Name _____ Date _____

Chapter 6 Test

Simplify the expression. Write your answer using only positive exponents.

1. $\frac{2^{-3}x^0}{y^{-4}}$ $\frac{x^0y^4}{2^3} = \frac{y^4}{8}$

2. 3^0 anything to zero power equals 1

3. $5^{-6} \cdot 5^3$ $5^{-3} = \frac{1}{5^3}$

4. $(-4x^2)^3$ $(-4)^3(x^2)^3 = -64x^6$

5. $\left(\frac{1}{3a^3}\right)^{-4} = \left(\frac{3a^3}{1}\right)^4$ $(3)^4(a^3)^4$

6. $12c^{-7}d^6$ $\frac{12d^6}{c^7}$

Evaluate the expression.

7. $-\sqrt[3]{216} = -6$

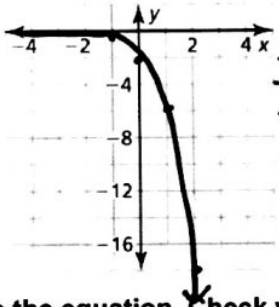
8. $(64)^{5/3}$ $\sqrt[3]{64}^5 = 4^5 =$

9. $(-8)^{2/3}$ $\sqrt[3]{-8}^2 = (-2)^2$

Graph the function. Describe the domain and range.

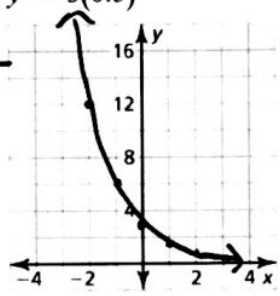
10. $y = -2(3)^x$

x	$-2(3)^x$	y
-2	$-2(3)^{-2}$	$-2/6$
-1	$-2(3)^{-1}$	$-\frac{2}{3}$
0	$-2(3)^0$	-2
1	$-2(3)^1$	-6
2	$-2(3)^2$	-18
3	$-2(3)^3$	-54



11. $y = 3(0.5)^x$

x	$3(0.5)^x$	y
-3	$3(0.5)^{-3}$	24
-2	$3(0.5)^{-2}$	12
-1	$3(0.5)^{-1}$	6
0	$3(0.5)^0$	3
1	$3(0.5)^1$	$\frac{3}{2}$
2	$3(0.5)^2$	$\frac{3}{4}$
3	$3(0.5)^3$	$\frac{3}{8}$



Solve the equation. Check your solution.

12. $3^x = \frac{1}{81}$ $3^x = 3^{-4}$ $x = -4$

13. $25^{2x-3} = 125^{x+1}$ $(5^2)^{2x-3} = (5^3)^{x+1}$ $4x - 6 = 3x + 3$ $-3x + 6 \quad -3x + 6$ $x = 9$

15. You buy a used car for $6599. Its value decreases by 12% every year.

a. Write a function that represents the value y (in dollars) of the car after t years. $y = a(1-r)^t = y = 6599(1-.12)^t$ $y = 6599(0.88)^t$

b. What is the value of the car after 2.5 years?

c. What is the value of the car after 20 years?

d. According to the model, when will the value of the car be zero?

b. $y = 6599(0.88)^{2.5}$

$6599\ [(0.88) \times^y 2.5]$

$4793.854061 = 4793.85$

c. $y = 6599(0.88)^{20}$

$6599\ [(0.88) \times^y 20]$

511.8368752

511.84

Answers

1. $\frac{y^4}{8}$
2. 1
3. $\frac{1}{125}$
4. $-64x^6$
5. $81a^{12}$
6. $\frac{12d^6}{c^7}$
7. -6
8. 1024
9. 4
10. See left.

d: ARN r: y<0

11. See left.

d: ARN r: y>0

12. -4
13. 9
15. a. $y = 6599(0.88)^t$

b. 4793.85

c. 511.84

d. NEVER: IT APPROACHES ZERO BUT WILL NOT REACH IT!

Name _____ Date _____

Chapter 6 Test (continued)

Determine whether the table represents an *exponential growth function*, an *exponential decay function*, or *neither*.

16.

x	1	2	3	4
y	2	8	24	128

×4 ×3 ×5.3

17.

x	0	1	2	3
y	40	20	10	5

÷2 ÷2 ÷2

Evaluate the function for the given value of *x*.

18. $y = 2^x$; $x = 5$ $y = 2^5$

19. $f(x) = 3(4)^x$; $x = -1$ $3(4)^{-1} = 3 \cdot \frac{1}{4} = \frac{3}{4}$

20. $f(x) = \frac{1}{2}(5)^x$; $x = 3$ $\frac{1}{2}(5)^3 = \frac{1}{2}(125)$

21. $y = 0.5^x$; $x = -4$ $(0.5)^{-4} = \left(\frac{1}{2}\right)^{-4} = (2)^4$

22. The bacteria *E. coli* often cause illness among people who eat infected food. Suppose that a **single** *E. coli* bacterium in a batch of ground beef begins **doubling** every minute.

a. Complete the table below that represents the number of bacteria after *x* minutes. (Assume no bacteria die.)

Minutes, x	0	1	2	3	4	5	6
Number of bacteria, y	1	2	4	8	16	32	64

b. Write an equation that can be used to calculate the number of bacteria in the food after any number of minutes. **(BONUS)** HINT: DOUBLING

c. How many bacteria will there be after 20 minutes? $y = 2^{20}$

Answers

16. neither
17. expo decay
18. 32
19. $\frac{3}{4}$
20. 62.5
21. 16
22. a. See left.
b. $y = 2^x$
c. 1048576

Solve the equation. Check your solution.

23. $3^{8x} = 3^{6x-12}$ (−6)

24. $4^{2x} = 2^{5x+3}$ (−3)

25. $8^{5x} = 4^{4x+7}$ (2)

26. $125^{x-1} = 5^{3x-2}$ (NS)

$(5^3)^{x-1} = 5^{3x-2} \rightarrow 3x-3 = 3x-2$
$-3x \quad -3x$
$-3 \neq -2$

27. $9^{x-6} = 729^{3(x+2)}$ below (−1.5)

28. $\left(\frac{1}{8}\right)^{2x+4} = 16^{4-x}$ (−14)

$(2^{-3})^{2x+4} = (2^4)^{4-x}$
$-6x-12 = 16-4x$
$-28 = 2x$

Solve the equation.

29. $8^{2x+1} = 1$

$8^{2x+1} = 8^0$
$2x+1 = 0$
$-1 \quad -1$
$\frac{2x}{2} = \frac{-1}{2}$
$x = -\frac{1}{2}$

30. $3^{8(2x-1)} = 81^{4x-2}$

$3^{16x-8} = (3^4)^{4x-2}$
$16x-8 = 16x-8$
(IM)

31. $\left(\sqrt[5]{3}\right)^x = 3^{3x-5}$

$3^{\frac{1}{5}x} = 3^{3x-5}$

(31) $\frac{1}{5}x = 3x-5$
$-3x \quad -3x$
$\frac{5}{-14} \cdot \frac{-14}{5}x = -5 \cdot \frac{5}{-14}$
$x = \frac{25}{14}$

(23) $8x = 6x-12$
$-6x \quad -6x$
$\frac{2x}{2} = \frac{-12}{2}$
$\boxed{x = -6}$

(24) $(2^2)^{2x} = 2^{5x+3}$
$4x = 5x+3$
$-5x \quad -5x$
$-x = 3$
$\boxed{x = -3}$

(27) $(3^2)^{x-6} = (3^6)^{3(x+2)}$
$2x-12 = 6(3x+6)$
$2x-12 = 18x+36$
$-2x-36 \quad -2x \quad -36$
$\frac{-24}{16} = \frac{16x}{16}$
$-1.5 = x$

(25) $(2^3)^{5x} = (2^2)^{4x+7}$
$15x = 8x+14$
$-8x \quad -8x$
$\frac{7x}{7} = \frac{14}{7}$
$\boxed{x = 2}$