Algebra 2 SIA #3 Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Let \( f(x) = -5x - 4 \) and \( g(x) = 6x - 7 \). Find \( f(x) + g(x) \).
   a. \(-11x + 3\)  b. \(x + 3\)  c. \(-11x - 11\)  d. \(x - 11\)

____ 2. Let \( f(x) = 4x - 5 \) and \( g(x) = 6x - 3 \). Find \( f(x) - g(x) \).
   a. \(10x - 8\)  b. \(10x - 2\)  c. \(-2x - 8\)  d. \(-2x - 2\)

____ 3. Let \( f(x) = 3x + 2 \) and \( g(x) = x - 3 \). Find \( f(x) - g(x) \).
   a. \(2x - 5\)  b. \(2x + 5\)  c. \(4x - 1\)  d. \(2x - 1\)

____ 4. Let \( f(x) = 3x + 2 \) and \( g(x) = 7x + 6 \). Find \( f \cdot g \) and its domain.
   a. \(6x^2 + 4x + 42\); all real numbers except \(x = \frac{2}{3}\)
   b. \(6x^2 + 4x + 42\); all real numbers
   c. \(21x^2 + 32x + 12\); all real numbers
   d. \(21x^2 + 32x + 12\); all real numbers except \(x = \frac{6}{7}\)

____ 5. Let \( f(x) = 3x - 6 \) and \( g(x) = x - 2 \). Find \( \frac{f}{g} \) and its domain.
   a. 3; all real numbers
   b. 3; all real numbers except \(x = 2\)
   c. 1; all real numbers
   d. \(-3\); all real numbers except \(x = 3\)

____ 6. Let \( f(x) = x^2 - 16 \) and \( g(x) = x + 4 \). Find \( \frac{f}{g} \) and its domain.
   a. \(x + 4\); all real numbers except \(x \neq 4\)
   b. \(x + 4\); all real numbers except \(x \neq -4\)
   c. \(x - 4\); all real numbers except \(x \neq 4\)
   d. \(x - 4\); all real numbers except \(x \neq -4\)

____ 7. Let \( f(x) = -2x - 7 \) and \( g(x) = -4x + 3 \). Find \( (f \circ g)(-5) \).
   a. 23  b. \(-53\)  c. \(-9\)  d. 3

____ 8. Let \( f(x) = x^2 + 6 \) and \( g(x) = \frac{x + 8}{x} \). Find \( (g \circ f)(-7) \).
   a. \(-\frac{55}{7}\)  b. \(\frac{384}{7}\)  c. \(\frac{295}{49}\)  d. \(\frac{63}{55}\)

____ 9. Let \( f(x) = x + 2 \) and \( g(x) = x^2 \). Find \( (g \circ f)(-5) \).
   a. 9  b. -3  c. 49  d. -10
10. You have a coupon good for $6 off the price of any large pizza. You also get a 20% discount on any pizza if you show your student ID. How much more would you pay for a large pizza if the cashier applies the coupon first?
   a. $1.50  
   b. $0.00  
   c. $1.20  
   d. $.50  

11. A store is offering a 25% discount on all items. Also, employees get a 10% employee discount. If you are an employee which discount would you want to be applied first to save the most money?
   a. 10%  
   b. 25%  
   c. It doesn’t matter which discount is applied first, the result is the same.  
   d. Not enough information is given.  

12. Graph the relation and its inverse. Use open circles to graph the points of the inverse.

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>4</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td>–1</td>
</tr>
</tbody>
</table>

a.  

b.  

c.  

d.  
13. Is relation \( t \) a function? Is the inverse of relations \( t \) a function?

Relation \( t \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>–8</td>
<td>–7</td>
<td>–4</td>
<td>–4</td>
</tr>
</tbody>
</table>

a. Relation \( t \) is not a function. The inverse of relation \( t \) is a function.
b. Relation \( t \) is not a function. The inverse of relation \( t \) is not a function.
c. Relation \( t \) is not a function. The inverse of relation \( t \) is a function.
d. Relation \( t \) is a function. The inverse of relation \( t \) is not a function.

14. What is the inverse of the given relation?

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

a. \( y = \pm \sqrt{\frac{x + 3}{7}} \)

b. \( x = \sqrt{\frac{y + 3}{7}} \)

c. \( y^2 = \frac{x - 3}{7} \)

d. \( y = \pm \sqrt{\frac{x - 3}{7}} \)

15. \( y = 3x + 9 \)

a. \( y = \frac{1}{3}x + 3 \)

b. \( y = 3x - 3 \)

c. \( y = 3x + 3 \)

d. \( y = \frac{1}{3}x - 3 \)
16. Graph \( y = -4x^2 - 2 \) and its inverse.

a. 

b. 

c. 

d.
17. Graph \( y = -2x + 3 \) and its inverse.

a. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is not a function.} \]

b. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is not a function.} \]

c. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is a function.} \]

d. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is a function.} \]

18. For the function \( f(x) = (8 - 2x)^2 \), find \( f^{-1} \). Determine whether \( f^{-1} \) is a function.

a. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is not a function.} \]

b. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is not a function.} \]

c. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is a function.} \]

d. \[ f^{-1}(x) = \pm \sqrt{\frac{8 + x}{2}}; \quad f^{-1} \text{ is a function.} \]

19. For the function \( f(x) = \sqrt{x - 5} \), find \( f^{-1} \). What is the range of \( f^{-1} \)?

a. \[ f^{-1}(x) = x^2 + 25; \quad y \geq 25 \]

b. \[ f^{-1}(x) = x^2 + 25; \quad y \geq 5 \]

c. \[ f^{-1}(x) = x^2 + 5; \quad y \geq 25 \]

d. \[ f^{-1}(x) = x^2 + 5; \quad y \geq 5 \]
20. Police can estimate the speed of a vehicle before the brakes are applied using the formula \(0.75d = \frac{s^2}{30.25}\), where \(s\) is the speed in miles per hour and \(d\) is the length of the vehicle’s skid marks. What was the approximate speed of a vehicle that left a skid mark measuring 100 feet?

a. about 29 miles per hour  
b. about 10 miles per hour  
c. about 48 miles per hour  
d. about 43 miles per hour

21. The function \(d = 4.9t^2\) represents the distance \(d\), in meters, that an object falls in \(t\) seconds due to Earth’s gravity. Find the inverse of this function. How long, in seconds, does it take for a cliff diver who is 70 meters above the water to reach the water below?

a. 3.8 seconds  
b. 5.9 seconds  
c. 8.1 seconds  
d. 13.8 seconds

22. For the function \(f(x) = x + 9\), find \((f \circ f^{-1})(5)\).

a. 14  
b. 5  
c. –5  
d. 25

23. For the function \(g(x) = \frac{14}{x+3}\), find \((g^{-1} \circ g)(4)\).

a. 6  
b. 10  
c. 4  
d. 0

24. Generate the first five terms in the sequence using the explicit formula.

\(y_n = -5n - 5\)

a. –30, –25, –20, –15, –10  
b. 30, 25, 20, 15, 10  
c. –10, –15, –20, –25, –30  
d. 10, 15, 20, 25, 30

25. \(c_n = 12n - 11\)

a. 49, 37, 25, 13, 1  
b. –1, –13, –25, –37, –49  
c. 1, 13, 25, 37, 49  
d. –49, –37, –25, –13, –1

26. What is the 15\(^{th}\) term in the sequence using the given formula?

\(c_n = 3n - 1\)

a. 14  
b. 57  
c. 44  
d. –44
27. Write a recursive formula for the sequence 7, 13, 19, 25, 31, ... Then find the next term.
   a. \( a_n = a_{n-1} + 6 \), where \( a_1 = 7 \); 37
   b. \( a_n = a_{n-1} + 6 \), where \( a_1 = 37 \); 7
   c. \( a_n = a_{n-1} - 6 \), where \( a_1 = 6 \); -23
   d. \( a_n = a_{n-1} - 6 \), where \( a_1 = 7 \); 37

28. Write a recursive formula for the sequence 7, 4, 1, -2, -5, .... Then find the next term.
   a. \( a_n = a_{n-1} - 3 \), where \( a_1 = -8 \); 7
   b. \( a_n = a_{n-1} - 3 \), where \( a_1 = 7 \); -8
   c. \( a_n = a_{n-1} + 3 \), where \( a_1 = -3 \); 22
   d. \( a_n = a_{n-1} + 3 \), where \( a_1 = 7 \); -8

29. Write a recursive formula for the sequence 15, 26, 48, 92, 180, ... Then find the next term.
   a. \( a_n = 2a_{n-1} - 4 \), where \( a_1 = 15 \); 356
   b. \( a_n = 2a_{n-1} - 4 \), where \( a_1 = 15 \); 356
   c. \( a_n = 4 + 11 \cdot 2^{n-1} \), where \( a_1 = 15 \); 356
   d. \( a_n = 3a_{n-1} - 19 \), where \( a_1 = 15 \); 356

30. Write an explicit formula for the sequence 8, 6, 4, 2, 0, ... Then find \( a_{14} \).
   a. \( a_n = -2n + 10 \); -16
   b. \( a_n = -2n + 8 \); -18
   c. \( a_n = -2n + 8 \); -20
   d. \( a_n = -2n + 10 \); -18

31. Write an explicit formula for the sequence \( \frac{1}{2}, \frac{3}{7}, \frac{1}{3}, \frac{5}{19}, \frac{3}{14}, \ldots \) Then find \( a_{14} \).
   a. \( a_n = a_{n-1} - \frac{n-1}{7n}; \frac{15}{199} \)
   b. \( a_n = \frac{a_{n+1}}{n^2 + 3}; \frac{15}{199} \)
   c. \( a_n = \frac{n + 1}{n^2 + 3}; \frac{15}{199} \)
   d. \( a_n = \frac{n}{n^2 - 1}; \frac{15}{199} \)

32. Suppose you drop a tennis ball from a height of 8 feet. After the ball hits the floor, it rebounds to 80% of its previous height. How high will the ball rebound after its third bounce? Round to the nearest tenth.
   a. 3.3 feet
   b. 4.1 feet
   c. 5.1 feet
   d. 1 feet

33. Orlando is making a design for a logo. He begins with a square measuring 24 inches on a side. The second square has a side length of 19.2 inches, and the third square has a side length of 15.36 inches. Which square will be the first square with a side length of less than 12 inches?
   a. fourth square
   b. fifth square
   c. sixth square
   d. seventh square
34. The table shows the predicted growth of a particular bacteria after various numbers of hours. Write an explicit formula for the sequence of the number of bacteria.

<table>
<thead>
<tr>
<th>Hours (n)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Bacteria</td>
<td>21</td>
<td>42</td>
<td>63</td>
<td>84</td>
<td>105</td>
</tr>
</tbody>
</table>

- a. \( a_n = 21n \)
- b. \( a_n = \frac{1}{21}n \)
- c. \( a_n = n + 21 \)
- d. \( a_n = 21n + 21 \)

Is the sequence arithmetic? If so, identify the common difference.

35. 13, 20, 27, 34, ...
- a. yes; 7
- b. yes; –7
- c. yes; 13
- d. no

36. 14, 21, 42, 77, ...
- a. yes; 7
- b. yes; –7
- c. yes; 14
- d. no

37. –2.4, 9.8, 22, 34.2, ...
- a. yes; 12
- b. yes; 12.2
- c. yes; 12.3
- d. no

38. Find the 50th term of the sequence 5, –2, –9, –16, ...
- a. –352
- b. –343
- c. –338
- d. –331

39. Find the 110th term of the sequence –7, 3, 13, 23, ...
- a. 1083
- b. –1097
- c. 1093
- d. 40

40. Find the 2nd and 3rd term of the sequence –7, ___, ___, –22, –27, ...
- a. –12, –15
- b. –17, –12
- c. –10, –17
- d. –12, –17

41. Find the missing term of the arithmetic sequence 22, ___, 34, ...
- a. 46
- b. 16
- c. 28
- d. 40

42. Find the arithmetic mean \( a_n \) of \( a_{n-1} = 3.9 \) and \( a_{n+1} = 7.1 \).
- a. 11
- b. 5.5
- c. 3.7
- d. 1.6

43. Viola makes gift baskets for Valentine’s Day. She has 13 baskets left over from last year, and she plans to make 12 more each day. If there are 15 work days until the day she begins to sell the baskets, how many baskets will she have to sell?
- a. 193 baskets
- b. 156 baskets
- c. 205 baskets
- d. 181 baskets
44. A grocery clerk sets up a display of 12-pack cartons of cola. There are 15 cartons at the base of the triangle and one at the top. How many cartons of cola are needed for the complete display?

a. 180 cartons  

b. 30 cartons  

c. 120 cartons  

d. 15 cartons

Is the sequence geometric? If so, identify the common ratio.

45. 6, 12, 24, 48, ...

a. yes; 2  
b. yes; –2  
c. yes; 4  
d. no

46. 2, –4, –16, –36, ...

a. yes; –2  
b. yes; 2  
c. yes; –3  
d. no

47. \(\frac{1}{3}, \frac{2}{9}, \frac{4}{27}, \frac{8}{81}, \frac{16}{243}, \ldots\)

a. yes; \(\frac{2}{3}\)  
b. yes; \(\frac{1}{9}\)  
c. yes; \(\frac{1}{6}\)  
d. not geometric

What is the fifth term of the geometric sequence?

48. 5, 15, 45, ...

a. 1215  
b. 1875  
c. 405  
d. 3645

49. \(a_1 = 120, a_2 = 36, a_3 = 10.8, a_6 = 0.2916\)

a. 0.87  
b. 3.33  
c. 25.2  
d. 0.972

Write the explicit formula for the geometric sequence. Then find the fifth term in the sequence.

50. \(a_1 = -4, a_2 = 8, a_3 = -16\)

a. \(a_n = -4 \cdot (2)^{n}; -64\)  
b. \(a_n = -4 \cdot (-2)^{n-1}; -64\)  
c. \(a_n = -4 \cdot (-2)^n; 128\)  
d. \(a_n = -2 \cdot (-4)^{n-1}; -512\)
51. Kaylee is painting a design on the floor of a recreation room using equilateral triangles. She begins by painting the outline of Triangle 1 measuring 50 inches on a side. Next, she paints the outline of Triangle 2 inside the first triangle. The side length of Triangle 2 is 80% of the length of Triangle 1. She continues painting triangles inside triangles using the 80% reduction factor. Which triangle will first have a side length of less than 29 inches?
   a. Triangle 4   c. Triangle 5
   b. Triangle 3   d. Triangle 6

52. A rope is swinging in such a way that the length of the arc is decreasing geometrically. If the first arc is 18 feet long and the third arc is 8 feet long, what is the length of the second arc?
   a. 12 feet   b. 10 feet   c. 5 feet   d. 72 feet

What is a possible value for the missing term of the geometric sequence?

53. 50, □, 450, ...
   a. 1350
   b. 150
   c. 3
   d. 53

54. 1250, □, 50, ...
   a. 1200
   b. 650
   c. 250
   d. 125

55. 39, □, 975, ...
   a. −44
   b. −195
   c. −5
   d. −4875

What is the sum of the finite arithmetic series?

56. 26 + 29 + 32 + 35 + 38 + 41 + 44
   a. 219
   b. 245
   c. −193
   d. 201

57. 7.6 + 6.3 + 5 + 3.7 + 2.4 + 1.1 + (−0.2) + (−1.5)
   a. 17.4
   b. 24.4
   c. 27.8
   d. 36.4

58. 29 + 32 + 35 + 38 + 41 + … + 59
   a. 234
   b. 425
   c. 484
   d. 455

59. (−5) + 0 + 5 + 10 + … + 65
   a. 900
   b. 455
   c. 450
   d. 445
60. A large asteroid crashed into a moon of a planet, causing several boulders from the moon to be propelled into space toward the planet. Astronomers were able to measure the speed of one of the projectiles. The distance (in feet) that the projectile traveled each second, starting with the first second, was given by the arithmetic sequence 26, 44, 62, 80, … . Find the total distance that the projectile traveled in seven seconds.
   a. 534 feet  b. 560 feet  c. 212 feet  d. 426 feet

61. Use summation notation to write the series 49 + 54 + 59 + … for 14 terms.
   a. \( \sum_{n=1}^{14} (49 + 5n) \)  c. \( \sum_{n=1}^{14} (44 + 5n) \)
   b. \( \sum_{n=1}^{13} (44 + 5n) \)  d. \( \sum_{n=1}^{44} (49 + 5n) \)

62. Use summation notation to write the series 2 + 4 + 6 + 8 + … for 10 terms.
   a. \( \sum_{n=1}^{10} 2n \)  b. \( \sum_{n=1}^{10} (n + 2) \)  c. \( \sum_{n=1}^{10} n \)  d. \( \sum_{n=0}^{10} 2n \)

63. Use summation notation to write the series 6.6 + 15.4 + 24.2 + … for 5 terms.
   a. \( \sum_{n=1}^{5} (-2.2 + 8.8n) \)  c. \( \sum_{n=0}^{4} (-2.2 + 8.8n) \)
   b. \( \sum_{n=0}^{4} (8.8 + 6.6n) \)  d. \( \sum_{n=1}^{5} (8.8 + 6.6n) \)

64. Evaluate the series \( \sum_{n=1}^{4} (n + 4) \).
   a. 26  b. 10  c. 16  d. –6

65. Evaluate the series \( \sum_{n=3}^{8} 5n \).
   a. 125  b. 38  c. 210  d. 165

66. Use a calculator to evaluate the series \( \sum_{x=1}^{85} 2x + 6 \).
   a. 7,820  c. 7,826
   b. 4,165  d. 12,035

67. Use a calculator to evaluate the series \( \sum_{n=1}^{50} (n^2 - 2) \).
   a. 42,825  c. 14,320
   b. 4,285  d. 9,285
68. Evaluate the series $1 + 4 + 16 + 64 + 256 + 1024$.
   a. 1365    b. 1364    c. 341    d. 5461

69. What is $S_7$ for $6 - 24 + 96 - 384 + ...$?
   a. 19,662    b. -78,642    c. -4914    d. 1230

70. What is $S_5$ for $1000 + 500 + 250 + ...$?
   a. 968.75    b. 1062.5    c. 1937.5    d. 12,500

71. What is $S_{10}$ for $1 + 2 + 4 + 8 + ...$?
   a. 256.5    b. 511    c. 1023    d. 2047

72. What is the sum of the geometric series $\sum_{x=1}^{10} 6(2)^x$?
   a. 15,658    b. 6,138    c. 12,276    d. 756

73. What is the sum of the geometric series $\sum_{x=0}^{15} 2(\frac{1}{2})^x$ rounded to the nearest whole number?
   a. 4    b. 0    c. 2    d. 3

74. Justine earned $26,000 during the first year of her job at city hall. After each year she received a 3% raise. Find her total earnings during the first five years on the job.
   a. $138,037.53    b. $1,004,704.20    c. $4,020.51    d. $108,774.30

75. A rubber ball dropped on a hard surface takes a sequence of bounces, each one $\frac{3}{5}$ as high as the preceding one. If this ball is dropped from a height of 10 feet, what is the total vertical distance it has traveled after it hits the surface the 5th time?
   a. $23\frac{7}{125}$ feet    b. $36\frac{14}{125}$ feet    c. $43\frac{111}{125}$ feet    d. $46\frac{14}{125}$ feet

76. In June, Cory begins to save money for a video game and a TV he wants to buy in December. He starts with $20. Each month he plans to save 10% more than the previous month. How much money will he have at the end of December?
   a. $154.31    b. $251.59    c. $228.72    d. $189.74

Does the infinite geometric series diverge or converge? Explain.

77. $\frac{1}{5} + \frac{1}{10} + \frac{1}{20} + \frac{1}{40} + ...$
   a. It diverges; it has a sum.    c. It converges; it has a sum.
   b. It diverges; it does not have a sum.    d. It converges; it does not have a sum.

78. $3 + 9 + 27 + 81 + ...$
   a. It converges; it does not have a sum.    c. It diverges; it does not have a sum.
   b. It diverges; it has a sum.    d. It converges; it has a sum.
Short Answer

79. Consider the infinite geometric series \( \sum_{n=1}^{\infty} -4 \left( \frac{1}{3} \right)^{n-1} \).
   a. Write the first four terms of the series.
   b. Does the series diverge or converge?
   c. If the series has a sum, find the sum.

Essay

80. The table shows how the number of sit-ups Marla does each day has changed over time. At this rate, how many sit-ups will she do on Day 12? Explain your steps in solving this problem.

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>21</td>
<td>25</td>
<td>29</td>
<td>33</td>
</tr>
</tbody>
</table>

81. Dante is making a necklace with 18 rows of tiny beads in which the number of beads per row is given by the series \( 3 + 10 + 17 + 24 + \ldots \)
   a. Use summation notation to write the series. Explain what the numbers in the summation notation represent in this situation and how you found the expression used in the summation.
   b. Find the total number of beads in the necklace. Explain your method for finding the total number of beads.
MULTIPLE CHOICE

1. ANS: D  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.1 To add, subtract, multiply, and divide functions
TOP: 6-6 Problem 1 Adding and Subtracting Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

2. ANS: D  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.1 To add, subtract, multiply, and divide functions
TOP: 6-6 Problem 1 Adding and Subtracting Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

3. ANS: B  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.1 To add, subtract, multiply, and divide functions
TOP: 6-6 Problem 1 Adding and Subtracting Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

4. ANS: C  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.1 To add, subtract, multiply, and divide functions
TOP: 6-6 Problem 2 Multiplying and Dividing Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

5. ANS: B  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.1 To add, subtract, multiply, and divide functions
TOP: 6-6 Problem 2 Multiplying and Dividing Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

6. ANS: D  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.1 To add, subtract, multiply, and divide functions
TOP: 6-6 Problem 2 Multiplying and Dividing Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

7. ANS: B  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.2 To find the composite of two functions
TOP: 6-6 Problem 3 Composing Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

8. ANS: D  PTS: 1  DIF: L4  REF: 6-6 Function Operations
OBJ: 6-6.2 To find the composite of two functions
TOP: 6-6 Problem 3 Composing Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

OBJ: 6-6.2 To find the composite of two functions
TOP: 6-6 Problem 3 Composing Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

10. ANS: C  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.2 To find the composite of two functions
TOP: 6-6 Problem 4 Using Composite Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2

11. ANS: C  PTS: 1  DIF: L3  REF: 6-6 Function Operations
OBJ: 6-6.2 To find the composite of two functions
TOP: 6-6 Problem 4 Using Composite Functions
STA: MA.912.A.2.7|MA.912.A.2.8
DOK: DOK 2
ID: A

12. ANS: C  PTS: 1  DIF: L2  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 1 Finding the Inverse of a relation
   DOK: DOK 1  STA: MA.912.A.2.11
   KEY: inverse relation

13. ANS: D  PTS: 1  DIF: L2  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 1 Finding the Inverse of a relation
   DOK: DOK 1  STA: MA.912.A.2.11
   KEY: inverse relation

14. ANS: A  PTS: 1  DIF: L3  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 2 Finding an Equation for the Inverse
   DOK: DOK 2  STA: MA.912.A.2.11
   KEY: inverse relation

15. ANS: D  PTS: 1  DIF: L3  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 2 Finding an Equation for the Inverse
   DOK: DOK 2  STA: MA.912.A.2.11
   KEY: inverse relation

16. ANS: B  PTS: 1  DIF: L3  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 3 Graphing a Relation and Its Inverse
   DOK: DOK 2  STA: MA.912.A.2.11
   KEY: inverse relation

17. ANS: A  PTS: 1  DIF: L2  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 3 Graphing a Relation and Its Inverse
   DOK: DOK 2  STA: MA.912.A.2.11
   KEY: inverse relation

18. ANS: B  PTS: 1  DIF: L3  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 4 Finding an Inverse Function
   DOK: DOK 2  STA: MA.912.A.2.11
   KEY: inverse function

19. ANS: D  PTS: 1  DIF: L2  REF: 6-7 Inverse Relations and Functions
   OBJ: 6-7.1 To find the inverse of a relation or function
   TOP: 6-7 Problem 4 Finding an Inverse Function
   DOK: DOK 2  STA: MA.912.A.2.11
   KEY: inverse function

20. ANS: C  PTS: 1  DIF: L3  REF: 6-7 Inverse Relations and Functions
    OBJ: 6-7.1 To find the inverse of a relation or function
    TOP: 6-7 Problem 5 Finding the Inverse of a Formula
    DOK: DOK 3  STA: MA.912.A.2.11
    KEY: inverse function

21. ANS: A  PTS: 1  DIF: L4  REF: 6-7 Inverse Relations and Functions
    OBJ: 6-7.1 To find the inverse of a relation or function
    TOP: 6-7 Problem 5 Finding the Inverse of a Formula
    DOK: DOK 3  STA: MA.912.A.2.11
    KEY: inverse function

22. ANS: B  PTS: 1  DIF: L2  REF: 6-7 Inverse Relations and Functions
    OBJ: 6-7.1 To find the inverse of a relation or function
    TOP: 6-7 Problem 6 Composing Inverse Functions
    KEY: composition of functions | inverse relations and functions
    DOK: DOK 2  STA: MA.912.A.2.11
23. ANS: C PTS: 1 DIF: L3 REF: 6-7 Inverse Relations and Functions
OBJ: 6-7.1 To find the inverse of a relation or function STA: MA.912.A.2.11
TOP: 6-7 Problem 6 Composing Inverse Functions
KEY: composition of functions | inverse relations and functions
DOK: DOK 2

24. ANS: C PTS: 1 DIF: L3 REF: 9-1 Mathematical Patterns
OBJ: 9-1.1 To identify mathematical patterns found in a sequence
TOP: 9-1 Problem 1 Generating a Sequence Using an Explicit Formula
KEY: sequence | recursive formula DOK: DOK 1

25. ANS: C PTS: 1 DIF: L3 REF: 9-1 Mathematical Patterns
OBJ: 9-1.1 To identify mathematical patterns found in a sequence
TOP: 9-1 Problem 1 Generating a Sequence Using an Explicit Formula
KEY: sequence DOK: DOK 1

26. ANS: C PTS: 1 DIF: L2 REF: 9-1 Mathematical Patterns
OBJ: 9-1.1 To identify mathematical patterns found in a sequence
TOP: 9-1 Problem 1 Generating a Sequence Using an Explicit Formula
KEY: sequence DOK: DOK 1

27. ANS: A PTS: 1 DIF: L2 REF: 9-1 Mathematical Patterns
OBJ: 9-1.1 To identify mathematical patterns found in a sequence
TOP: 9-1 Problem 2 Writing a Recursive Definition for a Sequence
KEY: sequence | recursive formula DOK: DOK 2

28. ANS: B PTS: 1 DIF: L4 REF: 9-1 Mathematical Patterns
OBJ: 9-1.1 To identify mathematical patterns found in a sequence
TOP: 9-1 Problem 2 Writing a Recursive Definition for a Sequence
KEY: sequence | recursive formula DOK: DOK 2

29. ANS: A PTS: 1 DIF: L4 REF: 9-1 Mathematical Patterns
OBJ: 9-1.1 To identify mathematical patterns found in a sequence
TOP: 9-1 Problem 2 Writing a Recursive Definition for a Sequence
KEY: sequence | recursive formula DOK: DOK 2

30. ANS: D PTS: 1 DIF: L3 REF: 9-1 Mathematical Patterns
OBJ: 9-1.2 To use a formula to find the nth term of a sequence
TOP: 9-1 Problem 3 Writing an Explicit Formula for a Sequence
KEY: sequence | explicit formula DOK: DOK 2

31. ANS: C PTS: 1 DIF: L4 REF: 9-1 Mathematical Patterns
OBJ: 9-1.2 To use a formula to find the nth term of a sequence
TOP: 9-1 Problem 3 Writing an Explicit Formula for a Sequence
KEY: sequence | explicit formula DOK: DOK 2

32. ANS: B PTS: 1 DIF: L3 REF: 9-1 Mathematical Patterns
OBJ: 9-1.2 To use a formula to find the nth term of a sequence
TOP: 9-1 Problem 4 Using Formulas to Find Terms of a Sequence
KEY: sequence DOK: DOK 2

33. ANS: B PTS: 1 DIF: L3 REF: 9-1 Mathematical Patterns
OBJ: 9-1.2 To use a formula to find the nth term of a sequence
TOP: 9-1 Problem 4 Using Formulas to Find Terms of a Sequence
KEY: sequence DOK: DOK 2
34. ANS: A  PTS: 1  DIF: L2  REF: 9-1 Mathematical Patterns
   OBJ: 9-1.2 To use a formula to find the nth term of a sequence
   TOP: 9-1 Problem 4 Using Formulas to Find Terms of a Sequence
   KEY: sequence  DOK: DOK 2

35. ANS: A  PTS: 1  DIF: L2  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 1 Identifying Arithmetic Sequences
   KEY: arithmetic sequence
   DOK: DOK 2

36. ANS: D  PTS: 1  DIF: L2  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 1 Identifying Arithmetic Sequences
   KEY: arithmetic sequence
   DOK: DOK 2

37. ANS: B  PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 1 Identifying Arithmetic Sequences
   KEY: arithmetic sequence
   DOK: DOK 2

38. ANS: C  PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 2 Analyzing Arithmetic Sequences
   KEY: arithmetic sequence
   DOK: DOK 2

39. ANS: A  PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 2 Analyzing Arithmetic Sequences
   KEY: arithmetic sequence
   DOK: DOK 2

40. ANS: D  PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 2 Analyzing Arithmetic Sequences
   KEY: arithmetic sequence
   DOK: DOK 2

41. ANS: C  PTS: 1  DIF: L2  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 3 Using the Arithmetic Mean
   KEY: arithmetic sequence | arithmetic mean  DOK: DOK 2

42. ANS: B  PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 3 Using the Arithmetic Mean
   KEY: arithmetic mean | arithmetic sequence  DOK: DOK 2

43. ANS: A  PTS: 1  DIF: L2  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 4 Using an Explicit Formula for an Arithmetic Sequence
   KEY: arithmetic sequence  DOK: DOK 3

44. ANS: C  PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
   OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
   TOP: 9-2 Problem 4 Using an Explicit Formula for an Arithmetic Sequence
   KEY: arithmetic sequence  DOK: DOK 3
56. ANS: B  PTS: 1  DIF: L2  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 1 Finding the Sum of a Finite Arithmetic Series
KEY: finite series | series  DOK: DOK 2

57. ANS: B  PTS: 1  DIF: L3  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 1 Finding the Sum of a Finite Arithmetic Series
KEY: series | finite series  DOK: DOK 2

58. ANS: C  PTS: 1  DIF: L2  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 1 Finding the Sum of a Finite Arithmetic Series
KEY: series | finite series  DOK: DOK 2

59. ANS: C  PTS: 1  DIF: L3  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 1 Finding the Sum of a Finite Arithmetic Series
KEY: series | finite series  DOK: DOK 2

60. ANS: B  PTS: 1  DIF: L3  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 2 Using the Sum of a Finite Arithmetic Series
KEY: series | finite series  DOK: DOK 3

61. ANS: C  PTS: 1  DIF: L3  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 3 Writing a Series in Summation Notation
KEY: series | finite series  DOK: DOK 2

62. ANS: A  PTS: 1  DIF: L2  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 3 Writing a Series in Summation Notation
KEY: series | finite series  DOK: DOK 2

63. ANS: A  PTS: 1  DIF: L3  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 3 Writing a Series in Summation Notation
KEY: series | finite series  DOK: DOK 2

64. ANS: A  PTS: 1  DIF: L3  REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 4 Finding the Sum of a Series
KEY: series | finite series  DOK: DOK 2
65. ANS: D PTS: 1 DIF: L3 REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 4 Finding the Sum of a Series KEY: series | finite series
DOK: DOK 2

66. ANS: A PTS: 1 DIF: L2 REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 5 Using a Graphing Calculator to Find the Sum of a Series
KEY: series | finite series

67. ANS: A PTS: 1 DIF: L3 REF: 9-4 Arithmetic Series
OBJ: 9-4.1 To define arithmetic series and find their sums
TOP: 9-4 Problem 5 Using a Graphing Calculator to Find the Sum of a Series
KEY: series | finite series
DOK: DOK 2

68. ANS: A PTS: 1 DIF: L4 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 1 Finding the Sums of Finite Geometric Series
KEY: geometric series DOK: DOK 2

69. ANS: A PTS: 1 DIF: L4 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 1 Finding the Sums of Finite Geometric Series
KEY: geometric series DOK: DOK 2

70. ANS: C PTS: 1 DIF: L3 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 1 Finding the Sums of Finite Geometric Series
KEY: geometric series DOK: DOK 2

71. ANS: C PTS: 1 DIF: L2 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 1 Finding the Sums of Finite Geometric Series
KEY: geometric series DOK: DOK 2

72. ANS: C PTS: 1 DIF: L3 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 1 Finding the Sums of Finite Geometric Series
KEY: geometric series DOK: DOK 2

73. ANS: A PTS: 1 DIF: L3 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 1 Finding the Sums of Finite Geometric Series
KEY: geometric series DOK: DOK 2

74. ANS: A PTS: 1 DIF: L2 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 2 Using the Geometric Series Formula
KEY: geometric series
DOK: DOK 3

75. ANS: B PTS: 1 DIF: L3 REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
STA: MA.912.D.11.2| MA.912.D.11.4
TOP: 9-5 Problem 2 Using the Geometric Series Formula
KEY: geometric series
DOK: DOK 3
76. ANS: D  PTS: 1  DIF: L3  REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
TOP: 9-5 Problem 2 Using the Geometric Series Formula
DOK: DOK 3

77. ANS: C  PTS: 1  DIF: L3  REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
TOP: 9-5 Problem 3 Analyzing Infinite Geometric Series
DOK: DOK 2

78. ANS: C  PTS: 1  DIF: L2  REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
TOP: 9-5 Problem 3 Analyzing Infinite Geometric Series
DOK: DOK 2

SHORT ANSWER

79. ANS:
   a. \(-4 + \left(\frac{4}{3}\right) + \left(-\frac{4}{9}\right) + \left(-\frac{4}{27}\right)\)
   b. converge
   c. \(-6\)

   PTS: 1  DIF: L4  REF: 9-5 Geometric Series
OBJ: 9-5.1 To define geometric series and find their sums
TOP: 9-5 Problem 3 Analyzing Infinite Geometric Series
DOK: DOK 2

ESSAY

80. ANS:
   [4] To find the number of sit-ups on Day 12, first write an explicit formula for the sequence using the explicit formula \(a_n = a_1 + (n - 1)d\). You can see that the first term, \(a_1\), is 17 and the common difference is 4. Substitute these values into the formula:
   \(a_n = 17 + (n - 1)4\). Next, substitute 12 into the formula for \(n\) and solve for \(a_n\):
   \(a_{12} = 17 + (12 - 1)4\). Simplify to find that \(a_n = 61\). She will do 61 sit-ups on Day 12.

   [3] correct procedure with one minor mathematical error
   [2] correct procedure with two minor mathematical errors
   [1] incomplete procedure or correct answer with no explanation or work shown

   PTS: 1  DIF: L3  REF: 9-2 Arithmetic Sequences
OBJ: 9-2.1 To define, identify, and apply arithmetic sequences
TOP: 9-2 Problem 4 Using an Explicit Formula for an Arithmetic Sequence
DOK: DOK 3
81. ANS: 

[4] a. The series written in summation notation is \( \sum_{n=1}^{18} (7n - 4) \). The lower limit is 1 for the first row and the number 18 is the upper limit for the 18th row. The expression \( 7n - 4 \) can be found by using the expression \( a_1 + (n - 1)d \). In this case, \( a_1 \) is 3 and \( d \) is 7. Substituting the values into the expression and simplifying results in \( 7n - 4 \).

b. To find the total number of beads, use the formula \( S_n = \frac{n}{2} (a_1 + a_n) \). In this case, \( n \) is 18 and \( a_n \) is \( 7(18) - 4 \) or 122. Substitute into the formula: \( S_n = \frac{18}{2} (3 + 122) \), or 1125. There are 1125 beads in the necklace.

PTS: 1  DIF: L4  REF: 9-4 Arithmetic Series  
OBJ: 9-4.1 To define arithmetic series and find their sums  
TOP: 9-4 Problem 2 Using the Sum of a Finite Arithmetic Series  
KEY: series | finite series  DOK: DOK 3