

§ 1.3 INTEGER EXPONENTS & SCIENTIFIC NOTATION

NOTATION

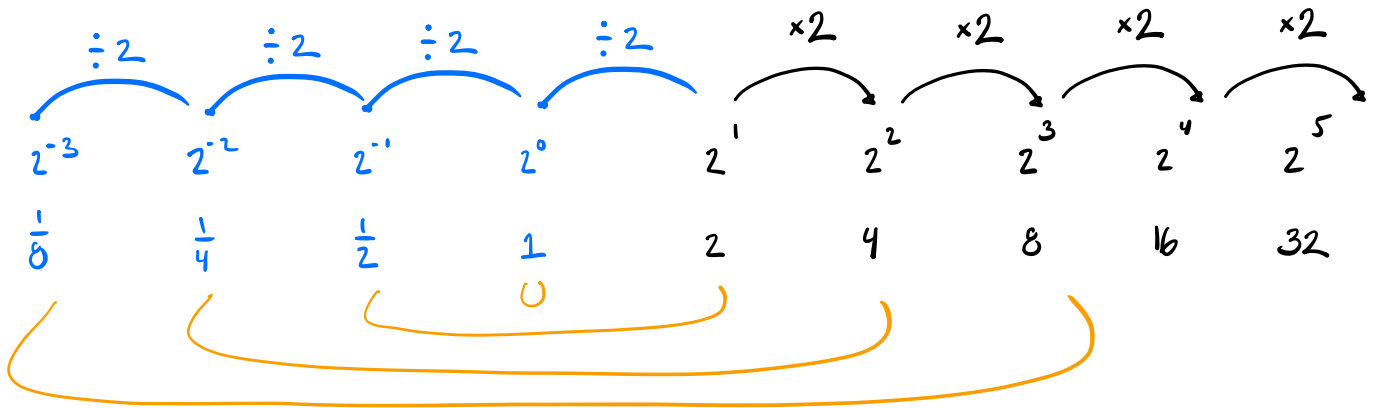
GIVES ANY REAL NUMBER a & ANY POSITIVE INTEGER n ,

$$a^n = \underbrace{a \cdot a \cdot \dots \cdot a}_{n \text{ TIMES}}$$

- NOTATION
- RULES
- SCIENTIFIC NOTATION

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

ex. -3^2 vs. $(-3)^2$



$$\forall a \in \mathbb{R}, a^0 = 1$$

$$\forall a \neq 0, a^{-n} = \frac{1}{a^n}$$

LAWS OF EXPONENTS

1 $a^m a^n = a^{m+n}$

2 $\frac{a^m}{a^n} = a^{m-n}$

3 $(a^m)^n = a^{mn}$

4 $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

5 $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

6 $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

7 $\frac{a^{-m}}{b^{-n}} = \frac{b^n}{a^m}$

ex. SIMPLIFY : $(2a^4b^5)^2(4a^2b^3)^3$

ex. SIMPLIFY : $(6a^2(bc^3)^3)^2$

ex. SIMPLIFY : $\frac{3x^{-2}y^4}{4x^3y^{-5}}$

ex. SIMPLIFY : $\left(\frac{5a^2b}{c^3}\right)^{-2}$

Note: solve $x = x^2$

$x = 0, x = 1$

so unless $\frac{a}{b} = 0$ or 1

$\frac{a}{b} \neq \left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2}$

e.g. $\frac{2}{3} \neq \frac{2^2}{3^2} = \frac{4}{9}$

Scientific Notation

Most #'s VERY LARGE OR VERY SMALL (NOT Goldilocks #'s)

$120000000000000 = 1.2 \times 10^{13}$

$.00000000000000017 = 1.7 \times 10^{-14}$

Def: GIVEN ANY REAL # $x \neq 0$, x IS WRITTEN IN SCIENTIFIC NOTATION
WHEN $x = a \times 10^n$, WHERE $1 \leq a < 10$ & $n \in \mathbb{Z}$.

ex. SPEED OF LIGHT $299,792,458 \text{ m/s} = 2.99792458 \times 10^8 \text{ m/s}$

ex. MASS OF H Atom $.000000000000000000000000166 \text{ g}$ (23 zeros)
 $= 1.66 \times 10^{-24} \text{ g}$

ex. EXPAND 4.886×10^7 , 4.886×10^{-4}

ex. $(6.1 \times 10^4) \times (8.2 \times 10^6) = 50.02 \times 10^{10} = 5.002 \times 10^{11}$