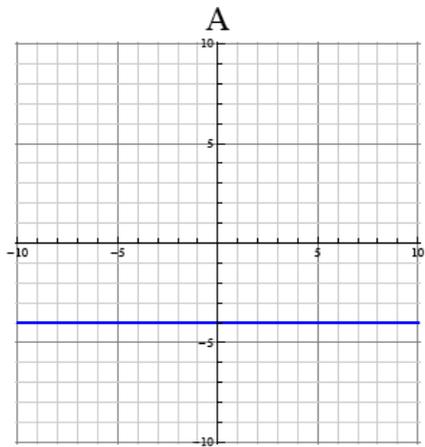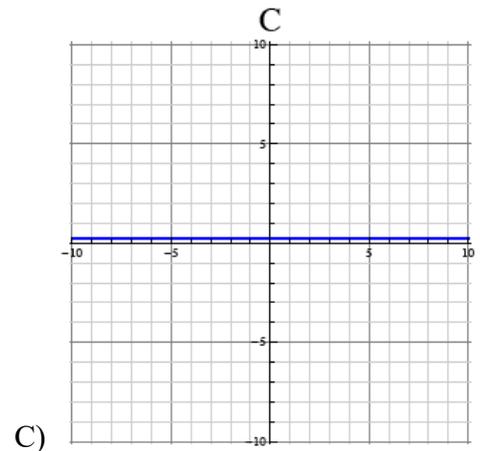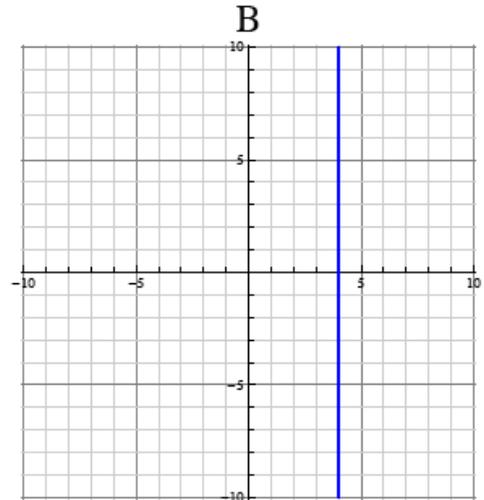
D
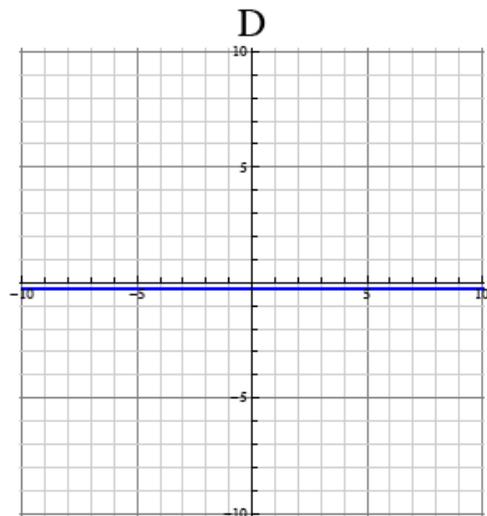
58. The range of $y = \dfrac{1}{-3x+6}$ is:

   A) $\{x \mid x \in \Re\}$
   B) $\{y \mid y \in \Re\}$
   C) $\{y \mid y \in \Re, y \neq 0\}$
   D) $\{x \mid x \in \Re, x \neq 0\}$

59. The range of $y = \dfrac{1}{x^2 + 1}$ is:

   A) $\{x \mid x \in \Re\}$
   B) $\{y \mid y \in \Re\}$
   C) $\{y \mid y \in \Re, y \neq 0\}$
   D) $\{y \mid y \in \Re, y > 0\}$

60. The vertical asymptotes of
   $y = \dfrac{1}{2x^2 - 7x - 4}$ are:

   A) $y = 0$ and $x = 0$
   B) $x = -0.5$ and $x = 4$
   C) $x = -0.5$ and $y = 4$
   D) $x = 0.5$ and $x = -4$

Linear and Quadratic Inequalities
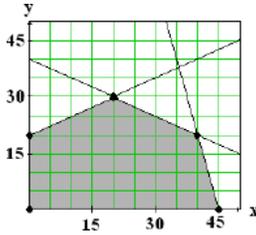
1. Given the constraint polygon shown, the optimal value for the objective function $T = x + 4y$ is

    _____.

2. Which of the numberlines shown below best represents the statement: 'x is less than zero, and x is greater than –2'?
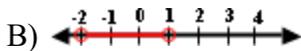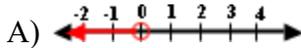
    A)
    B)
    C)
    D) This statement cannot be represented on a number line

3. Solve $x^2 – 2x – 35 > 0$, without using technology.
    A) $x < –5, x > 7$
    B) $–5 < x < 7$
    C) $x < –7, x > 5$
    D) $– 7 < x < 5$

4. A box is to be constructed from a rectangular piece of cardboard with dimensions 18 cm by 26 cm. The box will be made by cutting out a square with a side length of x from each corner of the cardboard sheet, and folding up the sides, as shown in the diagram below:
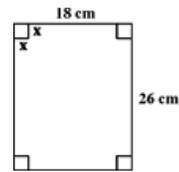
    Given this information, for what values of x can a box be made?
    A) $x > 0$
    B) $x = 0, 9, 13$
    C) $x \le 9$
    D) $0 < x < 9$

5. The graph of $x + 2y > 4$ is:

    A)
    .

    B)
    .

    C)
    .

    D)

.

6. Which of the following graphical solutions best illustrates $3x + 2y + 1 < 0$?

A)

B)

C)

D)
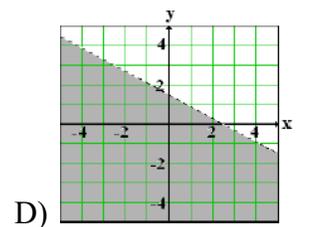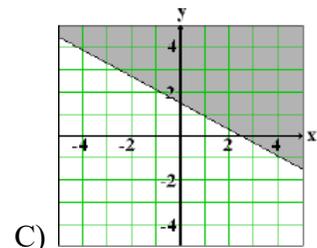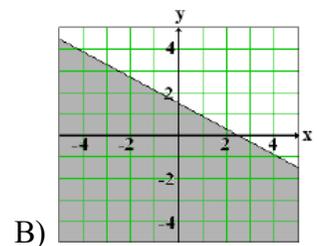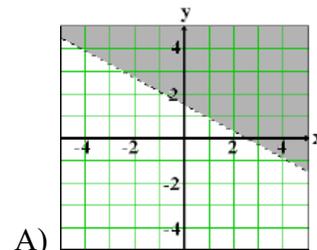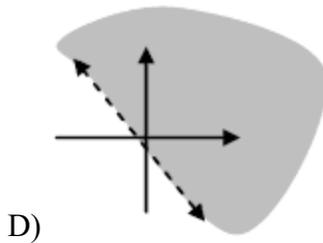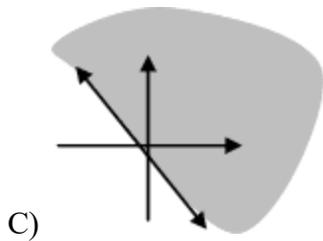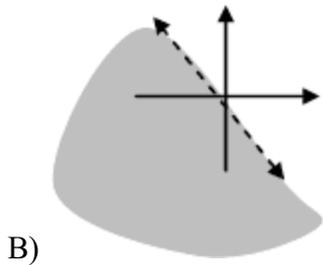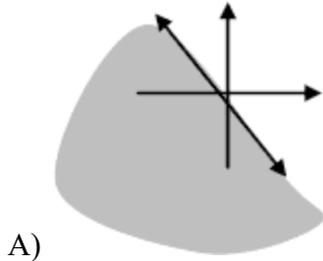
7.

The graphical solution to a linear inequality in two variables is shown.
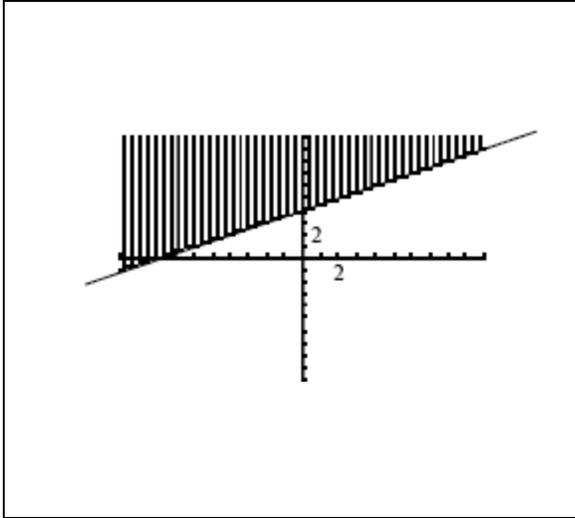
Which of the following linear inequalities corresponds to the given graphical solution?
A) $2y - x - 8 \geq 0$
B) $2y - x - 8 > 0$
C) $2y - x - 8 \leq 0$
D) $2y - x - 8 < 0$
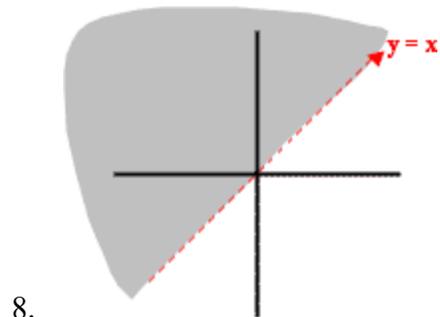
8.
The shaded region on the graph shown above represents the area in which the inequality:
A) $y > x$ is true.
B) $y < x$ is true.
C) $y = x$ is true.
D) $y = x = 0$ is true.

9.

The solution to an inequality is represented by the number line shown.
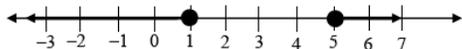
Which of the following inequalities could have its solution represented by the number line shown?
A) $x^2 + 6x + 5 \leq 0$
B) $x^2 + 6x + 5 \geq 0$
C) $x^2 - 6x + 5 \leq 0$
D) $x^2 - 6x + 5 \geq 0$

10. Elisha devotes up to a total of 18 hours per week on either her math (*m*) homework or her science (*s*) homework, as shown in the graph below by the red line and shaded region:
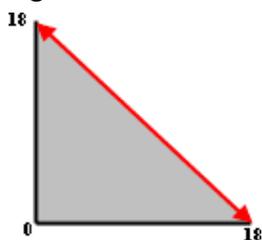
Which of the situations listed below is not represented by this graph?
A) $m + s \geq 18$
B) $m + s \leq 18$

C) Elisha can spend 10 hours on math homework and 8 hours on science homework in a week
D) Elisha can spend 8 hours on math homework and 10 hours on science homework in a week

11. The solution to the inequality $6x^2 - x - 2 > 0$ is:

A) $-\dfrac{1}{2} < x < \dfrac{2}{3}$

B) $-\dfrac{2}{3} < x < \dfrac{1}{2}$

C) $x < -\dfrac{1}{2}, x > \dfrac{2}{3}$

D) $x < \dfrac{1}{2}, x > -\dfrac{2}{3}$

12. A cannon ball was fired from an underwater cannon located at the bottom of a shallow lake. The cannon ball shot out of the water and then fell back into the water. The function that models the height, *h*, of the cannon, in metres, where a height of zero corresponds to the water's surface is given by $h = -2.94t^2 + 11.72t - 8.59$, where *t* is the time measured in seconds.
How long was the cannon ball out of the water?
A) 1.94 s
B) 2.05 s
C) 3.02 s
D) 3.99 s

D) $-5x^2 + 30x + y - 48 \geq 0$

13. The solution to the inequality $x - y < 0$ would best be represented by the half-plane:
    A) under, and including, the line $y = x$
    B) above, and including, the line $y = x$
    C) under, and excluding, the line $y = x$
    D) above, and excluding, the line $y = x$
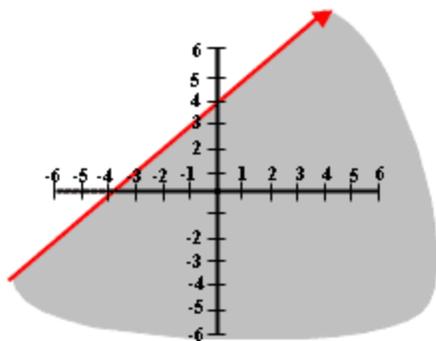
14.
    Which of the following points does not represent the inequality shown in the graph above?
    A) $(-4, -2)$
    B) $(0, 0)$
    C) $(2, 1)$
    D) $(3, 7)$

15. Which of the following inequalities could be illustrated with shading above a broken parabolic curve with a vertex at (3,3) and an x-intercept of 5?
    A) $3x^2 - 18x + 4y + 15 > 0$
    B) $3x^2 - 18x + 4y + 15 \geq 0$
    C) $-5x^2 + 30x + y - 48 > 0$

16. The amount of money made by a motivational speaker depends on the number of appearances he makes and the fee charged for the appearance. His profit is determined by the equation $P = 0.03f(13000 - 100f)$ where f = fee for appearance. Given this information, for what range of fees will the motivational speaker make more than $12000 in profits?
    A) Between $50 and $80 per appearance
    B) More than $80 per appearance
    C) Less than $80 per appearance
    D) More than $0 per appearance

17. When graphing the solution to a quadratic inequality, a solid line should be used when the points on the curve of the related quadratic function are:
    A) known.
    B) used as test points.
    C) included in the solution region.
    D) excluded from the solution region.

18. Which of the following number lines best represents the solution to the inequality $x^2 - 7x + 12 > 0$?

A)

B)

C)

D)
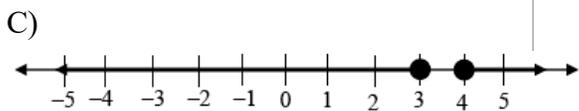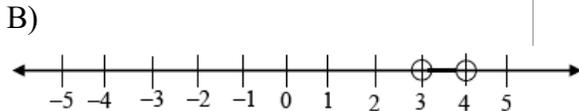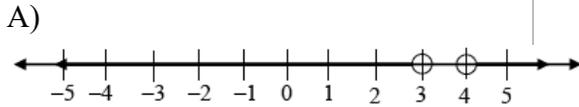
19.

The solution to an inequality is represented by the number line shown.
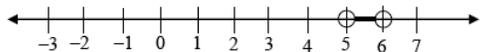
Which of the following inequalities could have its solution represented by the number line shown?

A) $x^2 - 11x + 30 < 0$

B) $x^2 - 11x + 30 > 0$

C) $x^2 - 11x + 30 \leq 0$

D) $x^2 - 11x + 30 \geq 0$

20. Which of the following test points is part of the solution for $-20x^2 - x + 1 > 0$?

A) $x = 0$

B) $x = \frac{1}{5}$

C) $x = -\frac{1}{4}$

D) $x = -20$
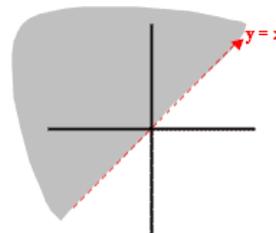
21. The shaded region on the graph shown above represents the area in which the inequality:

A) $y > x$ is true.

B) $y < x$ is true.

C) $y = x$ is true.

D) $y = x = 0$ is true.

22. The solution to the inequality $3x - 2y + 5 \geq 0$ would best be represented by the half-plane:

A) Under, and including, the line $y = \frac{3}{2}x + \frac{5}{2}$

B) Above, and including, the line $y = \frac{3}{2}x + \frac{5}{2}$

C) Under, and excluding, the line $y = \frac{3}{2}x + \frac{5}{2}$

D) Above, and excluding, the line $y = \frac{3}{2}x + \frac{5}{2}$

23.
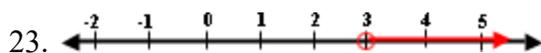
Which of the statements below can represent the inequality shown on the number line above?
A) x > 3 and x > 4
B) x > 1 or x > 3
C) x > 1 and x > 3
D) x < 5 and x = 3

24. The graphical solution to the inequality $2x^2 - y + 5 < 0$ would be the region:
A) inside a parabola opening upwards.
B) below a parabola opening upwards.
C) inside a parabola opening downwards.
D) above a parabola opening downwards.

25. Solve $x^2 - 2x - 35 > 0$, without using technology.
A) $x < -5, x > 7$
B) $-5 < x < 7$
C) $x < -7, x > 5$
D) $-7 < x < 5$

26. For which of the following inequalities would the graphical solution show a broken line?
A) $2x + y \leq 1$
B) $2x + y \geq 1$
C) $3x - 2y > -1$
D) $3x - 2y \geq -1$

27. Elisha devotes up to a total of 18 hours per week on either her math (m) homework or her science (s) homework, as shown in the graph below by the red line and shaded region:
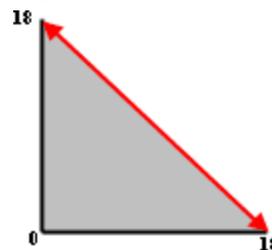
Which of the situations listed below is not represented by this graph?
A) $m + s \geq 18$
B) $m + s \leq 18$
C) Elisha can spend 10 hours on math homework and 8 hours on science homework in a week
D) Elisha can spend 8 hours on math homework and 10 hours on science homework in a week

28. Which of the following inequalities could be illustrated with shading above a solid boundary line with an x-intercept of 2 and a y-intercept of –4?
A) $2x + y + 4 > 0$
B) $2x + y + 4 \geq 0$
C) $-2x + y + 4 > 0$
D) $-2x + y + 4 \geq 0$

29. A bakery makes cakes and pies. In one week, the bakery can produce a total of up to 250 baked goods. Which of the graphs shown below has a shaded area that correctly shows the number of cakes and pies which can be made in one week?
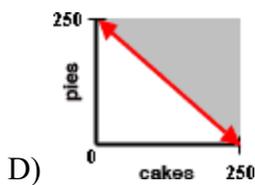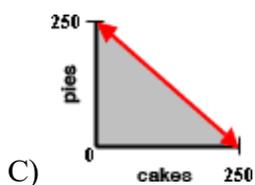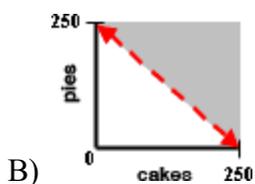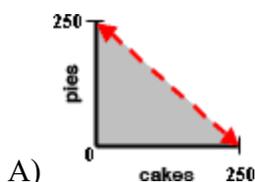
A)

B)

C)

D)

30. A event planning company has determined an inequality that models the ticket prices, x, for events that generate acceptable revenue to be $-5x^2 + 9880x + 240000 \geq 5000000$. A ticket price of $500 would generate:

A) less revenue than a ticket price of $400.

B) more revenue than a ticket price of $1200.

C) more revenue than a ticket price $2000.

D) less revenue than a ticket price of $1800.

31.
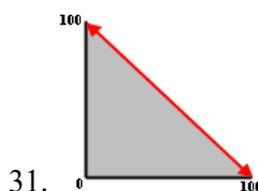
The inequality shown in the graph above by the shaded region and solid red line can best represent which of the situations listed below?

A) A factory which produces twice as many cars as trucks, with up to 100 vehicles produced in total.

B) An exercise program involving jogging and weight lifting which requires a minimum of 100 hours of exercise per month.

C) A veterinary practice which in one week can examine either 100 dogs or 100 cats.

D) A gardener who wishes to plant annuals and perennials, up to a total off 100 plants.

32. Which of the following inequalities could be illustrated with shading above a solid boundary line with an x-intercept of 2 and a y-intercept of -4?

A) $2x + y + 4 > 0$

B) $2x + y + 4 \geq 0$

C) $-2x + y + 4 > 0$

D) $-2x + y + 4 \geq 0$

33. Which of the following graphical solutions best illustrates $3x + 2y + 1 < 0$?

A)

B)

C)

D)
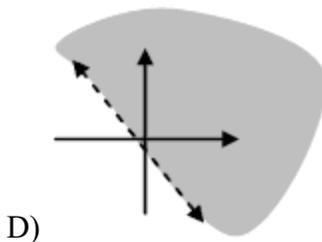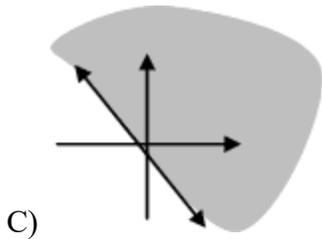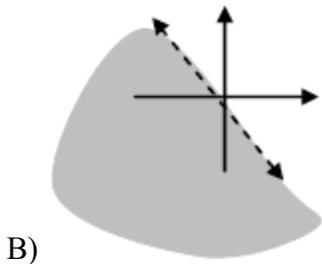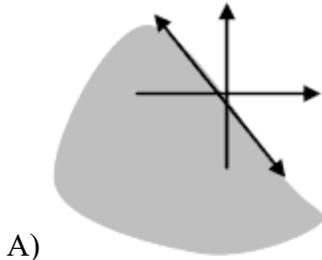
34. Which of the following points represents the inequality expressed by the equation: $x - 3y - 6 > 0$?
    A) (3, 1)
    B) (−3, −5)
    C) (1, 0)
    D) (0, 0)

35.

A event planning company has determined an inequality that models the ticket prices, x, for events that generate acceptable revenue to be $-5x^2 + 9880x + 240000 \geq 5000000$.

A ticket price of $500 would generate:
A) less revenue than a ticket price of $400.
B) more revenue than a ticket price of $1200.
C) more revenue than a ticket price $2000.
D) less revenue than a ticket price of $1800.

36. Which of the following inequalities could be illustrated with shading above a broken parabolic curve with a vertex at (3,3) and an x-intercept of 5?
    A) $3x^2 - 18x + 4y + 15 > 0$
    B) $3x^2 - 18x + 4y + 15 \geq 0$
    C) $-5x^2 + 30x + y - 48 > 0$
    D) $-5x^2 + 30x + y - 48 \geq 0$

37. Which of the following number lines best represents the solution to the inequality $-5x^2 + 35x - 60 \geq 0$?

A)
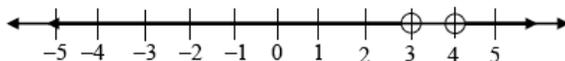
B)
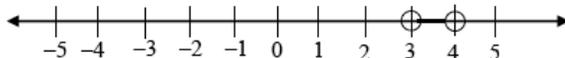
C)
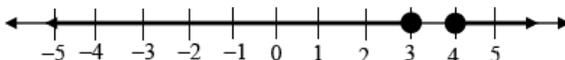
D)
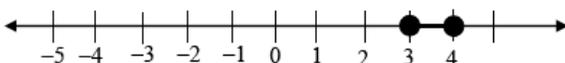
38. The solution to the inequality $3x - 2y + 5 \geq 0$ would best be represented by the half-plane:

A) Under, and including, the line $y = \frac{3}{2}x + \frac{5}{2}$

B) Above, and including, the line $y = \frac{3}{2}x + \frac{5}{2}$

C) Under, and excluding, the line $y = \frac{3}{2}x + \frac{5}{2}$

D) Above, and excluding, the line $y = \frac{3}{2}x + \frac{5}{2}$

39. For which of the following inequalities would the graphical solution show a broken line?

A) $2x + y \leq 1$

B) $2x + y \geq 1$

C) $3x - 2y > -1$

D) $3x - 2y \geq -1$

27

Quadratic Equations

1. Sam was given the following statement:

   The sum of the squares of two consecutive numbers is a minimum.

   The quadratic function that models the sum is given by:
   A) $S = 2x^2 - x - 1$
   B) $S = 4x^2 - x - 4$
   C) $S = 2x^2 + 2x + 1$
   D) $S = 4x^2 + 4x + 1$
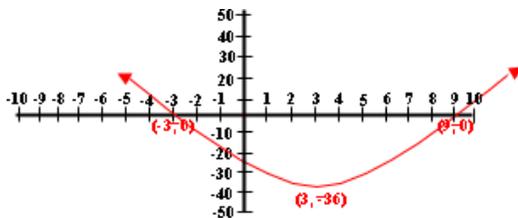
2. Using the information provided in the graph above, what is the equation of the parabola shown, and what is the value of its roots?
   A) $y = x^2 - 33x - 108$; roots are $x = -3, 9$
   B) $y = (x + 36)^2 + 3$; roots are $x = -36, 3$
   C) $y = x^2 - 6x - 27$; roots are $x = -3, 9$
   D) $y = x^2 + 6x - 27$; roots are $x = 3, -9$

3. The greatest common factor in the expression $8x^2 - 32x - 180$ is:
   A) 2
   B) 4
   C) 6
   D) 8

A graph is given.
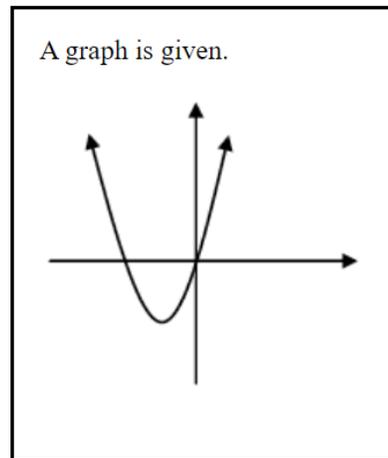
4. The equation representing the graph of the given function could be:
   A) $y = x^2 + 4x$
   B) $y = -x^2 + 4x$
   C) $y = x^2 + 5x + 6$
   D) $y = -x^2 + 5x - 6$

5. If $\sqrt{x} + (x + 5)^{0.5} = 5$, what are the roots of this equation, and what is the meaning of the roots?
   A) $x = 4$ and the roots represent the vertical asymptote
   B) $x = 4$ and the roots represent the intersection between the functions $y = \sqrt{x}$ and $y = (x + 5)^{0.5}$
   C) $x = 4$ and the roots represent the x-intercept
   D) $x = 4$ and the roots represent the y-intercept

6. Subtracting a number from its square gives a value of 1640. Given this information, which of the following quadratic equations shown below correctly shows how to solve this problem?

A) $-1 \pm \dfrac{\sqrt{(-1)^2 - 4(1)(-1640)}}{2(1)}$

B) $-(-1) \pm \dfrac{\sqrt{(-1)^2 - 4(1)(1640)}}{2(1)}$

C) $-1 \pm \dfrac{\sqrt{(-1)^2 - 4(1)(1640)}}{2(1)}$

D) $-(-1) \pm \dfrac{\sqrt{(-1)^2 - 4(1)(-1640)}}{2(1)}$

7. The solutions to the equation $0 = x^2 + 2x$ are:
   A) $x = 0$ and $x = 2$
   B) $x = 2$ and $x = -2$
   C) $x = 0$ and $x = -2$
   D) $x = 0$ and $x = 1$

8.

A student is given a diagram of a right triangle as shown.
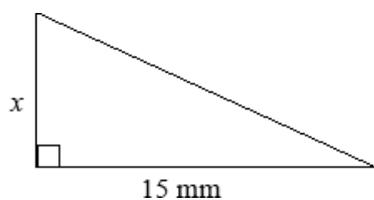
15 mm

The hypotenuse of this triangle is 3 mm longer than twice one of the other sides. The third side is 15 mm in length.

Which equation could the student use to solve for the length of the hypotenuse?
A) $0 = x^2 - 99$
B) $0 = x^2 - 549$
C) $0 = 3x^2 + 12x - 216$
D) $0 = 3x^2 - 12x - 216$

9. Factor $6x^2 + 6x - 12$
   A) $3(x - 1)(2x + 4)$
   B) $3(x + 1)(2x + 4)$
   C) $3(x - 1)(2x - 4)$
   D) $3(x + 1)(2x - 4)$

10. The binomial $x + 7$ can only be a factor of:
    A) $x^2 - 7$
    B) $7x^2 - 49$
    C) $x^2 + 7x + 12$
    D) $x^2 + 10x + 21$

11. When $a > 0$ and $c < 0$ in a quadratic function of the form $y = ax^2 + bx + c$, the graph of the function will have:
    A) no x-intercepts.
    B) two positive x-intercepts.
    C) two negative x-intercepts.
    D) one negative x-intercept and one positive x-intercept.

12. For the function $y = -2(x - 4)^2 - 7$ to represent the same function as one given in the form $y = ax^2 + bx + c$, the value of b would need to be:
    A) -16
    B) -8
    C) 8
    D) 16

13. The quadratic formula is:

    A) $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2c}$

    B) $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

    C) $x = \dfrac{b \pm \sqrt{b^2 - 4ac}}{2a}$

    D) $x = \dfrac{-b + \sqrt{b^2 - 4ac}}{2a}$

14. The greatest common factor in the expression $8x^2 - 32x - 180$ is:
    A) 2
    B) 4
    C) 6
    D) 8

15. Subtracting a number from its square gives a value of 1640. Given this information, which of the following quadratic equations shown below correctly shows how to solve this problem?

    A) $-1 \pm \dfrac{\sqrt{(-1)^2 - 4(1)(-1640)}}{2(1)}$

    B) $-(-1) \pm \dfrac{\sqrt{(-1)^2 - 4(1)(1640)}}{2(1)}$

    C) $-1 \pm \dfrac{\sqrt{(-1)^2 - 4(1)(1640)}}{2(1)}$

    D) $-(-1) \pm \dfrac{\sqrt{(-1)^2 - 4(1)(-1640)}}{2(1)}$

16. An equation is given.

    $0 = -2.4x^2 - 6.5x + 0.8$

    $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

    A student attempted to solve this quadratic equation, and her work is shown below.

    1. $x = \dfrac{-(-6.5) \pm \sqrt{(-6.5)^2 - 4(-2.4)(0.8)}}{2(-2.4)}$

    2. $x = \dfrac{6.5 \pm \sqrt{42.25 + 7.68}}{-4.8}$

    3. $x = \dfrac{6.5 \pm \sqrt{49.93}}{-4.8}$

    4. $x \approx -2.83$

    In which step did the student make her first mistake?
    A) 1
    B) 2
    C) 3
    D) 4

30

17.

The quadratic formula stems from solving the equation $0 = ax^2 + bx + c$ for x by first completing the square.

$$0 = ax^2 + bx + c$$

$$0 = a\left(x^2 + \frac{b}{a}x + \underline{\quad}\right) - a(\underline{\quad}) + c$$

.

.

$$0 = a(x-p)^2 + q$$

In the process shown above, what is q?

A) $\dfrac{b}{2a}$

B) $-\dfrac{b}{2a}$

C) $\dfrac{b^2 - 4ac}{4a}$

D) $-\left(\dfrac{b^2 - 4ac}{4a}\right)$

18. If the greatest common factor of a polynomial expression is $25x^3$, each term of the original polynomial expression must be:
   A) of degree 3 or higher and divisible by 5.
   B) of degree 4 or higher and divisible by 5.
   C) of degree 3 or higher and divisible by 25.
   D) of degree 4 or higher and divisible by 25.

19. Factor $-3x^2 - 9x + 30$
   A) $3(x + 2)(x - 5)$
   B) $-3(x + 2)(x - 5)$
   C) $3(x - 2)(x + 5)$
   D) $-3(x - 2)(x + 5)$

20. The zeros of the function $y = x^2 + 8x + 15$ would be:
   A) $x = 3$ and $x = 5$
   B) $x = 3$ and $x = -5$
   C) $x = -3$ and $x = 5$
   D) $x = -3$ and $x = -5$

Quadratic Functions

1. A missile is launched into the air and follows the pathway described by $h = -10t^2 + 100t$, where h is the missile's height above the ground in metres and t is the time elapsed in seconds. What is the maximum height the missile reaches?
   A) 10 m
   B) 50 m
   C) 250 m
   D) 500 m
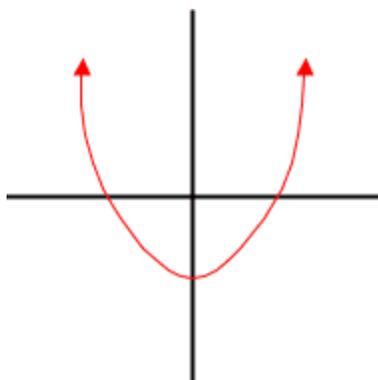
2. The graph above most likely represents the function described by the equation:
   A) $y = x^2$
   B) $y = x - 5$
   C) $y = x^2 - 5$
   D) $y = x$

3. The largest value in the range of the quadratic function $y = -1.5(x - 3)^2 + 48$ is _____.

4.

$$3x - 2y = 6$$

Is the equation Linear (L) or Quadratic (Q)?

5. The graph of the function $y = a(x - p)^2 + q$ is guaranteed to have two x-intercepts if:
   A) a is negative and p is negative
   B) a is negative and p is positive
   C) a is negative and q is negative
   D) a is negative and q is positive

6. The vertex of the graph of the function $y = 3x^2 - 12x + 4$ is located at:
   A) (3,4)
   B) (2,–8)
   C) (–2,–8)
   D) (2,8)

7. A skateboard company uses the relation $p = 146x - 73x^2$ to model its profit, where x represents the number of skateboards sold in thousands and p represents the profit in thousands of dollars What is the maximum profit the company can earn?
   A) $73
   B) $146
   C) $73,000
   D) $146,000

$y = -x(x-4)$

8. Refer to the information in question 7.

   How many skateboards must be sold to maximize the company's profit?

   A) 1
   B) 1000
   C) 2
   D) 2000

A) (4,2)
B) (2,4)
C) (0,0)
D) (4,0)

9. What are the *x*-intercepts of the parabola?

$y = 2x2-8x+6$
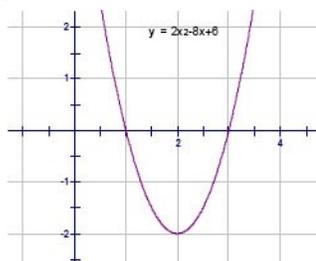
   A) x = 2, x = -2
   B) x = 0, x = 2
   C) x = 1, x = -2
   D) x = 1, x = 3

12. Which graph represents the function $y = x^2 - 2x + 4$?

   A)

   B)

   C)

10.   A movie theatre charges $8.00 per ticket and sells 500 tickets each night. The manager knows that for every $0.25 increase in ticket price, he will decrease the number of tickets sold by 10. Find the ticket price that will maximize revenue.

A) $9.50
B) $9.75
C) $10.00
D) $10.25

   D)

11. What are the coordinates of the vertex of the parabola?
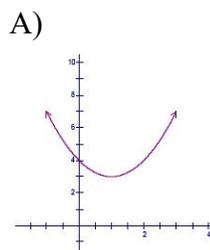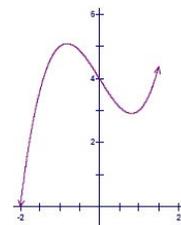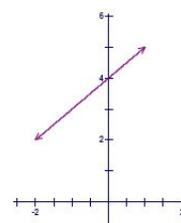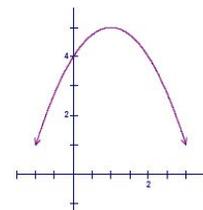
13.

$$4x^2 + 2y - 12x + 8 = 0$$

What is the range?

A) $R = \{y \in \Re \mid y \leq 1\}$
B) $R = \{x \in \Re \mid x \leq 1\}$
C) $D = \{x \in \Re\}$
D) $D = \{y \in \Re\}$

14. Find the zeros of the function $y = x^2 - 81$

A) $x = 9$ and $x = -9$
B) $x = 9$ and $y = 9$
C) $x = 81$ and $x = -81$
D) $x = 81$ and $y = 81$

15.

A skateboard company uses the relation $p = 146x - 73x^2$ to model its profit, where x represents the number of skateboards sold in thousands and p represents the profit in thousands of dollars.

How many skateboards must be sold to maximize the company's profit?

A) 1
B) 1000
C) 2
D) 2000

16. A missile is launched into the air and follows the pathway described by $h = -10t^2 + 100t$, where h is the missile's height above the ground in metres and t is the time elapsed in seconds. What is the maximum height the missile reaches?

A) 10 m
B) 50 m
C) 250 m
D) 500 m

17.

The equation, $h = -5.25(t - 4)^2 + 86$, models the height of a flare height, h metres, as a function of the time, t seconds, since the flare was fired from a boat.

When did the flare reach its maximum height?

A) 4 seconds
B) 5.25 seconds
C) 86 seconds
D) Cannot be determined

18. Refer to the information in question 7.
What was the height of the flare when it was fired?

A) 2 metres
B) 16 metres
C) 86 metres
D) Cannot be determined

19. Factor fully:

    $x^2 + 25$

    A) $(x - 5)(x + 5)$
    B) $(x + 5)(x + 5)$
    C) $(x - 5)(x - 5)$
    D) Cannot be factored

20. The vertex of the quadratic function

    $y = \frac{2}{3}x^2 - 8x + 15$ is at

    A) $(9, -6)$
    B) $(-9, 6)$
    C) $(-6, 9)$
    D) $(6, -9)$

21. The graph shows the path of a bungee jumper leaping from a bridge. How close does the jumper get to the water's surface?
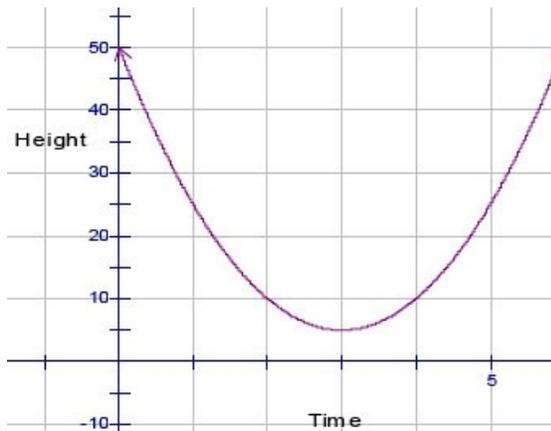
    A) 2 m
    B) 5 m
    C) 10 m
    D) 50 m

22.
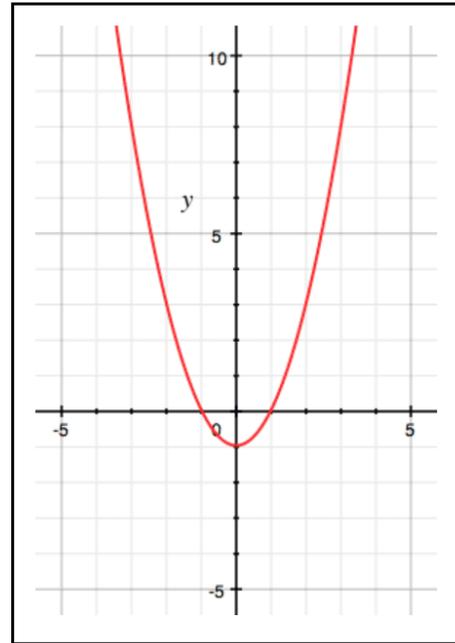
The vertex of the parabola shown is:

    A) $(0,0)$
    B) $(-1,0)$
    C) $(0,-1)$
    D) $(1,0)$

23. A missile is launched into the air and follows the pathway described by $h = -10t^2 + 100t$, where h is the missile's height above the ground in metres and t is the time elapsed in seconds. What is the maximum height the missile reaches?

    A) 10 m
    B) 50 m
    C) 250 m
    D) 500 m

24.

$$f(x) = -(x - 1)(x + 3)$$

Identify the *y*-intercept.
A) (1, 0)
B) (-3, 0)
C) (0, 3)
D) (-1, 4)

25. A parabola with an axis of symmetry defined by the equation $x - 2 = 0$ and a vertex at (2, –4) also passes through the point (4, 0). Given this information, the parabola has a *y*-intercept of:
A) (0, 4)
B) (–2, 0)
C) (0, 0)
D) (2, 0)

26. The graph of a function of the form $f(x) = a(x - 3)^2 - 4$ has two *x*-intercepts, one of which is -2.7. The other *x*-intercept, to the nearest tenth, is _____.

27. Which of the following represents the parabola $y = -2(x-4)^2 - 1$?
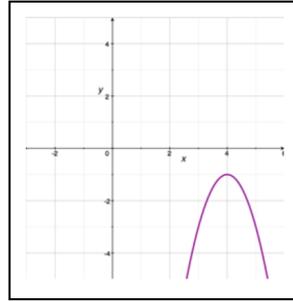
A)
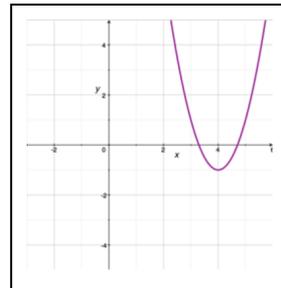
B)
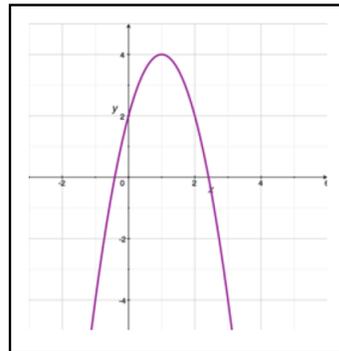
C)
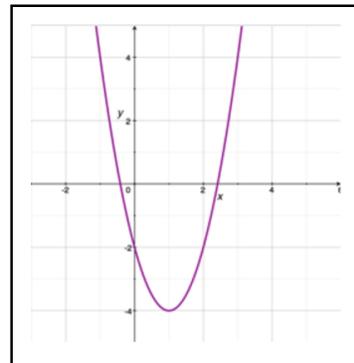
D)

28. What is the *y*-intercept of a quadratic function described by the equation $y = x^2 - 6x + 10$?
    A) (0, 10)
    B) (0, –6)
    C) (0, 1)
    D) There is no *y*-intercept for this function

29. Which of the equations listed below best describes the function $y = x^2$, when it is moved 4 units to the left?
    A) $y = x^2 - 4$
    B) $y = x^2 + 8x + 16$
    C) $y = x^2 - 8x + 16$
    D) $y = x^2 + 4$

30. If $y = f(x)$, what happens to the graph if the results of the function are negated?
    A) the graph is reflected in the *x*-axis
    B) the graph is reflected in the *y*-axis
    C) the graph is shifted down by 1 unit
    D) the graph is shifted to the right by 1 unit

31.

The height of a ball tossed in the air is defined by the equation: $h(t) = -5t^2 + 10t + 3$

At what time does the ball reach its highest point?
A) 1 second
B) 8 seconds
C) 5 seconds
D) 3 seconds

32. Given the graph $y = x^2$, the parabola $y = (x + 2)^2$ has undergone a:
    A) horizontal translation of 2 to the right
    B) horizontal translation of 2 to the left
    C) vertical translation of 2 up
    D) vertical translation of 2 down

33. The vertex of a quadratic function is at V(3, -5). If the point (1, 8) is on the graph of this function, then so is the point
    A) (-3, 5)
    B) (3, 5)
    C) (-1, 8)
    D) (5, 8)

34. Factor fully:
    $25p^2q^2 - 5pq^2 + 20p^2q^3$
    A) $pq^2 (25p - 5 + 20pq)$

    B) $5pq^2 (5p - 1 + 4pq)$

    C) $5pq (5pq - q + 4pq^2)$

    D) $25p^2q^2 (1 - 5p - 0.8q)$

35. Viewers all over the world are tuned in for the season finale of Quirky Quadratic Quiz, the fabulous game show where contestants compete for fabulous prizes as they try to identify quadratic functions.

It's the final round and the host of the show has placed the following problem on the screen:

A quadratic function in standard form is written as $y = a(x - p)^2 + q$

The vertex of the graph of the function is at (4, 6)

The values a, p, and q, in that order, form an arithmetic sequence.

The value of $a + p + q$ is _____ ??

36. You kick a ball off the roof of your school and graph its trajectory. Based on the graph, what is the maximum height that the ball reaches?
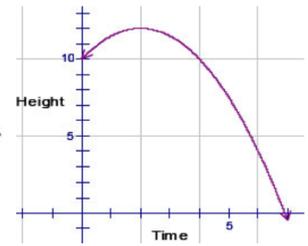
A) 2 m
B) 3 m
C) 10 m
D) 12 m

37. What are the x-intercepts of the parabola?

$y = -x(x-4)$
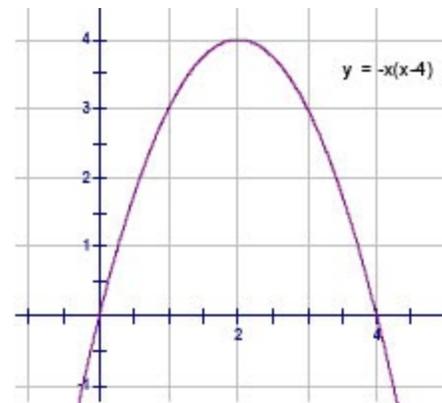
A) x = 2, x = 4
B) x = 0, x = 2
C) x = 0, x = 4
D) x = 1, x = 4

38. Factor fully:
$2ab^2 + 3a^2b$
A) $b (2ab + 3a^2)$

B) $ab (2b + 3a)$

C) $2ab (b + 3a)$

D) $2ab^2 (1 + 3a)$

39.
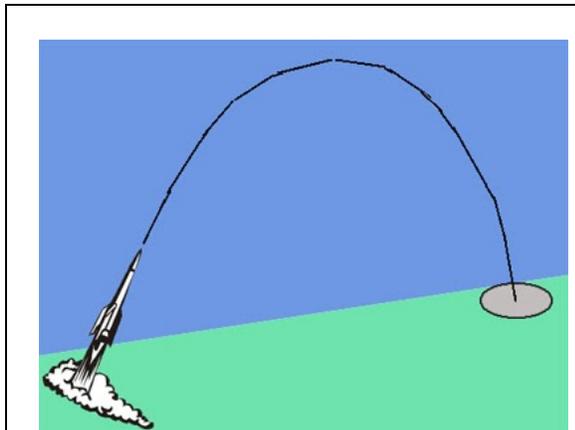
A model rocket is shot into the air and its path forms a parabola represented by $h = -4t^2 + 24t$, where h is the height above the ground in metres and t is the time elapsed in seconds.

When will the rocket hit the ground?
A) After 3 seconds have elapsed
B) After 6 seconds have elapsed
C) After 9 seconds have elapsed
D) After 12 seconds have elapsed

40. Refer to the information in question 9.
What is the maximum height reached by the rocket?
A) 12 m
B) 24 m
C) 36 m
D) 48 m

41. If $y = f(x)$, what happens to the graph if 2 is added to the result of the function?
A) the graph is shifted 2 units to the right
B) the graph is shifted 2 units to the left
C) the graph is shifted 2 units down
D) the graph is shifted 2 units up

42.

$$f(x) = 2x^2 - 5x - 3.$$

The vertex_____
A) is a maximum
B) is a minimum
C) cannot be determined
D) neither a maximum nor a minimum

43. The equation of the axis of symmetry of the quadratic function $y = -2x^2 - 12x + 1$ is
A) $x = -12$
B) $x = -6$
C) $x = -3$
D) $x = -2$

44. What is the domain of $y = 2x^2 + x - 10$?
   A) $x \geq 0$
   B) $x \in R$
   C) $y \geq -10.125$
   D) $y \in R$

45. You are in the business of making and selling snowboards. Based on the graph below, what is your maximum profit?

Number of Snowboards
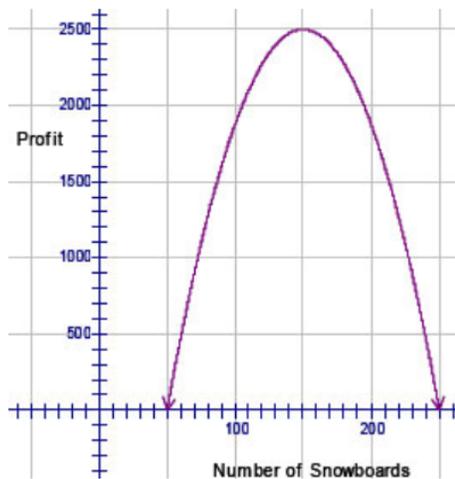
   A) 50
   B) 150
   C) 1500
   D) 2500

46. The graph of the function $y = a(x - p)^2 + q$ is guaranteed to have two x-intercepts if:
   A) a is negative and p is negative
   B) a is negative and p is positive
   C) a is negative and q is negative

D) a is negative and q is positive

47. You are in the business of making and selling snowboards. Based on the graph below, how many snowboards do you have to sell to maximize your profit?

Number of Snowboards
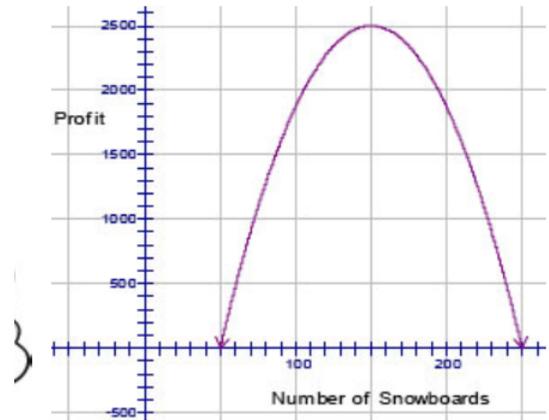
   A) 50
   B) 150
   C) 1500
   D) 2500

48. A missile is launched into the air and follows the pathway described by $h = -10t^2 + 100t$, where h is the missile's height above the ground in metres and t is the time elapsed in seconds. What is the maximum height the missile reaches?
   A) 10 m
   B) 50 m
   C) 250 m
   D) 500 m

49. Given the graph $y = x^2$, the parabola $y = (x - 2)^2$ has undergone a:

    A) horizontal translation of 2 to the right

    B) horizontal translation of 2 to the left

    C) vertical translation of 2 up

    D) vertical translation of 2 down

50. A 3 sided dog pen is to be constructed using 80m of chain link fencing, as shown in the diagram below:
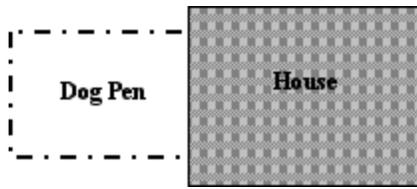
    Using this information, what is the maximum area which can be enclosed?

    A) 40m

    B) 800m

    C) 20m

    D) 400m

Radical Expressions and Equations

1. The value of $\sqrt{x^2}$, is always equal to:
   A) x
   B) $-x$
   C) $|x|$
   D) $-|x|$

2. Simplify $3\sqrt{12} + 7\sqrt{27}$
   A) $10\sqrt{39}$

   B) $21\sqrt{324}$

   C) $27\sqrt{3}$

   D) $10\sqrt{15}$

3. $x = 2$ is an acceptable value for the equation:
   A) $3\sqrt{2x - 7} - \sqrt{12 - 5x} = 1$

   B) $\sqrt{2 + x} - \sqrt{x + 14} = -2$

   C) $3 + \sqrt{x - 3} = x$

   D) $\sqrt{x - 2} - \sqrt{x - 4} = 1$

4. The simplified form of the expression $\dfrac{4\sqrt{10}}{12\sqrt{2}}$ is:
   A) $\frac{1}{3}\sqrt{5}$

   B) $\sqrt{\frac{5}{3}}\sqrt{\frac{5}{3}}$

C) $\dfrac{1}{3\sqrt{5}}$

D) $3\sqrt{5}$

5. The product of $\sqrt{2}\,(\sqrt{3} + 4)$ is:
   A) $\sqrt{6} + 4$

   B) $4\sqrt{6}$

   C) $\sqrt{5} + 4$

   D) $\sqrt{6} + 4\sqrt{2}$

6. The restrictions on x for the radical equation $\sqrt{x + 3} + \sqrt{4 - x} = 12$ can be represented as $A \leq x \leq B$ where A, B are integers.
   The value of $A + B$ is _____.

7. The equation below which is true for *every* real value of x is
   A) $\sqrt{(5 - 2x)} \geq 0$

   B) $\sqrt{(5 - 2x)} < 0$

   C) $\sqrt{(5 - 2x)^2} \geq 0$

   D) $\sqrt{(5 - 2x)^2} < 0$
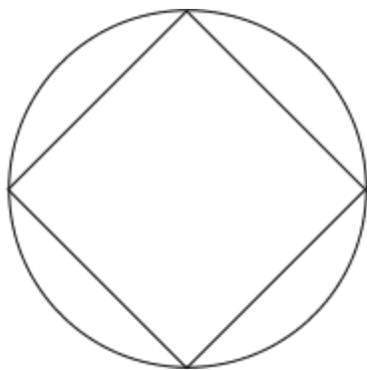
8.

A square is inscribed in a circle, as shown above.

The area of the circle is 38π m²

The *exact* length of the diagonal of the square can be expressed as $p\sqrt{q}$ where p and q are integers.

The value of $p + q$ is _____

9. The product of $(\sqrt{2} - \sqrt{6})^2$ is:

A) $\sqrt{2} - \sqrt{6}$

B) -2

C) $8 - 4\sqrt{3}$

D) 2
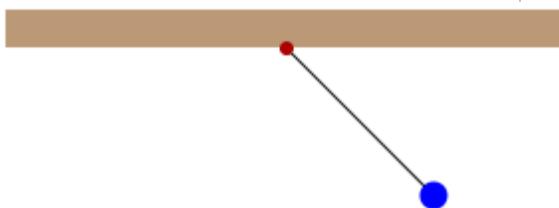
10.

The time, T, that it takes a pendulum to swing back and forth is called the period.

This time depends on the length of the pendulum, L, and the force of gravity, g.

For small swings, the formula

$T = 2\pi \sqrt{L \div g}$

can be used to determine the period (in seconds) of a pendulum of length L metres, with the acceleration due to gravity being $g = 9.81$ m/s².

To the nearest hundredth of second, the period of a pendulum of length 0.62 metres is _____ s.

11. The product of $4\sqrt{3}(\sqrt{3} + 2\sqrt{3})$ is:

A) $12\sqrt{6}$

B) 36

C) $12 + 2\sqrt{3}$

D) $4\sqrt{6} + 2\sqrt{3}$

12. $x = 2$ is an acceptable value for the equation:

A) $3\sqrt{2x - 7} - \sqrt{12 - 5x} = 1$

B) $\sqrt{2 + x} - \sqrt{x + 14} = -2$

C) $3 + \sqrt{x - 3} = x$

D) $\sqrt{x - 2} - \sqrt{x - 4} = 1$

13. The simplified form of the expression $\sqrt{50} - \sqrt{18}$ is:

A) $2\sqrt{2}$

B) $\sqrt{32}$

C) 5.65

D) $\sqrt{2.77}$

14. The exact value of the

    expression....$(-\frac{1}{8})^{-2/3}$ is:

    A) 4

    B) $-\frac{1}{4}$

    C) -4

    D) $\frac{1}{4}$

15. The solution to the radical equation

    $\sqrt{x+1} = \sqrt{x^2 - 5}$ is

    A) $x = -2, 3$

    B) $x = -3, 2$

    C) $x = -2$ only

    D) $x = 3$ only

16. The equation below which is true for
    every real value of x is

    A) $\sqrt{(5 - 2x)} \geq 0$

    B) $\sqrt{(5 - 2x)} < 0$

    C) $\sqrt{(5 - 2x)^2} \geq 0$

    D) $\sqrt{(5 - 2x)^2} < 0$

17. The product of $(\sqrt{2} - \sqrt{6})^2$ is:

    A) $\sqrt{2} - \sqrt{6}$

    B) -2

    C) $8 - 4\sqrt{3}$

    D) 2

18. The exact value of $(\frac{1}{9})^{-3/2}$ is:

    A) $-\frac{1}{27}$

B) 27

C) $\frac{1}{9}$

D) $\sqrt[3]{81}$

19. The simplified form of the

    expression $\dfrac{3 - \sqrt{2}}{\sqrt{5}}$, leaving a whole
    number in the denominator, is:

    A) $(3\sqrt{5} - \sqrt{10})/5$

    B) $(3 - \sqrt{2} + \sqrt{5})/5$

    C) $(3 - \sqrt{2})/5$

    D) $3/\sqrt{3}$

20. The simplified form of the

    expression $\dfrac{4\sqrt{10}}{12\sqrt{2}}$ is:

    A) $\frac{1}{3}\sqrt{5}$

    B) $\sqrt{\frac{5}{3}}\sqrt{\frac{5}{3}}$

    C) $\dfrac{1}{3\sqrt{5}}$

    D) $3\sqrt{5}$

21. 125 expressed as a power of 5 is:

    A) $5 \times 5 \times 5$

    B) 5^3

    C) $\sqrt[3]{125}$

    D) $5^{1/3}$

22. The points $A(8, -9)$, $B(-2, -4)$ and $C(2, -1)$ determine a triangle.
    The perimeter of the triangle can be written in the form $a + b \sqrt{c}$ where a, b and c are integers.
    The value of $a + b + c$ is _____

23.

$$\{-3, 2, 0, \sqrt{2}, -\sqrt{3}, -\sqrt{2}, -2, \sqrt{3}, 3\}$$

Ordered from least to greatest, the correct order for the numbers in the set above would be:

A) $\{-\sqrt{3}, -\sqrt{2}, -3, -2, 0, 2, 3, \sqrt{2}, \sqrt{3}\}$

B) $\{-3, -\sqrt{3}, -2, -\sqrt{2}, 0, \sqrt{2}, 2, \sqrt{3}, 3\}$

C) $\{-\sqrt{2}, -2, -\sqrt{3}, 3, 0, \sqrt{2}, 2, \sqrt{3}, 3\}$

D) $\{-3, -2, -\sqrt{3}, -\sqrt{2}, 0, \sqrt{2}, \sqrt{3}, 2, 3\}$

24. Expressed as a power with a negative exponent, the expression $\sqrt[4]{25^2}$ is equivalent to:

A) $\frac{1}{5}$

B) $\frac{1}{25}$

C) $(25)^{-1/2}$

D) $\sqrt{25}$
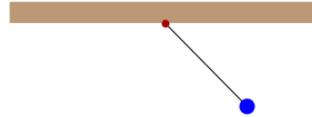
25.

The time, T, that it takes a pendulum to swing back and forth is called the period.
This time depends on the length of the pendulum, L, and the force of gravity, g.
For small swings, the formula $T = 2\pi \sqrt{L \div g}$ can be used to determine the period (in seconds) of a pendulum of length L metres, with the acceleration due to gravity being $g = 9.81$ m/s².
To the nearest centimeter, the length of a pendulum with a period of 1.5 seconds is _____ cm.
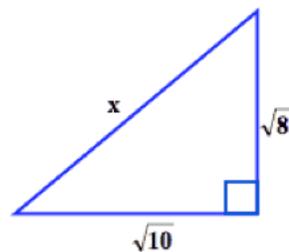
26.

Using the information provided in the above diagram, the value of x in its most simplified form is:

A) $2\sqrt{2} + \sqrt{10}$

B) $3\sqrt{2}$

C) 18

D) $\sqrt{18}$

27. Given the expression $A = 2b\sqrt{h}$, by what factor must the value of h be increased so that the value of A is doubled?

A) 4

B) 2

C) $\sqrt{2}$

D) 1

28. The simplified form of the expression $\dfrac{3-\sqrt{2}}{\sqrt{5}}$, leaving a whole number in the denominator, is:

A) $(3\sqrt{5} - \sqrt{10})/5$

B) $(3 - \sqrt{2} + \sqrt{5})/5$

C) $(3 - \sqrt{2})/5$

D) $3 / \sqrt{3}$

29. *The answer to this problem will be an **integer**.*

The mixed radical $2\sqrt[3]{5}$ can be expressed as the entire radical $\sqrt[3]{A}$. The value of A is: _____.

30. Expressed in its most simplified form, the expression $\dfrac{\sqrt{8}}{2^{\frac{1}{3}}}$ is:

A) $\sqrt{8} / \sqrt{2}$

B) $\sqrt{6}$

C) $\sqrt{4}$

D) 2

31. The product of $\sqrt{2} \ (\sqrt{3} + 4)$ is:

A) $\sqrt{6} + 4$

B) $4\sqrt{6}$

C) $\sqrt{5} + 4$

D) $\sqrt{6} + 4\sqrt{2}$

32. The value of $\sqrt{x^2}$, is always equal to:

A) x

B) $-x$

C) $|x|$

D) $-|x|$

33. Expressed as a power with a negative exponent, the expression $\sqrt[4]{25^2}$ is equivalent to:

A) $\dfrac{1}{5}$

B) $\dfrac{1}{25}$

C) $(25)^{-1/2}$

D) $\sqrt{25}$

34. The simplified form of the expression $\sqrt{50} - \sqrt{18}$ is:

A) $2\sqrt{2}$

B) $\sqrt{32}$

C) 5.65

D) $\sqrt{2.77}$
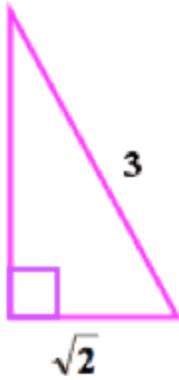
35. The area of the triangle shown above is:

A) $\sqrt{7}$

B) $\frac{3}{2}\sqrt{7}$

C) $\frac{1}{2}\sqrt{9}$

D) $\frac{1}{2}\sqrt{14}$

36. The simplified form of the expression $\dfrac{24\sqrt{15}}{6\sqrt{3}}$ is:

A) $4\sqrt{5}$

B) $18\sqrt{12}$

C) $4\dfrac{\sqrt{15}}{\sqrt{3}}$

D) 20
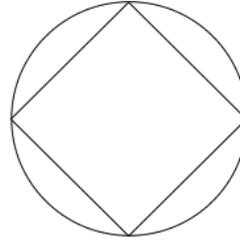
37. A square is inscribed in a circle, as shown above.
The area of the circle is 38π m^2
The *exact* length of the diagonal of the square can be expressed as $p\sqrt{q}$ where p and q are integers.
The value of $p + q$ is _____

38. The radical equation $\sqrt{x} + \sqrt{x} - 5 = 5$ is defined for

A) $x \geq 0$

B) $x \geq -5$

C) $x \geq 5$

D) $x \geq 10$

39. The volume of an ice cube is 16 000 mm^3.
The exact length of each edge of the ice cube can be written in simplest mixed radical form as $p\sqrt[3]{q}$ (cube root of q) where p and q are whole numbers.
The value of $p - q$ is _____

40. Expressed as an entire radical, the expression $2\sqrt{12}$ is equivalent to:

A) $\sqrt{14}$

B) $\sqrt{48}$

C) $\sqrt{24}$

D) $12 / \sqrt{2}$

41. The solution to the radical equation
$\sqrt{x+1} = \sqrt{x^2-5}$ is
A) $x = -2, 3$
B) $x = -3, 2$
C) $x = -2$ only
D) $x = 3$ only

42. The product of $\sqrt{2}\ (\sqrt{3}+4)$ is:
A) $\sqrt{6}+4$

B) $4\sqrt{6}$

C) $\sqrt{5}+4$

D) $\sqrt{6}+4\sqrt{2}$

43. The simplified form of the

expression $\dfrac{24\sqrt{15}}{6\sqrt{3}}$ is:

A) $4\sqrt{5}$

B) $18\sqrt{12}$

C) $4\ \dfrac{\sqrt{15}}{\sqrt{3}}$

D) 20

44. Which of the following expressions
is true?
A) $\sqrt{3}+\sqrt{5} \neq \sqrt{8}$

B) $\sqrt{3}+\sqrt{5} = \sqrt{8}$

C) $\sqrt{3}+\sqrt{5} = \sqrt{15}$

D) $\sqrt{3}+\sqrt{5} = \dfrac{3}{2}+\dfrac{5}{2}$

45.
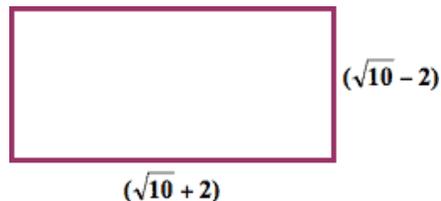
The area of the rectangle shown in
the diagram above is:
A) $2\sqrt{10}$

B) 10

C) 6

D) $2\sqrt{10}-4$

46. The product of $(\sqrt{2}-\sqrt{6})^2$ is:
A) $\sqrt{2}-\sqrt{6}$
B) -2
C) $8-4\sqrt{3}$
D) 2

47. The exact value of $(9^{\frac{1}{9}})^{-3/2}$ is:
A) $-\dfrac{1}{27}$
B) 27
C) $\dfrac{1}{9}$
D) $\sqrt[3]{81}$

48. Simplify $3\sqrt{12}+7\sqrt{27}$
A) $10\sqrt{39}$
B) $21\sqrt{324}$
C) $27\sqrt{3}$
D) $10\sqrt{15}$

49. The simplified form of the expression $\sqrt{50} - \sqrt{18}$ is:

A) $2\sqrt{2}$

B) $\sqrt{32}$

C) 5.65

D) $\sqrt{2.77}$

50. The simplified form of the expression $\dfrac{\sqrt{3}+1}{\sqrt{3}-1}$, leaving a whole number in the denominator, is:

A) 0

B) –2

C) 2

D) $2 + \sqrt{3}$

Rational Expressions and Equations

1. For what value(s) of the variable x is the expression $\dfrac{28x^2}{10x}$ undefined?

   A) $x = 0$

   B) $x = -10$

   C) $x = -\dfrac{1}{10}$

   D) the expression is defined for all values of x

2. Simplify the following expression

   $$\dfrac{18ab + 21b}{6ab^2}$$

   A) $\dfrac{6a + 7}{2ab}$

   B) $\dfrac{6ab + 7b}{2ab^2}$

   C) 5

   D) $\dfrac{3ab + 21b}{b}$

3. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

   $$\dfrac{2}{x} + \dfrac{x}{5}$$

   A) $\dfrac{2+x}{x+5}, x \neq -5$

   B) $\dfrac{2+x}{5x}, x \neq -5$

   C) $10 + x^2, x \in R$

   D) $\dfrac{x^2 + 10}{5x}, x \neq 0$

4. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

   $$\dfrac{2x}{(x+3) - (x-2)}$$

   A) $\dfrac{3-x}{x-2}, x \neq 2$

   B) $\dfrac{-2x}{(x-2)}, x \neq 2$

   C) $\dfrac{x^2 - x - 6}{x-2}, x \neq 2$

   D) $x - 3, x \in R$

5. The result of $\dfrac{1}{x+4} + \dfrac{1}{x-3}$, in simplified form, is:

   A) $2, x \neq -4, 3$

   B) $\dfrac{2}{(x+4)(x-3)}, x \neq -4, 3$

   C) $\dfrac{2x+1}{(x+4)(x-3)}, x \neq -4, 3$

   D) $\dfrac{2x+7}{(x+4)(x-3)}, x \neq -4, 3$

6. For what value(s) is the variable x in the expression $\dfrac{5}{x} + \dfrac{2x+1}{5x-2}$ undefined?

   A) $x = 5$, $\dfrac{2}{5}$

   B) $x = 0$, $\dfrac{2}{5}$, $-\dfrac{1}{2}$

   C) $x = 0$, $-\dfrac{2}{5}$

   D) $x = 0$, $\dfrac{2}{5}$

7. For what value(s) is the variable y in the expression $\dfrac{6y}{y^2 - 2y}$ undefined?

   A) $y = 0$, $\dfrac{1}{6}$, 2

   B) $y = 0$, 2

   C) $y = 2$

   D) $y = 0$, -2

8. Determine if $\dfrac{8x^2 - 6x - 5}{2x + 1}$ is equivalent to $(3x - 1)(x + 4) - 3x(x + 2) - (x + 1)$ for $x \neq -\dfrac{1}{2}$.

   A) Yes, they are equivalent for $x \neq -\dfrac{1}{2}$

   B) No, they are not equivalent for $x \neq -\dfrac{1}{2}$

9. The denominators of the rational expressions in a rational equation are x, x^2, and x–3. Which of the following **could** be solutions to such an equation?

   A) $x = 0$, 3

   B) $x = 3$, 5

   C) $x = 0$, 2, 3

D) $x = -3$, -2

10. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\frac{35xy}{-4x^2} \times \frac{-24xy^2}{5x^3y}$$

   A) $\dfrac{42y^2}{x^3}$, $x \neq 0$ and $y \neq 0$

   B) $\dfrac{42y^2}{x^3}$, $x \neq 0$

   C) $\dfrac{-600x^2y^3}{-20x^3y}$, $x \neq 0$ and $y \neq 0$

   D) $175x^4y + 96x^3y^2$, $x \in \mathbb{R}$

11. Reduced to its lowest terms, the rational expression $\dfrac{8x^2 + 6x}{2x}$ is:

   A) $4x + 3$

   B) $8x^2 + 8x$

   C) $8x^2 + 4x$

   D) $16x^3 + 12x^2$

12. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\frac{7}{x} - \frac{3}{x^2}$$

   A) $\dfrac{4}{-x^2}$, $x \neq 0$

   B) $\dfrac{7x - 3}{x^2}$, $x \neq 0$

   C) $7x^2 - 3x$, $x \neq 0$

   D) $\dfrac{4}{x^2 - x}$, $x \neq 0$

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13. The perimeter of a rectangular picture frame is 150 cm. The length of the frame is 10 cm longer than one quarter its width. What are the dimensions of the frame?
    A) 10 cm by 65 cm
    B) 13 cm by 62 cm
    C) 23 cm by 52 cm
    D) 34 cm by 41 cm

14. For what value(s) is the variable y in the expression $\dfrac{6y}{y^2 - 2y}$ undefined?
    A) $y = 0, \frac{1}{6}, 2$
    B) $y = 0, 2$
    C) $y = 2$
    D) $y = 0, -2$

15. For what value(s) is the variable x in the expression $\dfrac{2x + 1}{2x^2 - 9x - 5}$ undefined?
    A) $x = -\frac{1}{2}, \frac{1}{9}$
    B) $x = -\frac{1}{2}, 5$
    C) $x = 5$
    D) the expression is defined for all values of x

16. Reduced to its lowest terms, the rational expression
    $$\frac{12a^2b^2 + 26ab^3 + 12b^4}{9a^2b - 12ab^2 - 12b^3}$$ is:
    A) $12a^2b^2 + 9a^2b + 26ab^3 - 12ab^2 - 12b^3 + 12b^4$

B) $\dfrac{2(2ab^2 + 3b^3)(3a + 2b)}{3b(3a + 2b)(a - 2b)}$

C) $\dfrac{2b(2a + 3b)}{3(a - 2b)}$

D) $\dfrac{50a^5b^6}{-12ab^3}$

17. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:
    $$\frac{x + 5}{x^2 + 7x + 10} + \frac{x + 3}{x^2 + 5x}$$
    A) $\dfrac{2x^2 + 10x + 6}{x(x^2 + 7x + 10)}, x \neq 0, -2, -5$
    B) $\dfrac{2x^2 + 10x + 6}{x(x^2 + 7x + 10)}, x \neq 0$
    C) $\dfrac{2x + 8}{2x^2 + 12x + 10}, x \neq 0, -1, -5$
    D) $[(x + 5)(x^2 + 5x)] + [(x + 3)(x^2 + 7x + 10)], x \neq 0, -5, -3, -2$

18. The algebraic expression
    $$\left(x - \frac{4}{(x-3)} \right) \div \left(x + \frac{2+6x}{(x-3)} \right)$$ in its most simplified form is:
    A) $\dfrac{(x^2 - 3x - 4)}{(x^2 + 3x + 2)}$
    B) $\dfrac{2(x-1)}{(x-3)}$
    C) $\dfrac{(x - 4)}{(x + 2)}$
    D) $\dfrac{6x - 2}{(x - 3)}$

19. Reduced to its lowest terms, the rational expression $\dfrac{x^2 - 16}{2x^2 + 7x - 4}$ is:

A) $\dfrac{x - 4}{2x - 1}$

B) $\dfrac{x - 4}{(x+4)(2x-1)}$

C) $3x^2 + 7x - 20$

D) $\dfrac{-12}{x^2 + 7x}$

20. Reduced to its lowest terms, the rational expression $\dfrac{3x^2 - 5x - 2}{x^2 - 4}$ is:

A) $\dfrac{2x - 5x}{3x^2 + 9x}$

B) $4x^2 - 5x - 6$

C) $\dfrac{3x + 1}{(x+2)}$

D) $\dfrac{(x-2)(3x+1)}{(x+2)}$

21. The strategy that would be used to write equivalent forms of rational expressions, but would not be used to write equivalent forms of rational numbers, is to:
A) identify the non-permissible values.

B) divide the numerator and denominator by a constant.
C) reduce the numerator and denominator by a common factor.
D) remove the constant term from the numerator and denominator.

22.

$$\dfrac{3}{x-5} + \dfrac{x}{x+5} = \dfrac{2}{x^2 - 5}$$

How many non-permissible values are there for the equation shown above?
A) 2
B) 3
C) 4
D) 5

23. For what value(s) is the variable x in the expression $\dfrac{(x - 1)}{(x^2 - 1)}$ undefined?
A) $x = 1$
B) $x = -1$
C) $x = \pm 1$
D) $x = \sqrt{1}$

24. Reduced to its lowest terms, the rational expression

$$\frac{8x^2 - 20xy - 12y^2}{3x^2 - 6xy - 9y^2}$$ is:

A) $5x^2 - 14xy - 3y^2$

B) $\dfrac{4(2x+y)}{3(x+y)}$

C) $\dfrac{(2x+y)(4x-12y)}{(x+y)(3x-9y)}$

D) $\dfrac{8x+4y}{3x+3y}$

25. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\frac{2}{x}+\frac{x}{5}$$

A) $\dfrac{2+x}{x+5}$, $x \neq$ -5

B) $\dfrac{2+x}{5x}$, $x \neq$ -5

C) $10 + x^2$, $x \in \mathbb{R}$

D) $\dfrac{x^2 + 10}{5x}$, $x \neq 0$

26.

$$\frac{a}{x-b} - \frac{c}{x+d} = \frac{e}{f}$$

What **could** be the solution to the rational equation shown above, where a, b, c, d, e, and f are natural numbers?

A) $x = b, e$

B) $x = a, d$

C) $x = c, -d$

D) $x = -b, -d$

27.

Sam is given two rational expressions with an operation symbol between the two. To perform the operation, Sam erases the operation symbol and the second rational expression and replaces the second rational expression with its reciprocal.

Assuming Sam has begun to correctly perform the given operation, the student should replace the original operation symbol with:

A) +

B) −

C) ×

D) ÷

28.

Elise was trying to create a list of reasons why particular values for the variable in a rational equation might be non-permissible. This is what she came up with:

1. Rational equations can only have positive solution values for the variable.
2. The context of the equation does not allow for certain values of the variable.
3. The value(s) make the numerator of one or more rational expressions in the equation equal to zero.
4. The value(s) make the denominator of one or more rational expressions in the equation equal to zero.

Which items on Elise's list are correct?
A) 1 and 3
B) 2 and 4

C) 1, 2 and 3
D) 1, 2 and 4

29. If a simplified rational expression has non-permissible values of 0, 1 and 2, which statement must be true?
A) The denominator of the original expression must be $x(x-1)(x-2)$.
B) The denominator of the simplified expression must be $x(x-1)(x-2)$.
C) The numerator and denominator of the original expression must contain $x(x-1)(x-2)$.
D) The numerator and denominator of the simplified expression must contain $x(x-1)(x-2)$.

30.

$$\frac{1}{1+x} = 3$$

What are the non-permissible values for the rational equation above?
A) $x = 0$
B) $x = -1$
C) $x = -1, 0$
D) $x = -1, -\frac{2}{3}$

31. The non-permissible values of the

rational expression $\dfrac{x}{x^2 - 9x + 20}$

are:

A) $x = 0$

B) $x = -20$

C) $x = 4, x = 5$

D) $x = -5, x = -4$

32. Solve $\dfrac{10}{x+4} = \dfrac{15}{4(x+1)}$

A) 3

B) 4

C) 5

D) $\dfrac{4}{5}$

33. If a simplified rational expression has non-permissible values of 0, 1 and 2, which statement must be true?

A) The denominator of the original expression must be $x(x - 1)(x - 2)$.

B) The denominator of the simplified expression must be $x(x - 1)(x - 2)$.

C) The numerator and denominator of the original expression must contain $x(x - 1)(x - 2)$.

D) The numerator and denominator of the simplified expression must contain $x(x - 1)(x - 2)$.

34. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$\dfrac{2}{x} + \dfrac{x}{5}$

A) $\dfrac{2+x}{x+5}$, $x \neq -5$

B) $\dfrac{2+x}{5x}$, $x \neq -5$

C) $10 + x^2$, $x \in R$

D) $\dfrac{x^2 + 10}{5x}$, $x \neq 0$

35. When subtracting rational expressions with different binomial denominators of the form $x - a$, the lowest common denominator is the:

A) sum of the binomials.

B) product of the binomials.

C) quotient of the binomials.

D) difference between the binomials.

36. Solve $\dfrac{x+3}{4} = 7x$

A) $\dfrac{3}{29}$

B) $-\dfrac{1}{9}$

C) 9

D) $\dfrac{1}{9}$

37. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$\dfrac{x + 5}{x^2 + 7x + 10} + \dfrac{x + 3}{x^2 + 5x}$

A) $\dfrac{2x^2 + 10x + 6}{x(x^2 + 7x + 10)}$, $x \neq 0, -2, -5$

B) $\dfrac{2x^2 + 10x + 6}{x(x^2 + 7x + 10)}$, $x \neq 0$

C) $\dfrac{2x + 8}{2x^2 + 12x + 10}$, $x \neq 0, -1, -5$

D) $[(x + 5)(x^2 + 5x)] + [(x + 3)(x^2 + 7x + 10)]$, $x \neq 0, -5, -3, -2$

38. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\frac{35xy}{-4x^2} \times \frac{-24xy^2}{5x^3y}$$

A) $\dfrac{42y^2}{x^3}$, $x \neq 0$ and $y \neq 0$

B) $\dfrac{42y^2}{x^3}$, $x \neq 0$

C) $\dfrac{-600x^2y^3}{-20x^3y}$, $x \neq 0$ and $y \neq 0$

D) $175x^4y + 96x^3y^2$, $x \in R$

39. A student showed her work in simplifying the rational expression $\dfrac{6x+3}{6x^2+21x+9}$ as follows:

Step 1: $\dfrac{6x+3}{6x^2+21x+9} = \dfrac{3(2x+1)}{3(2x^2+7x+3)}$

Step 2: $\dfrac{2x+1}{2x^2+7x+3} = \dfrac{2x+1}{(2x+1)(x+3)}$

Step 3: $\dfrac{2x+1}{(2x+1)(x+3)} = \dfrac{1}{x+3}$

Step 4: $\dfrac{1}{x+3}, x \neq -3, -1$

In which step did the student make her first mistake?

A) 1
B) 2
C) 3

D) 4

40. Solve the following rational equation for x:

$$\frac{1}{x} + \frac{3x}{2x} = 6$$

A) $x = 0$

B) $x = \dfrac{1}{15}$

C) $x = 6$

D) $x = \dfrac{2}{9}$

41. The perimeter of a rectangular picture frame is 150 cm. The length of the frame is 10 cm longer than one quarter its width. What are the dimensions of the frame?

A) 10 cm by 65 cm
B) 13 cm by 62 cm
C) 23 cm by 52 cm
D) 34 cm by 41 cm

42. The simplified form of the algebraic expression $\dfrac{2x+6}{x^2+8x+15}$ is:

A) $\dfrac{2}{(x+5)}$

B) $\dfrac{1}{x^2+6x+9}$

C) $\dfrac{1}{x^2+10x+21}$

D) $2(x+3)(x+5)$

43.

$$\frac{x}{x+8}-\frac{2}{x}=1$$

A student is asked to solve the rational equation shown here.
One of the first steps in solving is to multiply:
A) both sides of the equation by x only.
B) both sides of the equation by x (x + 8).
C) the right side of the equation by x only.
D) the right side of the equation by x (x + 8).

44. $\frac{10}{x^2-2x}+\frac{4}{x}=\frac{5}{x-2}$

Solve the rational equation shown.
A) $x = 0$
B) $x = 2$
C) $x = -2$
D) There is no solution.

45. Reduced to its lowest terms, the rational expression $\frac{y^2-9x^2}{3x^2-2xy-y^2}$ is:

A) $\frac{3x}{y}$
B) $-6x^2 -2xy$
C) $(y + 3x)^2(y - 3x)(x - y)$

D) $\frac{y - 3x}{x - y}$

46. Multiply $\frac{x^2+7x+12}{x^2-1}\times\frac{x^2-4x+3}{x+3}$
and then simplify.

A) $\frac{(x+4)(x-3)}{(x+1)}, x \ne -1$

B) $\frac{(x+4)(x-3)}{(x+1)}, x \ne -3,-1,1$

C) $\frac{(x+4)(x+3)}{(x-1)}, x \ne -3,-1,1$

D) $\frac{(x+3)(x+4)(x-1)(x-3)}{(x-1)(x+1)(x+3)}, x \ne -3,-1,1$

47. Which of the following expressions is equivalent to $\frac{x-1}{x}, x \ne 0$ when its denominator is changed to $x(x-2)$?

A) $\frac{x-1}{x(x-2)}, x \ne 0$

B) $\frac{x-1}{x(x-2)}, x \ne 0,2$

C) $\frac{(x-1)(x-2)}{x(x-2)}, x \ne 0$

D) $\frac{(x-1)(x-2)}{x(x-2)}, x \ne 0,2$

48. For what value(s) is the variable x in

the expression $\dfrac{2x + 1}{2x^2 - 9x - 5}$ undefined?

A) $x = -\dfrac{1}{2}, \dfrac{1}{9}$

B) $x = -\dfrac{1}{2}, 5$

C) $x = 5$

D) the expression is defined for all values of x

49.

$$\dfrac{24st - 40s^2t^2 + 16st^4}{8st}$$

A student simplified the rational expression above and stated the steps as follows:

1. Factor the greatest common factor st from the numerator and denominator.
2. Reduce by dividing numerator and denominator by st.
3. State the non-permissible values.

4. Express the given expression in simplified form.

The student did not fully simplify the rational expression because of an error in step:

A) 1

B) 2

C) 3

D) 4

50. The result of $\dfrac{4x^2 + 1}{x - 3} - \dfrac{3x^2 + 10}{x - 3}$, in simplified form, is:

A) $x + 3, x \neq 3$

B) $x - 3, x \neq 3$

C) $\dfrac{1}{x - 3}, x \neq 3$

D) $\dfrac{x^2 + 11}{x - 3}, x \neq 3$

59

51. The non-permissible values of the

rational expression $\dfrac{x^2 - 4}{x^2 - 25}$ are:

A) non-existent because the variable x is squared.

B) $x = \pm 5$ because these values make the expression $\dfrac{21}{0}$.

C) $x = \pm 2$ because these values make the expression $\dfrac{0}{-21}$.

D) $x = \pm 2$ and $x = \pm 5$ because these values make the expression $\dfrac{0}{0}$.

52. The speed of a train is five times as great as the speed of a scooter. The scooter takes 4 hours longer than the train to travel 400 km.

If the speed of the scooter is given by x, which of the following equations correctly models the given scenario?

A) $\dfrac{400}{6x} = 4$

B) $\dfrac{400}{x} - \dfrac{400}{5x} = 4$

C) $\dfrac{400}{x} + \dfrac{400}{5x} = 4$

D) $\dfrac{400}{5x} - \dfrac{400}{x} = 4$

53. Simplify the following expression

$$\dfrac{18ab + 21b}{6ab^2}$$

A) $\dfrac{6a + 7}{2ab}$

B) $\dfrac{6ab + 7b}{2ab^2}$

C) 5

D) $\dfrac{3ab + 21b}{b}$

54. Perform the operation indicated on the rational expression shown below, and find the non-permissible values for x:

$$\dfrac{7}{x} - \dfrac{3}{x^2}$$

A) $-x^2$, $x \neq 0$

B) $\dfrac{7x - 3}{x^2}$, $x \neq 0$

C) $7x^2 - 3x, x \neq 0$

D) $\dfrac{4}{x^2 - x}, x \neq 0$

55. For what value(s) is the variable x in
the expression $\dfrac{3x + 1}{x^2 - x - 2}$
undefined?

A) $x = -\dfrac{1}{3}$

B) $x = 0$

C) $x = -1, 2$

D) the expression is defined for all values of x

56. The expression $\dfrac{x^2 + 3x - 4}{x^2 + 2x - 8}$
simplifies to:

A) $x + 4$

B) $x - 12$

C) $\dfrac{x-1}{x-2}, x \neq -4, 2$

D) $\dfrac{x+1}{x+2}, x \neq -2, 4$

57. Some of the strategies used to simplify rational expressions are also used to simplify:

A) integers.

B) radicals.

C) fractions.

D) polynomials.

58.

A student showed her work in simplifying the rational

expression $\dfrac{6x + 3}{6x^2 + 21x + 9}$ as follows:

Step 1: $\dfrac{6x+3}{6x^2+21x+9} = \dfrac{3(2x+1)}{3(2x^2+7x+}$

Step 2: $\dfrac{2x+1}{2x^2+7x+3} = \dfrac{2x+1}{(2x+1)(x+3)}$

Step 3: $\dfrac{2x+1}{(2x+1)(x+3)} = \dfrac{1}{x+3}$

Step 4: $\dfrac{1}{x+3}, x \neq -3, -1$

In which step did the student make her first mistake?

A) 1

B) 2

C) 3

D) 4

59. The simplified form of the algebraic
expression $\dfrac{2x + 6}{x^2 + 8x + 15}$ is:

A) $\dfrac{2}{(x+5)}$

B) $\dfrac{1}{x^2 + 6x + 9}$

C) $\dfrac{1}{x^2 + 10x + 21}$

D) $2(x + 3)(x + 5)$

60. Multiply $\dfrac{x^2+7x+12}{x^2-1} \times \dfrac{x^2-4x+3}{x+3}$
and then simplify.

A) $\dfrac{(x+4)(x-3)}{(x+1)}, x \neq -1$

B) $\dfrac{(x+4)(x-3)}{(x+1)}, x \neq -3,-1,1$

C) $\dfrac{(x+4)(x+3)}{(x-1)}, x \neq -3,-1,1$

D) $\dfrac{(x+3)(x+4)(x-1)(x-3)}{(x-1)(x+1)(x+3)}, x \neq -3,-1,1$

61. The result of $\dfrac{1}{x+4}+\dfrac{1}{x-3}$, in simplified form, is:

A) $2, x \neq -4, 3$

B) $\dfrac{2}{(x+4)(x-3)}, x \neq -4,3$

C) $\dfrac{2x+1}{(x+4)(x-3)}, x \neq -4,3$

D) $\dfrac{2x+7}{(x+4)(x-3)}, x \neq -4,3$

62.

$$\frac{2}{x^2-6x+8} - \frac{x}{x-2} = \frac{1}{x-4}$$

Solve the rational equation shown.

A) $x = 4$

B) $x = -1$

C) $x = -1, 4$

D) There is no solution.

63. On his math unit tests, Cody has received a mark of $\dfrac{44}{50}$ on one test and $\dfrac{32}{x}$ on the other test. If the average mark on the two tests was 80%, what value was the second test out of?

A) 44

B) 88

C) 50

D) 32

64. A non-permissible value for a rational expression is a value for the variable that makes the:

A) numerator equal to zero.

B) expression equal to zero.

C) denominator equal to zero.

D) numerator and denominator both equal to zero.

65. The non-permissible values of the

rational expression $\dfrac{x^2 - 4}{x^2 - 25}$ are:

A) non-existent because the variable x is squared.

B) $x = \pm 5$ because these values make the expression $\dfrac{21}{0}$.

C) $x = \pm 2$ because these values make the expression $\dfrac{0}{-21}$.

D) $x = \pm 2$ and $x = \pm 5$ because these values make the expression $\dfrac{0}{0}$.

66.

$$\dfrac{1}{1+x} = 3$$

What are the non-permissible values for the rational equation above?

A) $x = 0$

B) $x = -1$

C) $x = -1, 0$

D) $x = -1, -\dfrac{2}{3}$

67. The non-permissible values of the

rational expression $\dfrac{w-5}{w^2 + 2w - 35}$ are:

A) $w = 5$

B) $w = -5, w = 7$

C) $w = -7, w = 5$

D) $w = -7, w = -5, w = 5$

68.

The box shown above has a square base with a side of x and a height of h. The box has a volume of 392 cm³.
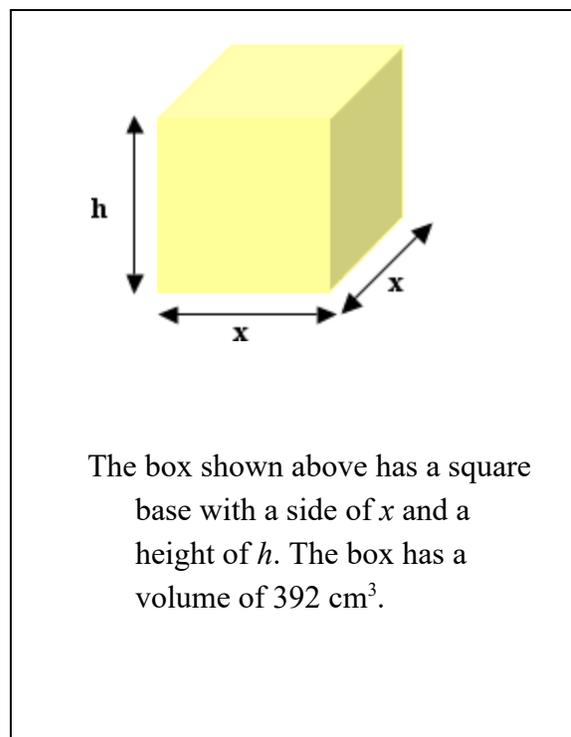
Which algebraic expression below correctly expresses the height of the box (h) in terms of the length of a side (x)?

A) $h = 392 - x^2$

B) $h = \dfrac{392}{x}$

C) $x = \dfrac{392}{h}$

D) $h = \dfrac{392}{x^2}$

69. Reduced to its lowest terms, the rational expression $\dfrac{8x^2 + 6x}{2x}$ is:

A) $4x + 3$

B) $8x^2 + 8x$

C) $8x^2 + 4x$

D) $16x^3 + 12x^2$

70. Which of the following expressions is equivalent to $\dfrac{x-1}{x}, x \neq 0$ when its denominator is changed to $x(x - 2)$?

A) $\dfrac{x-1}{x(x-2)}, x \neq 0$

B) $\dfrac{x-1}{x(x-2)}, x \neq 0,2$

C) $\dfrac{(x-1)(x-2)}{x(x-2)}, x \neq 0$

D) $\dfrac{(x-1)(x-2)}{x(x-2)}, x \neq 0,2$

Sequences and Series

1. What is the sum formula for the series 80 - 40 + 20 - 10 + 5 - ...?

   A) $S_n = -\dfrac{160}{3}\left[\left(-\dfrac{1}{2}\right)^n - 1\right]$

   B) $S_n = 81n - n^2$

   C) $S_n = -\dfrac{40}{3}\left[\left(-\dfrac{1}{2}\right)^n - 1\right]$

   D) $S_n = \dfrac{160}{3}\left[2^n - 1\right]$

2. The sum of the first n terms of a geometric series can be found using:

   A) $S_n = ar^n$

   B) $S_n = ar^{n-1}$

   C) $S_n = a\dfrac{\left(1 - r^n\right)}{\left(1 - r\right)}$

   D) $S_n = a\dfrac{\left(1 - r\right)^{n-1}}{\left(1 - r\right)}$

3. The first term in a geometric sequence with a common ratio of -2 and a thirteenth term of 4648 is:

   A) $\dfrac{581}{512}$

   B) $\dfrac{581}{1024}$

   C) $-\dfrac{581}{512}$

   D) $-\dfrac{581}{1024}$

4. If you were to earn $0.01 on the first day of the month, $0.02 the day afterwards, $0.04 the next day, and so on, doubling the amount you earn every day, how much will you have earned in total at the end of a month of 30 days?
   A) $1310.72
   B) $671,088.64
   C) $5,368,709.12
   D) $10,737,418.23

5. The table below shows the number of years, t, that a car has been owned and its value, y, in dollars.

t	y
0	$8400
2.5	$4200
5	$2100
7.5	$1050
10	
12.5	

Determine the value of the car after 12.5 years.
A) $525.00
B) $262.50
C) $131.25
D) $0

6. The general term of the sequence $\frac{x}{2}$, $-\frac{x^2}{6}$, $\frac{x^3}{18}$, ... is

   A) $t_n = \left(\frac{x}{2}\right)^n$

   B) $t_n = \left(-\frac{x}{2}\right)^n$

   C) $t_n = \frac{3}{2}\left(-\frac{x}{3}\right)^n$

   D) $t_n = -\frac{3}{2}\left(-\frac{x}{3}\right)^n$

7. What kind of sequence does the general term $t_n = -8 + 9n$ generate?
   A) Arithmetic
   B) Geometric
   C) Neither

8. The general term of a geometric sequence with a first term of a and a common ratio of r could be represented by:
   A) $t_n = ar^n$
   B) $t_n = ar^{n-1}$
   C) $t_n = a + r^{n-1}$
   D) $t_n = a(n-1)r$

9. As part of his teaching contract, Jason gets a base salary of $36,000 for the first year, with a $3000 raise each year. What is his salary for the 4th year he works?
   A) $45,000
   B) $48,000
   C) $36,000

D) $39,000

10. In a geometric series:
    A) terms will be added together.
    B) terms will be multiplied together.
    C) subsequent terms will be found by multiplying the previous terms.
    D) subsequent terms will be found by adding the common ratio to the previous term.

11. What kind of sequence does the general term $t_n = -8 + 9n$ generate?
    A) Arithmetic
    B) Geometric
    C) Neither

12. Find the next three terms in the geometric sequence shown below:
    {78732, 26244, 8748, 2916 ...}
    A) 972, 324, 108
    B) -2916, -8748, -14580
    C) 1458, 729, 364.5
    D) this is not a geometric sequence and more terms can not be found

13. Which of the following geometric series is convergent?
    A) $1 + 5 + 25 + 125 + ...$
    B) $\frac{1}{8} + \frac{3}{8} + \frac{9}{8} + \frac{27}{8} + ...$
    C) $-256 + 64 - 16 + 4 - ...$
    D) $-7 + \frac{21}{2} - \frac{63}{4} + \frac{189}{8} - ...$

14. Zack has $500 in his bank account. Each week he earns $75 at his part-time job. If Zack wants to buy a $4000 mountain bike one year from now, will he have enough money to do so? (assume there are 52 weeks in one year and no interest is paid on the account)
    A) No – he will only have $575 saved
    B) No – he will only have $3900 saved
    C) Yes – he will have $25,575 saved
    D) Yes – he will have $4400 saved

15. In a geometric series:
    A) terms will be added together.
    B) terms will be multiplied together.
    C) subsequent terms will be found by multiplying the previous terms.
    D) subsequent terms will be found by adding the common ratio to the previous term.

16. The sum of the first n terms of a geometric series can be found using:
    A) $S_n = ar^n$
    B) $S_n = ar^{n-1}$
    C) $S_n = a\dfrac{(1-r^n)}{(1-r)}$
    D) $S_n = a\dfrac{(1-r)^{n-1}}{(1-r)}$

17. A king agrees to pay one of his servants in grains of rice each day. On his first day, he receives one grain of rice and every day after that he is given twice the previous day's number of grains.
    The servant's annual pay forms a:

A) divergent geometric series.
B) divergent arithmetic series.
C) convergent geometric series.
D) convergent arithmetic series.

18. The general term of a geometric sequence with a first term of a and a common ratio of r could be represented by:
    A) $t_n = ar^n$
    B) $t_n = ar^{n-1}$
    C) $t_n = a + r^{n-1}$
    D) $t_n = a(n-1)r$

19. Find the next three terms in the geometric sequence shown below:
    {3, 6, 12, 24 ...}
    A) 3, 6, 12
    B) 27, 30, 33
    C) 48, 72, 96
    D) 48, 96, 192

20. An arithmetic sequence with a positive common difference is similar to a:
    A) linear function with a positive slope.
    B) constant function with a slope of zero.
    C) geometric sequence with a positive common ratio.
    D) quadratic function with a positive leading coefficient.

21. Find the next three terms if the first four terms of an arithmetic sequence are:

    {12, 19, 26, 33 ...}

    A) 40, 47, 54
    B) 12, 19, 26
    C) 38, 44, 50
    D) 52, 82, 129

22. The first term in a geometric sequence with a common ratio of –2 and a thirteenth term of 4648 is:

    A) $\dfrac{581}{512}$

    B) $\dfrac{581}{1024}$

    C) $-\dfrac{581}{512}$

    D) $-\dfrac{581}{1024}$

23. A student tried to derive a rule for determining the sum of the first n terms in a geometric series as follows: The student made his first error in step:

1. $S_n = a + ar + ar^2 + ar^3 \ldots + ar^{n-2} + ar^{n-1}$

2. $rS_n = ar + ar^2 + ar^3 + ar^4 \ldots + ar^{n-1} + ar^n$

3. $S_n = a + ar + ar^2 + ar^3 \ldots + ar^{n-2} + ar^{n-1}$
     $\underline{rS_n = ar + ar^2 + ar^3 + ar^4 \ldots + ar^{n-1} + ar^n}$
     $S_n - rS_n = a - ar^n$

4. $S_n(1 - r) = a(1 - ar^n)$

5. $S_n = \dfrac{a(1 - ar^n)}{(1 - r)}$

    A) 2
    B) 3
    C) 4
    D) 5

24. A rule equivalent to $S_n = \dfrac{n}{2}\left(2a + (n-1)d\right)$ is:

    A) $S_n = nt_n$

    B) $S_n = ar^{n-1}$

    C) $S_n = \dfrac{n}{2}(a + t_n)$

    D) $S_n = a + (n - 1)d$

25. In a geometric series:
    A) terms will be added together.
    B) terms will be multiplied together.
    C) subsequent terms will be found by multiplying the previous terms.
    D) subsequent terms will be found by adding the common ratio to the previous term.

26. What kind of sequence is 60, 53, 46, 39, 32,...?
    A) Arithmetic
    B) Geometric
    C) Neither

27. What kind of sequence does the general term $t_n = 3(4)^{n-1}$ generate?
    A) Arithmetic
    B) Geometric
    C) Neither

28.

> As part of his teaching contract, Jason gets a base salary of $36,000 for the first year, with a $3000 raise each year.

What is his salary for the 4th year he works?
    A) $45,000
    B) $48,000
    C) $36,000
    D) $39,000

29. Refer to the information in question 8. What are Jason's total earnings after teaching for 6 years?
    A) $51,000
    B) $261,000
    C) $87,000
    D) $522,000

30.

> A 45-year old electrician working for a company is paid $47/hour and is told that every year he will receive a 3% raise.

Which of the following statements is most likely true?
    A) One day he will make $206.04/hour.
    B) After five years, he will be making $193.64/hour.
    C) In four years, his pay will have increased by more than 9%.
    D) If he works until age 55, his pay will have increased by nearly 30%.

31. The sum of the first 50 terms of the geometric sequence –3, 3.6, –4.32, ... is
    A) –22748.6
    B) 22748.6
    C) –136491.6
    D) 12408.3

32. The sum of the first n terms in an arithmetic series can be determined by:
    A) Adding the first $n - 1$ terms.
    B) Multiplying the first term, last term and half the number of terms in the series.
    C) Multiplying the sum of the first and last terms by half the number of terms in the series.
    D) Adding the first and second last term and then multiplying the result by the number of terms in the series.

33. The first term in a geometric sequence with a common ratio of –2 and a thirteenth term of 4648 is:

A) $\frac{581}{512}$

B) $\frac{581}{1024}$

C) $-\frac{581}{512}$

D) $-\frac{581}{1024}$

34. The geometric sequence is:
A) 2, –1, 0, 1,...

B) 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$,...

C) 2, –1, $\frac{1}{2}$, $-\frac{1}{4}$,...

D) –81, 3, $\frac{1}{9}$, $-\frac{1}{243}$,...

35. Find the next three terms if the first four terms of an arithmetic sequence are:
{12, 19, 26, 33 ...}
A) 40, 47, 54
B) 12, 19, 26
C) 38, 44, 50
D) 52, 82, 129

36.

A king agrees to pay one of his servants in grains of rice each day. On his first day, he receives one grain of rice and every day after that he is given twice the previous day's number of grains.

The servant's annual pay forms a:
A) divergent geometric series.
B) divergent arithmetic series.
C) convergent geometric series.
D) convergent arithmetic series.

37. If you were to earn $0.01 on the first day of the month, $0.02 the day afterwards, $0.04 the next day, and so on, doubling the amount you earn every day, how much will you have earned in total at the end of a month of 30 days?
A) $1310.72
B) $671,088.64
C) $5,368,709.12
D) $10,737,418.23

38. Which of the following sequences does the term formula $t_n = 4n - 7$ generate?
A) -3, 1, 5, 9, 13,...
B) -7, -3, 1, 5, 9, 13,...
C) 1, 5, 9, 13, 17,...
D) 11, 15, 19, 23, 27,...

39. A student tried to derive a rule for determining the sum of the first n terms in a geometric series as follows:

1. $S_n = a + ar + ar^2 + ar^3 \ldots + ar^{n-2} + ar^{n-1}$

2. $rS_n = ar + ar^2 + ar^3 + ar^4 \ldots + ar^{n-1} + ar^n$

3. $S_n = a + ar + ar^2 + ar^3 \ldots + ar^{n-2} + ar^{n-1}$
   $rS_n = ar + ar^2 + ar^3 + ar^4 \ldots + ar^{n-1} + ar^n$
   $\overline{S_n - rS_n = a - ar^n}$

4. $S_n(1-r) = a(1 - ar^n)$

5. $S_n = \dfrac{a(1 - ar^n)}{(1-r)}$

The student made his first error in step:
A) 2
B) 3
C) 4
D) 5

40. Find S_9 for $\dfrac{x}{2}, \ -\dfrac{x^2}{6}, \ \dfrac{x^3}{18}, \ldots$

A) $S_9 = \dfrac{x^8}{6561}$

B) $S_9 = \dfrac{x^9}{13122}$

C) $S_9 = \dfrac{19683 + x^9}{39366 + 13122x}$

D) $S_9 = \dfrac{19683x + x^{10}}{39366 + 13122x}$

Systems of Equations

1. The line with equation $20x - 8y = 4$ passes through the point P(5, 12). A second line intersects the first at the same point P. The equation of this second line could be
    A) $5x - 2y = 4$
    B) $-8x + 2y = 64$
    C) $-3x - 5y = 75$
    D) $10x + 3y = 86$

2. For what values of a and b is $(-1,2)$ the solution for the linear system shown below?
    1) $ax + 3y = 1$
    2) $2x + by = -4$
    A) $(-1, 5)$
    B) $(-1, 2)$
    C) $(2, -1)$
    D) $(5, -1)$

3. Given the following non–linear system:
    1) $y = x^2 + 1$
    2) $y = 3x + 1$
    How many points of intersection are there?
    A) Zero
    B) One
    C) Two
    D) Three

4.
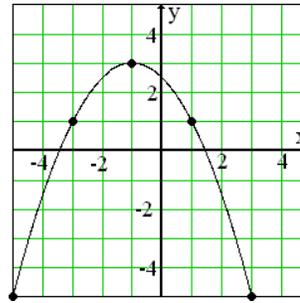
x	y
–5	–5
–3	1
–1	3
1	1
3	–5

The quadratic regression equation for the graph has the form of $y = ax^2 + bx + c$. The value of b in this equation is
A) –1
B) 1
C) 2.5
D) 3

5. Solve the system of equations:

$5x - 2y + 14 = 0$

$y = -3x^2 + x - 6$

A) No Solution

B) (0,–6)

C) (–2,–20) and (3,–30)

D) (0,6) and (–2,2)
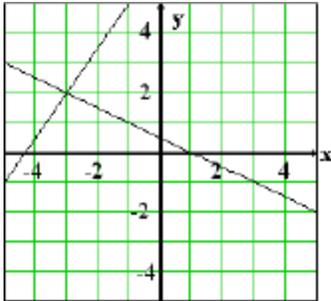
6.

The solution to the linear system whose graph is shown is

A) (–4.5,0)

B) (1,0)

C) (2,–3)

D) (–3,2)

7.   For which of the linear systems listed below is (2, –1) a solution?

A)

$2x - y = -1$

$x + 2y = -1$

B)

$7x + y = 13$

$3x - 2y = 8$

C)

$3x - y = 5$

$5x - 2y = 8$

D)

$2x + y = 2$

$3x - 2y = 10$

8. Solve for x, y and z:

1) $2x - y - z = -3$

2) $2x - 3y + 5z = 11$

3) $x + 2y - 2z = -1$

A) (1, 2, 3)

B) (2, –1, –1)

C) (–3, 11, –1)

D) (3, 2, –1)

9.

A stone is tossed off a bridge and its flight path is approximately parabolic. The data in the following table shows the height, h metres above the river, of the stone after t seconds of flight.

Time t seconds	1	2	3	4	5
Height h metres	50.1	60.4	60.9	51.6	32.5

The quadratic regression equation for the flight path of the stone has the form $y = ax^2 + bx + c$. The value of c in this equation is _____.

10. A closet contains pants, shirts and coats. In total there are 47 items of clothing. The number of shirts is two less than twice the number of pants. The number of coats is two more than half the number of shirts. Using this information, how many of each item of clothing is there?
A) Pants = 10; Shirts = 22; Coats = 15
B) Pants = 14; Shirts = 12; Coats = 8
C) Pants = 12; Shirts = 10; Coats = 7
D) Pants = 12; Shirts = 22; Coats = 13

11. At a car dealership there are yellow, red and blue cars. The total number of cars in the parking lot is 234. There are 50 more red cars than blue cars, and the number of blue cars is 2 more than twice the number of yellow cars. How many red, blue and yellow cars are in the parking lot?
A) Yellow cars = 60; Blue cars = 122; Red cars = 172
B) Yellow cars = 36; Blue cars = 72; Red cars = 122
C) Yellow cars = 56; Blue cars = 114; Red cars = 164
D) Yellow cars = 36; Blue cars = 74; Red cars = 124

12. The linear function $4x - 3y + 15 = 0$ can be graphed on a graphing calculator by first isolating the y variable. The correct equivalent equation to graph is
A) $y = \frac{4}{3}x + 5$
B) $y = \frac{3}{4}x + 5$
C) $y = \frac{4}{3}x - 5$
D) $y = \frac{3}{4}x - 5$

13. CityCab charges a flat rate of $7.50 for a cab ride, plus $0.10 per kilometer traveled. TaxiTown charges a flat rate of $5.00 for a cab ride, plus $0.15 per kilometer traveled. How many kilometers of travel results in the same total charge from each taxi company?
    A) 13.33 km
    B) 25 km
    C) 50 km
    D) They will never have the same fare, as the equations describing the cost from each company is different

14. An equation that can be paired up with $3x - y = 6$ in order to form a linear system with infinitely many solutions is
    A) $6x - 2y = 6$
    B) $-6x + 2y = -12$
    C) $3x + y = -6$
    D) $3x - y = -6$

15. A right triangle is formed by 3 lines as shown in the diagram.
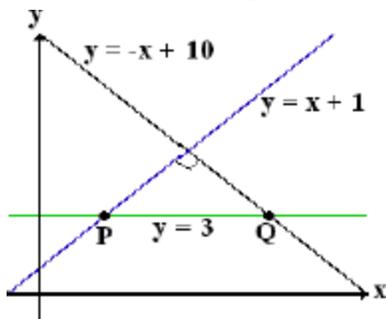
    The length of the hypotenuse PQ of this triangle is
    A) 4

B) 5
C) 6
D) 7

16. The pet store has 3 dogs for sale. The brown dog weighs 11 kg more than the white dog. The white dog weighs 2 kg less than twice the weight of the black dog. The combined weight of the three dogs is 42 kg. What is the weight of each dog?
    A) Black dog = 16 kg; White dog = 11 kg; Brown dog = 15 kg
    B) Black dog = 7 kg; White dog = 12 kg; Brown dog = 23 kg
    C) Black dog = White dog = Brown dog = 14 kg
    D) Black dog = 10 kg; White dog = 20 kg; Brown dog = 12 kg

17. A stone is tossed off a bridge and its flight path is approximately parabolic. The data in the following table shows the height, h metres above the river, of the stone after t seconds of flight.

Time t seconds	1	2	3	4	5
Height h metres	50.1	60.4	60.9	51.6	32.5

The quadratic regression equation for the flight path of the stone has the form $y = ax^2 + bx + c$. The value of c in this equation is _____.

75
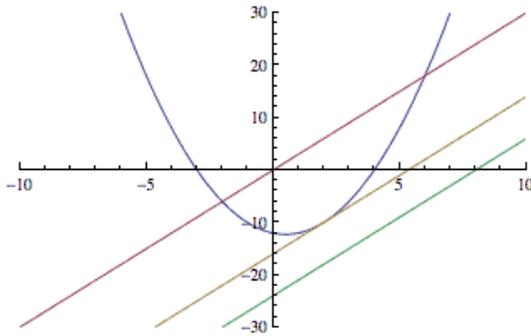
18.

A student in a math class was looking at how a parameter k affected the intersection of a line and parabola.

The diagram above shows the graph of $y = x^2 - x - 12$ and the graph of $y = 3x + k$ for three different values of k. Based on the diagram, the value of k that produces a linear-quadratic system with no solution is _____.

19.

Cal was offered a job as a waiter in two different restaurants. A waiter at the Empress earns $6.50/h and averages $60 a day in tips for a usual shift of 8 hours. Joey's pays $9.50/h and a waiter averages $30 a day in tips for the usual 8-hour shift. A graph representing the daily pay at each restaurant as a function of the number of hours worked in a day is shown.
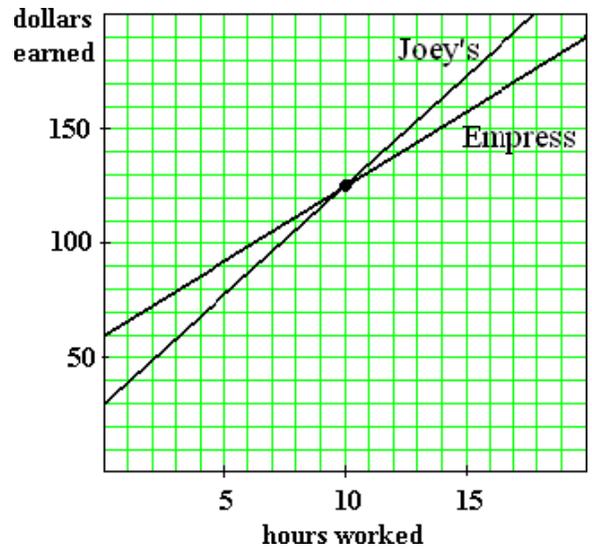
For an 8-hour shift, the pay for working at the Empress would exceed that at Joey's by _____ dollars.

20. Solve for x, y and z:

1) $x + y + 3z = 12$
2) $2x + y + 3z = 14$
3) $x - y + 4z = 13$

A) $(1, 2, 1)$
B) $(2, 1, 3)$
C) $(12, 13, 14)$
D) $(3, 3, 2)$

x	y
−5	−5
−3	1
−1	3
1	1
3	−5
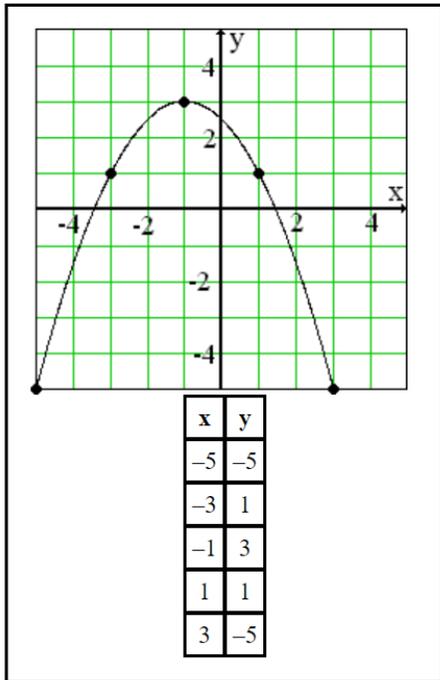
21.

The quadratic regression equation for the graph has the form of $y = ax^2 + bx + c$. The value of b in this equation is

A) −1

B) 1

C) 2.5

D) 3

22. Given the non–linear system:

1) $-x^4 + 2x^2 - 1$

2) $2x^2 - 17$

What is/are the point(s) of intersection if this system was to be graphed?

A) (2, −9)

B) (2, −9) and (−2, −9)

C) (−2, 9)

D) There are no points of intersection in this system

23. Cal was offered a job as a waiter in two different restaurants. A waiter at the Empress earns $6.50/h and averages $60 a day in tips for a usual shift of 8 hours. Joey's pays $9.50/h and a waiter averages $30 a day in tips for the usual 8-hour shift. A graph representing the daily pay at each restaurant as a function of the number of hours worked in a day is shown.
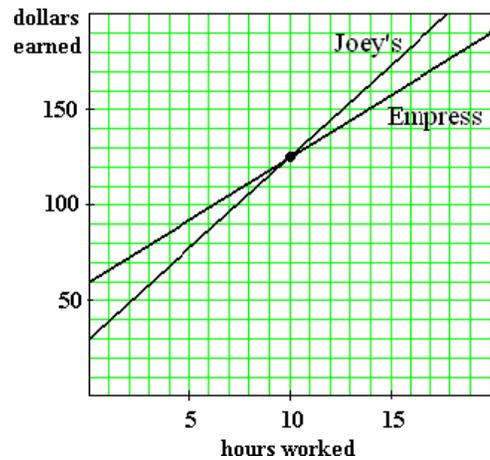
Cal should choose the job at

A) Joey's because the hourly pay is more.

B) Joey's because the daily tips are more.

C) the Empress because his total pay for the day would be more if he was to work more than 10 hours.

D) the Empress because his total pay for the day would be more for shifts less than 10 hours

24. A mountain climbing team plans to scale a 3450 metre mountain on a day for which the air temperature at 1600 m is 10°C and at 2000 m is 8°C. The air temperature T°C at a height of h metres can be approximated by the linear function $T = ah + b$ for some constant values a and b. Correct to the nearest whole number, the value of b in this equation is _____.

25. A student used their graphing calculator to plot several sets of two quadratic functions. They observed that a quadratic-quadratic system of two different parabolas might result in 2 solutions, 1 solution, or no solution.

    If the condition listed below can produce all three possible kinds of solutions, give it a truth value of 1. If the condition listed below can't produce all three possible kinds of solutions, give it a truth value of 0.

    R. Both parabolas open up and they have the same axis of symmetry.
    E. Both parabolas open down and they have the same axis of symmetry.
    T. Both parabolas open up and they have a different axis of symmetry.
    I. Both parabolas open down and they have a different axis of symmetry.
    N. One parabola opens up and the other opens down and they have the same axis of symmetry.
    A. One parabola opens up and the other opens down and they have a different axis of symmetry.

    The 6-digit number represented by the truth value of R E T I N A is _____.

26. The linear function $4x - 3y + 15 = 0$ can be graphed on a graphing calculator by first isolating the y variable. The correct equivalent equation to graph is

    A) $y = \frac{4}{3}x + 5$

    B) $y = \frac{3}{4}x + 5$

    C) $y = \frac{4}{3}x - 5$

    D) $y = \frac{3}{4}x - 5$

27. A right triangle is formed by 3 lines as shown in the diagram.
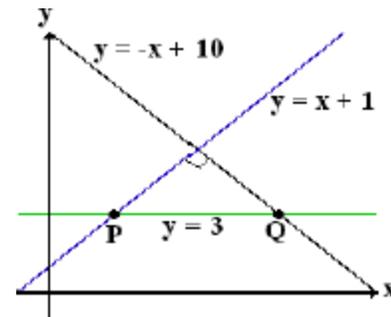
    The length of the hypotenuse PQ of this triangle is
    A) 4
    B) 5
    C) 6
    D) 7

28. If (2, 3) is the solution to the linear system
    $x + y = 5$
    $5kx - ky = 84$
    then the value of k is _____.

29. Solve the following linear system to determine the values of x and y:
    1) $x + y = 6$
    2) $2x + y = 3$
    A) (6, 3)
    B) (–3, 9)
    C) $x = 9$
    D) $3x + 2y = 9$

30. A student graphed a system of linear equations on a calculator and discovered that the two lines were parallel. The number of solutions to this linear system is
    A) 1
    B) 2
    C) infinitely many
    D) none

31. Jarred has an opportunity to work as a car salesman at one of two dealerships. The first dealer is offering to pay Jarred $500 per month plus a 3% commission on all sales. The second dealer is offering to pay Jarred a straight commission of 5% on all sales. Jarred has determined that the following equations relate to these offers where P is his total monthly pay and S is his monthly sales total.

| First dealer: | $P = 500 + 0.03S$ |
| Second dealer: | $P = 0.05S$ |

The monthly sales total for which the two wage offers would be identical is
A) $1250
B) $2500
C) $12 500
D) $25 000

32. If (2, 3) is the solution to the linear system
    $x + y = 5$
    $5kx - ky = 84$
    then the value of k is _____.

33. For what values of a and b is (–1,2) the solution for the linear system shown below?
    1) $ax + 3y = 1$
    2) $2x + by = -4$
    A) (–1, 5)
    B) (–1, 2)
    C) (2, –1)
    D) (5, –1)

34. A linear system for which (–5, 10) is the solution is

    A)

    $$x + y = 5$$

    $$x - y = -5$$

    B)

    $$2x + y = 0$$

    $$x - 2y = -25$$

    C)

    $$3x + y = 5$$

    $$x - y = -15$$

    D)

$$2x + 3y = 40$$

$$4x + y = -10$$

35. The point of intersection in a non–linear system is the point where:
    A) Each system becomes linear
    B) Each system has the same slope
    C) Each system has the same value of x and y
    D) Each system has the same coefficients

36. For what values of a and b is (–2,5) the solution for the linear system shown below?
    1) $ax + 3y = 11$
    2) $5x - by = -15$
    A) $a = 2$; $b = 1$
    B) $a = -2$; $b = 5$
    C) $a = 5$; $b = 3$
    D) $a = -2$, $b = -1$

37. Refer to the information in question 7.
    The stone will hit the river in approximately
    A) 5.3 seconds
    B) 5.7 seconds
    C) 6.1 seconds
    D) 6.5 seconds

38. At a car dealership there are yellow, red and blue cars. The total number of cars in the parking lot is 234. There are 50 more red cars than blue cars, and the number of blue cars is 2 more than twice the number of yellow cars. How many red, blue and yellow cars are in the parking lot?
A) Yellow cars = 60; Blue cars = 122; Red cars = 172
B) Yellow cars = 36; Blue cars = 72; Red cars = 122
C) Yellow cars = 56; Blue cars = 114; Red cars = 164
D) Yellow cars = 36; Blue cars = 74; Red cars = 124

39. CityCab charges a flat rate of $7.50 for a cab ride, plus $0.10 per kilometer traveled. TaxiTown charges a flat rate of $5.00 for a cab ride, plus $0.15 per kilometer traveled. How many kilometers of travel results in the same total charge from each taxi company?
A) 13.33 km
B) 25 km
C) 50 km
D) They will never have the same fare, as the equations describing the cost from each company is different

Trigonometry

1. Which of the following is the exact value for cos 150°?
   A) –1/2
   B) 1/2
   C) $\sqrt{3}$ / 2
   D) $-\sqrt{3}$ / 2

2. The exact value of cos210° is
   A) $\frac{1}{2}$

   B) $\frac{\sqrt{3}}{2}$

   C) $-\frac{1}{2}$

   D) $-\frac{\sqrt{3}}{2}$

3. Fred stands high atop a distant cliff while Mike tries to determine the height of the cliff from below. Mike stands an unknown distance from the base of the cliff and measures an angle of elevation of 37° to Fred. He then backs away 50 m more from the cliff and measures an angle of elevation of 27°. Calculate the height of the cliff.
   A) 78.7 m
   B) 130.7 m
   C) 150.0 m
   D) 175.3 m

4.

   Using the information provided in the diagram above, the perimeter of ΔABC is:
   A) 232.4
   B) 132.4
   C) 55.0
   D) 300.0

5. Determine the tangent ratio for 60°.
   A) $\tan 60° = \frac{1}{\sqrt{2}}$

   B) $\tan 60° = \frac{1}{2}$

   C) $\tan 60° = \sqrt{3}$

   D) $\tan 60° = \frac{\sqrt{3}}{2}$

6. Find the value of x:
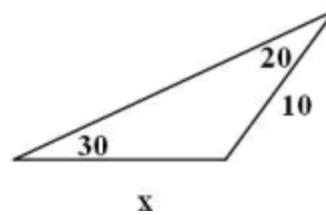
   A) 6
   B) 6.5
   C) 6.8
   D) 7

7.

> The point (-2,-2) lies on the terminal arm of an angle, θ, in standard position.

Which of the following diagrams best illustrates one possibility for angle θ?

A)
45°

B)
135°

C)
135°

D)
225°
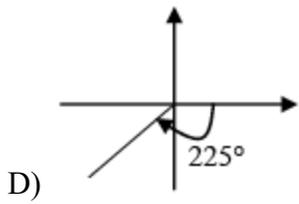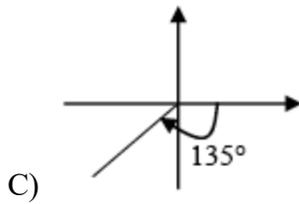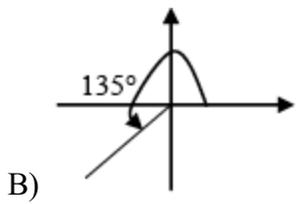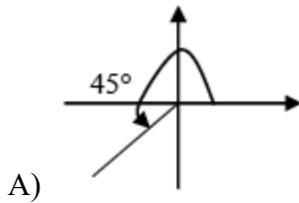
8. Given $\sin \theta = \frac{2}{7}$, determine θ, where $0 \le \theta \le 360°$.
A) 16° and 163°

B) 16° and 164°
C) 17° and 163°
D) 17° and 164°

9. Which of the following diagrams represents the solution(s) to the equation $\cos \theta = \frac{\sqrt{2}}{2}$, $0° \le \theta \le 360°$?

A)
45°

B)
45°
45°

C)
45°
45°

D)
45°   45°
45°   45°

10.
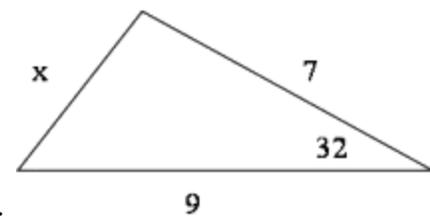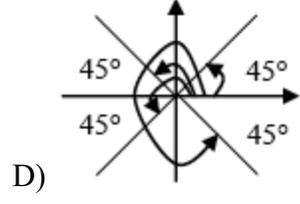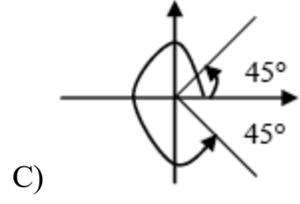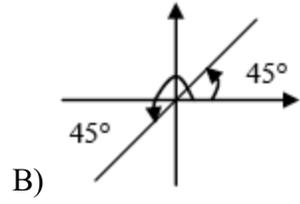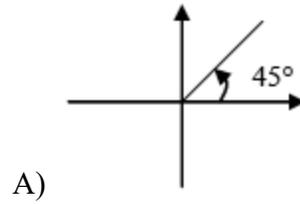
Find the value of x?
A) 4.0
B) 4.5
C) 4.7
D) 4.8

11. A soccer ball is 4.1 meters from one goal post and 3.9 meters from the other goal post. The poles of the goal post are 3.07 meters apart, as shown in the diagram below:
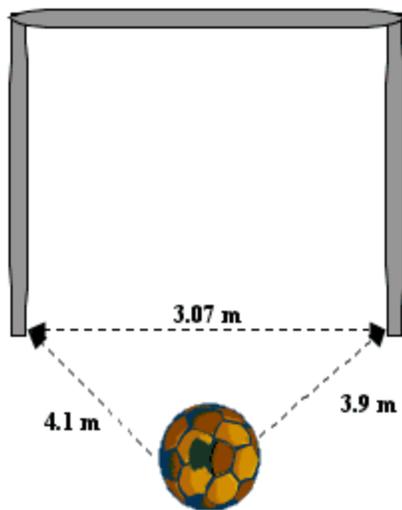
Using this information, within what angle must the ball travel in order to score a goal?

A) 0.70°
B) 52°
C) 60°
D) 45°

12. The points $P(x,y)$, $Q(-x,y)$, $R(-x,-y)$, and $S(x,-y)$ lie on the terminal arms of angles in standard position. The four standard position angles terminating at the given points

A) are of the same sign.
B) lie in the same quadrant.
C) have the same angle measure.
D) have the same reference angle.
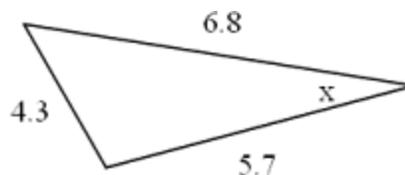
13.
Solve for x:
A) 35
B) 37
C) 39
D) 41

14. A buffet style restaurant has arranged its dining room as shown in the diagram below:
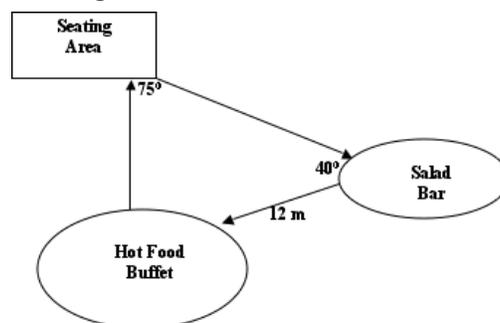
Using the information provided in the diagram, how far does a diner walk if they move from the seating area to the salad bar, then to the hot food buffet and finally back to the seating area?

A) 7.99 m
B) 31.25 m
C) 11.26 m
D) 19.25 m

15. Given $\cos \theta = \frac{3}{5}$, determine θ, where $0 \le \theta \le 360°$.

A) 53° and 307°
B) 54° and 307°
C) 53° and 306°
D) 54° and 306°
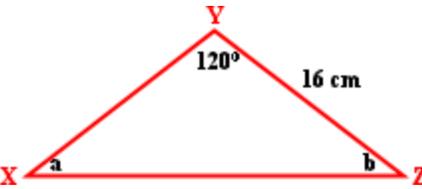
16. Using the diagram above, if angle a = angle b, the perimeter of the triangle is:
    A) 59.7 cm
    B) 27.7 cm
    C) 16 cm
    D) 32 cm

17. What is the solution to $\sqrt{3} \tan x - 1 = 0$, for $0° \leq x < 360°$?
    A) $x = 30°$, $x = 330°$
    B) $x = 30°$, $x = 210°$
    C) $x = 60°$, $x = 240°$
    D) $x = 60°$, $x = 300°$

18. Given the following diagram, solve for angle B.
    A) 44°
    B) 45°
    C) 82°
    D) 83°
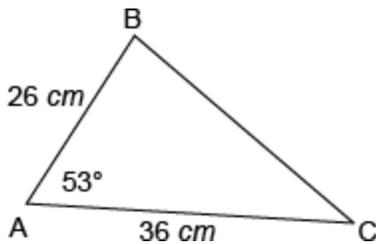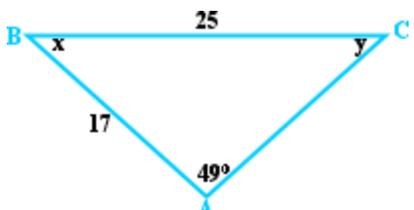
19. Using the diagram above, the value of the angles marked x and y are:
    A) angle x = angle y = 65.5°
    B) angle x = 100°, angle y = 31°
    C) angle x = 31°, angle y = 100°
    D) angle x = angle y = 49°

20. The third quadrant angle with the same reference angle as a first quadrant angle measuring 40° can be found by
    A) Adding 40° to 180°
    B) Adding 40° to 360°
    C) Subtracting 40° from 270°
    D) Subtracting 40° from 270°

21. Whenever $|\sin x| = |\cos x|$, $x \neq 90°$, 270°, $\tan x$ is equal to
    A) –1
    B) 0
    C) 1
    D) ±1

22. By reflecting a first quadrant reference angle first about the x-axis and then about the y-axis, the resulting angle will lie in quadrant
    A) I
    B) II
    C) III
    D) IV

23. The diagram below shows a surveyor marking the distance to two survey markers (A and B):
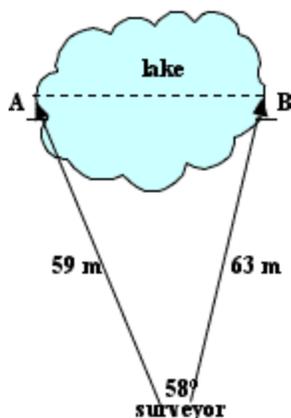
Using this information, the length of the lake (AB) is:
A) 118.9 meters
B) 86.3 meters
C) 59.25 meters
D) 111.3 meters

24.
David's hang-glider has wings that go out 6 m from the tip at an angle of 95°. How wide is the glider at the back?
A) 8.85 m
B) 9.50 m
C) 10.65 m
D) 12 m

25. The values of θ that satisfy the equation cosθ = 0.1234, 0° ≤ θ ≤ 360° are
A) 82.91°, 277.09°
B) 97.09°, 262.91°
C) 97.09°, 277.09°
D) 262.91°, 277.09°

26. The exact value of cos210° is
A) $\frac{1}{2}$
B) $\frac{\sqrt{3}}{2}$
C) $-\frac{1}{2}$
D) $-\frac{\sqrt{3}}{2}$

27. The exact value of the tangent of the standard position angle θ, whose terminal arm contains the point (0,—1) is
A) 0
B) 1
C) –1
D) Undefined

28. Given sin θ = $\frac{2}{7}$, determine θ, where 0 ≤ θ ≤ 360°.
A) 16° and 163°
B) 16° and 164°
C) 17° and 163°
D) 17° and 164°

29. The values of θ that satisfy the equation tanθ = -9.9876, 0° ≤ θ ≤ 360° are
A) 84.28°, 95.72°
B) 95.72°, 264.28°
C) 95.72°, 275.72°
D) 264.28°, 275.72°

30. Which of the following diagrams shows points that would lie on the terminal arm of angles in standard position that all have near-zero cosine ratio values?

A)

B)

C)

D)

31.

Emmy aims his bright spotlight at the top of a tree. The spotlight forms an angle of 65° with the ground. He then walks 100 m away from the spotlight and looks up at the spot of light on the tree. If he is looking at an angle of elevation of 52°, what is the height of the tree?

A) 70.2 m
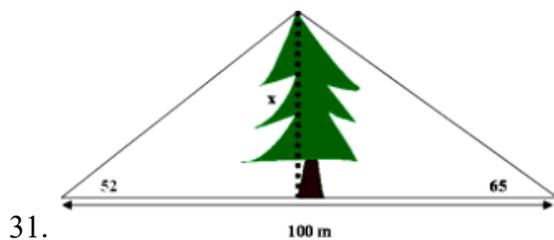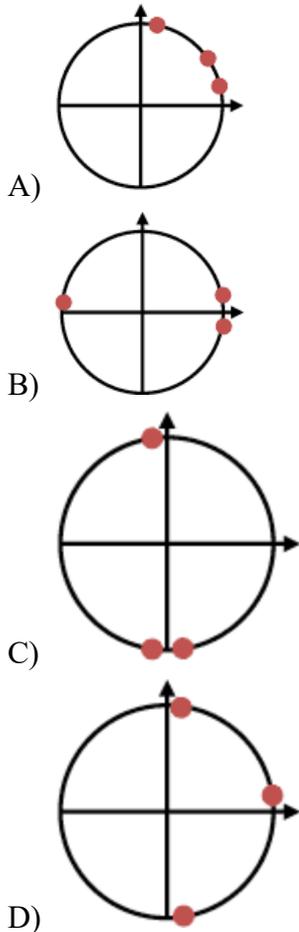
B) 80.2 m

C) 90.2m

D) 100.2 m

32. Which of the following diagrams represents the solution(s) to the equation $\cos \theta = \dfrac{\sqrt{2}}{2}$, $0° \leq \theta \leq 360°$?

A) 45°

B) 45° 45°

C) 45° 45°

D) 45° 45° 45° 45°
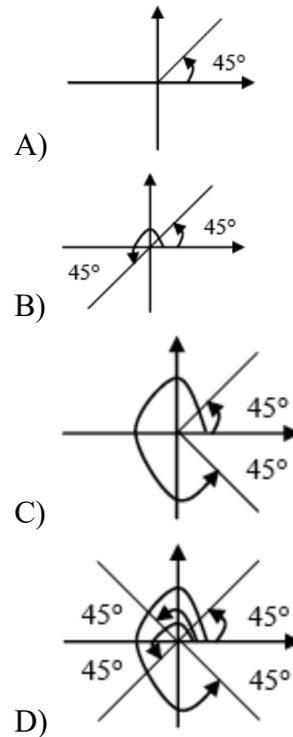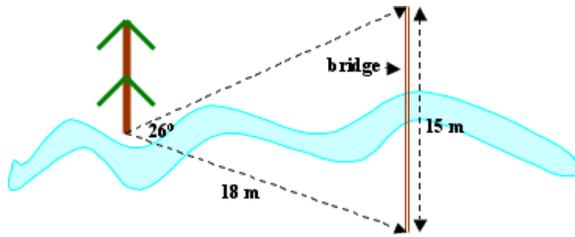
33. Using the information in the diagram above, how far is the base of the tree from the closest end of the bridge?

A) 18 meters
B) 23.4 meters
C) 7.89 meters
D) 28.9 meters

34. Given the following diagram, solve for angle C.
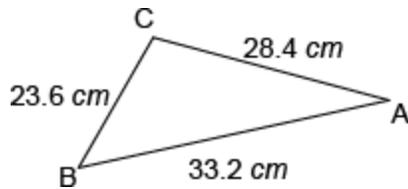
A) 44°
B) 45°
C) 57°
D) 79°

35. A man is driving directly towards a mountain. He stops the car and measures the angle of elevation to the summit as 24°. He then drives 1 km closer and finds that the angle of elevation has increased to 36°. How far from the summit of the mountain was the man when he took the first measurement?

A) 1148 metres
B) 1580 metres
C) 2580 metres
D) 2824 metres
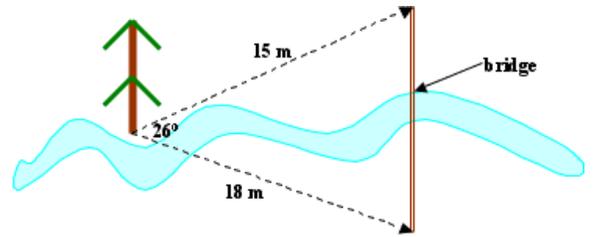
36. Using the data provided in the diagram above, the length of the bridge is:

A) 16.5 m
B) 63.7 m
C) 9.9 m
D) 7.98 m

37. Which of the following diagrams shows points that would lie on the terminal arm of angles in standard position that all have near-zero cosine ratio values?

A)

B)

C)

D)

38.
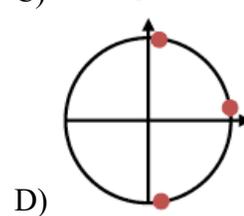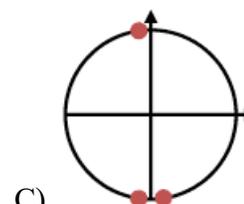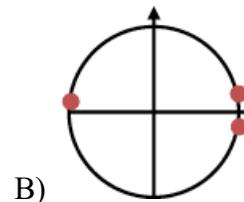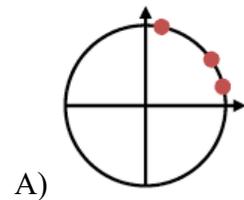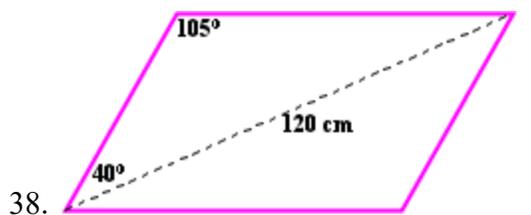
Using the information in the diagram above, the area of the parallelogram is:

A) 14400 cm²
B) 79.9 cm²
C) 5696.9 cm²
D) 5496.4 cm²

39. The exact value of the tangent of the standard position angle θ, whose terminal arm contains the point (0,—1) is

A) 0
B) 1
C) –1
D) Undefined

40. Given the following diagram, solve for angle B.
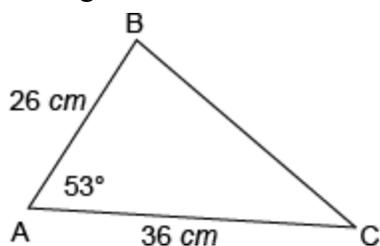
A) 44°
B) 45°
C) 82°
D) 83°

41. From her yard, Carla sees Alice and Ben walking along the road as shown in the diagram below:
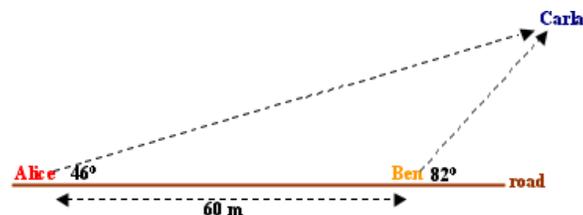
Using this information, how far is Carla from Alice?

A) 103.9 m
B) 101.1 m
C) 98.0 m
D) 47.5 m

42. Determine the exact value of cos 30° + sin 135°.

A) $\dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{2}}$

B) $\dfrac{\sqrt{3}+\sqrt{2}}{2}$

C) $\dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}}$

D) $\dfrac{\sqrt{3}+\sqrt{2}}{3}$

43.
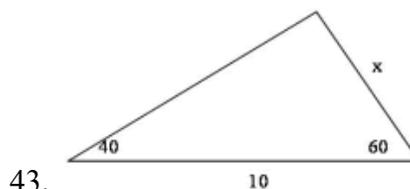
Solve for x:

A) 5
B) 6
C) 6.5
D) 8

44. Determine the exact value of cos 30° × sin 240° + tan45°.

A) $\frac{1}{4}$

B) $-\frac{1}{4}$

C) $\frac{1}{2}$

D) $-\frac{1}{2}$

45. A buffet style restaurant has arranged its dining room as shown in the diagram below:
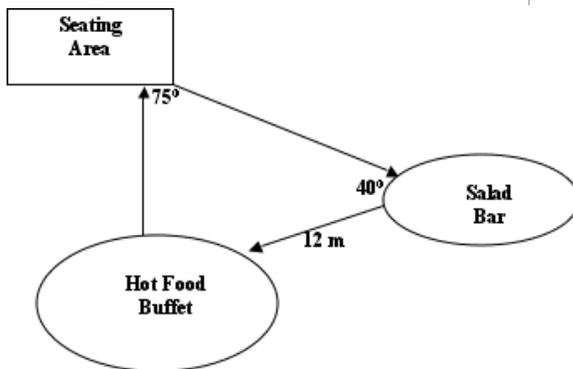
Using the information provided in the diagram, how far does a diner walk if they move from the seating area to the salad bar, then to the hot food buffet and finally back to the seating area?

A) 7.99 m
B) 31.25 m
C) 11.26 m
D) 19.25 m
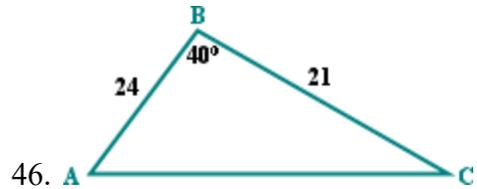
46. Using the diagram above, the value of AC is:

A) 244.9
B) 13.5
C) 15.6
D) 42.3
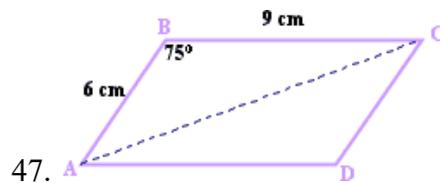
47. Using the diagram above, the length of the diagonal AC is:

A) 34.77 cm
B) 890.5 cm
C) 10.81 cm
D) 9.4 cm
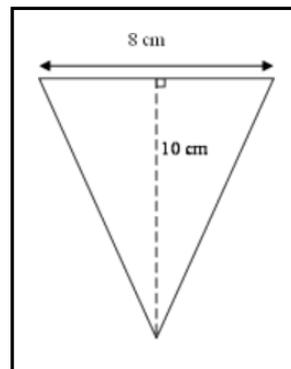
48. Find the value of the angle at the base of the cone:

A) 40°
B) 43.5°
C) 45°
D) 45.5°

90

49. Fred stands high atop a distant cliff while Mike tries to determine the height of the cliff from below. Mike stands an unknown distance from the base of the cliff and measures an angle of elevation of 37° to Fred. He then backs away 50 m more from the cliff and measures an angle of elevation of 27°. Calculate the height of the cliff.

A) 78.7 m
B) 130.7 m
C) 150.0 m
D) 175.3 m

50. The exact values of θ that satisfy the equation $\sin\theta = -\dfrac{\sqrt{3}}{2}$, 0° ≤ θ ≤ 360° are

A) 60°, 120°
B) 120°, 240°
C) 120°, 300°
D) 240°, 300°

51. Given the following diagram, solve for side a.

B

53°   46°
A   36 cm   C
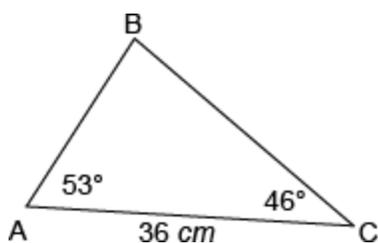
A) 26 cm
B) 29 cm
C) 32 cm
D) 36 cm

52. The exact value of cos210° is

A) $\dfrac{1}{2}$

B) $\dfrac{\sqrt{3}}{2}$

C) $-\dfrac{1}{2}$

D) $-\dfrac{\sqrt{3}}{2}$
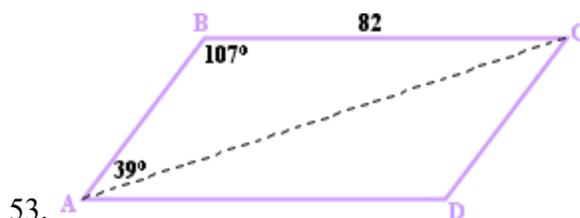
53. Using the diagram shown above, the length of the diagonal AC is:

A) 130.3
B) 34.0
C) 53.9
D) 124.6

54. Find the value of x:

10
5
X
10
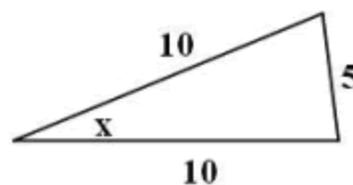
A) 25°
B) 27°
C) 29°
D) 31°

55. The point $P(x,11)$ lies on the terminal arm of an angle in standard position.
    If the distance from the origin to point P is 23 units, x could be
    A) –34.0
    B) —20.2
    C) 12.0
    D) 25.5

56. Two wolves with tracking collars are being monitored by biologists at a central tracking station as shown in the diagram below:
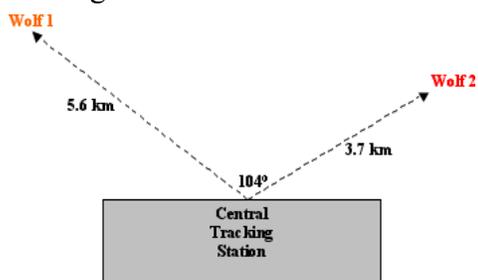

    Using this information, how far apart are the two wolves?
    A) 55.1 km
    B) 35.0 km
    C) 7.4 km
    D) 5.9 km

57. What is the solution to $\sqrt{3} \tan x - 1 = 0$, for $0° \le x < 360°$?
    A) $x = 30°, x = 330°$
    B) $x = 30°, x = 210°$
    C) $x = 60°, x = 240°$
    D) $x = 60°, x = 300°$

58. A
    Using the information in the diagram
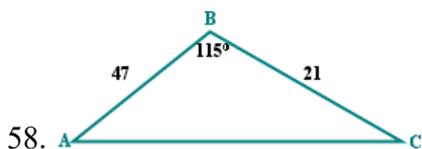
above, the length of side AC in $\triangle ABC$ is:
A) 42.05
B) 59.03
C) 42.61
D) 3484.25

59. The sine of which of the following angles in standard position is negative?
    A) 25°
    B) 125°
    C) 625°
    D) 1250°

60. The point (5,6) lies on the terminal arm of an angle, θ, in standard position.
    Which of the following diagrams best illustrates one possibility for angle θ?

A)

B)

C)

D)

61. Determine the sine ratio for 60°.

A) $\sin 60° = \dfrac{1}{\sqrt{2}}$

B) $\sin 60° = \dfrac{1}{2}$

C) $\sin 60° = \sqrt{3}$

D) $\sin 60° = \dfrac{\sqrt{3}}{2}$

62. The exact value of tan225° can be expressed in the form $\dfrac{a}{b}$, where the value of $a + b$ is
A) 0
B) 1
C) 2
D) 6

63. Find the value of x:
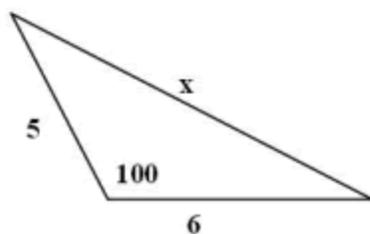
A) 7.5
B) 8
C) 8.5
D) 9

64. Given the following diagram, solve for side a.
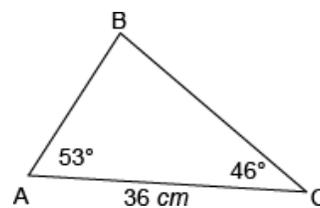
A) 26 cm
B) 29 cm
C) 32 cm
D) 36 cm

65. Given $\sin \theta = \dfrac{2}{7}$, determine θ, where $0 \le \theta \le 360°$.
A) 16° and 163°
B) 16° and 164°
C) 17° and 163°
D) 17° and 164°

66. A buffet style restaurant has arranged its dining room as shown in the diagram below:
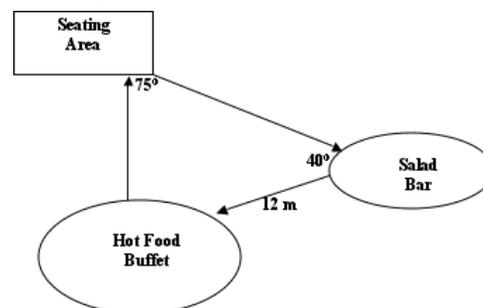
Using the information provided in the diagram, how far does a diner walk if they move from the seating area to the salad bar, then to the hot food buffet and finally back to the seating area?
A) 7.99 m
B) 31.25 m
C) 11.26 m
D) 19.25 m

67. The tangent of which of the following angles in standard position is positive?
A) -65°
B) -265°
C) -465°
D) -765°

of 3°. However, a jet experiences problems and makes an emergency descent through the air at an angle of 10°. If this jet is landing with an airspeed of 160 knots, and there is a 35 knot crosswind at right angles to the runway, what is the jet's true ground speed?
A) 157.6 knots
B) 153.6 knots
C) 159.8 knots
D) 155.9 knots

68.

Emmy aims his bright spotlight at the top of a tree. The spotlight forms an angle of 65° with the ground. He then walks 100 m away from the spotlight and looks up at the spot of light on the tree. If he is looking at an angle of elevation of 52°, what is the height of the tree?
A) 70.2 m
B) 80.2 m
C) 90.2m
D) 100.2 m

The minute hand of a clock is 30 cm and hour hand is 21 cm.

71.
At 4:00, how far are the tips of the hands away from each other?
A) 20.0 cm
B) 23.5 cm
C) 36.8 cm
D) 44.4 cm

69. By reflecting a first quadrant reference angle first about the *x*-axis and then about the *y*-axis, the resulting angle will lie in quadrant
A) I
B) II
C) III
D) IV

72. Which of the following transformations of an angle measuring 30° would result in an angle measuring 150°? A reflection about the
A) *x*-axis
B) *y*-axis
C) line $y = x$
D) *x*-axis followed by a reflection in the *y*-axis

70. An airplane typically approaches a runway for landing at a descent angle

73. Given the following diagram, solve for angle A.
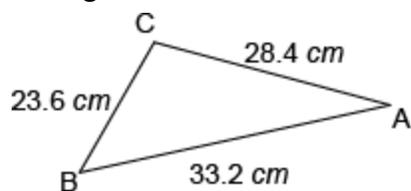
A) 44°
B) 45°
C) 57°
D) 79°

74. The tangent of which of the following angles in standard position is positive?
A) -65°
B) -265°
C) -465°
D) -765°

75.
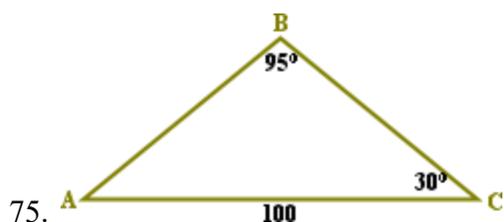
Using the information provided in the diagram above, the perimeter of ΔABC is:
A) 232.4
B) 132.4
C) 55.0
D) 300.0
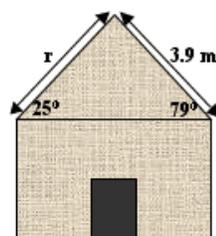
76.

Using the information provided in the above diagram, the length of the roof line section labelled r is:
A) 5.85 m
B) 9.06 m
C) 12.96 m
D) 1.68 m

77. Which of the following trigonometric ratios is always positive?
A) sin200°
B) tan300°
C) sin400°
D) tan500°

78. If cos x = 4/5, what are all of the possible values for sin x and tan x?
A) sin x = 3/4, tan x = 3/5
B) sin x = ±3/4, tan x = ±3/5
C) sin x = 3/5, tan x = 3/4
D) sin x = ±3/5, tan x = ±3/4

79.
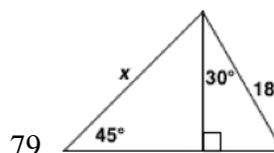
What is the exact value of x?
A) $9\sqrt{3}$
B) $9\sqrt{6}$
C) $18\sqrt{3}$
D) $18\sqrt{6}$

80. Which of the following diagrams shows points that would lie on the terminal arm of angles in standard position that all have near-zero cosine ratio values?

A)

B)

C)

D)
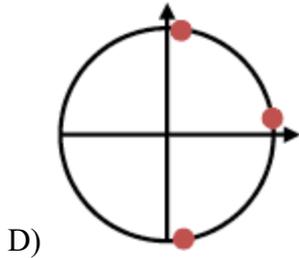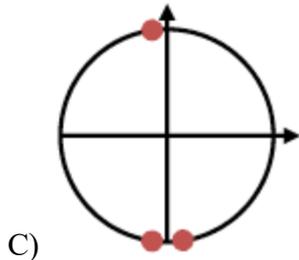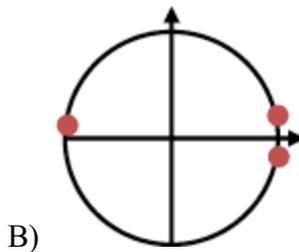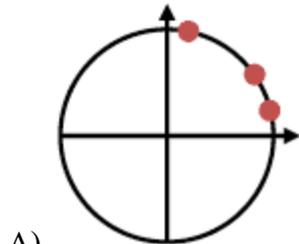
Answer Key

Absolute Value and Reciprocal Functions

1. A
2. A
3. D
4. D
5. B
6. B
7. B
8. C
9. D
10. B
11. C
12. C
13. 4312
14. A
15. D
16. B
17. C
18. B
19. A
20. -9
21. D
22. C
23. D
24. C
25. Negative
26. B
27. A
28. A
29. 1002
30. D
31. 270230
32. Vertical
33. A
34. D
35. D
36. 3.4
37. B
38. B
39. C
40. A
41. 4312
42. -9
43. 6
44. D
45. D
46. D
47. B
48. C
49. A
50. D
51. B
52. A
53. C
54. D
55. A
56. B
57. C
58. C
59. D
60. B

Linear and Quadratic Inequalities

1. 140
2. B
3. A
4. D
5. A
6. B
7. A
8. A
9. D

10. A
11. C
12. B
13. D
14. D
15. A
16. A
17. C
18. A
19. A
20. A
21. A
22. A
23. A
24. A
25. A
26. C
27. A
28. D
29. C
30. C
31. D
32. D
33. B
34. B
35. C
36. A
37. D
38. A
39. C
40. D

Quadratic Equations

1. C
2. C
3. B
4. A
5. B
6. D
7. C
8. C
9. A

10. D
11. D
12. D
13. B
14. B
15. D
16. D
17. D
18. C
19. D
20. D

Quadratic Functions

1. C
2. C
3. 48
4. L
5. D
6. B
7. C
8. B
9. D
10. D
11. B
12. A
13. A
14. A
15. B
16. C
17. A
18. A
19. D
20. D
21. B
22. C
23. C
24. C
25. C
26. 8.7
27. A
28. A
29. B

30. A
31. A
32. B
33. D
34. B
35. 12
36. D
37. C
38. B
39. B
40. C
41. D
42. B
43. C
44. B
45. D
46. D
47. B
48. C
49. A
50. B

Radical Expressions and Equations

1. C
2. C
3. B
4. A
5. D
6. 1
7. C
8. 40
9. C
10. 1.58
11. B
12. B
13. A
14. A
15. D
16. C
17. C
18. B
19. A

20. A
21. B
22. 25
23. D
24. C
25. 56
26. B
27. A
28. A
29. 40
30. D
31. D
32. C
33. C
34. A
35. D
36. A
37. 40
38. C
39. 18
40. B
41. D
42. D
43. A
44. A
45. C
46. C
47. B
48. C
49. A
50. D

Rational Expressions and Equations

1. A
2. A
3. D
4. C
5. C
6. D
7. B
8. A
9. D

10. A
11. A
12. B
13. C
14. B
15. B
16. C
17. A
18. C
19. A
20. C
21. A
22. C
23. C
24. B
25. D
26. B
27. C
28. B
29. A
30. B
31. C
32. D
33. A
34. D
35. B
36. D
37. A
38. A
39. D
40. D
41. C
42. A
43. B
44. D
45. D
46. B
47. D
48. B
49. A
50. A
51. B
52. B

53. A
54. B
55. C
56. C
57. C
58. D
59. A
60. B
61. C
62. B
63. A
64. C
65. B
66. B
67. C
68. D
69. A
70. D

Sequences and Series

1. A
2. C
3. A
4. D
5. B
6. D
7. A
8. B
9. A
10. A
11. A
12. A
13. C
14. D
15. A
16. C
17. A
18. B

19. D

20. A

21. A

22. A

23. C

24. C

25. A

26. A

27. B

28. A

29. B

30. C

31. D

32. C

33. A

34. C

35. A

36. A

37. D

38. A

39. C

40. D

Systems of Equations

1. D
2. D
3. C
4. A
5. A
6. D
7. B
8. A
9. 30
10. D
11. D
12. A
13. C
14. B
15. B

16. B

17. 30

18. -24

19. 6

20. B

21. A

22. B

23. D

24. 18

25. 110011

26. A

27. B

28. 12

29. B

30. D

31. D

32. 12

33. D

34. B

35. C

36. A

37. C

38. D

39. C

Trigonometry

1. D
2. D
3. A
4. A
5. C
6. C
7. C
8. C
9. C
10. D
11. D
12. D
13. C
14. B
15. A
16. A

17. B
18. C
19. B
20. A
21. D
22. C
23. C
24. A
25. A
26. D
27. D
28. C
29. C
30. C
31. B
32. C
33. A
34. D
35. D
36. D
37. C
38. D
39. D
40. C
41. B
42. B
43. C
44. A
45. B
46. C
47. D
48. B
49. A
50. D
51. B
52. D
53. D
54. C
55. B
56. C
57. B
58. B
59. C

60. B
61. D
62. C
63. C
64. B
65. C
66. B
67. C
68. B
69. C
70. B
71. D
72. B
73. A
74. C
75. A
76. B
77. C
78. D
79. B
80. C