

7.2 Division Properties of Exponents

Quotient of Powers

$$\frac{a^m}{a^n} = a^{m-n} \leftarrow \text{subtract exp.}$$

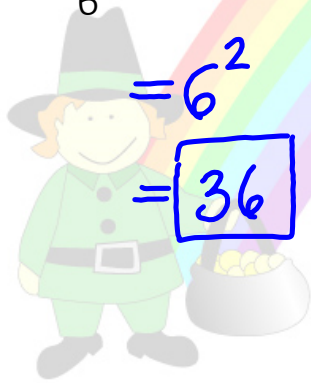
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Examples: Simplify each quotient.

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

$= \boxed{k^3}$

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.

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

$$= \boxed{\frac{16}{81}}$$

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

$$= \boxed{\frac{-27}{y^3}}$$

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

$$= \boxed{\frac{g^6}{64}}$$



You try some...

Examples: Simplify each quotient.

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

$$= \boxed{\frac{32}{x^5}}$$

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

$$= \boxed{\frac{125}{64}}$$

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

$$= \boxed{\frac{w^2}{49}}$$



Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

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

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

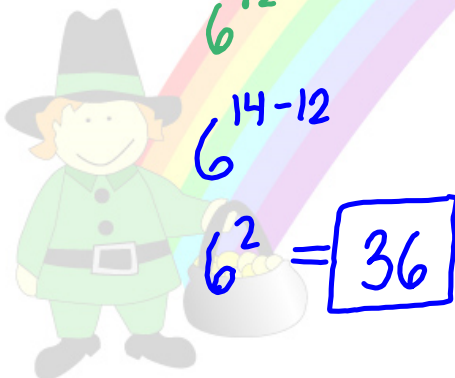


Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

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

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



Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

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

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

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



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

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

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

$$-1 \cdot 9^3$$

$$-729$$

Simplifying Expressions Using Multiple Properties

Examples: Simplify each expression.

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

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

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

$$\frac{144v^{10}w^{10}}{2304v^4w^2}$$

$$\frac{1v^6w^8}{16}$$

$$8. \frac{12^5 \cdot 12}{12^4} = \frac{12^6}{12^4} = 12^2 = 144$$

