

# Exponential Functions Review

## SIMPLIFYING EXPONENTIAL EXPRESSIONS

Use properties of exponents to simplify each expression.

1.  $(2a^2)^3$   
 $= 2^3 a^{2 \cdot 3}$   
 $= 8a^6$

2.  $(2x^4)(3x^3)$   
 $= 2 \cdot 3 x^{4+3}$   
 $= 6x^7$

3.  $[(2^3)^3]^2$   
 $= 2^{3 \cdot 3 \cdot 2}$   
 $= 2^{18} = 262,144$

4.  $\frac{x^8}{x^6} = x^{8-6} = x^2$

5.  $\frac{b^3 c^{-2}}{a^{-5}} = \frac{b^3 a^5}{c^2}$   
 "fraction train"

6.  $\left(\frac{8x^3}{y}\right)^2$   
 $= \frac{8^2 x^{3 \cdot 2}}{y^2} = \frac{64x^6}{y^2}$

## SCIENTIFIC NOTATION

Express each number in scientific notation.

7. 980,200,000,000,000  
 $9.802 \times 10^{14}$

8. 0.000000000008  
 $8 \times 10^{-11}$

Express each number in standard form.

9.  $1.86 \times 10^{-4}$   
 0.000186

10.  $4.9 \times 10^5$   
 490,000

Simplify. Show your work.

11.  $(8.8 \times 10^8)(3.5 \times 10^{-13})$   
 ①  $8.8 \times 3.5 = 30.8$   
 ②  $10^{8+(-13)} = 10^{-5}$   
 $30.8 \times 10^{-5+1}$   
 $3.08 \times 10^{-4}$

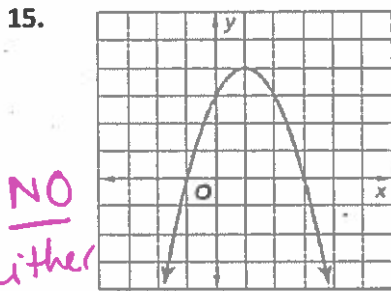
12.  $(1.35 \times 10^8)(7.2 \times 10^{-4})$   
 ①  $1.35 \cdot 7.2 = 9.72$   
 ②  $10^{8+(-4)} = 10^4$   
 $9.72 \times 10^4$

13.  $\frac{(2.376 \times 10^{-4})}{(7.2 \times 10^{-8})}$   
 ①  $2.376 \div 7.2 = .33$   
 ②  $10^{-4-(-8)} = 10^4$   
 ③  $.33 \times 10^{4-1}$   
 $3.3 \times 10^3$

14.  $\frac{(8.74 \times 10^{-3})}{(1.9 \times 10^5)}$   
 ①  $8.74 \div 1.9 = 4.6$   
 ②  $10^{-3-5} = 10^{-8}$   
 $4.6 \times 10^{-8}$

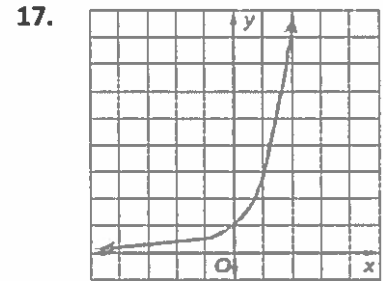
## EXPONENTIAL FUNCTIONS

Determine if the functions shown demonstrates exponential growth, decay, or neither.



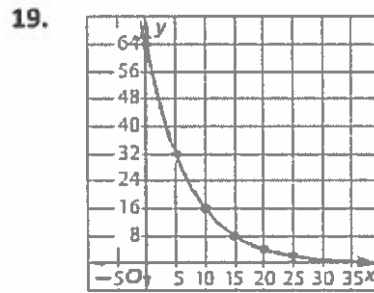
NO  
neither

16.  $y = \left(\frac{1}{4}\right)^x$   
 $\rightarrow 0 < \frac{1}{4} < 1$   
 yes,  
 decay



growth

18.  $y = 2^x$   
 $> 1$   
 growth



decay

20.  $y = x^3$   
 neither

Determine whether the set of data shown below displays exponential behavior. Write yes or no. If yes, name the common factor:

21. 

x	-3	-2	-1	0
y	9	12	15	18

$\frac{12}{9} = \frac{4}{3}$  |  $\frac{15}{12} = \frac{5}{4}$  |  $\frac{18}{15} = \frac{6}{5}$   
 NO

22. 

x	0	5	10	15
y	20	10	5	2.5

$\frac{10}{20} = \frac{1}{2}$  |  $\frac{5}{10} = \frac{1}{2}$  |  $\frac{2.5}{5} = \frac{1}{2}$   
 yes, decay, c.f. =  $\frac{1}{2}$

23. 

x	4	8	12	16
y	20	40	80	160

$\frac{40}{20} = 2$  |  $\frac{80}{40} = 2$  |  $\frac{160}{80} = 2$

yes, growth, c.f. = 2

24. 

x	50	30	10	-10
y	90	70	50	30

$\frac{70}{90} = \frac{7}{9}$  |  $\frac{50}{70} = \frac{5}{7}$  |  $\frac{30}{50} = \frac{3}{5}$

NO