Chapter 1 Review

Multiple Choice

For #1 to 5, select the best answer.

1. What are the missing terms of the arithmetic sequence 4, 14, 24, ?
   A 10, 20, 30  
   B 9, 19, 29  
   C 5, 10, 15  
   D 8, 18, 28

2. While baking a cake, Dylan notices that each of his measuring cups is about half as big as the one before it. The largest (first) measuring cup is 250 mL. What is the approximate capacity of the fourth measuring cup?
   A 125 mL  
   B 65 mL  
   C 30 mL  
   D 15 mL

3. The years in which the Commonwealth Games take place form an arithmetic sequence with a common difference of 4. In 1978, the Commonwealth Games were held in Edmonton, Alberta. In which of the following years could the Commonwealth Games be held again?
   A 2011  
   B 2022  
   C 2033  
   D 2044

4. The sum of the first 20 terms of the arithmetic series 204 + 212 + 220 + ... is
   A 11 200  
   B 7120  
   C 5680  
   D 5600

5. The sum of the first 11 terms of the geometric series 7 – 14 + 28 – … is
   A 28 679  
   B 4 781  
   C –9 555  
   D –28 665

Short Answer

6. Gentry notices that the bank of lockers outside his math classroom are numbered 511, 513, 515, ..., 575. Determine the number of lockers in the set.

7. Brittany, a landscape designer, is setting out trees for planting. The 12 trees she needs are currently in one location, 40 m from the spot the first tree will be planted. The trees will be spaced 6 m apart. The cart she uses to transport the trees will only carry one tree at a time, so she must take the first tree to its spot, return for the second tree, take it to its spot, and so on. After Brittany takes all 12 trees to the correct spot and returns to the original location of the trees, how far will she have travelled, in total?

8. Determine the sum of the arithmetic series 9 + 21 + 33 + … + 693.

9. In an arithmetic sequence, \( t_3 = 16 \) and \( t_7 = 40 \).
   a) Determine the common difference in the sequence.
   b) Determine the first term in the sequence.
   c) Determine \( t_{100} \).

10. 5, _, 405 is a geometric sequence.
    a) Determine all possible values for the second term of this sequence.
    b) Determine all possible general terms for this sequence.
11. The $n$th sum of a series is given by the formula $S_n = 1 - 4^n$.
   a) Determine the first three terms of the sequence.
   b) Decide whether the sequence is arithmetic or geometric. Determine the general term for the sequence.

12. According to Statistics Canada, Chestermere, Alberta is one of the fastest growing communities in Canada. Between 2001 and 2006, the population grew at an average rate of about 8% per year.
   a) The population of Chestermere in 2001 was 6462. Determine the population for the years 2002 through 2004, inclusive.
   b) Write the general term for the geometric sequence that models the population of Chestermere, where $n$ is the number of years starting in 2001.
   c) Predict the population of Chestermere in the year 2020.
   d) What assumption(s) did you make in your answer to part c)?

Chapter 2 Review

Multiple Choice
For #1 to 5, select the best answer.

1. Which diagram represents an angle of 230° in standard position?

![Diagram A](image1)

![Diagram B](image2)

![Diagram C](image3)

![Diagram D](image4)

2. Which expression does not have a value of 1?

A) $\cos 0°$
B) $\cos 180°$
C) $\sin 90°$
D) $\tan 225°$

3. The point $N(4, -8)$ is on the terminal arm of angle $\theta$. What is the exact value of $\sin \theta$?

A) $\frac{2}{\sqrt{5}}$
B) $-\frac{1}{2\sqrt{3}}$
C) $-\frac{2\sqrt{5}}{5}$
D) $\frac{3}{2\sqrt{3}}$
4. Three students recorded the first step of their reasoning to solve $\triangle KLM$.

<table>
<thead>
<tr>
<th>Student</th>
<th>Reasoning</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devin</td>
<td>Begin by using the sine law, since you are given two sides and an angle opposite one of the sides.</td>
<td><img src="https://via.placeholder.com/150" alt="Diagram" /></td>
</tr>
<tr>
<td>Andy</td>
<td>Begin by using the cosine law, since you are given two sides and their included angle.</td>
<td></td>
</tr>
<tr>
<td>Cathy</td>
<td>Begin by using the primary trigonometric ratio of cosine, since you are given the hypotenuse and adjacent sides.</td>
<td></td>
</tr>
</tbody>
</table>

Which of the following statements about the students’ reasoning is true?

A  Both Andy and Cathy gave a correct statement.
B  Both Devin and Cathy gave a correct statement.
C  Only Andy gave a correct statement.
D  Only Devin gave a correct statement.

5. For $\triangle ABC$ suppose you are given the measure of $\angle A$ and the lengths of sides $a$ and $c$. Under which of the following conditions would there be two possible solutions?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$c &gt; a &gt; c \sin A$</td>
</tr>
<tr>
<td>B</td>
<td>$a &gt; c$ or $a &lt; b$</td>
</tr>
<tr>
<td>C</td>
<td>$a &lt; c \sin A$</td>
</tr>
<tr>
<td>D</td>
<td>$a = c \sin A$</td>
</tr>
</tbody>
</table>

Short Answer

6. Amanda is playing a virtual golf game. The distance from the tee box to the hole is 190 yd. Her first shot was 160 yd long, but was $15^\circ$ off a direct line to the hole. Amanda’s second shot (taken from where her first shot landed) was aimed at the hole, but it was only 45 yd long, and landed short of the hole. How far is it from where her second shot landed to the hole, to the nearest tenth of a yard?

7. Determine the length of $EF$, to the nearest tenth of a centimetre.

8. The diagram shows the cross section of a ditch that drains water from the eavestroughs of a building. What is the length of $AB$, to the nearest centimetre?

9. Determine the exact value for each expression.
   a) $\tan 300^\circ$  
   b) $\cos 210^\circ$  
   c) $\sin 135^\circ$
10. A surveyor uses a wide-angle camera to take a picture of a rock painting.
   a) If the camera’s angle of view, $160^\circ$, is an angle in standard position, what would the measure of
      the reference angle be?
   b) What other angles between $0^\circ$ and $360^\circ$ would have the same reference angle?

Chapter 3 Review

Multiple Choice
For #1 to 5, select the best answer.

1. Which of the following does not represent a quadratic function?
   A $y = (x - 3)^2 + 8$  
   B $y = (x + 6) - 2$  
   C $y = 3x^2 - 7x + 2$  
   D $y + 3 = x^2$

2. Which of the following statements is true about the graph of the function $y = x^2 - 1$?
   A It has two $x$-intercepts.  
   B It opens downward.  
   C The axis of symmetry is $x = 1$.  
   D The vertex is at the origin.

3. What are the coordinates of the vertex for the quadratic function $y = -4(x + 7)^2 + 5$?
   A $(7, 5)$  
   B $(7, -5)$  
   C $(-7, 5)$  
   D $(-7, -5)$

4. Which of the following statements is true about the quadratic function shown?
   A The equation of the axis of symmetry could be $2x - 5 = 0$.
   B The range could be $\{y \mid y < 2, y \in \mathbb{R}\}$.
   C The vertex could be $(3, -5)$.
   D The $x$-intercept could have a value of 5.

5. Suppose that the graph of the function $f(x) = 2x^2$ is reflected in the $x$-axis, translated 2 units to the
   left, and then translated 5 units upward. What could the equation of the quadratic function of the
   resultant graph be?
   A $f(x) = -(x + 2)^2 + 5$
   B $f(x) = 2(-x - 2)^2 + 5$
   C $f(x) = -2(x - 2)^2 + 5$
   D $f(x) = -2(x + 2)^2 + 5$

Short Answer
6. Identify the coordinate, $x$ or $y$, that is affected in every point $(x, y)$ on the graph of $y = x^2$ by the
   following transformations.
   a) horizontal translation
   b) vertical translation
   c) reflection in the $x$-axis
7. Three graphs of the form \( f(x) = x^2 \) are shown. Identify the graph(s) that fit each description.

   a) \( a > 0 \)
   b) \( a < 0 \)

8. Write a quadratic function in the form \( f(x) = a(x - p)^2 + q \) for each graph.

9. Rewrite each quadratic function in vertex form by completing the square. Determine the coordinates of the vertex.

   a) \( y = x^2 - 4x + 12 \)
   b) \( y = -\frac{1}{4}x^2 - 4x - 18 \)

10. Determine the following characteristics of the quadratic function \( y = \frac{1}{2}x^2 - 6x - 3 \).

   - vertex
   - axis of symmetry
   - direction of opening

   - domain
   - range
   - exact value for \( x \)-intercepts
   - \( y \)-intercept

11. Last year, a music theatre charged $60 admission, and at that price an average of 200 seats were sold for each show. A survey predicts that for every $5 increase in ticket price, ten fewer people would be expected to attend a show.

   a) Write a quadratic function to model this situation.
   b) Determine the admission price that would maximize revenue.
   c) What is the maximum revenue?
   d) How many seats would be empty when revenue is maximized compared to last year’s average?
Chapter 4 Review

Multiple Choice
For #1 to 5, choose the best answer.

1. Consider the quadratic function \( f(x) = 2x^2 - 8x - 5 \). The smallest zero of the function is
   \( \text{A} \ -0.55 \quad \text{B} \ -5.00 \quad \text{C} \ 2.00 \quad \text{D} \ 4.55 \)

2. The roots of the quadratic equation \( 6x^2 - 16x = 0 \) are
   \( \text{A} \ 0 \quad \text{B} \ 0 \text{ or } \frac{8}{3} \quad \text{C} \ 2 \text{ or } \frac{8}{3} \quad \text{D} \ \frac{8}{\sqrt{3}} \)

3. For what value of \( k \) does the equation \( (2k - 1)x^2 - 8x + 2 = 0 \) have two equal real roots?
   \( \text{A} \ \frac{1}{2} \quad \text{B} \ \frac{29}{2} \quad \text{C} \ \frac{7}{2} \quad \text{D} \ \frac{9}{2} \)

4. Which student uses correct mathematical vocabulary to describe the solutions to a quadratic equation?
   \( \text{A} \ \text{Alain}: \text{The solutions are the roots of the quadratic function.} \)
   \( \text{B} \ \text{Beth}: \text{The solutions are the zeros of the quadratic function.} \)
   \( \text{C} \ \text{Cody}: \text{The solutions are the x-intercepts of the quadratic equation.} \)
   \( \text{D} \ \text{Dolores}: \text{The solutions are the y-intercepts of the graph of the related function.} \)

5. Which graph represents a quadratic function that has two distinct real roots?

   \( \text{A} \)
   \( \text{B} \)
   \( \text{C} \)
   \( \text{D} \)

Short Answer

6. A smokejumper is a firefighter who parachutes into remote areas to combat forest fires. Saskatchewan’s smokejumpers, founded in 1949, were Canada’s first aerial firefighting team. The function \( h(t) = -16t^2 + 1500 \) models the height, \( h \), of a smokejumper, in feet, \( t \) seconds after jumping from 1500 ft. Suppose a parachute opens at 1000 ft. Determine algebraically how long the jumper was in free fall, to the nearest hundredth of a second.
7. Identify and correct the errors in each solution to the quadratic equations.
   \( a) \ 2x^2 - 4x - 3 = 0 \)
   \[ x = \frac{-(-4) \pm \sqrt{-4^2 - 4(2)(-3)}}{2(2)} \]
   \[ x = \frac{4 \pm \sqrt{16 + 24}}{4} \]
   \[ x = \frac{4 \pm \sqrt{8}}{4} \]
   \[ x = \frac{2 \pm \sqrt{2}}{2} \]

   \( b) \ 15x^2 + 6x - 2 = 0 \)
   \[ 15x^2 + 6x + 9 = 2 \]
   \[ (15x + 3)^2 = 2 \]
   \[ 15x + 3 = \sqrt{2} \]
   \[ x = \frac{\sqrt{2} - 3}{15} \]

8. Determine the real roots of each equation algebraically. Choose a different method for each equation, and explain why you chose that method. Express your answers as exact values in simplest form.
   \( a) \ x^2 - 10x + 16 = 0 \)
   \( b) \ 3x^2 + 19x - 14 = 0 \)
   \( c) \ x^2 - 6x + 7 = 0 \)
   \( d) \ 2(x - 3)^2 - 8 = 0 \)

9. Rewrite the equation \( \frac{x + 1}{x - 5} + \frac{x - 2}{x} = \frac{3x - 1}{x - 5} \) as a simplified quadratic equation equal to zero. Then, use the quadratic formula to determine the real roots of the equation.

10. For what values of \( k \) does the graph of \( f(x) = kx^2 - 5x + k \) have no \( x \)-intercepts?

11. The length and width of a rectangle are 7 m and 5 m, respectively. When each dimension is increased by the same amount, the area is tripled. Find the dimensions of the new rectangle, to the nearest tenth of a metre.

12. Find a rational number such that the sum of the number and its reciprocal is \( \frac{13}{6} \).

13. Robin Chestnut is a two-time Canadian juggling champion. As part of his act, Robin tosses a ball into the air and lets it drop to the floor. After a ball is tossed, its height, \( h \), in metres, after \( t \) seconds, is modelled by the equation \( h(t) = -4.9t^2 + 12t + 1.5 \). For how many seconds, to the nearest hundredth, is the ball in the air?

**Chapter 5 Review**

**Multiple Choice**

For #1 to 5, select the best answer.

1. Which mixed radical is equal to \( \sqrt{486a^4b} \) in simplest form?
   - A \( 3a^2\sqrt{54b} \)
   - B \( 9a^2\sqrt{6b} \)
   - C \( 2ab\sqrt{86} \)
   - D \( 2ab\sqrt{243} \)

2. Which expression represents \( 5ab^2\sqrt{5} \) written as an entire radical?
   - A \( ab^2\sqrt{25} \)
   - B \( \sqrt{25a^2b^3} \)
   - C \( \sqrt{125ab^2} \)
   - D \( \sqrt{125a^2b^4} \)

3. What is the sum of \( \sqrt{50} - \sqrt{18} + \sqrt{8} \)?
   - A \( 4\sqrt{2} \)
   - B \( 2\sqrt{10} \)
   - C \( \sqrt{40} \)
   - D \( 10\sqrt{2} \)
4. Which expression represents \((5 + \sqrt{2})^2\) when it is expanded and written in simplest form?

A 27 \hspace{1cm} B 29 \hspace{1cm} C 27 + 10\sqrt{2} \hspace{1cm} D 37\sqrt{2}

5. Fran and Jaspreet rationalize the denominator of a radical expression. They record their partial solutions.

Which student made an error, and in which step?

A Fran made an error in step 2.
B Jaspreet made an error in step 2.
C Fran made an error in step 3.
D Jaspreet made an error in step 3.

Fran
\[
\sqrt{18} \quad \text{Step 1}
\]
\[
\frac{\sqrt{18}}{\sqrt{3}} \quad \text{Step 2}
\]
\[
= \frac{18}{3} \quad \text{Step 3}
\]
Jaspreet
\[
\frac{\sqrt{6}}{} \quad \text{Step 1}
\]
\[
= \left(\frac{3}{\sqrt{6}}\right)\left(\sqrt{6}\right) \quad \text{Step 2}
\]
\[
= 3 \quad \text{Step 3}
\]

Short Answer

6. Arrange the numbers 9, \(5\sqrt{3}\), \(4\sqrt{5}\), 2\(\sqrt{19}\), and \(6\sqrt{2}\) in order from least to greatest.

7. Determine algebraically whether the statement \(\sqrt{16} + \sqrt{9} = 5\) is true or false.

8. The area of a rectangle is 42 square units and its width is \(\sqrt{6}\) units. What is the exact length of the rectangle in simplest form?

9. What is the expression \(2\sqrt{3} - \left(\sqrt{5} + \sqrt{12} - 2\sqrt{45}\right)\) in simplest form?

10. Solve \(\sqrt{r+15} = \sqrt{3r} + 1\) algebraically. State any restrictions on the values for the variable.

11. What is the quotient of \(\frac{4 + \sqrt{5}}{2 - \sqrt{5}}\) in simplest form?

12. The velocity, \(v\), in metres per second, of a roller coaster at the bottom of a hill is related to the vertical drop, \(h\), in metres, and the velocity, \(v_0\), in metres per second, of the roller coaster at the top of the hill by the formula \(v_0 = \sqrt{v^2 - 20h}\).

a) Valerie simplifies the expression for the formula to \(v_0 = v - 2\sqrt{5}h\). Is Valerie’s simplification correct? Explain your reasoning.

b) Suppose the velocity at the top of a hill is 20 m/s and the velocity at the bottom of the hill is 40 m/s. What is the vertical drop of the hill?

13. a) Isolate the \(x\)-variable in the radical equation, \(4 + \sqrt{4 + x^2} = x\).

b) Verify by substitution whether the value determined for \(x\) is a root of the equation.

14. a) Determine the roots of the equation \(\sqrt{5y} + 1 - \sqrt{3y} - 5 = 2\) algebraically.

b) Identify any restrictions on the values for the variable.

Chapter 6 Review

Multiple Choice

For #1 to #7, select the best answer.

1. What are the non-permissible values of \(c\) for the rational expression \(\frac{c^2 + 6c + 8}{c^2 - 5c - 14}\)?

A \(-7, 2\) \hspace{1cm} B \(-2, -4\) \hspace{1cm} C 7 \hspace{1cm} D 7, -2
2. Simplify the rational expression $\frac{5(a-7)(b+2)^2}{20a(7-a)(b+2)}$.

   A $\frac{2 + b}{4}$  B $\frac{-b - 2}{4}$  C $\frac{b + 2}{4a}$  D $\frac{2 + b}{4a}$

3. Valerie wants to write an expression equivalent to $\frac{b + 1}{2b}$ with a denominator of $6b(2b - 3)$. By what expression must she multiply the original expression?

   A $\frac{1}{3b(2b - 3)}$  B $ \frac{3(2b - 3)}{3b(2b - 3)}$  C $\frac{(2b - 3)}{(2b - 3)}$  D $3(2b - 3)$

4. State the least common denominator of $\frac{6}{2a}$ and $\frac{4}{2a(a - 1)}$.

   A $(a - 1)$  B $a(a - 1)$  C $2a$  D $2a + (2a)(a - 1)$

5. In simplest form, the expression $\frac{12x^5 + 6x^4 - 8x^3}{2x^3} - \frac{6x^4 + 15x^3 - 9x^2}{3x^2}$ can be expressed as

   A $4x^2 - 2x - 7$  B $4x^2 - 2x - 1$  C $4x^2 + 2x - 7$  D $4x^2 - 2x + 7$

6. What is the solution to the equation $\frac{x + \frac{x^2 - 5}{x^2 - 1}}{\frac{x + 2}{x + 1}}$?

   A $x = -1$  B $x = 0, 3$  C $x = 3$  D $x = 3, -1$

7. What is the simplified form of the expression $\frac{9x + 5}{x + 6} - \frac{2x - 1}{x + 6}$, $x \neq -6$?

   A $7x + 6$  B $\frac{7x + 4}{x + 6}$  C $\frac{7x + 2}{x + 3}$  D $\frac{7x + 6}{x + 6}$

Short Answer

8. Simplify $\frac{x^2 - 9}{2x^2 + 3x - 9}$. State any non-permissible values.

9. Determine the sum of $\frac{4x}{x^2 - 9x + 18}$ and $\frac{2x - 1}{x - 6}$ in simplest form.

10. The rational expressions $\frac{x^2 + 13x + 40}{x^2 - 13x + 40}$ and $\frac{64 + x^2}{64 - x^2}$ have one integral non-permissible value in common. What is this non-permissible value?

11. Consider the rational expression $\frac{x^2 - x - 20}{x^2 - 6x} + \frac{x^2 + 9x + 20}{x^2 - 12x + 36}$.

   a) Determine the non-permissible values.
   b) Determine the quotient in simplest form.
12. Jacob is a junior member of a local golf driving range. He pays $15 per month to use the range, and pays $1 per bucket of balls.
   a) If Jacob hits \( x \) buckets of balls in one month, write an expression that represents how much he would pay per month.
   b) Write an expression that represents the actual cost per bucket for a month.
   c) Write and solve an equation to determine the number of buckets of balls Jacob would have to hit in a month for the actual cost per bucket to be $1.25.

13. Consider the following rational equation:
   \[
   \frac{3x}{x+1} + \frac{2}{x+2} - \frac{3x}{x+3} = \frac{-2}{(x+1)(x+2)(x+3)}
   \]
   a) List the non-permissible values for \( x \).
   b) Determine the roots of the equation algebraically.
   c) Is each of the roots a solution to the equation? Explain.
   d) What is the solution to the given equation?

**Chapter 7 Review**

**Multiple Choice**
For #1 to 6, select the best answer.

1. The order of real numbers \( \frac{4}{3}, |-9|, -|2|, |0|, -|3| \) from least to greatest is
   A  \( |-9|, -|3|, -|2|, |0|, \frac{4}{3} \)  B  \( |0|, \frac{4}{3}, -|2|, -|3|, -9 \)  C  \( -|2|, |0|, \frac{4}{3}, -|3|, -9 \)  D  \( -|2|, -9, -|3|, |0|, \frac{4}{3} \)

2. The value of the expression \(-|-11 - (-7)|\) is
   A  \(-4\)  B  \(4\)  C  \(-18\)  D  \(18\)

3. The absolute value equation \(|2r + 5| = 11\) has the solution(s)
   A  \(r = -3\)  B  \(r = 8\)  C  \(r = 3\) and \(r = -8\)  D  \(r = 3\) and \(r = 11\)

4. Which statement is false?
   A  \(-|20 + (-2)^2 - 4^2| = -8\)  B  \(|x + 3| = -3\) has two solutions.
   C  \(y = \frac{1}{x+3}\) has a vertical asymptote at \(x = -3\).  D  If \(\left(4, \frac{1}{3}\right)\) is on the graph of \(y = \frac{1}{f(x)}\), then \((4, 3)\) is on the graph of \(y = f(x)\).
5. Consider the function \( f(x) = (x + 1)^2 - 2 \). Which graph represents \( y = |f(x)| \)?

![Graphs A, B, C, D](image)

6. Given the graph of \( y = \frac{1}{f(x)} \), which of the following expressions represents \( y = f(x) \)?

- A) \( x = 5 \)
- B) \( f(x) = x + 5 \)
- C) \( f(x) = x - 5 \)
- D) \( f(x) = \frac{1}{x - 5} \)

**Short Answer**

7. Write the absolute value function \( y = |3x - 4| \) in piecewise notation.

8. Solve the equation \(|x + 1| + 5 = 3x\) algebraically. Verify the solution.

9. Consider the function \( f(x) = x^2 + x - 6 \). What are equations of the vertical asymptotes for the graph of \( y = \frac{1}{f(x)} \)?

10. Consider the function \( f(x) = -x + 5 \).

   a) Sketch the graph of \( y = |f(x)| \).
   
   b) Determine the x-intercept of the graph of \( y = |f(x)| \).
   
   c) State the domain and range of the graph of \( y = |f(x)| \).
11. Consider the function \( f(x) = 2x^2 + 5x - 12 \).

a) Identify the values of \( x \) for which \( \frac{1}{f(x)} \) has vertical asymptotes.

b) Sketch the graphs of \( f(x) = 2x^2 + 5x - 12 \) and \( \frac{1}{f(x)} \) on the same set of axes.

**Chapter 8 Review**

**Multiple Choice**
For #1 to #5, select the best answer.

1. The sum of two integers is \(-5\). When 10 times the larger number is subtracted from the square of the smaller number, the result is 34. Which system of equations could be used to determine the two integers?

   A \( x + 5 = -y \) \hspace{1cm} B \( x + 5 = y \) \hspace{1cm} C \( x + y = -5 \) \hspace{1cm} D \( x + y = 5 \)

   \( x^2 - 10y = 34 \) \hspace{1cm} y^2 - 10x = 34 \hspace{1cm} x^2 - 34 = -10y \hspace{1cm} x^2 - 10y = 34

2. Given the graphs of a linear function and a quadratic function, what is the solution set of the system of equations?

   A \{-4, 0\}, \{(3, -4)\} \\
   B \{-1, 0\}, \{(3, -4)\} \\
   C \{-1, 0\}, \{(4, 0)\} \\
   D \{(1, -6)\}, \{(2, -6)\}

3. A rectangular field is enclosed by 600 m of fencing. A second rectangular field, which is alongside a river, has the same area and is also enclosed by 600 m of fencing. However, this second field has fencing on only three sides because there is no need for fencing along the riverbank. The system of quadratic equations that could be used to determine the dimensions of the two fields is

   A \( A = x^2 + 300x \) \hspace{1cm} B \( A = -x^2 + 300x \)  \\
   \( A = 2x^2 + 60x \) \hspace{1cm} A = -2x^2 + 60x \\
   C \( A = -x^2 + 300x \) \hspace{1cm} D \( A = -2x^2 + 600x \)  \\
   \( x + y = 300 \) \hspace{1cm} 2x + y = 600

4. What is the solution to the following linear-quadratic system of equations?

   \( y = 3x - 3 \) \\
   \( y = -x^2 + 4x - 1 \)

   A \{-1, 3\}, \{(2, -6)\} \\
   B \{(2, 3)\} \\
   C \{-1, 2\} \\
   D \{(1, -6), (2, 3)\}

5. How many real number solutions exist for the following quadratic-quadratic system of equations?

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

   A zero \hspace{1cm} B one \hspace{1cm} C two \hspace{1cm} D an infinite number
6. Determine the solution to the following system of equations algebraically.
   \[ y = -x^2 - 6x + 3 \]
   \[ y = -x + 3 \]

7. a) Verify that (3, 14) is a solution to the following system of equations.
   \[ 2x^2 + x - 7 = y \]
   \[ 3x + y - 23 = 0 \]
   b) Are there any other solutions to this system of equations?

8. Determine algebraically the solution set to the following quadratic-quadratic system of equations.
   \[ y = -2x^2 - 3x + 3 \]
   \[ y = -x^2 - x + \frac{7}{4} \]

9. Determine the value of \( k \) and \( m \) if \((-3, 4)\) is a solution to each of the following systems of equations.
   a) \( x^2 + kx - 2y + m = 0 \)
   \[ x^2 + 6x + y + m = 0 \]
   b) \( y = -2x^2 - kx - m \)
   \[ y = mx + 10 \]

10. The point \((2, 5)\) is a solution to the following system of equations.
    \[ y = -\frac{1}{3}(x - 2)^2 + 5 \]
    \[ y = 2(x - k)^2 - 3 \]
    a) How many possible solutions are there for \( k \)? Explain how you determined your answer.
    b) Determine the value(s) for \( k \).
    c) For one of these values of \( k \), determine the other solution to the system of equations. Express your answer to the nearest hundredth.

11. The dimensions of a rectangle are represented by the expressions \( x - 4 \) and \( x - 9 \).
    a) If the perimeter can be expressed as \(2y\) and the area represented by \(3y - 9\), write equations in terms of \(x\) and \(y\) for the perimeter and the area of the rectangle.
    b) Solve the system of equations to determine the values of \(x\) and \(y\).
    c) Determine the dimensions of the rectangle.
    d) What are the values of the perimeter and area of the rectangle?

Chapter 9 Review

Multiple Choice

For #1 to #5, select the best answer.

1. Which ordered pair makes the inequality \(x + 3y < 6\) true?
   A (−3, 4)   B (1, −2)   C (2, 3)   D (6, 0)
2. What would the graph of the inequality $2x + 5y < 18$ show?

- **A** a solid boundary line with shading above the line
- **B** a solid boundary line with shading below the line
- **C** a broken boundary line with shading above the line
- **D** a broken boundary line with shading below the line

3. Rachel wants to graph the solution region for the inequality $5x - 2y + 8 > 0$. Her partial solution for isolating the $y$ variable is shown. In which step did Rachel make her first mistake?

- **A** Step 1
- **B** Step 2
- **C** Step 3
- **D** Step 4

4. What is the solution to the quadratic inequality $(x - 4)(x - 1) < 0$?

- **A** $\{x \mid 1 < x < 4, x \in \mathbb{R}\}$
- **B** $\{x \mid x < -4 \text{ or } x > -1, x \in \mathbb{R}\}$
- **C** $\{x \mid -4 < x < -1, x \in \mathbb{R}\}$
- **D** $\{x \mid x < 1 \text{ or } x > 4, x \in \mathbb{R}\}$

5. Which of the following is a graph of the inequality $y \leq 2x^2 - 2x - 12$?

- **A**
- **B**
- **C**
- **D**
Short Answer

6. Explain how the test point (2, 3) could be used to determine the solution region for the graph of the inequality \( x + 3y > 4 \).

7. Why is test point (0, 0) not a good choice to determine the solution region that satisfies \( 4x - 2y \geq 0 \)?

8. Sketch the graph of the inequality \( y > -3x + 4 \). Use a test point to verify the solution region. Show your work.

9. Determine the solution interval for the quadratic inequality \(-x^2 - 6x - 7 \geq 0\).

10. Sketch a graph of the solution to \( y > -\frac{1}{2}x^2 - 3x + 1 \). Use a test point to verify the solution region. Show your work.

11. Pierre wants to take his extended family to a movie at an IMAX theatre. He has a budget of $150 to spend on tickets. Tickets for children cost $9.50, and tickets for adults cost $13.95.

   a) Write an inequality that represents the number of tickets that Pierre can afford.
   
   b) Graph the solution region.
   
   c) Interpret the solution set in reference to the number of tickets.

12. The royalties received by an author depend on the number of books sold and the price of each book. For a particular book, the royalties, \( R \), in dollars, depend on the price, \( P \), in dollars, according to the equation \( R = 0.02P(20000 - 200P) \). For what range of prices would the author receive more than $8400 in royalties?