

## Properties of Exponents

Name: \_\_\_\_\_

Simplify each expression.

1)  $(2a^3)^2$

2)  $(-2x)^3$

3)  $(5y^4)^2$

4)  $(3x^3)^3$

5)  $(2x^4)(3x^3)$

6)  $(4x^{-2})(2x^3)$

7)  $2(3x^2)^3$

8)  $\frac{(2x^3)(8x^5)}{4x^6}$

9)  $\frac{9x^4 - 27x^4}{3x^3}$

10)  $(2x^2)^{-4}$

11)  $\frac{a^4}{a^{-2}}$

12)  $\frac{6x^4y^{-2}z^6}{4x^2z}$

13)  $\frac{\frac{3x^3y^2}{2z^4}}{\frac{z^2y}{9x^4}}$

14)  $\frac{a^x}{a^{x+3}}$

15)  $a^{2x} \cdot a^{5x-1}$

16)  $\frac{a^x}{a^{x-5}}$

17)  $a^{4x-1} \cdot b^4$

18)  $\frac{a^{8x}}{a^{2x}}$

19)  $a^{x-1} \cdot a$

20)  $x^{b-a}(x^{a+b} - x^{a-b} + x^a)$

21) If  $3^x = 27$ , then  $\frac{2^x}{2^5} = ?$

Solve for x in each equation.

22)  $\frac{2^3}{2^x} = 2^7$

23)  $\frac{1}{3^4} = 3^{-x}$

24)  $\frac{1}{2^9} = (2^{-x})^x$

25) Determine the value of y given the equations:  $\frac{(b^2)^x \cdot b^3 \cdot b^y}{b} = b^{18}$  and  $\frac{1}{a^7} = a^3 \cdot \frac{1}{a^x}$

26) Complete using <, =, or >:  $5^4 \cdot 5^5$  \_\_\_\_\_  $(5 \cdot 5)^9$

27) If  $y^7 x^8 z^6 < 0$ , which of the following must be true?

I.  $xy < 0$

II.  $yz < 0$

III.  $xz < 0$

(A) III only

(B) I and II

(C) II and III

(D) I, II, and III

(E) None

28) If a and b are nonzero numbers such that  $a^2 = b^3$ , what the value of x in  $a^6 = b^x$ ?29) If  $\sqrt{x} = y^2 = 6$ , what is the value of  $x^3 y^4$ ?

(A)  $6^4$

(B)  $6^6$

(C)  $6^7$

(D)  $6^8$