

1.5 Exponent Laws/Rules

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|--------------------------|--|
| Multiplication Rule | $a^x \cdot a^y = a^{x+y}$ |
| Division Rule | $a^x \div a^y = a^{x-y}$ |
| Power of a Power Rule | $(a^x)^y = a^{xy}$ |
| Power of a Product Rule | $(ab)^x = a^x b^x$ |
| Power of a Fraction Rule | $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$ |
| Zero Exponent | $a^0 = 1$ |

example 1:
 $3^5 \cdot 3^2 = 3^{5+2} = 3^7$

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

$$(3^5)^2 = 3^{5 \cdot 2} = 3^{10}$$

$$(3x)^2 = (3)^2(x)^2 = 9x^2$$

$$\left(\frac{3}{5}\right)^2 = \frac{(3)^2}{(5)^2} = \frac{9}{25}$$

$$\left(\frac{3x^5y}{z}\right)^0 = 1$$

Example 1: Simplify:

a) $2^3 \cdot 2^5$
 $= 2^{3+5}$
 $= 2^8$

evaluate...

$$2^8 = 256$$

b) $(x^3y^2)(x^2y^4)$
 $= x^{3+2} \cdot y^{2+4}$
 $= x^5y^6$

c) $\frac{(1.4^3)(1.4^4)}{1.4^2}$
 $= 1.4^{3+4-2}$
 $= 1.4^5$

d) $\frac{10a^5b^3}{2a^2b^2}$
 $= 5a^3b$

e) $\frac{6x^4y^3z}{14xy^2}$
 $= \frac{3x^3yz}{7}$

To SIMPLIFY $(ab)^m$ or $\left(\frac{a}{b}\right)^m$

Apply exponent to each value inside the bracket. That is $(ab)^m = a^m b^m$ and $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

****Remember to follow BEDMAS****

Example 2: Simplify.

$$\begin{aligned} \text{a) } (2a^5b^3)^4 &= (2)^4(a^5)^4(b^3)^4 \\ &= 16a^{20}b^{12} \end{aligned}$$

$$\begin{aligned} \text{b) } \left(\frac{y^4}{x^2}\right)^5 &= \frac{(y^4)^5}{(x^2)^5} \\ &= \frac{y^{20}}{x^{10}} \end{aligned}$$

$$\begin{aligned} \text{c) } \left(\frac{3x^3y}{4}\right)^3 &= \frac{(3)^3(x^3)^3(y)^3}{(4)^3} \\ &= \frac{27x^9y^3}{64} \end{aligned}$$

$$\begin{aligned} \text{d) } \left(\frac{100r^5b^2}{25r^2b^3}\right)^2 &= \left(\frac{4r^3}{b^3}\right)^2 \\ &= \frac{(4)^2(r^3)^2}{(b^3)^2} \\ &= \frac{16r^6}{b^6} \end{aligned}$$

$$\begin{aligned} \text{e) } \left(\frac{78x^{12}}{2y^2z^3}\right)^0 &= 1 \end{aligned}$$

① 1.1-1.4 Quiz

② HW: 1.5 WS