

$$\frac{17-7}{7-7} = \frac{10}{0} \text{ undefined}$$

$$\begin{aligned} 3 - 2(6) + \left| \frac{8}{2} \right| \\ 3 - 12 + 4 \\ -9 + 4 \\ \textcircled{-5} \end{aligned}$$

$$\begin{aligned} \frac{24}{3+(-5)} - 4(-9) \\ \frac{24}{-2} + 36 \quad -12 + 36 = 24 \end{aligned}$$

$$33 \quad -7 - \frac{1 \cdot 14}{2(2-3)} - 3(8-6)$$

$$-7 - \frac{14}{2 \cdot -1} - 3 \cdot 2$$

$$-7 - \frac{14}{-2} - 6 \quad \textcircled{-6}$$

$$-7 + 7 - 6$$

$$-3 \cdot -4 = 12$$

$$-3 \cdot -4 \cdot -1 = 12$$

$$x = 3$$

$$y = -\frac{1}{3}$$

$$-x \cdot y = 1$$

$$-3 \cdot -\frac{1}{3} = 1$$

$$x \neq 0 \quad y \neq 0$$

$$x \neq y \quad \frac{x-y}{x-y} = \frac{0}{0} =$$

$x=7$
 $y=7$

1.4 Exponents

$$\text{Base } a^n \text{ exponent}$$

the nth power of a

1. A natural number power is repeated multiplication

$$a^5 = a \cdot a \cdot a \cdot a \cdot a$$

$$-3 * -3 * -3 * -3 * -3 * -3 = (-3)^6$$

$$\frac{3}{4} * \frac{3}{4} * \frac{3}{4} = \left(\frac{3}{4}\right)^3 = \frac{3^3}{4^3}$$

2. A negative power is a reciprocal.

$$a^{-5} = \frac{1}{a^5} \quad \Bigg| \quad \frac{1}{a^{-5}} = a^5$$

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

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

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

$$3(x)^{-1} = \frac{3}{x} = \frac{3}{1} \times \frac{1}{x}$$

$$3x^{-1} = \frac{3}{x}$$

3. any nonzero expression raised to the zero power is 1.

$$a^0 = 1$$

$$\frac{x^3}{x^3} = \frac{\overbrace{x \cdot x \cdot x}^{\cancel{x \cdot x \cdot x}}}{\cancel{x \cdot x \cdot x}}$$
$$x^{(3-3)} = x^0 = 1$$

$$5^0 = 1$$

caution!

$$0^0 = \text{undefined}$$

$$(4x)^0 = 1$$

$$4x^0 = 4$$

$$4x^1$$

4. To **Multiply** the same base **Add exponents**

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

$$a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a$$

$$2^3 \cdot 3^2 =$$

$$10^5 * 10^4 = 10^9$$

$$3 = 3^1$$

$$5 = 5^1$$

$$3^1 * 3^2 = 3^3$$

$$1 = 2^1$$

5. To **Divide** the same base Subtract exponents. *Keep base*

$$\frac{\cancel{a} \cdot \cancel{a} \cdot \cancel{a} \cdot a \cdot a}{\cancel{a} \cdot \cancel{a} \cdot \cancel{a}} a^5 = a^{5-3} = a^2$$

$$\frac{2^8}{2^5} = 2^3 = 8$$

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

$$= a^{-2+(+3)} = a$$

$$\frac{10^6}{10^{-3}} = 10^{6+(+3)} = 10^9$$

$$\frac{10^{-6}}{10^3} = 10^{-6-3} = 10^{-9}$$

6. To raise a **Power to a Power Multiply** exponents.

$$a^5 \cdot a^5 \cdot a^5 \quad (a^5)^3 = a^{5 \cdot 3} = a^{15}$$

$$(2^3)^2 = 2^6 = 64$$

$$(a^3)^{-2} = a^{-6} = \frac{1}{a^6}$$

$$(ab)^4 = a^4 b^4$$

$$(2ab^2)^3 = \underline{2^3} a^3 b^6 = 8a^3 b^6$$

$$2(ab^2)^3 = 2a^3 b^6$$

caution 2.3

$X^0 = 1$, X is not equal to 0. X

$X^{(-a)} = \frac{1}{X^a}$

$6^{-2} = \frac{1}{6^2}$

$(XY)^a = X^a Y^a$

$(2x^2)^3$

$\frac{X^a}{X^b} = X^{(a-b)}$, X is not equal to 0.

$\left(\frac{X}{Y}\right)^a = \frac{X^a}{Y^a}$, X and Y are not equal to 0.

$X^1 = X$

$5^1 = 5$
 $X^a X^b = X^{a+b}$

$5^4 \cdot 5^3 =$

$(X^a)^b = X^{ab}$

$(5^4)^3$

$\left(\frac{3}{4}\right)^5 = \frac{3^5}{4^5}$

Order of Operations

1. Operations within groupings are done first $(, \{, []$ _
2. Powers exponents
3. Multiplications and Divisions (from left to right)
4. Additions and Subtractions (from left to right)

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