Benchmark Test: Algebra 1

Name ____________________________ Date _________
Class/Grade ____________________________

1 Benchmark: MA.912.A.4.1

Which of the following expressions is equivalent to \((6x^3y^6)^2\)?

A \(6x^6y^{12}\)
B \(12x^6y^{12}\)
C \(36x^5y^8\)
D \(36x^6y^{12}\)
Which graph correctly shows the slope $-\frac{3}{2}$?

A

B

C

D
Benchmark Test: Algebra 1

3 Benchmark: MA.912.A.3.14

What is the value of the $y$-coordinate of the solution to the system of equations $x - 2y = 1$ and $x + 4y = 7$?

A $-1$
B $1$
C $3$
D $4$

4 Benchmark: MA.912.A.3.1

Solve this equation.

$$\frac{3x - 6}{10} = \frac{2x}{15}$$

A $x = \frac{6}{25}$
B $x = \frac{18}{5}$
C $x = 11$
D $x = 31$
The graph of line \( l \) is shown below.

What is the slope of line \( l \)?

- A. \(-\frac{7}{3}\)
- B. \(-\frac{3}{7}\)
- C. \(\frac{3}{7}\)
- D. \(\frac{7}{3}\)
Benchmark: MA.912.A.7.1

The graph of which equation has an axis of symmetry of $x = 4$?

A. $\frac{1}{2}x^2 + 4x + 10$

B. $\frac{1}{2}x^2 - 4x + 10$

C. $2x^2 - 8x - 10$

D. $2x^2 + 8x - 10$
Which graph represents a linear function?

A

B

C

D
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8. Benchmark: MA.912.A.3.4
Which statement is equivalent to the inequality \(4x + 24 \geq 8x - 16\)?
A. \(x \geq 10\)
B. \(x \leq 10\)
C. \(x = 10\)
D. \(x \leq 4\)

Simplify:
\[
\frac{2xy^2z^3}{3x^2y^3z^2} \div \frac{x^2y}{3y^3z}
\]
A. \(\frac{2y}{x^3z^4}\)
B. \(\frac{2}{9y^7z^9}\)
C. \(\frac{2x}{9y^2z^6}\)
D. \(\frac{2y^3}{x^3z^5}\)

Which expression is equivalent to \(9x^2 - 100\)?
A. \((9x - 100)(x + 1)\)
B. \((3x - 10)(3x + 10)\)
C. \((9x - 10)(x + 10)\)
D. \((3x - 100)(3x - 1)\)

The graph of a line is shown on the grid below.

Which of the following equations best represents the graph?
A. \(y = 3x + 2\)
B. \(y = 3x - 2\)
C. \(y = -3x + 2\)
D. \(y = -3x - 2\)
12 Benchmark: MA.912.A.3.10

The graph of line $l$ is shown below.

Which of the following is an equation for a line that is perpendicular to line $l$ in the graph?

A $y = 3x - 5$

B $y = \frac{1}{3}x$

C $y = -3x$

D $y = x + 3$

13 Benchmark: MA.912.A.4.4

Divide:

\[
\frac{x^2 - 6x + 9}{2x^2 - 9x + 9}
\]

A $\frac{x - 3}{2}$

B $\frac{x - 6}{2x - 9}$

C $\frac{x - 3}{2x - 3}$

D $\frac{x + 3}{2x - 3}$

14 Benchmark: MA.912.A.3.9

What is the slope of the line represented by the equation $3x - 4y - 16 = 0$?

A $-4$

B $\frac{3}{4}$

C $\frac{4}{3}$

D $3$
Benchmark: MA.912.D.7.1

Given \( A = \{0, 1, 2, 5, 7, 8\} \) and \( B = \{3, 5, 7, 9\} \), what is the union of \( A \) and \( B \)?

A. \( \{0, 1, 2, 3, 5, 7, 8, 9\} \)
B. \( \{5, 7\} \)
C. \( \{0, 1, 2, 5, 7, 8\} \)
D. \( \{3, 5, 7, 9\} \)

Benchmark: MA.912.A.5.4

Nicole’s aerobics class exercises to fast-paced music. If the rate of the music is 120 beats per minute, how many beats would there be in a class that is 0.75 hours long?

A. 90
B. 160
C. 5,400
D. 7,200

Benchmark: MA.912.A.5.4

If the ratio of the corresponding sides of two similar triangles is 3:5, what is the ratio of the areas of these triangles?

A. \( \sqrt{3} : \sqrt{5} \)
B. 9:25
C. 3:5
D. 27:125

Benchmark: MA.912.D.7.1

If \( U = \{x\} \) (\( x \) is an integer, \( 1 \leq x \leq 5\)) and \( P = \{1, 2, 5\} \), what is the complement of \( P \) (\( P' \))?

A. \( \{1, 2, 5\} \)
B. \( \{3, 4\} \)
C. \( \{1, 2, 3, 4, 5\} \)
D. \( \{2, 3, 4\} \)
20 Benchmark: MA.912.A.3.9

What is the slope of the line represented by the equation $x + 2y = 6$?

A $-\frac{1}{2}$
B 1
C 2
D 6

21 Benchmark: MA.912.A.4.3

Factor the following polynomial:

$2x^3y - 3x^2y^2 + 4x^2y$

A $xy(2x^2 - 3xy + 4)$
B $x^2(2xy - 3y^2 + 4y)$
C $x^2y(2x - 3y + 4)$
D $y(2x^3 - 3x^2y^2 + 4x^2)$

22 Benchmark: MA.912.A.4.1

Simplify:

$\frac{1}{2}(a^4b^7) \times \frac{1}{3}(a^2b^{-5})$

A $\frac{1}{5a^2b^3}$
B $\frac{1}{6a^8b^{10}}$
C $\frac{1}{6a^2b^3}$
D $\frac{a^8b^{10}}{6}$

23 Benchmark: MA.912.A.3.4

Which statement is equivalent to the inequality $2x - 1 > -x + 2$?

A $x > 3$
B $x < 1$
C $x \leq 1$
D $x > 1$

24 Benchmark: MA.912.A.7.2

What is the solution set of the equation $(x - a)(x + b) = 0$?

A $\{-a, -b\}$
B $\{a, -b\}$
C $\{-a, b\}$
D $\{a, b\}$
Benchmark Test: Algebra 1

25  Benchmark: MA.912.A.3.1

If \( 2(x + 3) = x + 10 \), what is the value of \( x \)?

- A 4
- B 5
- C 7
- D 14

26  Benchmark: MA.912.A.3.11

Look at the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>-2</td>
</tr>
<tr>
<td>10</td>
<td>-4</td>
</tr>
</tbody>
</table>

Which equation represents the relationship of \( x \) to \( y \)?

- A \( y = -2x + 13 \)
- B \( y = 5x \)
- C \( y = x - 2 \)
- D \( y = -x + 6 \)
Which is the graph of the equation $x = -4$?
The graph of a function is shown below. Each hash mark represents 1 unit.

Which of the following best describes the domain and range of the function in the graph?

A. Domain: \(0 \leq x \leq 7\)
   Range: \(-2 \leq y \leq 10\)

B. Domain: \(0 \leq x < \infty\)
   Range: \(0 \leq y < \infty\)

C. Domain: \{All real numbers\}
   Range: \(0 \leq y < \infty\)

D. Domain: \{All real numbers\}
   Range: \(0 \leq y \leq 7\)

Divide:
\[
\frac{6a^2b^3}{3ab}
\]

\(\text{A.} \ 2\)
\(\text{B.} \ 2ab\)
\(\text{C.} \ 2a^2b^3\)
\(\text{D.} \ 2ab^2\)

Which table represents a linear function?

A
\[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
0 & -1 \\
1 & -3 \\
2 & -4 \\
3 & -6 \\
\hline
\end{array}
\]

C
\[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
0 & -5 \\
1 & -2 \\
2 & 1 \\
3 & 4 \\
\hline
\end{array}
\]

B
\[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
0 & 0 \\
1 & 1 \\
2 & 2 \\
3 & 7 \\
\hline
\end{array}
\]

D
\[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
0 & 10 \\
1 & 12 \\
2 & 18 \\
3 & 28 \\
\hline
\end{array}
\]
Benchmark: MA.912.A.3.10

Look at the graph below.

Which equation represents the relationship of $x$ to $y$?

A. $y = 2x + 1$
B. $y = 2x + 2$
C. $y = 3x$
D. $y = 3x + 1$

Benchmark: MA.912.A.2.3

Which of the following relations can be determined to be a function?

A. $\{(-1, 6), (2, 6), (3, -7), (-1, -8)\}$
B. $\{(-1, 6), (2, 7), (-3, 6), (-2, -8)\}$
C. $\{(-1, 4), (5, 7), (-2, 6), (-1, 7)\}$
D. $\{(-1, 4), (5, 7), (-2, 7), (-1, 8)\}$
What is the solution to the following system of equations?

\[ x + 2y = 4 \]
\[ y = 2x + 7 \]

A. \( \left( \frac{7}{2}, 3 \right) \)
B. \( (-2, 3) \)
C. \( \left( \frac{10}{3}, \frac{1}{3} \right) \)
D. \( \left( \frac{18}{5}, \frac{1}{5} \right) \)
Benchmark Test : Algebra 1

34 Benchmark: MA.912.A.3.8

Which is the graph of the equation $y = \frac{1}{3}x + 4$?
Benchmark Test: Algebra 1

35 Benchmark: MA.912.A.4.3

If \((3x - 2)\) is one factor of \(6x^2 + 5x - 6\), what is the other factor?

A. \(2x + 3\)  
B. \(3x + 3\)  
C. \(2x - 3\)  
D. \(6x + 3\)

38 Benchmark: MA.912.A.4.2

Simplify:

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

A. \(4x^3 - 6x^2 - 7x + 6\)  
B. \(4x^3 + 10x^2 + x - 6\)  
C. \(4x^3 - 8x^2 - 3x + 6\)  
D. \(-4x^2 - 2x + 3\)

36 Benchmark: MA.912.A.4.2

What is the sum of \(x^2 - 3x + 7\) and \(3x^2 + 5x - 9\)?

A. \(4x^2 + 2x - 2\)  
B. \(4x^2 - 8x + 2\)  
C. \(4x^2 + 2x + 16\)  
D. \(4x^2 - 2x - 2\)

37 Benchmark: MA.912.A.5.4

Delroy's sailboat has two sails that are similar triangles. The larger sail has sides of 10 feet, 24 feet, and 26 feet. If the shortest side of the smaller sail measures 6 feet, what is the perimeter of the smaller sail?

A. 15 ft.  
B. 36 ft.  
C. 60 ft.  
D. 100 ft.
Benchmark Test : Algebra 1

Directions: Use the diagram below to answer the questions that follow.

Ben took a poll at a local ice cream shop to determine how many people like hot fudge, nuts, and caramel on their sundaes. He recorded his results in the Venn diagram below.

---

39 Benchmark: MA.912.D.7.2

How many people like hot fudge and caramel, but not nuts?

A 10  
B 12  
C 17  
D 19

40 Benchmark: MA.912.D.7.2

How many people like hot fudge and nuts, but not caramel?

A 9  
B 10  
C 17  
D 26
Benchmark Test: Algebra 1

41 Benchmark: MA.912.A.6.2

Look at the expression below.

\[ \sqrt{16} \sqrt{64} \]

Which of the following shows the expression reduced to its simplest form?

A. \( 8\sqrt{2} \)

B. \( 4\sqrt{2} \)

C. \( 8 \)

D. \( 16\sqrt{2} \)

42 Benchmark: MA.912.A.3.10

Which statement describes the lines whose equations are \( y = \frac{1}{3}x + 12 \) and \( 6y = 2x - 6 \)?

A. They intersect each other.

B. They are parallel to each other.

C. They are perpendicular to each other.

D. They are identical.

43 Benchmark: MA.912.A.3.9

What is the slope of the line represented by the equation \( 5y - 10x = -15 \)?

A. \(-15\)

B. \(-10\)

C. \(2\)

D. \(10\)

44 Benchmark: MA.912.A.3.1

If \( 3(x + 2) - 2(x + 1) = 8 \), what is the value of \( x \)?

A. \( \frac{1}{5} \)

B. \( 1 \)

C. \( 4 \)

D. \( 5 \)

45 Benchmark: MA.912.A.3.11

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<td>14</td>
</tr>
<tr>
<td>8</td>
<td>44</td>
</tr>
<tr>
<td>12</td>
<td>68</td>
</tr>
</tbody>
</table>

Which equation represents the relationship of \( x \) to \( y \)?

A. \( y = 5x - 1 \)

B. \( y = 7x \)

C. \( y = 6x - 4 \)

D. \( y = 5x + 4 \)
Benchmark: MA.912.A.3.3

If \(4x + y = H\), which of the following expressions represents \(x\)?

- **A** \(\frac{H + y}{4}\)
- **B** \(\frac{H}{4} - y\)
- **C** \(\frac{H}{4} + y\)
- **D** \(\frac{H - y}{4}\)

Benchmark: MA.912.A.7.1

The equation \(y = -x^2 - 2x + 8\) is graphed on the set of axes below.

Based on the graph, what are the roots of the equation \(-x^2 - 2x + 8 = 0\)?

- **A** 4 and -2
- **B** 2 and -4
- **C** 9 and -1
- **D** 8 and 0
Benchmark: MA.912.A.3.3

In terms of $p$ and $q$, what is the value of $x$ in the equation below?

$$3x + p = q$$

A. $$\frac{q - p}{3}$$

B. $$\frac{q}{3 + p}$$

C. $$\frac{q}{p} - 3$$

D. $$\frac{q}{3} - p$$

Benchmark: MA.912.A.3.4

Which of the following is the greatest integer that makes the inequality $3 - 2x > 9$ a true statement?

A. −4

B. −2

C. 2

D. 5
Which is the graph of the equation $y = \frac{3}{4} x - 2$?

A

B

C

D
Benchmark Test: Algebra 1

51 Benchmark: MA.912.A.2.4
Which of the following shows the domain and range of \( f(x) = 2|x| \)?

A. Domain: \{All real numbers\}
   Range: \(0 \leq y < \infty\)

B. Domain: \{All real numbers\}
   Range: \{All real numbers\}

C. Domain: \(0 \leq x < \infty\)
   Range: \{All real numbers\}

D. Domain: \(0 \leq x < \infty\)
   Range: \(0 \leq y < \infty\)

52 Benchmark: MA.912.A.3.5
An online music club has a one-time registration fee of $13.95 and charges $0.49 per song. If Emma has $50.00 to join the club and buy songs, what is the maximum number of songs she can buy?

A. 30
B. 73
C. 74
D. 131

53 Benchmark: MA.912.A.3.3
If \(ac - b = 1\), then which expression represents \(c\)?

A. \(b + 1 - a\)

B. \(\frac{b + 1}{a}\)

C. \(1 - a + b\)

D. \(a - b + 1\)

54 Benchmark: MA.912.A.6.2
Which of the following is equivalent to the expression below?

\[
\frac{6\sqrt{20}}{3\sqrt{5}}
\]

A. \(2\sqrt{15}\)
B. 8
C. \(3\sqrt{15}\)
D. 4

55 Benchmark: MA.912.A.4.4
Divide:

\[
\frac{3x^3 + 5x^2 - 48x - 80}{x + 4}
\]

A. \(3x^2 - 7x - 20\)
B. \(3x^2 - 17x + 20\)
C. \(3x^2 + 5x - 32\)
D. \(3x^2 + 17x + 20\)

56 Benchmark: MA.912.A.4.3
How is the binomial \(2x^2y - 4xy^3\) expressed in factored form?

A. \(2x^2y^3(y - 2)\)
B. \(2xy(x - 2y^2)\)
C. \(2xy(x - 2y)\)
D. \(2xy(xy - 4y)\)
57 Benchmark: MA.912.A.4.2

What is the sum of \(3x^2 + x + 8\) and \(x^2 - 9\)?

A. \(4x^2 + x - 1\)
B. \(4x^4 + x - 1\)
C. \(4x^2 + x - 17\)
D. \(3x^4 + x - 1\)

58 Benchmark: MA.912.A.3.10

The graph of a line is shown on the grid below.

Which equation best represents the graph of the line?

A. \(y = 2x - 4\)
B. \(y = -2x + 4\)
C. \(y = 2x + 4\)
D. \(y = -2x - 4\)

59 Benchmark: MA.912.A.7.2

What is the solution set of the equation \(x^2 - 2x - 8 = 0\)?

A. \(-2, 8\)
B. \(-4, 2\)
C. \(4, -2\)
D. \(6, 2\)

60 Benchmark: MA.912.A.3.5

At Central High School, the sophomore class has 60 more students than the freshman class. The junior class has 50 fewer than twice the number of students in the freshman class. The senior class is three times as large as the freshman class. If there are a total of 1,424 students at Central High School, how many students are in the freshman class?

A. 202
B. 205
C. 235
D. 236