1. Which family of function is not shown below?

A. Quadratic  
B. Absolute Value  
C. Square Root  
D. Exponential

2. The following diagrams show relationships among a group of students. Which relationship is a function?

A. Age  
   - 14  
   - 16  
   - 17  
   - Jim  
   - Kelly  
   - Kyle  
   - Mary  

B. Birthday  
   - April 28  
   - May 30  
   - Aug 4  
   - Oct 31  
   - Jim  
   - Kelly  
   - Kyle  
   - Mary  

C. Driver’s License Number  
   - 2408927  
   - 8675309  
   - 8721459  
   - 8874424  
   - Jim  
   - Kelly  
   - Kyle  
   - Mary  

D. First Initial  
   - J  
   - K  
   - M  
   - Jim  
   - Kelly  
   - Kyle  
   - Mary
Carol is studying this chart of early U.S. presidents.

<table>
<thead>
<tr>
<th>Early U.S. Presidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>George Washington</td>
</tr>
<tr>
<td>John Adams</td>
</tr>
<tr>
<td>Thomas Jefferson</td>
</tr>
<tr>
<td>James Madison</td>
</tr>
<tr>
<td>James Monroe</td>
</tr>
<tr>
<td>John Quincy Adams</td>
</tr>
</tbody>
</table>

Based on the chart, which of the following represents a function?

A  Given a president’s first name, you can determine the president’s last name
B  Given a year between 1789 and 1829, you can determine the name of the president.
C  Given a president’s full name, you can determine the first year he was in office
D  Given a wife’s first name, you can determine the name of the president

Function $g$ is defined below.

$$g(x) = -\frac{1}{2}x + 7$$

If the range of function $g$ is {4.325, 6.225}, what is the domain of function $g$?

A  {4.8375, 3.8875}  C  {−1.55, 5.35}
B  {1.55, 5.35}         D  {−4.325, −6.225}
5. The percent of fat \((p)\) in a food depends on how many grams of fat \((g)\) the food contains. The percent of fat in 300-calorie foods is given by this equation.

\[ p(g) = \frac{9}{300}g \]

Which table can be used to correctly graph this equation?

- **A**
  
  \[
  \begin{array}{|c|c|}
  \hline
  g & p \\
  \hline
  2 & 0.06 \\
  3 & 0.09 \\
  5 & 0.15 \\
  10 & 0.3 \\
  \hline
  \end{array}
  \]

- **B**
  
  \[
  \begin{array}{|c|c|}
  \hline
  g & p \\
  \hline
  2 & 0.015 \\
  3 & 0.01 \\
  5 & 0.006 \\
  10 & 0.003 \\
  \hline
  \end{array}
  \]

- **C**
  
  \[
  \begin{array}{|c|c|}
  \hline
  g & p \\
  \hline
  2 & 0.007 \\
  3 & 0.01 \\
  5 & 0.017 \\
  10 & 0.03 \\
  \hline
  \end{array}
  \]

- **D**
  
  \[
  \begin{array}{|c|c|}
  \hline
  g & p \\
  \hline
  2 & 0.03 \\
  3 & 0.03 \\
  5 & 0.03 \\
  10 & 0.03 \\
  \hline
  \end{array}
  \]

6. The number of boxes \((b)\) that a machine in a manufacturing plant can pack in \((t)\) minutes can be

\[ b(t) = t^2 + 6t \]

What is the appropriate range for this function?

- **A** All Real Numbers
- **B** All Natural Numbers
- **C** All Real Numbers Greater than 6
- **D** All Natural Numbers Greater than 6
7 The value of a stock, in dollars per share, during a one-year period is shown on the graph below.

![Stock Value Graph]

Which of these statements BEST describes the change in value of the stock?

A The lowest rate of change occurred during the first month.

B The highest rate of change occurred during the eleventh month.

C The rate of change was lower during the fourth month than during the eleventh month.

D The rate of change was higher during the fourth month than during the eleventh month.

8 Which represents a linear situation?

A The temperature is double each day from the previous day.

B The temperature increases at a constant rate of 5 degrees each day.

C Each day the humidity is 95% more than the previous day.

D Each day the humidity is 5% less than the previous day.
UNIT 2

9  A section of a parabola is graphed below.

Which inequality describes the domain of this function?

A  \( x \geq -1 \)  
B  \( x \geq -9 \)
C  \(-1 \leq x \leq 5 \)
D  \(-9 \leq x \leq 0 \)

10  Which situation can be represented by a linear equation?

A  The area of a square related to the measure of one of its sides

B  The length of hair of a person who gets a haircut at random times throughout the year.

C  The yearly balance of a person’s savings account earning compound interest

D  The number of minutes left in a class period as recorded every 10 minutes once class has begun.
11. In the graph below, \( x \) represents the number of hours Rick uses the Internet and \( y \) represents the total cost of his Internet provider. Which function best represents this situation?

\[ y = 5x \]  
\[ y = 20x \]  
\[ y = 5x + 20 \]  
\[ y = 20x + 5 \]

UNIT 3

12. On an algebra test, the highest grade was 38 points higher than the lowest grade. The sum of the two grades was 142. Find the lowest grade.

\[ A \quad 90 \]  
\[ B \quad 71 \]  
\[ C \quad 38 \]  
\[ D \quad 52 \]
13 The perimeter of a rectangle is 276 feet. The length of the rectangle is 3 more than twice its width. Find the length and width of the rectangle.

A Length = 185 ft; Width = 91 ft.  
B Length = 99 ft; Width = 44 ft.  
C Length = 93 ft; Width = 45 ft.  
D Length = 45 ft; Width = 21 ft.

14 You just got a new puppy. Bones cost $2.00 each, and toys cost $6.00 each. Write an equation to relate the number of bones \( b \) and toys \( t \) you are able to buy your puppy with $30.00.

A \( 6b - 2t = 30 \)  
B \( 2b + 6t = 30 \)  
C \( 6b + 2t = 30 \)  
D \( 30 + 2b = 6t \)

15 There are at most 12 bicycles and tricycles in a school playground. There are at least 17 wheels altogether. Let \( b \) equal the number of bicycles and \( t \) equal the number of tricycles. Which system describes this situation?

A \( b + t < 12 \)  
\( 2b + 3t \geq 17 \)  
B \( b + t \leq 12 \)  
\( 2b + 3t > 17 \)  
C \( b + t \leq 12 \)  
\( 2b + 3t \geq 17 \)  
D \( b + t \leq 12 \)  
\( 2b + 3t \leq 17 \)

16 The formula for the perimeter of a rectangle is shown below. Solve the formula for the variable \( w \).

\[ P = 2l + 2w \]

A \( w = P - l \)  
B \( w = \frac{P}{2} - l \)  
C \( w = P - 2l - 2 \)  
D \( w = \frac{P - w}{2} \)
17 State which inequalities have equivalent solution sets.

i. \( \frac{1}{3}x \geq \frac{2}{3} \)

ii. \(-3x \geq -6\)

iii. \(x + 4 \geq 6\)

A i. and ii.  
B i. and iii.  
C ii. and iii.  
D i., ii., and iii.

18 Which graph shows the solution set of the inequality below?

\(-3x + 3 > -9\)

A  
B  
C  
D  

19 Simplify the following compound inequality.

\(57 \leq 3x - 15 \leq 75\)

A \(14 \leq x \leq 20\)  
B \(14 \geq x \geq 20\)  
C \(24 \leq x \leq 30\)  
D \(24 \geq x \geq 30\)

20 Determine if the following functions are perpendicular, parallel, or neither.

\(3x - 5y = 13\)

\(y - 3 = \frac{3}{5}(x - 7)\)

A Perpendicular  
B parallel  
C Neither  
D Cannot be determined
21. What are the x- and y-intercepts of the following function?

\[ 4x = 6y + 12 \]

A. (3, 0) and (0, -2)  
B. (-3, 0) and (0, 2)  
C. (0, 3) and (-2, 0)  
D. (0, -3) and (2, 0)

22. Two systems of linear equations are shown below.

\[
\begin{align*}
10x - 5y &= 25 \\
x - y &= 15 \\
-10x + 5y &= -25 \\
2x - 2y &= 30
\end{align*}
\]

Which statement is a correct comparison of the solutions of these systems?

A. The x-value is the same, but the y-values are different.  
B. The x- and y- values are the same.  
C. The x-values are different, but the y-value is the same.  
D. The x- and y- values are different.

23. How many solutions does the following system of linear equations have?

\[
\begin{align*}
4x - 2y &= 16 \\
3y &= 6x - 24
\end{align*}
\]

A. Zero  
B. One  
C. Two  
D. Infinite

24. Solve the system of equations.

\[
\begin{align*}
-3x - 9y &= -3 \\
2x + 9y &= 11
\end{align*}
\]

A. (1, 0)  
B. (1, 1)  
C. (-1, -2)  
D. (-8, 3)
25 Sophie graphed the line \( y = -\frac{1}{4}x + 3 \) on a coordinate plane. Which ordered pair could not be on the line?

A (12, 0)  
B (7, \( \frac{5}{4} \))  
C (\( -\frac{4}{5} \), 3)  
D (16, -1)

26 A company sells brass and steel machine parts. One shipment contains 3 brass and 10 steel parts and costs $48. A second shipment contains 7 brass and 4 steel parts and costs $54.

a) Find the cost of each type of machine part.
b) How much would a shipment containing 10 brass and 13 steel machine parts cost?

A a) Brass $3, Steel $6; 
b) $108  
B a) Brass $6, Steel $3; 
b) $108  
C a) Brass $6, Steel $3; 
b) $99  
D a) Brass $3, Steel $6; 
b) $99

27 Your pool has 15,000 gallons of water. We are draining it for the winter season and want 4000 gallons to remain. If it drains at 1,500 gallons per hour, how long until you have finished draining?

A 7 hours 33 minutes  
B 2 hours 40 minutes  
C 10 hours  
D 7 hour 20 minutes
28 Which of the following graphs could represent the solution set of the inequality \( y < \frac{1}{2}x + 1 \)?

A  

B  

C  

D
29 Sue translated the graph of \( y = |x| \) she moved it 3 units to the right and 2 units down. Which of the following shows Sue’s new graph and correct equation?

A \( y = |x + 3| + 2 \)

\[ \text{Graph A} \]

B \( y = |x - 3| - 2 \)

\[ \text{Graph B} \]

C \( y = |x + 3| + 2 \)

\[ \text{Graph C} \]

D \( y = |x - 3| - 2 \)

\[ \text{Graph D} \]

30 Function \( f(x) \) has the equation \( f(x) = 5(2)^x \), and function \( g(x) \) is described by the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( g(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

How are these two functions alike?

A Both are linear functions.

B Both are exponential functions.

C Both have graphs with the same \( y \)-intercept.

D Both have graphs that approach \( +\infty \) as \( x \) approaches \( +\infty \).
31 Which statement is true about the graphs of \( y = \frac{2}{5}x + 4 \) and \( 2x - 5y = -15 \) ?

A They represent the same graph.
B They have different slopes and y-intercepts.
C They have different slopes but the same y-intercept.
D They have the same slope but different y-intercepts.

32 Which situation BEST shows a constant rate of change?

A the number of even days \( d \) in the month of January
B the number of odd days \( d \) in the month of February
C The number of pieces of candy you receive during Halloween
D The amount of gas you put into your car each time you fill up

MISC

33 What is the constant in the expression \( 12x^3 - 2x^2 + x \)

A 3, 2, and 1
B 12, –2, and 1
C 0
D There is no constant value

34 The expression \( (x^4y^{-3})^{-2} \) can be rewritten as

A \( x^2y^{-5} \)
B \( x^2y^6 \)
C \( y^6 \)
D \( \frac{x^{-8}}{y^6} \)
### 35
Match the expression to the evaluation blocks pictured at the right.

- **A** \((5 - 6) + (3 \times 7)\)
- **B** \((6 + (3 \times 7)) - 5\)
- **C** \(5 - (6 + 3) \times 7\)
- **D** \(5 - (6 + (3 \times 7))\)

### 36
Match the expression that models the evaluation blocks pictured at below:

- **A** \(6 - 2 \times 5 + \frac{16}{4}\)
- **B** \(6 - ((2 \times 5) + (16/4))\)
- **C** \(6 + (2 \times 5) - (16/4)\)
- **D** \((2 \times 5) + (16/4) - 6\)
37. Suppose you invest $15,840 in equipment to manufacture a new board game. Each game costs $2 to manufacture and sells for $20. How many games must you make and sell before your business breaks even?

A 792  C 880
B 720  D 7920

38. John and Will leave their home traveling in opposite directions on a straight road. John drives 20 miles per hour faster than Will. After 4 hours they are 250 miles apart. Find both John and Will’s rate.

A John: 21.25 mph  Will: 41.25 mph
B John: 41.25 mph  Will: 21.25 mph
C John: 48.75 mph  Will: 28.75 mph
D John: 62.5 mph  Will: 42.5 mph

39. Solve: $2|d + 3| = 8$

A $d = 1, d = -1$
B $d = 1, d = -7$
C $d = 3, d = -9$
D $d = 7, d = -1$
40  Solve: \( 4 - 3|m + 2| > -14 \)

A  \(-16 < m < 12\)
B  \(-4 < m < 8\)
C  \(4 < m < -8\)
D  \(-8 < m < 4\)

41  The following ordered pairs represent an inverse variation. Find the missing value. \((-9, 6)\) \((3, y)\)

A  \(y = -2\)
B  \(y = -18\)
C  \(y = -4.5\)
D  \(y = -\frac{2}{3}\)
42  The following values represent a direct variation. Write the equation to represent the relationship.

<table>
<thead>
<tr>
<th>X</th>
<th>-4</th>
<th>-1</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>12</td>
<td>3</td>
<td>-9</td>
<td>-15</td>
</tr>
</tbody>
</table>

A  \( y = -3x \)
B  \( y = -\frac{1}{3}x \)
C  \( y = 3x \)
D  \( y = \frac{1}{3}x \)

43  \( f(x) = |x + 3| + 4 \)  Find the max or min point

A  Max (-3, 4)
B  Min (-3, 4)
C  Max (3, -4)
D  Min (3, -4)
44  Find the domain and range. \( f(x) = -|x - 5| - 2 \)

A  D: \(-\infty \leq x < \infty\) all real numbers  
    R: \(-\infty \leq y < -2\)

B  D: \(-5 \leq x < \infty\)  
    R: \(-\infty \leq y \leq -2\)

C  D: \(-\infty \leq x < \infty\) all real numbers  
    R: \(-2 \leq y \leq 5\)

D  D: \(-\infty \leq x < -2\)  
    R: \(-\infty \leq y < \infty\) all real numbers

45  Solve the system:

\[
\begin{align*}
  f(x) &= -|x - 4| \\
  g(x) &= -4x + 1
\end{align*}
\]

Find the product of the coordinates of the real solution.

A  -3  C  -1

B  5  D  -15