

Honours GSE Advanced Algebra  
Unit 5: Exponential and Logarithmic Functions  
Properties of Exponents Worksheet

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

Date: \_\_\_\_\_ Period: \_\_\_\_\_

Evaluate the expression.

1.  $4^2 \cdot 4^4$

2.  $(5^{-2})^3$

3.  $\frac{5^2}{5^5}$

4.  $\left(\frac{3}{7}\right)^3$

5.  $\frac{2^2}{2^{-9}}$

6.  $(-9)(-9)^3$

Simplify the expression.

7.  $a^6 \cdot a^3$

8.  $(x^5)^2$

9.  $(4a^2b^3)^5$

10.  $\frac{x^8}{x^6}$

11.  $\frac{x^5}{x^8}$

12.  $\frac{x^6}{x^6}$

13.  $\left(\frac{4a^3}{2b^4}\right)^2$

14.  $(2^3x^2)^5$

15.  $(x^4y^7)^{-3}$

16.  $\frac{x^{11}y^{10}}{x^{-3}y^{-1}}$

17.  $-3x^{-4}y^0$

18.  $\frac{5x^3y^9}{20x^2y^{-2}}$

19.  $\frac{x^5}{x^{-2}}$

20.  $\frac{x^5y^2}{x^4y^0}$

21.  $(x^3)^0$

22.  $(10x^5y^3)^{-3}$

23.  $\frac{x^{-1}y}{xy^{-2}}$

24.  $(4x^2y^5)^{-2}$

25.  $\frac{2x^2y}{6xy^{-1}}$

26.  $\frac{xy^9}{3y^{-2}} \cdot \frac{-7y}{21x^5}$

27.  $\frac{12xy}{7x^4} \cdot \frac{7x^5y^2}{4y}$

## Properties of Exponents

Let  $a$  and  $b$  be real numbers and let  $m$  and  $n$  be integers.

**Product of Powers Property**

$$a^m \cdot a^n = a^{m+n}$$

**Power of a Power Property**

$$(a^m)^n = a^{mn}$$

**Power of a Product Property**

$$(ab)^m = a^m b^m$$

**Negative Exponent Property**

$$a^{-m} = \frac{1}{a^m} \quad a \neq 0$$

**Zero Exponent Property**

$$a^0 = 1 \quad a \neq 0$$

**Quotient of Powers Property**

$$\frac{a^m}{a^n} = a^{m-n} \quad a \neq 0$$

**Power of a Quotient Property**

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \quad b \neq 0$$