1. Which equation below is equivalent to $4(2 - 5x) = 6x - 3(1 - x)$?

   a. $29x = 5$  
   b. $8x = 17$  
   c. $7x = 5$  
   d. $14x = 17$  
   e. $23x = 5$

2. If $u(0) = 16$, which of the equations below represents the rest of the recursive formula for the sequence

   $16, 15.2, 14.4, 13.6, 12.8, \ldots$

   a. $u(n) = (n - 1) - \frac{4}{5}$  
   b. $u(n) = u(n-1) + \frac{4}{5}$  
   c. $u(n) = -\frac{4}{5}n + 16$  
   d. $u(n) = u(n-1) - \frac{4}{5}$  
   e. $u(n) = -\frac{4}{5}u(n-1)$

3. The area $A$ of a rectangle plot of land with one side having length $x$ meters can be found by the equation $A(x) = -x^2 + 38.8x$

   When considering the real world, what values can the side length $x$ be for this rectangle?

   a. $x > 0$ meters  
   b. $0 < x < 19.4$ meters  
   c. $x < 19.4$ meters  
   d. $0 < x < 38.8$ meters  
   e. $x < 38.8$ meters

4. Deborah owns a restaurant. Her most popular dish is her famous lasagna. When she opened the restaurant to the lunch crowd at 11 a.m., she had 45 pans of lasagna already made. During the day she sold 25% of that lasagna each hour. The function $L(t) = 45(0.75)^t$ represents the number of pans of lasagna Deborah had not sold $t$ hours after she opened the restaurant at 11 a.m. How many whole pans of lasagna had Deborah sold at the close of the restaurant at 10 pm?

   a. 44  
   b. 43  
   c. 33  
   d. 2  
   e. 1
5. If \( A = \begin{bmatrix} 7 & 3 & 0 \\ -2 & -5 & 7 \end{bmatrix} \) and \( B = \begin{bmatrix} -8 & -1 & 9 \\ -4 & -3 & 2 \end{bmatrix} \), then \( B - A = \)

a. \( \begin{bmatrix} 15 & 2 & -9 \\ -2 & 2 & 5 \end{bmatrix} \)  
b. \( \begin{bmatrix} 15 & 4 & -9 \\ 2 & -2 & 5 \end{bmatrix} \)  
c. \( \begin{bmatrix} -1 & 2 & 9 \\ -2 & -8 & -5 \end{bmatrix} \)  
d. \( \begin{bmatrix} -15 & -4 & 9 \\ -2 & 2 & -5 \end{bmatrix} \)  
e. \( \begin{bmatrix} -15 & -4 & 9 \\ -10 & -6 & -5 \end{bmatrix} \)

6. Find the solution(s) for the equation \( 28 = x^2 - 3x \).

a. \( x = -4 \)  
b. \( x = -7 \)  
c. \( x = 7 \)  
d. a and b  
e. a and c

7. If the perimeter of the triangle below is 59 ft, what is the value of \( x \) in feet?

a. 6 ft  
b. 8 ft  
c. \( 10 \frac{6}{7} \) ft  
d. \( 14 \frac{2}{7} \) ft  
e. \( 14 \frac{2}{3} \) ft
8. Observe the table of inputs and outputs below for a mysterious number machine. You input a number and it outputs a new number using its own logic and pattern. Given the table of values, what will be the output when you input $1.5a$ into the mysterious number machine?

<table>
<thead>
<tr>
<th>Input</th>
<th>$-8a$</th>
<th>$-3a$</th>
<th>0</th>
<th>$5a$</th>
<th>$18a$</th>
<th>$27a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>$\frac{4a}{3}$</td>
<td>$\frac{a}{2}$</td>
<td>0</td>
<td>$\frac{-5a}{6}$</td>
<td>$-3a$</td>
<td>$\frac{-9a}{2}$</td>
</tr>
</tbody>
</table>

   a. $\frac{a}{4}$  
   b. $-\frac{a}{4}$  
   c. $-1.5a$  
   d. $\frac{-a}{6}$  
   e. $-\frac{4a}{6}$

9. Data for the average number of takeout meals per person purchased at restaurants in selected years were given to five algebra students. Each student sketched the scatterplot of the data and added a linear model that he/she thought did a fairly good job describing the trend of the data. Assuming the data is sketched correctly in each student’s graph, which of the five student graphs represents the linear model that best fits the data?
10. Emily wants to grow an amazing garden in her back yard. She initially plants 10 seeds in her back yard. Unfortunately, her dog Quincy loves to dig up 27% of her seeds by the end of each week. Knowing this, Emily plants 12 more seeds at end of each week. If this process continues over the next several weeks, by the end of what week will Emily’s garden eventually have 40 seeds planted?

a. the end of the 4th week
b. the end of the 6th week
c. the end of the 7th week
d. the end of the 8th week
e. none of the above

11. Find the equation of a line that goes through the point (0, -3) and intersects the line graphed below at a right angle.

a. \(-5x + y - 12 = 0\)
b. \(-x + 5y + 15 = 0\)
c. \(-\frac{1}{5}x + y - 3 = 0\)
d. \(x - \frac{1}{5}y + 3 = 0\)
e. \(-x - 5y - 15 = 0\)

12. In 1997, the average price for a new domestic car was $17,740. In 2004, the average price was $20,210. If the average price for a new domestic car increases linearly over time, which of the following best describes the predicted average price for 2009?

a. $22,327
d. $21,964
b. $22,182
e. $20,916
c. $21,974
13. A newspaper article gave a table of data that showed the number of manatee watercraft-related deaths each year from 1974 to 2002. An Algebra I student used a graphing calculator to find a best-fit linear model, \( M(x) = 2.860714286x + 2.15 \), for the number of watercraft-related manatee deaths \( x \) years since 1974. What does the slope of this model tell us about manatee death situation?

a. There were almost 3 watercraft-related manatee deaths each year.

b. The number of watercraft-related manatee deaths increased by approximately 3 times the number of years.

c. There was a manatee watercraft-related death every 2.15 years.

d. There was an increase of almost 3 watercraft-related manatee deaths each year.

e. There were approximately 2 watercraft deaths in 1974.

14. For what values of \( A \) in the spreadsheet below is \( 16 - 2A < A^2 + 3A - 4 \) true?

<table>
<thead>
<tr>
<th>A</th>
<th>3*A-4</th>
<th>16+2*A</th>
<th>A*A</th>
<th>A*A+1</th>
<th>2*(8-A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-10</td>
<td>-34</td>
<td>36</td>
<td>100</td>
<td>101</td>
</tr>
<tr>
<td>2</td>
<td>-9</td>
<td>-31</td>
<td>34</td>
<td>81</td>
<td>82</td>
</tr>
<tr>
<td>3</td>
<td>-8</td>
<td>-28</td>
<td>32</td>
<td>64</td>
<td>65</td>
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<td>4</td>
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</tr>
<tr>
<td>10</td>
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<td>18</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
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<td>0</td>
<td>-4</td>
<td>16</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>-1</td>
<td>14</td>
<td>1</td>
<td>2</td>
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<tr>
<td>13</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
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<td>8</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>17</td>
<td>6</td>
<td>14</td>
<td>4</td>
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<tr>
<td>18</td>
<td>7</td>
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<td>2</td>
<td>49</td>
<td>50</td>
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<tr>
<td>19</td>
<td>8</td>
<td>20</td>
<td>0</td>
<td>64</td>
<td>65</td>
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<td>10</td>
<td>26</td>
<td>-4</td>
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<td>101</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. \( A = -10, -9, -8 \)

b. \( A = -7, -6, -5, -4, -3, -2, -1, 0, 1, 2 \)

c. \( A = 3, 4, 5, 6, 7, 8, 9, 10 \)
15. Given the sequence of figures below, how many black triangles will be in the 10th figure?

   n = 0                      n = 1                    n = 2                    n = 3                    n = 4

   a. 3000  
   b. 19683  
   c. 30000  
   d. 59049  
   e. 177147

16. A bus and a motorcycle start traveling toward each other on a straight highway at a speed of 55 mph. About how far apart will they be five minutes after they pass each other on the highway?

   a. 4.6 miles  d. 10 miles
   b. 5 miles    e. 22 miles
   c. 9.2 miles

17. Suppose a triangle has length x, y, and z inches. Which side lengths produce a triangle in which two of the three sides are perpendicular?

   a. x = 4, y = 7, z = 8
   b. x = 12, y = 4, z = 13
   c. x = 13, y = 15, z = 17
   d. x = 18, y = 18, z = 20
   e. x = 20, y = 21, z = 29
18. Each month, Darcy earns a salary of $1,400 plus a commission of 3.25% of her sales for the month. If she wants to earn a total of at least $1,550 this month, what is the least amount of sales (to the nearest dollar) she needs to make for the month?

a. $46.00  
   d. $4616.00
b. $51.00  
   e. $5038.00
c. $4615.00

19. What is the x coordinate in the solution to the system of equations below:

\[ 3x - y - 70 = 0 \]
\[ 5y = x \]
\[ y = 5 \]

a. 0  
   d. \( 23\frac{1}{3} \)
b. 1  
   e. 25
c. 5

20. Landon has 50 coins. They are all nickels and dimes. The total value of her coins is $3.65. Landon wants to use algebra to find out how many of each type of coin she has. She knows she needs to use a system of equations to do so and that one of the equations will be “\( n + d = 50 \)”, where \( n \) is the number of nickels she has and \( d \) is the number of dimes she has. What is the other equation that Landon needs for her system of equations to solve her problem?

a. 23  
   d. 0.05n = 365 – 0.10d
b. 25  
   e. \( n = 73 - 2d \)
c. \( n = 365 - 2d \)
21. A dog sees a cat 60 feet away and starts running after it at a rate of 50 feet per second. At the same time, the cat runs away at a rate of 30 feet per second. This chase is graphically represented below;

What does the graph’s point of intersection mean in the context of this problem?

a. After 150 seconds, both the cat and the dog will be 3 feet from the dog’s original starting position.

b. After 3 seconds, both the cat and the dog have run 150 feet.

c. After 3 seconds the cat and dog are 150 feet away from the cat’s starting position.

d. After 3 seconds, the cat and the dog are 150 feet away from dog’s starting position.

e. None of the above.

22. Which of the following is not a factor of \(2x^2y^5z^4 - 6y^4z^3\)?

a. \(y^4\)  

b. \(2z^4\)  

c. \(x^2yz - 3\)  

d. \(2y^4z^3\)  

e. \(xy\)
23. The percentage of funding for public elementary and secondary education provided by the federal government during the 1980’s is given by the following table:

<table>
<thead>
<tr>
<th>School Year Beginning in</th>
<th>Percentage of Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>7.4</td>
</tr>
<tr>
<td>1983</td>
<td>7.1</td>
</tr>
<tr>
<td>1984</td>
<td>6.8</td>
</tr>
<tr>
<td>1985</td>
<td>6.6</td>
</tr>
<tr>
<td>1986</td>
<td>6.7</td>
</tr>
<tr>
<td>1987</td>
<td>6.4</td>
</tr>
<tr>
<td>1988</td>
<td>6.3</td>
</tr>
<tr>
<td>1989</td>
<td>6.2</td>
</tr>
<tr>
<td>1990</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Which of the following statement best describes the way the federal government funding for elementary and secondary public school funding changed over time?

a. The percentage of federal funding to elementary and secondary public schools stayed approximately the same during the 1980s.

b. The percentage of federal funding to elementary and secondary public schools increased on average by approximately 0.15 percentage point every 10 years.

c. The percentage of federal funding to elementary and secondary public schools increased on average by approximately 0.15 percentage point each year.

d. The percentage of federal funding to elementary and secondary public schools decreased on average by approximately 0.15 percentage point every 10 years.

e. The percentage of federal funding to elementary and secondary public schools decreased on average by approximately 0.15 percentage point each year.
24. Which of the following expressions does not represent the area of the shaded rectangle below?

![Diagram of a shaded rectangle]

a. $(3x^2 + 2x) + (21x + 14)$

b. $(3x + 2)(x + 7)$

c. $(3x^2 + 7) + (2x + 14)$

d. $3x(x + 7) + 2(x + 7)$

e. $x(3x) + x(2) + 7(3x) + 7(2)$

25. Nick bought some baseball cards. He paid $3 for every six cards he bought. Later, Nick was offered $3 for every four cards he bought. He sold all the cards and made a profit of $6. How many cards did Nick buy?

a. 6  

b. 9  

c. 10  

d. 24  

e. 60

26. You are given that the midpoint of $\overline{AB}$ is (-21, -33). The coordinate for B is (8, -9). Find the coordinate for A.

a. (-6.5, -21)

b. (-50, -57)

c. (-50, -75)

d. (-17, -57)

e. (-17, -75)
27. Consider the exponential functions graphed below and the six constants \(a, b, c, d,\) and \(e\). Which of the following pairs of constants could be equal?

a. \(d\) and \(q\)

b. \(a\) and \(p\)

c. \(b\) and \(d\)

d. \(b\) and \(q\)

e. all of the above

28. Simplify \(\sqrt[3]{-48r^3s^{24}z} \div -3r^2s^{10}\)

a. \(4r^3s^7\sqrt{z}\)

b. \(4s^7\sqrt{\frac{z}{r^{-6}}}\)

c. \(\sqrt{16\frac{s^{14}z}{r^{-6}}}\)

d. \(4r^3s^7z\)

e. none of the above

29. Two lines, \(y_1 = 7x - 23\) and \(y_2\), have no solutions in common. We know that one point on \(y_2\) is \((0, -1)\). Find the equation of \(y_2\).

a. \(-x + 7y_2 - 7 = 0\)

b. \(-7x + y_2 - 1 = 0\)

c. \(-x + 7y_2 + 7 = 0\)

d. \(-7x + y_2 + 1 = 0\)

e. not enough information given to find the equation
30. If the distance a car travels is proportional to the time spent traveling, which of the graphs below best represents \( d(t) = \) the car’s total distance traveled \( d \) as a function of time \( t \)?

a. 
![Graph A]

b. 
![Graph B]

c. 
![Graph C]

d. 
![Graph D]

e. none of the above