

U2:L4 - Exponent Laws 1+2

Consider the product power:

$$x^2 \cdot x^4$$

Write using repeated multiplication:

$$(x \cdot x) \cdot (x \cdot x \cdot x \cdot x) = x^6$$

This gives us the first law of exponents:

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

"When multiplying powers with the same base, add the exponents"

Write each power as a single power, then evaluate (if possible).

a) $2^3 \times 2^2 = 2^{3+2} = 2^5 = 64$

b) $(-3)^2 \times (-3)^5 = (-3)^{2+5} = (-3)^7 = -2,187$

c) $x^3 \cdot x^5 = x^{3+5} = x^8$

d) $y^2 \cdot y^1 \cdot y^7$

$$y^{2+1+7} = y^{10} \rightarrow (y \cdot y) \cdot (y) \cdot (y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y)$$

e) $a^3 b^2 a^3$

$$a^3 a^3 b^2 = a^{3+3} b^2 = a^6 b^2$$

ARE
The Bases
the SAME?

$$\frac{a}{a} = 1$$

Consider the quotient:

$$\frac{5}{5} = 1$$

$$\frac{36}{36} = 1$$

$$\frac{x^5}{x^3} = \frac{\cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}{\cancel{x} \cdot \cancel{x} \cdot \cancel{x}}$$

$$x^2$$

Write as repeated multiplication and simplify:

$$\frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x \cdot x} = x \cdot x = x^2$$

This gives us the second law of exponents:

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

"When dividing powers with the same base, subtract the exponents"

Write each power as a single power, then evaluate (if possible).

a) $2^6 \div 2^2 = \frac{2^6}{2^2} = 2^{6-2} = 2^4$

b) $(-5)^9 \div (-5)^6 = \frac{(-5)^9}{(-5)^6} = (-5)^{9-6} = (-5)^3$

f) $x^3 \div x^5 = \frac{x^3}{x^5} = x^{3-5} = x^{-2}$

g) $\frac{y^2 y^1}{y^7} = \frac{y^{2+1}}{y^7} = \frac{y^3}{y^7} = y^{3-7} = y^{-4}$

h) $\frac{a^3 b^2}{a^3} = \frac{\cancel{a^3} b^2}{\cancel{a^3}} = b^2$

Same Base??