

Unit 6 Study Guide

Name Key

Simplify. Leave no negative exponents.

1) $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$$\boxed{2^5}$$

2) $-3 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y$

$$\boxed{-9x^3y^4}$$

3) $m^2n^4m^5n^{-8}$

$$\frac{n^7}{m^7} n^{-4}$$

4) 3^{-3}

$$\frac{1}{3^3} = \boxed{\frac{1}{27}}$$

5) $5^3 \cdot 5^4$

$$\boxed{5^7}$$

6) $\frac{t^2}{t^{-3}}$

$$\boxed{t^5}$$

7) $\frac{1y^0}{x^2y^{-5}}$

$$\boxed{\frac{y^5}{x^2}}$$

8) $\frac{2x^{-5}}{x^{-3}}$

$$\boxed{\frac{2}{x^2}}$$

9) $\frac{s^{11}t^3}{s^{13}t^3}$

$$\boxed{\frac{1}{s^2}}$$

10) $(4x)(3x^5y^7)(-4xy^{-3})$

11) $\frac{7x^4yz^{-7}}{21x^{-4}y^6z^{-2}}$

12) $(3x^{-4}y^6z^3)^{-5}$

$$\boxed{-48x^7y^4}$$

$$\boxed{\frac{x^8}{3y^5z^5}}$$

$$\boxed{\frac{x^{20}}{3^5 y^{30} z^{15}}} \quad 3^{-5} x^{20} y^{-30} z^{-15}$$

13) $3x^5 \left(\frac{3x^2}{y} \right)^{-1}$

$$\frac{3x^5}{1} \cdot \frac{y}{3x^2}$$

14) $\left(\frac{x^{-5}}{y^3} \right)^4 \left(\frac{y^{-2}}{x^4} \right)^{-7}$

$$\frac{x^{-20}}{y^{12}} \cdot \frac{y^{14}}{x^{-28}}$$

15) $2x^{-2}y^3z^{-3}$

$$\boxed{\frac{2y^3}{x^2z^3}}$$

16) $\left(\frac{1x^4y^3}{2z^{-8}} \right)^0$

$$\boxed{1}$$

$$\boxed{x^3y}$$

$$\boxed{x^8y^2}$$

17) $(3x^2y^3)^5$

$3^5 x^{10} y^{15}$

18) $\left(\frac{x^2}{y^{-4}}\right)^{-2} \left(\frac{x^{-2}}{y^3}\right)$

$$\frac{x^{-4}}{y^8} \cdot \frac{x^{-2}}{y^3}$$

$\boxed{\frac{1}{y^{11} x^6}}$

19) $\left(\frac{9n^2 n^3}{6n^4}\right)^3$

$$\left(\frac{3m}{2n^4}\right)^3$$

$\boxed{\frac{27m^3}{8n^{12}}}$

Explain if each is linear or exponential. Then, write the equation.

20.

X	-2	-1	0	1	2	3
Y	3	5	7	9	11	13

$\nearrow +2 \quad \nearrow +2 \quad \nearrow +2$

$y = 2x + 7$ linear

21.

x	-2	-1	0	1	2	3
y	1	2	4	8	16	32

$\nearrow \times 2 \quad \nearrow \times 2$

$y = 4 \cdot 2^x$ exp. growth

22.

X	-2	-1	0	1	2
Y	12.5	10	8	6.4	5.12

$y = 8 \cdot \left(\frac{4}{5}\right)^x$

exp. decay

23.

x	-2	-1	0	1	2	3
y	7	3	-1	-5	-9	-13

$y = -4x - 1$

linear

Explain if the following exponential model is growth or decay.

24) $y = 16(1.20)^x$

G

25) $y = 12(.80)^x$

D

26) $y = \frac{1}{3} \cdot \left(\frac{7}{2}\right)^x$

G

27) $y = 10 \left(\frac{5}{4}\right)^{-x} = 10 \left(\frac{4}{5}\right)^x$

D

28) $y = 12 \left(\frac{4}{5}\right)^x$

D

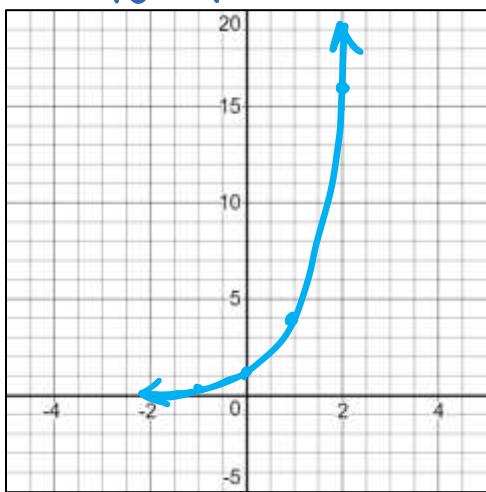
29) $y = \left(\frac{2}{7}\right)^{-x} = \left(\frac{7}{2}\right)^x$

G

Graph the following exponential functions.

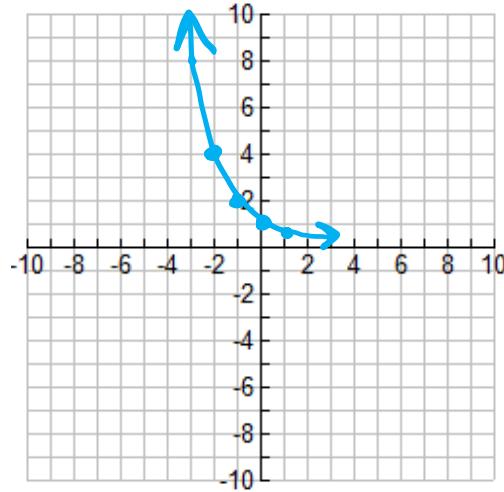
30) $y = 4^x$

x	-2	-1	0	1	2
y	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16



31) $y = \left(\frac{1}{2}\right)^x$

x	-2	-1	0	1	2
y	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$



Answer the following exponential growth/decay problems.

- 32) You deposit \$5,000 in an account that pays 5.7% interest compounded yearly. What will the account balance for the given number of years?
(Round to the nearest penny)

a) 3 years

$$y = 5000(1.057)^3$$

b) 7 years

$$y = 5000(1.057)^7$$

c) 18 months

$$y = 5000(1.057)^5$$

$$y = 5000(1.057)^t$$

$$\approx \$5904.66$$

$$\approx \$7370.47$$

$$\approx \$5433.54$$

- 33) The population of Carl Sandburg High School has been decreasing by about 5% each year. In 2005 there were about 3,500 people at Sandburg. What will be Carl Sandburg's population in.....

(Round to the nearest person)

a) 3 years

$$y = 3500(.95)^3$$

b) 7 years

$$y = 3500(.95)^7$$

c) 12 years

$$y = 3500(.95)^{12}$$

$$\approx 3001 \text{ students}$$

$$\approx 2444 \text{ students}$$

$$\approx 1891 \text{ students}$$