Study Guide and Review - Chapter 7

Choose the word or term that best completes each sentence.

1. $7xy^4$ is an example of a(n)_____ .

   ANSWER:
   monomial

2. The _____ of 95,234 is 10^5.

   ANSWER:
   order of magnitude

3. 2 is a(n) _____ of 8.

   ANSWER:
   cube root

4. The rules for operations with exponents can be extended to apply to expressions with a(n) _____ such as $7^{\frac{2}{3}}$.

   ANSWER:
   rational exponent

5. A number written in is of the form $a \times 10^n$, where $1 \leq a < 10$ and n is an integer.

   ANSWER:
   scientific notation

6. $f(x) = 3^x$ is an example of a(n) _____ .

   ANSWER:
   exponential function

7. $a_1 = 4 \text{ and } a_n = 3a_{n-1} + 16, \text{ if } n \geq 2,$ is a(n) _____ for the sequence $4, -8, -20, -32, \ldots$.

   ANSWER:
   recursive formula

8. $2^{3x-1} = 16$ is an example of a(n) _____ .

   ANSWER:
   exponential equation

9. The equation for _____ is $y = C(1 - r)^t$.

   ANSWER:
   exponential decay

10. If $a^n = b$ for a positive integer n, then a is a(n) _____ of b.

    ANSWER:
    nth root

Simplify each expression.

11. $x \cdot x^3 \cdot x^5$

ANSWER:

x^9

12. $(2xy)(-3x^2y^5)$

ANSWER:

$-6x^3y^6$

13. $(-4ab^4)(-5a^5b^2)$

ANSWER:

$20a^6b^6$

14. $(6x^3y^2)^2$

ANSWER:

$36x^6y^4$

15. $[(2r^3t)^3]^2$

ANSWER:

$64r^{18}t^6$

16. $(-2u^3)(5u)$

ANSWER:

$-10u^4$

17. $(2x^2)^3(x^3)^3$

ANSWER:

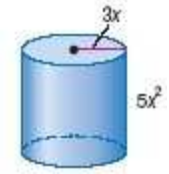
$8x^{15}$

18. $\frac{1}{2}(2x^3)^3$

ANSWER:

$4x^9$

19. **GEOMETRY** Use the formula $V = \pi r^2 h$ to find the volume of the cylinder.



ANSWER:

$45\pi x^4$

Simplify each expression. Assume that no denominator equals zero.

20. $\dfrac{(3x)^0}{2a}$

ANSWER:

$\dfrac{1}{2a}$

21. $\left(\dfrac{3xy^3}{2z}\right)^3$

ANSWER:

$\left(\dfrac{27x^3y^9}{8z^3}\right)$

22. $\left(\dfrac{12y^{-4}}{3y^{-5}}\right)$

ANSWER:

$4y$

23. $a^{-3}b^0c^6$

ANSWER:

$\dfrac{c^6}{a^3}$

24. $\dfrac{-15x^7y^8z^4}{-45x^3y^5z^3}$

ANSWER:

$\dfrac{x^4y^3z}{3}$

25. $\frac{(3x^{-1})^{-2}}{(3x^2)^{-2}}$

ANSWER:

x^6

26. $\left(\frac{6xy^{11}z^9}{48x^6yz^{-7}}\right)^0$

ANSWER:

1

27. $\left(\frac{12}{2}\right)\left(\frac{x}{y^5}\right)\left(\frac{y^4}{x^4}\right)$

ANSWER:

$\frac{6}{yx^3}$

28. **GEOMETRY** The area of a rectangle is $25x^2y^4$ square feet. The width of the rectangle is $5xy$ feet. What is the length of the rectangle?

ANSWER:

$5xy^3$ ft

Simplify.

29. $\sqrt[3]{343}$

ANSWER:

7

30. $\sqrt[6]{729}$

ANSWER:

3

31. $625^{\frac{1}{4}}$

ANSWER:

5

32. $\left(\frac{8}{27}\right)^{\frac{1}{3}}$

ANSWER:
$\frac{2}{3}$

33. $256^{\frac{3}{4}}$

ANSWER:
64

34. $32^{\frac{2}{5}}$

ANSWER:
4

35. $343^{\frac{4}{3}}$

ANSWER:
2401

36. $\left(\frac{4}{49}\right)^{\frac{3}{2}}$

ANSWER:
$\frac{8}{343}$

Solve each equation.

37. $6^x = 7776$

ANSWER:
5

38. $4^{4x-1} = 32$

ANSWER:
$\frac{7}{8}$

Express each number in scientific notation.

39. 2,300,000

ANSWER:
2.3×10^6

40. 0.0000543

ANSWER:
5.43×10^{-5}

41. **ASTRONOMY** Earth has a diameter of about 8000 miles. Jupiter has a diameter of about 88,000 miles. Write in scientific notation the ratio of Earth's diameter to Jupiter's diameter.

ANSWER:

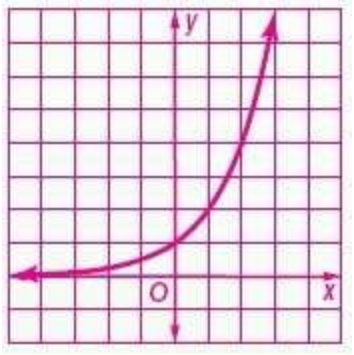
about 9.1×10^{-2}

Graph each function. Find the *y*-intercept, and state the domain and range.

42. $y = 2^x$

ANSWER:

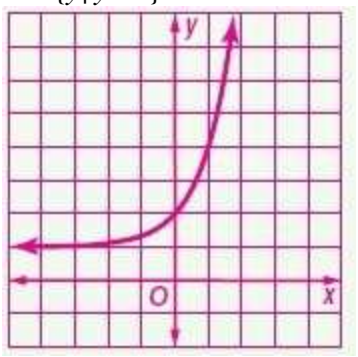
1; D = all real numbers;
R = $\{y \mid y > 0\}$



43. $y = 3^x + 1$

ANSWER:

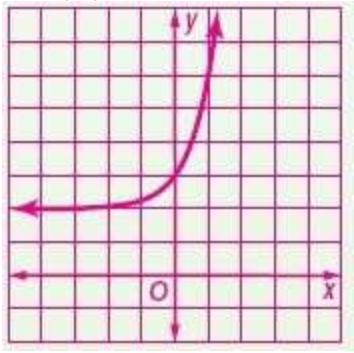
2; D = all real numbers;
R = $\{y \mid y > 1\}$



44. $y = 4^x + 2$

ANSWER:

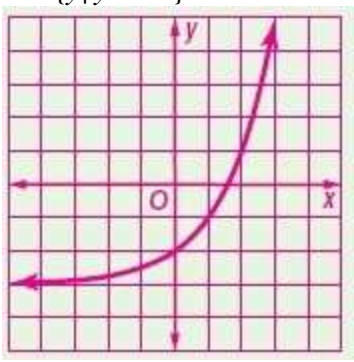
3; D = all real numbers;
R = $\{y \mid y > 2\}$



45. $y = 2^x - 3$

ANSWER:

−2; D = all real numbers;
R = $\{y \mid y > -3\}$



46. **BIOLOGY** The population of bacteria in a petri dish increases according to the model $p = 550(2.7)^{0.008t}$, where t is the number of hours and $t = 0$ corresponds to 1:00 P.M. Use this model to estimate the number of bacteria in the dish at 5:00 P.M.

ANSWER:

about 568

47. Find the final value of $2500 invested at an interest rate of 2% compounded monthly for 10 years.

ANSWER:

$3053.00

48. **COMPUTERS** Zita's computer is depreciating at a rate of 3% per year. She bought the computer for $1200.
a. Write an equation to represent this situation.
b. What will the computer's value be after 5 years?

ANSWER:

a. $1200(1 - 0.03)^t$
b. $1030.48

Find the next three terms in each geometric sequence.

49. −1, 1, −1, 1, ...

ANSWER:

−1, 1, −1

50. 3, 9, 27 ...

ANSWER:

81, 243, 729

51. 256, 128, 64, ...

ANSWER:

32, 16, 8

Write the equation for the *n*th term of each geometric sequence.

52. −1, 1, −1, 1, ...

ANSWER:

$a_n = -1(-1)^{n-1}$

53. 3, 9, 27, ...

ANSWER:

$a_n = 3(3)^{n-1}$

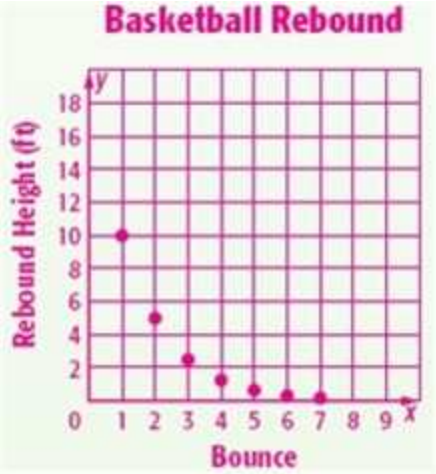
54. 256, 128, 64, ...

ANSWER:

$a_n = 256\left(\frac{1}{2}\right)^{n-1}$

55. **SPORTS** A basketball is dropped from a height of 20 feet. It bounces to $\frac{1}{2}$ its height each bounce. Draw a graph to represent the situation.

ANSWER:



Find the first five terms of each sequence.

56. $a_1 = 11, a_n = a_{n-1} - 4, n \geq 2$

ANSWER:
11, 7, 3, –1, –5

57. $a_1 = 3, a_n = 2a_{n-1} + 6, n \geq 2$

ANSWER:
3, 12, 30, 66, 138

Write a recursive formula for each sequence.

58. 2, 7, 12, 17, ...

ANSWER:
$a_1 = 2, a_n = a_{n-1} + 5, n \geq 2$

59. 32, 16, 8, 4, ...

ANSWER:
$a_1 = 32, a_n = 0.5a_{n-1}, n \geq 2$

60. 2, 5, 11, 23, ...

ANSWER:
$a_1 = 2, a_n = 2a_{n-1} + 1, n \geq 2$