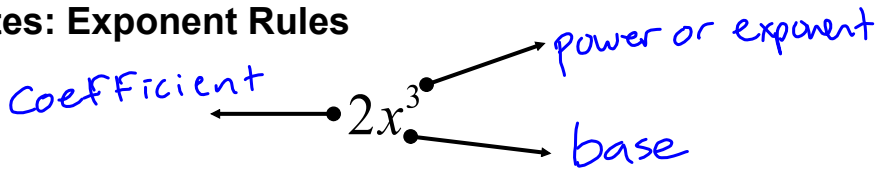
6-1a Notes: Exponent Rules



$a^m \cdot a^n = a^{m+n}$ (same bases)

$2^2 \cdot 2^3 = 2^{2+3} = 2^5 = 32$

$3r^1 \cdot r^4 = 3r^5$

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

$\frac{3^4}{3^1} = 3^{4-1} = 3^3 = 27$

$\frac{x^{13}y^2}{x^{13}y^1}$ * Only divide bases that are the same

$= y^{2-1} = y^1 = y$

Power to a Power

$(ab)^m = a^m b^m$

$(2x)^3 = 2^3 x^3 = 8x^3$

$(5y)^4 = 5^4 y^4 = 625y^4$

$(a^m)^n = a^{mn}$

$(c^2)^3 = c^6$

$(3n^6)^4 = 3^4 n^{24} = 81n^{24}$

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

$\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3} = \frac{8}{27}$

$\left(\frac{1}{x}\right)^3 = \frac{1^3}{x^3} = \frac{1}{x^3}$

$\left(\frac{2x^4}{5}\right)^2 = \left(\frac{x^4}{5}\right)^2 = \frac{x^8}{5^2} = \frac{x^8}{25}$

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

$\frac{a^{-m}}{1} = \frac{1}{a^m}$

$\frac{1}{a^{-m}} = a^m$

$4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

$\frac{1}{x^{-7}} = x^7$

$\frac{5x^{-4}}{1} = \frac{5}{x^4}$

* only move the exponent if it's negative.

$s^2 r^{-3} = \frac{s^2}{r^3}$

$\frac{1}{r^{-4}s^2} = \frac{r^4}{s^2}$

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

$\frac{3^{-2}}{t^{-5}} = \frac{t^5}{3^2} = \frac{t^5}{9}$

$\frac{-6d^{-1}}{3^{-2}} = -\frac{6 \cdot 3^2}{d^1} = -\frac{6 \cdot 9}{d} = -\frac{54}{d}$

$a^0 = 1$

$(-7)^0 = 1$

$x^0 = 1$

$-7^0 = -1$

$-7^0 = -1 \cdot 7^0 = -1 \cdot 1 = -1$

$(2x)^0$

$2^0 \cdot x^0$

$1 \cdot 1$

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Simplify each expression. Use only positive exponents.

1. $(3a^2)(4a^6)$

$= 3 \cdot 4 \cdot a^2 \cdot a^6$

$= 12a^{2+6}$

$= 12a^8$

2. $(-4x^2)(-2x^{-2})$

$= -4(-2)x^2 \cdot x^{-2}$

$= 8x^0 = 8 \cdot 1$

$= 8$

Never have negative exponent in final answer

3. $(4x^3y^5)^2$

$= 4^2x^6y^{10}$

$= 16x^6y^{10}$

4. $(2x^{-5}y^4)^3 = 2^3x^{-15}y^{12}$

$= \frac{8y^{12}}{x^{15}}$

5. $\frac{8a^5}{2a^2} = 4a^3$

6. $\frac{6x^7y^5}{3x^{-1}}$

$2x^{7-(-1)}y^5$

$2x^8y^5$

7. $\frac{(4x^2)^0}{2xy^5}$

8. $\left(\frac{3x^2}{2}\right)^2$

9. $(-6m^2n^2)(3mn)$

10. $(3x^4y^5)^{-3}$

11. $\frac{(2r^{-1}s^2t^0)^{-2}}{2rs}$

12. $x^5(2x)^3$

13. $\frac{x^4x^{-2}}{x^{-5}}$

14. $\frac{(12x^2y^6)^2}{8x^4y^7}$

15. $(4p^2q)(p^2q^3)$

16. $\frac{4x^3}{2x}$

17. $(p^2)^{-2}$

18. $\frac{-15x^4}{3x}$

19. $\frac{r^2s^3t^4}{r^2s^4t^{-4}}$

20. $\frac{xy^2}{2} \cdot \frac{6x}{y^2}$

21. $(s^2t)^3(st)$

22. $(3x^{-3}y^{-2})^{-2}$

23. $(h^4k^5)^0$

24. $\frac{s^2t^3}{r} \cdot \frac{sr^3}{t}$