

# Exponents

Practice

**Exponent Properties**  
**Exponential Property Summary**  
**Multiplying and Dividing Monomials**

## Exponent Properties

Problem #1: Simplify the expression.

$$a^6 \cdot a^6 \cdot a^2$$

A.  $a^{14}$

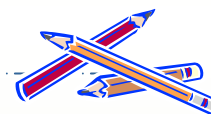
B.  $a^{36}$

C.  $a^{72}$

D.  $\frac{1}{a^{14}}$

**Hint for Problem #1: Product Property**

When multiplying like bases, **add** the exponents.



Problem #2: Simplify the expression.

$$(-3p^2)^5$$

A.  $-3p^{10}$

B.  $-3p^7$

C.  $-243p^{10}$

D.  $-243p^7$

**Hint for Problem #2: Power of a Power**

When a base to a power is raised to another power, **multiply** the exponents.

## Exponent Properties

Problem #3: Simplify the expression.

$$(st)^4$$

- A.  $st^4$       B.  $4st$       C.  $s^4t$       D.  $s^4t^4$

**Hint for Problem #3: Power of a Product**

When a product is raised to a power, **both** or **all** bases are raised to the power.



Problem #4: Simplify the expression.

$$\left(\frac{2x^3}{3}\right)^3$$

- A.  $\frac{2x^9}{3}$       B.  $\frac{8x^9}{27}$       C.  $\frac{8x^6}{27}$       D.  $\frac{2x^6}{3}$

**Hint 1 for Problem #4: Power of a Quotient**

When a quotient is raised to a power, **both** the numerator and denominator are raised to the power.

**Hint 2 for Problem #4: Power of a Power**

When a base to a power is raised to another power, **multiply** the exponents.

## Exponent Properties

Problem #5: Simplify the expression.

$$\frac{w^8}{w^2}$$

- A.  $w^4$       B.  $\frac{1}{w^6}$       C.  $w^{10}$       D.  $w^6$

**Hint for Problem #5: Quotient Property**

When dividing like bases, **subtract** the exponents.



Problem #6: Simplify the expression.

$$(5g^{-3})(4g^{-4})$$

- A.  $\frac{20}{g^7}$       B.  $\frac{20}{g^{12}}$       C.  $20g^7$       D.  $20g^{12}$

**Hint 1 for Problem #6: Product Property**

When multiplying like bases, **add** the exponents.

**Hint 2 for Problem #6: Negative Exponent Property**

When a base has a negative exponent, use the **reciprocal** of the base to produce a positive exponent.

# Exponential Property Summary

## Product of Powers

Problem #7: Simplify the expression.

$$a^4 \cdot a^5$$

- A.  $a^9$       B.  $a^{20}$

**Hint:**  $a^m \cdot a^n = a^{m+n}$

## Quotient of Powers

Problem #8: Simplify the expression.

$$\frac{a^{12}}{a^7}$$

- A.  $a^{-5}$       B.  $a^5$

**Hint:**  $\frac{a^m}{a^n} = a^{m-n}$

## Power of a Power

Problem #9: Simplify the expression.

$$(a^2)^6$$

- A.  $a^8$       B.  $a^{12}$

**Hint:**  $(a^m)^n = a^{m \times n}$

## Powers of a Product

Problem #10: Simplify the expression.

$$(ab)^8$$

- A.  $a^8b^8$       B.  $ab^8$

**Hint:**  $(ab)^n = a^n b^n$

## Power of a Fraction

Problem #11: Simplify the expression.

$$\left(\frac{a}{b}\right)^3$$

- A.  $a^3b^3$       B.  $\frac{a^3}{b^3}$

**Hint:**  $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

## Negative Exponents

Problem #12: Simplify the expression.

$$a^{-9}$$

- A.  $\frac{1}{a^9}$       B.  $\frac{1}{a^{-9}}$

**Hint:**  $a^{-m} = \frac{1}{a^m}$  or  $\frac{1}{a^{-m}} = a^m$



## Zero Exponent

Problem #13: Simplify the expression.

$$6^0$$

- A. 0      B. 1

**Hint:**  $a^0 = 1$

## Multiplying and Dividing Monomials

Problem #14: Simplify the expression.

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

- A.  $5a^9$       B.  $6a^9$       C.  $5a^{20}$       D.  $6a^{20}$

**Hint for Problem #14:**

Arrange the terms so that the numbers are together and the bases of  $a$  are together.

$$(3 \cdot 2)(a^4 \cdot a^5)$$



Problem #15: Simplify the expression.

$$\frac{x^3y^5}{xy^3}$$

- A.  $x^2y^2$       B.  $x^3y^2$       C.  $x^4y^8$       D.  $xy$

**Hint for Problem #15:** Use the properties of exponents to simplify.

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

## Multiplying and Dividing Monomials

Problem #16: Simplify the expression.

$$\frac{w^3}{w^{12}}$$

- A.  $w^4$       B.  $\frac{1}{w^9}$       C.  $w^9$       D.  $w^{15}$

**Hint for Problem #16:** Use the properties of exponents to simplify.

$$\frac{w^3}{w^{12}} = w^{3-12}$$



Problem #17: Simplify the expression.

$$\frac{5a^4b^2}{10a^3b^5}$$

- A.  $\frac{a^7}{2b^7}$       B.  $\frac{2b^3}{a}$       C.  $\frac{a^3}{2b}$       D.  $\frac{a}{2b^3}$

**Hint for Problem #17:**

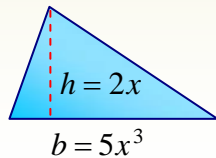
Step 1: Simplify the rational number  $\frac{5}{10}$ .

Step 2: Use the properties of exponents to simplify.

$$\frac{5a^4b^2}{10a^3b^5} = \frac{5}{10} \cdot a^{4-3}b^{2-5}$$

## Multiplying and Dividing Monomials

Problem #18: State the letter of the expression that represents the area of the figure given below.  $A = \frac{1}{2}bh$



- A.  $10x^4$     B.  $10x^3$     C.  $5x^4$     D.  $5x^3$

**Hint for Problem #18:**

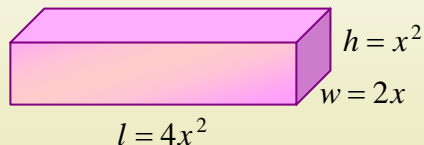
*Step 1:* Substitute the base ( $b$ ) and height ( $h$ ) into the formula for calculating area of a triangle.

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

*Step 2:* Arrange the terms so that the numbers are together and the bases of  $x$  are together.

*Step 3:* Use the properties of exponents to simplify.

Problem #19: State the letter of the expression that represents the volume of the figure given below.  $V = lwh$



- A.  $8x^4$     B.  $6x^4$     C.  $6x^5$     D.  $8x^5$

**Hint for Problem #19:**

*Step 1:* Substitute the length ( $l$ ), width ( $w$ ), and height ( $h$ ) into the formula for calculating the area of a prism.

$$A = 4x^2 \cdot 2x \cdot x^2$$

*Step 2:* Arrange the terms so that the numbers are together and the bases of  $x$  are together.

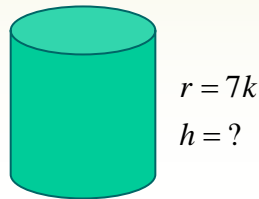
*Step 3:* Use the properties of exponents to simplify.



## Multiplying and Dividing Monomials

Problem #20: Write an expression to represent the height of the cylinder given below.

$$V = \pi r^2 h$$



$$V = 49k^{10}\pi$$

- A.  $7k$       B.  $49k^2$       C.  $k^8$       D.  $k^{10}\pi$

### Hint for Problem #20:

Step 1: Substitute “ $7k$ ” in for the radius ( $r$ ) into the formula for calculating volume of a cylinder and simplify.

$$V = \pi \cdot (7k)^2 \cdot h$$

Step 2: Substitute  $49k^{10}\pi$  in for “ $V$ ” in the equation above.

$$49k^{10}\pi = \pi \cdot (7k)^2 \cdot h$$

Step 3: Solve for “ $h$ ”.

Step 4: Use the properties of exponents to simplify.

Problem #21: Which expression is equal to the given expression?

$$\frac{(2x)(7y)}{6}$$

- A.  $\frac{56}{24xy}$       B.  $\frac{56x^3y^4}{24x^2y^3}$       C.  $\frac{14x^2y^3}{6x^3y^4}$       D.  $\frac{42x^3y^4}{18x^2y^2}$

### Hint for Problem #21:

Step 1: Simplify the given expression.

Step 2: Simplify all the choices to determine which one is equivalent to the given expression..

## Answers

Problem #1: Choice "A".

Problem #2: Choice "C".

Problem #3: Choice "D".

Problem #4: Choice "B".

Problem #5: Choice "D".

Problem #6: Choice "A".

Problem #7: Choice "A".

Problem #8: Choice "B".

Problem #9: Choice "B".

Problem #10: Choice "A".

Problem #11: Choice "B".

Problem #12: Choice "A".

Problem #13: Choice "B".

Problem #14: Choice "B".

Problem #15: Choice "A".

Problem #16: Choice "B".

Problem #17: Choice "D".

Problem #18: Choice "C".

Problem #19: Choice "D".

Problem #20: Choice "C".

Problem #21: Choice "B".

