

## 7.2 Division Properties of Exponents

## Quotient of Powers

$$\frac{a^m}{a^n} = a^{m-n}$$

↑  
keep base

← subtract exponents

Examples: Simplify each quotient.

$$1. \frac{6^5}{6^3} = 6^{5-3}$$

$$= 6^2$$

$$= \boxed{36}$$

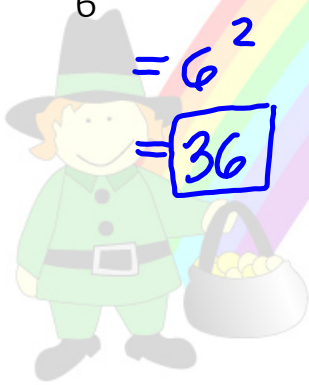
$$2. \frac{d^{12}}{d^9} = d^{12-9}$$

$$= \boxed{d^3}$$

$$3. \frac{(-3)^7}{(-3)^4} = (-3)^{7-4}$$

$$= (-3)^3$$

$$= \boxed{-27}$$



## You try some...

Examples: Simplify each quotient.

$$4. \frac{8^{10}}{8^8} = 8^{10-8}$$

$$= 8^2$$

$$= \boxed{64}$$

$$5. \frac{k^4}{k} = k^{4-1}$$

$$= \boxed{k^3}$$

$$6. \frac{(-4)^9}{(-4)^5} = (-4)^{9-5}$$

$$= (-4)^4$$

$$= \boxed{256}$$



## Power of a Quotient

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

Examples: Simplify each quotient.

$$7. \left(\frac{2}{3}\right)^4 = \frac{2^4}{3^4} = \frac{16}{81}$$

$$8. \left(\frac{-3}{y}\right)^3 = \frac{(-3)^3}{y^3} = \frac{-27}{y^3}$$

$$9. \left(\frac{g}{-2}\right)^6 = \frac{g^6}{(-2)^6} = \frac{g^6}{64}$$



## You try some...

Examples: Simplify each quotient.

$$10. \left(\frac{2}{x}\right)^5 = \frac{2^5}{x^5} = \frac{32}{x^5}$$

$$11. \left(\frac{5}{4}\right)^3 = \frac{5^3}{4^3} = \frac{125}{64}$$

$$12. \left(\frac{-w}{7}\right)^2 = \frac{(-w)^2}{7^2} = \frac{w^2}{49}$$



## Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

$$1. \frac{2x^2y \cdot 9xy^2}{3x \cdot 1xy} = \frac{18x^3y^3}{3x^2y} = 6xy^2$$

$$2. \left(\frac{3m^2}{2n}\right)^4 = \frac{3^4(m^2)^4}{2^4n^4} = \frac{81m^8}{16n^4}$$



## Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

$$3. \left(\frac{1}{6}\right)^{12} \cdot 6^{14} = \frac{1^{12}}{6^{12}} \cdot \frac{6^{14}}{1} = \frac{6^{14}}{6^{12}} = 6^2 = 36$$

$$4. \left(\frac{7f^3}{3d}\right)^2 \cdot \frac{6}{5f^4} = \frac{7^2(f^3)^2}{3^2d^2} \cdot \frac{6}{5f^4} = \frac{49f^6}{3^2d^2} \cdot \frac{6}{5f^4} = \frac{98f^2}{15d^2}$$



## Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

5.  $\left(\frac{5b^2c^7}{-4d}\right)^3$

$$\frac{5^3(b^2)^3(c^7)^3}{(-4)^3(d)^3}$$

$$\frac{125b^6c^{21}}{-64d^3}$$



6.  $9^8 \cdot \left(-\frac{1}{9}\right)^5$

$$\frac{9^8}{1} \cdot \frac{(-1)^5}{9^5} = -1$$

$$\frac{-1 \cdot 9^3}{1}$$

$$-729$$

## Simplifying Expressions Using Multiple Properties

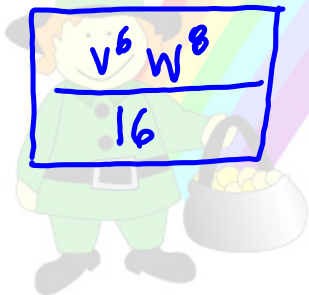
Examples: Simplify each expression.

7.  $\left(\frac{3w^5}{8v^2}\right)^2 \cdot \left(\frac{4v^5}{6w}\right)^2$

$$\frac{9w^{10}}{64v^4} \cdot \frac{16v^{10}}{36w^2}$$

$$\frac{v^{10} w^{10}}{16 v^4 w^2}$$

$$\frac{v^6 w^8}{16}$$



8.  $\frac{12^5 \cdot 12}{12^4}$

$$\frac{12^6}{12^4}$$

$$12^2$$

$$144$$