Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Algebra 3 Summer Math Assignment 2022 - Show all work.

Simplify:

1. $w^6 \cdot w^7 \cdot w^4$
   a. w^{17}
   b. $3w^{168}$
   c. $3w^{17}$
   d. w^{168}

2. $\left(-3c^8\right)\left(2c^6d^8\right)$
   a. $-6c^{14}d^8$
   b. $-6c^{48}d^8$
   c. $6c^{48}d^{14}$
   d. $6c^{14}d^{14}$

3. $\left(c^5\right)^2$
   a. c^7
   b. c^{10}
   c. $c^{5/2}$
   d. c^3

Simplify. Write your answer using exponents.

4. $\left(-3t^6r^8\right)^3$
   a. $-27t^{18}r^{24}$
   b. $27t^{18}r^{24}$
   c. $27t^9r$
   d. $-9t^9r^{11}$

Simplify:

5. $a^6 \cdot a^{-11}$
   a. a^{17}
   b. $\frac{1}{a^5}$
   c. -5^a
   d. $\frac{1}{a^{-5}}$

6. Write $8^0 \cdot 8^{-13}$ using positive exponents.
   a. $\frac{1}{8^{12}}$
   b. 8^0
   c. 8^{13}
   d. $\frac{1}{8^{13}}$

Factor the expression.

7. $x^2 + 7x + 10$
   a. $(x-10)(x-1)$
   b. $(x-5)(x-2)$
   c. $(x+10)(x+1)$
   d. $(x+5)(x+2)$

8. Write as the product of two factors: $x^2 + 3x - 40$
   a. $(x-5)(x+8)$
   b. $(x-5)(x-8)$
   c. $(x+5)(x-8)$
   d. $(x+5)(x+8)$

9. What are the solutions of the equation?

   $x^2 - 6x - 16 = 0$

   a. $x = -1$ or $x = 16$
   b. $x = -1$ or $x = -16$
   c. $x = -2$ or $x = 8$
   d. $x = 2$ or $x = -8$

10. Solve using factoring: $x^2 - 2x - 8 = 0$
    a. $-2, -4$
    b. $2, 4$
    c. $-2, 4$
    d. $-4, 2$

Factor the expression.

11. $9x^2 - 4$
    a. $(9x - 1)(x + 4)$
    b. $(3x + 2)(3x - 2)$
    c. $(9x + 1)(x - 4)$
    d. $(3x - 2)(3x - 2)$

12. Solve using factoring: $3x^2 + 5x - 12 = 0$
    a. $-\frac{4}{3}, 3$
    b. $4, -3$
    c. $8, -18$
    d. $\frac{4}{3}, -3$

Solve.

13. $x^2 + 5x = 0$
    a. $0, -5$
    b. $-5, 5$
    c. $0, 5$
    d. $1, -5$

14. $5x^2 - 3 = 242$
    a. no real-number solution
    b. $\pm\sqrt{245}$
    c. $\pm\sqrt{25}$
    d. ± 7

15. $3x^2 = 192$
    a. ± 8
    b. $\pm\sqrt{189}$
    c. $\pm\sqrt{576}$
    d. ± 24

16. $3(x + 7)^2 - 22 = -4$
    a. $18 \pm \sqrt{5}$
    b. $7 \pm \sqrt{6}$
    c. $-7 \pm \sqrt{6}$
    d. $-18 \pm \sqrt{5}$

17. Use the quadratic formula to solve:
    $2x^2 + 7x + 1 = 0$
    a. $\frac{-7 + \sqrt{41}}{4}, \frac{-7 - \sqrt{41}}{4}$
    b. $\frac{-7 + \sqrt{57}}{4}, \frac{-7 - \sqrt{57}}{4}$
    c. $\frac{7 + \sqrt{57}}{4}, \frac{7 - \sqrt{57}}{4}$
    d. $\frac{7 + \sqrt{41}}{4}, \frac{7 - \sqrt{41}}{4}$

Solve.

18. $7x^2 + 9x = -5$
    a. $\frac{-9 + i\sqrt{59}}{14}, \frac{-9 - i\sqrt{59}}{14}$
    b. $\frac{9 + i\sqrt{221}}{14}, \frac{9 - i\sqrt{221}}{14}$
    c. $\frac{-9 + i\sqrt{221}}{14}, \frac{-9 - i\sqrt{221}}{14}$
    d. $\frac{9 + i\sqrt{59}}{14}, \frac{9 - i\sqrt{59}}{14}$

19. Find the discriminant and determine the number of real solutions of the equation.
    $9x^2 - 30x + 25 = 0$
    a. 900; two
    b. -900; none
    c. 1800; two
    d. 0; one

20. Use the discriminant to determine the number and type of solutions of the equation.
    $5x^2 - 3x + 1 = 0$
    a. two real solutions
    b. one real solution
    c. two imaginary solutions

21. Find the minimum or maximum value of $f(x) = 2x^2 + 3x + 2$. Then state the domain and range of the function.
    a. The minimum value is 0.875. D:{$x \mid x \geq 0.875$ }; R:{all real numbers}
    b. The minimum value is 0.875. D: {all real numbers}; R: {$y \mid y \geq 0.875$}
    c. The maximum value is –0.75. D:{$x \mid x \geq 0.875$ }; R:{all real numbers}
    d. The maximum value is –0.75. D:{all real numbers}; R:{$y \mid y \geq 0.875$}

22. Divide $\frac{3x^8}{4x^7y} \div \frac{9}{4y^7}$. Assume that all expressions are defined.
    a. $\frac{3}{xy^6}$
    b. $\frac{x}{3y^6}$
    c. $\frac{xy^6}{3}$
    d. $\frac{27x}{16y^8}$

23. The area of a rectangle is equal to $x^2 + 10x + 21$ square units. If the length of the rectangle is equal to $x + 7$ units, what expression represents its width?
    a. $x - 3$
    b. $x + 14$
    c. x + 4.58
    d. $x + 3$

24. Identify the axis of symmetry for the graph of $f(x) = 2x^2 + 4x + 2$.
    a. $x = -1$
    b. $y = 0$
    c. $y = -1$
    d. $x = 0$

Find the sum or difference.

25. $\left(-9t^3 + 4t + 7\right) - \left(-5t^3 + t - 3\right)$
    a. $-4t^3 + 3t + 4$
    b. $-4t^3 + 5t + 4$
    c. $-4t^3 - 3t + -8$
    d. $-4t^3 + 3t + 10$

26. $\left(7n^5 + n^4 + 7\right) + \left(3n^5 + n - 5\right)$
    a. $4n^5 + n^4 - n + 12$
    b. $10n^5 + 2n^4 + 2$
    c. $4n^5 + n^4 + n + 12$
    d. $10n^5 + n^4 + n + 2$

Find the product.

27. $(k - 3)\left(k^2 + k - 1\right)$
    a. $k^3 - 2k^2 + 2k + 3$
    b. $k^3 + k^2 + 3$
    c. $k^3 - 4k^2 - 4k + 3$
    d. $k^3 - 2k^2 - 4k + 3$

28. Find the missing term: $(x+3)^2 = x^2 + 6x +$ _____ .
    a. 12
    b. 3
    c. 6
    d. 9

Divide.

29. $\left(c^3 + 343\right) \div (c+7)$
    a. $c^2 - 7c + 49$
    b. $c^2 + 49$
    c. $c^2 + 7c + 49$
    d. $c^2 - 49$

30. $\left(-2x^3 + 3x + 4\right) \div (x-2)$
    a. $-2x^2 - 4x - 5 - \frac{6}{x-2}$
    b. $-2x^2 - 4x + 11 - \frac{29}{x-2}$
    c. $-2x^2 - x + 2 + \frac{4}{x-2}$
    d. $-2x^2 - x + 2 + \frac{8}{x-2}$

31. $\left(3x^4 - 6x^3 - 18x - 23\right) \div (x-3)$
    a. $3x^3 + 3x^2 + 9x + 9 + 4$
    b. $3x^3 + 3x^2 + 9x + 9 + \frac{4}{x-3}$
    c. $3x^2 + 3x + 9 + 4$
    d. $3x^2 + 3x + 9 + \frac{4}{x-3}$

Factor the polynomial completely.

32. $5y^3 + 15y^2 + 10y$
    a. $5y(y+3)(y+2)$
    b. $y\left(5y^2 + 15y + 10\right)$
    c. $5y(y^2 + 3y + 2)$
    d. $5\left(y^3 + 3y^2 + 2y\right)$

Find the real-number solutions of the equation.

33. $c^3 + 3c^2 = 0$
    a. 0, –3
    b. –3, 2
    c. 0, 3
    d. 3, –3

34. Find the real solutions of the equation $x^3 - 7x^2 - 4x + 28 = 0$
    a. The solutions are -2, 2, 7
    b. The solutions are: -3, 7, -7.
    c. The solutions are 3, 2, -2.
    d. The solutions are: -3, -2, 2.

35. Simplify $(x-3) \cdot \left(\frac{x-2}{x^2-9}\right)$
    a. $\frac{x-2}{x+3}$
    b. $\frac{x-2}{(x-3)\left(x^2-9\right)}$
    c. $\frac{x-2}{x-3}$
    d. $\frac{x+2}{x+3}$

36. Simplify $\frac{x^2+9x+20}{x^2-16} \div \frac{x+5}{x-5}$
    a. $\frac{x-9}{x-4}$
    b. $\frac{x-5}{x-4}$
    c. $\frac{x+4}{x-5}$
    d. $\frac{9x+5}{4}$

37. The cost of a school banquet is $75 plus $11 for each person attending. Write an equation that gives total cost as a function of the number of people attending. What is the cost for 86 people?
    a. $y = 11x + 75$; $1021
    b. $y = 11x - 75$; $871
    c. $y = 75x - 11$; $6439
    d. $y = 75x + 11$; $6461

38. Write an equation of the line that passes through $(-5, -6)$ and is parallel to the line $y = -2x - 9$.
    a. $y = -5x - 16$
    b. $y = -2x - 9$
    c. $y = -2x - 16$
    d. $y = -5x - 9$

39. A rectangle has a length of $x - 8$ and a width of $x - 2$. Which equation below describes the perimeter, P, of the rectangle in terms of x?
    a. $P = 4x - 20$
    b. $P = x^2 - 10x + 16$
    c. $P = x - 10$
    d. $P = 2x - 10$

40. Write an equation of the line containing the points $(-1, 11)$ and $(-4, 2)$.
    a. $y = 3x + 26$
    b. $y = -x + 13$
    c. $y = -3x - 26$
    d. $y = x - 4$

41. Simplify $8^{4/3}$.
    a. 16
    b. 8
    c. $\frac{32}{3}$
    d. $\frac{1}{2}$

42. Which gives the solution(s) of the equation $\sqrt[3]{x-3} = 2$?
    a. -5
    b. 11
    c. 7
    d. $11, -5$

43. Solve $5^{x+2} = 25^{x}$.
    a. $x = -1$
    b. $x = 2$
    c. $x = -2$
    d. $x = 1$

Solve:

44. $\frac{1}{125} = 25^{8x-5}$
    a. $\frac{7}{16}$
    b. $-\frac{13}{16}$
    c. $\frac{1}{4}$
    d. $\frac{13}{16}$

45. Determine whether the binomial $(x - 6)$ is a factor of the polynomial $P(x) = x^3 - 9x^2 + 20x - 12$.
    a. Cannot determine.
    b. $(x - 6)$ is a factor of the polynomial $P(x) = x^3 - 9x^2 + 20x - 12$.
    c. $(x - 6)$ is not a factor of the polynomial $P(x) = x^3 - 9x^2 + 20x - 12$.

Solve the equation. Check for extraneous solutions.

46. $\frac{4}{j+6} = j + 3$
    a. 0
    b. 2
    c. 1
    d. $-7, -2$

47. $\frac{2}{t^2 - 9} = \frac{2}{t+3}$
    a. 5
    b. 4
    c. 6
    d. 3

48. $\frac{x-2}{x-6} = \frac{x+5}{x-4}$
    a. $\frac{38}{5}$
    b. $\frac{22}{5}$
    c. $-\frac{22}{3}$
    d. $-\frac{15}{4}$

49. Given $f(x) = 4x^2 + 8x - 2$ and $g(x) = -6x + 7$, find $(f-g)(x)$.
    a. $(f-g)(x) = 4x^2 + 2x + 5$
    b. $(f-g)(x) = 10x^2 + 8x - 9$
    c. $(f-g)(x) = 10x^2 + x - 2$
    d. $(f-g)(x) = 4x^2 + 14x - 9$

50. Given $f(x) = x^3$ and $g(x) = 4x + 4$, find $g(f(3))$.
    a. $g(f(3)) = 4,096$
    b. $g(f(3)) = 108$
    c. $g(f(3)) = 112$
    d. $g(f(3)) = 432$

51. Rewrite the polynomial $-x^3 + 16 + 12x^4 + 11x^2 + 8x^5 + 6x$ in standard form. Then, identify the leading coefficient, degree, and number of terms. Name the polynomial.
    a. $8x^5 + 12x^4 - x^3 + 11x^2 + 6x + 16$
    leading coefficient: 8; degree: 5; number of terms: 6; name: quintic polynomial
    b. $16 + 6x + 11x^2 + 12x^3 - x^4 + 8x^5$
    leading coefficient: 16; degree: 0; number of terms: 6; name: quintic polynomial
    c. $16 + 6x + 11x^2 - x^3 + 12x^4 + 8x^5$
    leading coefficient: 16; degree: 0; number of terms: 6; name: quintic polynomial
    d. $8x^5 + 12x^4 + 11x^3 - x^2 + 6x + 16$
    leading coefficient: 8; degree: 5; number of terms: 6; name: quintic polynomial

52. Find the product $-a^6b^3(-5a^5b^4 + 5a^3b^4)$.
    a. $5a^{11}b^7 - 5a^9b^7$
    b. $5a^{30}b^{12} - 5a^{18}b^{12}$
    c. $-6a^{11}b^7 + 4a^9b^7$
    d. $-a^{12}b^8 - a^{10}b^8$

53. Graph $f(x) = 3x^3 - 27x + 7$ on a calculator, and estimate the local maxima and minima.
    a. The local maximum is about 31.176915. The local minimum is about –31.176915.
    b. The local maximum is about –24.176915. The local minimum is about 38.176915.
    c. The local maximum is about 24.176915. The local minimum is about –38.176915.
    d. The local maximum is about 38.176915. The local minimum is about –24.176915.

54. Write a function that transforms $f(x) = 2x^3 + 4$ in the following way:

    stretch vertically by a factor of 5 and shift 3 units left.
    a. $g(x) = 10(x+3)^3 + 20$
    b. $g(x) = 10x^3 + 7$
    c. $g(x) = 10(x+3)^3 + 4$
    d. $g(x) = 10(x-3)^3 + 4$

55. How many turning points will a degree seven polynomial function with seven real zeros have?

Evaluate:

56. $\log_3 729$

a. $\frac{1}{6}$

b. 18

c. 6

d. $\frac{1}{18}$

57. Solve for x to the nearest hundredth: $4.85^x = 17$

a. 1.79

b. 0.69

c. 1.23

d. 0.56

58. If there are initially 2000 bacteria in a culture, and the number of bacteria double each hour, the number of bacteria after t hours can be found using the formula $N = 2000\left(2^t\right)$. How long will it take the culture to grow to 60,000 bacteria?

a. 29 hr

b. 2.96 hr

c. 4.91 hr

d. 1.48 hr

59. Write the exponential equation $2^3 = 8$ in logarithmic form.

a. $\log_2 8 = 3$

b. $\log_2 3 = 8$

c. $\log_3 8 = 2$

d. $\log_8 2 = 3$

60. Express $\log_2 64 - \log_2 4$ as a single logarithm. Simplify, if possible.

a. $\log_2 60$

b. 4

c. 8

d. $\log_2 4$

61. Mira bought $300 of Freerange Wireless stock in January of 1998. The value of the stock is expected to increase by 7.5% per year. Use a graph to predict the year the value of Mira's stock will reach $700.

a. 2004

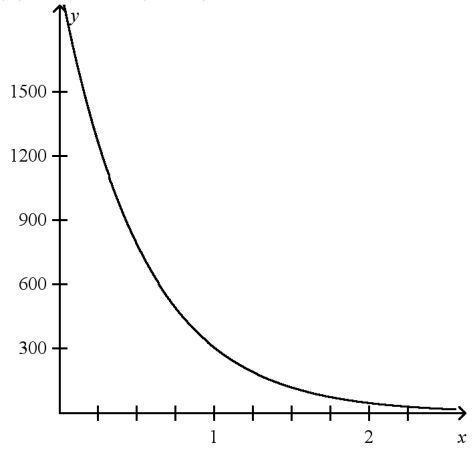
b. 1999

c. 2014

d. 2009

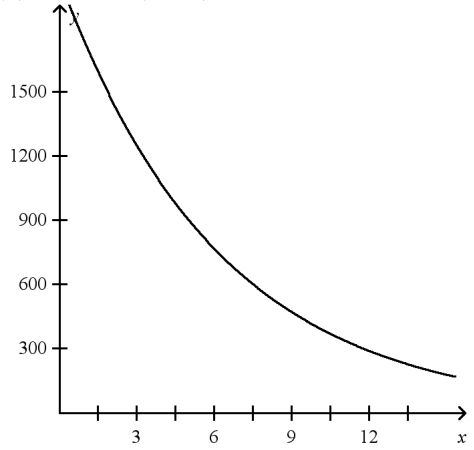
62. A bacteria population starts at 2,032 and decreases at about 15% per day. Write a function representing the number of bacteria present each day. Graph the function. After how many days will there be fewer than 321 bacteria?

a. $f(x) = 2,032(0.15)t$



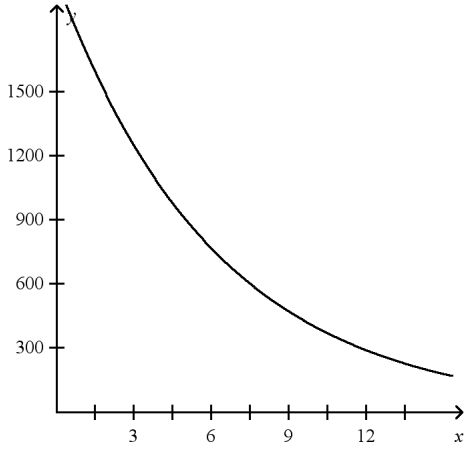
After about 1.05 days, there will be fewer than 321 bacteria.

b. $f(x) = 2,032(0.85)t$



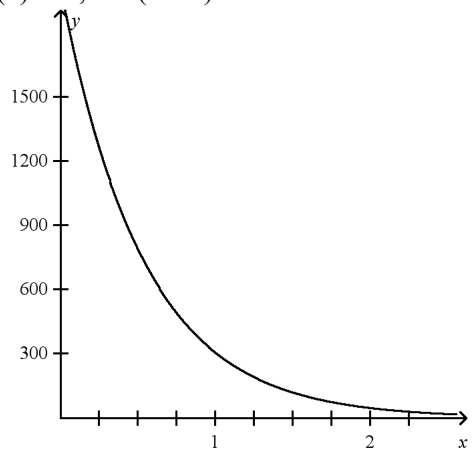
After about 0.19 days, there will be fewer than 321 bacteria.

c. $f(x) = 2032(0.85)^t$



After about 11.3 days, there will be fewer than 321 bacteria.

d. $f(x) = 2,032(0.15)^t$



After about 0.97days, there will be fewer than 321 bacteria.

63. A initial investment of $10,000 grows at 11% per year. What function represents the value of the investment after t years?
    a. $f(t) = 10000(1.11)^t$
    b. $f(t) = 10000(1.11)t$
    c. $f(t) = 10000(12)^t$
    d. $f(t) = 10000(0.11)^t$

64. Evaluate $\log_9 243$. If necessary, round your answer to the nearest tenth.
    a. 3
    b. 2.5
    c. 1.4
    d. 27

65. Simplify $\ln e^{-5x}$.
    a. -5
    b. e^{-5x}
    c. e^{-5}
    d. $-5x$

66. Express $\log_3 27^{-3}$ as a product. Simplify, if possible.
    a. $\frac{1}{27}$
    b. 3
    c. 9
    d. -9

67. Express $\log_3 6 + \log_3 4.5$ as a single logarithm. Simplify, if possible.
    a. $\log_6 10.5$
    b. 3
    c. $\log_3 10.5$
    d. 27

68. Simplify $\log_7 x^3 - \log_7 x$.
    a. $\log_7 2x$
    b. $2(x^3 - x)$
    c. $2\log_7 x$
    d. $\log_7 (x^3 - x)$

69. Solve $\log_5 x^{10} - \log_5 x^6 = 21$.
    a. $x = 21^{\frac{1}{4}}$
    b. $x = 5^{\frac{21}{4}}$
    c. $x = 5^{\frac{4}{21}}$
    d. $x = 21^4$