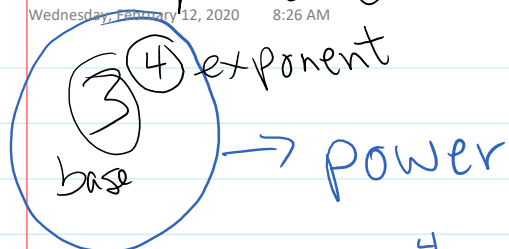


Exponent Laws.

Wednesday, February 12, 2020 8:26 AM



$$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$$

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power expanded form standard form

$$-2 \cdot -2 \cdot -2 \cdot -2 \cdot -2 = (-2)^5$$

$$-2^5 = -2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$(-5)^2 = -5 \cdot -5 = 25$$

$$-5^2 = -5 \cdot 5 = -25$$

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

$$(2x)^4 = 2x \cdot 2x \cdot 2x \cdot 2x$$

Write $\frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3}$ as a power

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

Exponent Laws:

① $x^n \cdot x^m = x^{n+m}$ When multiplying powers with the same base, add the exponents.
eg $2^3 \cdot 2^5 = 2^8$
 $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^8$

eg $2^3 \cdot 3^5$ can't be simplified
Bases must be the same

$$\textcircled{2} \frac{x^n}{x^m} \text{ or } x^n \div x^m = x^{n-m}$$

$$\frac{x^6}{x^2} = \frac{\cancel{x} \cdot \cancel{x} \cdot x \cdot x \cdot x \cdot x}{\cancel{x} \cdot \cancel{x}} = x^4$$

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

$$\textcircled{3} (x^n)^m = x^{n \cdot m}$$

$$\text{eg } (3^3)^4 = 3^3 \cdot 3^3 \cdot 3^3 \cdot 3^3 = 3^{12}$$

When raising a power to an exponent, multiply the exponents together.

$$\textcircled{4} (xy)^n = x^n y^n$$

$$\text{eg } (2x)^3 = 2^3 x^3 = 8x^3$$

When a product is raised to an exponent the exponent is applied to each factor of the product.

$$\textcircled{5} \left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$$

When a fraction is raised to an exponent the exponent is applied to numerator + denominator

$$\left(\frac{2}{5}\right)^3 = \frac{2 \cdot 2 \cdot 2}{5 \cdot 5 \cdot 5} = \frac{2^3}{5^3} = \frac{8}{125}$$

$\textcircled{6} x^0 = 1$ Any power with an exponent of zero has a value of one.

$$\text{eg } 279^0 = 1 \quad (-24)^0 = 1$$

$$-12^0 = -1 \quad -(-28)^0 = -1$$

Simplify: $(2^2)^3 = 2^6$ answer is given in

the same form (ie power)

Evaluate: $(2^2)^3 = 2^6 = 64$ answer is given in standard form

Simplify: ① $3^7 \cdot 3^9 = 3^{16}$ ③ $(9^2)^6 = 9^{12}$
② $\frac{12^7}{12^3} = 12^4$ ④ $\frac{2^3 \cdot 2^4}{2^5} = \frac{2^7}{2^5} = 2^2$

$$\textcircled{5} \frac{(4^7 \cdot 4^3)^2}{(4^4)^3} = \frac{(4^{10})^2}{4^{12}} = \frac{4^{20}}{4^{12}} = 4^8$$

OR $\frac{(4^7 \cdot 4^3)^2}{(4^4)^3} = \frac{4^{14} \cdot 4^6}{4^{12}} = \frac{4^{20}}{4^{12}} = 4^8$

$$x^2 \cdot x^5 = x^7$$

$$\frac{2x^2 \cdot 3x^3}{2 \cdot x^2 \cdot 3 \cdot x^3} = \frac{2 \cdot 3 \cdot x^2 \cdot x^3}{2 \cdot 3 \cdot x^2 \cdot x^3} = 6x^5$$

$$(4x^2)^2 = 4^2 \cdot (x^2)^2 = 16x^4$$

With mixed bases (variables + numbers) when simplifying, evaluate the numbers simplify the variables

Try: Simplify:

$$\textcircled{1} (4x^0)^2 = 4^2 \cdot (x^0)^2$$

$$\textcircled{2} \frac{2x^7}{x^3}$$

$$\textcircled{1} (4x^0)^2 = 4^2 \cdot (x^0)^2 \\ = 16x^0 \\ = 16$$

$$\textcircled{2} \frac{2x^7}{4x^4} \left(\frac{-x^3}{2} \right) \cdot 5x^3$$

$$\textcircled{3} -2x^5 \cdot 3x^4 \cdot 4x^0 = -24x^9 \\ 5 = 5'$$

$$5' \cdot 5^5 = 5^6$$

$$\frac{4}{4^3} = \frac{4}{\cancel{4} \cdot 4 \cdot 4} = \frac{1}{4^2}$$

$$\frac{3^2}{3^5} = 3^{2-5} = \boxed{3^{-3}}$$

$$\frac{\cancel{7} \cdot \cancel{7}}{\cancel{7} \cdot \cancel{7} \cdot 3 \cdot 3 \cdot 3} = \frac{1}{\underline{\underline{3^3}}}$$

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

Handout pg 1-2 # 1-48
pg 3-4 # 1-30

$$\frac{4n^3}{8n^1} = \frac{n^2}{2}$$