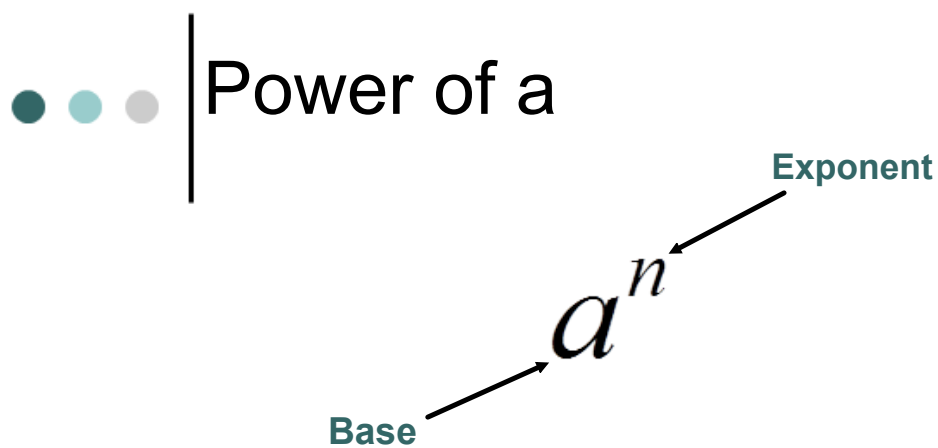


Exponent Laws

9/19



● ● ● | **Definition:**

$$a^n = a \times a \times a \times \dots a, \text{ (n times)}$$

$$2^4 =$$

● ● ● | Let's think about place value...

Position Name	Thousands	Hundreds	Tens	Units
Decimal Form	1000	100	10	1
Power of 10	$10^3$	$10^2$	$10^1$	$10^0$



$$a^0 = 1$$

- If  $a$  is nonzero.
- Thus,

$$6^0 = 1$$

$$23^0 = 1$$

$$(2ab)^0 = 1$$

$$\left[ \frac{2ab^2x^4}{4y^5} \right]^0 = 1$$

● ● ● | So what is

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

$$10^3 = 1000$$

$$10^2 = 100$$

$$10^1 = 10$$

$$10^0 = 1$$

$$10^{-1} = \frac{1}{10^1} = \frac{1}{10}$$

$$10^{-2} = \frac{1}{100} = \frac{1}{10^2}$$

$$10^{-3} = \frac{1}{10^3} = \frac{1}{1000}$$

HW

① Write 1 system of nonlinear eq. and solve by graphing.

② Write & solve 1 system of nonlinear inequalities

● ● ● | Let's explore.....

$$2^3 * 2^2 = 2^{3+2} = 2^5$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$2^5$$

$$x^3 \cdot x^{-5} = x^{3+(-5)} = x^{-2} = \boxed{\frac{1}{x^2}}$$

$$y^4 \cdot y^{-2} \cdot y^{10} = y^{12}$$

$$z^2 \cdot z^0 \cdot z^{-1} = z$$

● ● ● | Let's explore.....

$$(2^3)^2 = 2^{3 \cdot 2} = 2^6$$

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

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

$$(2x^3y^4)^5 = 2^{1 \cdot 5} x^{3 \cdot 5} y^{4 \cdot 5}$$

$$2^5 x^{15} y^{20}$$

$$32x^{15}y^{20}$$



● ● ● | **Let's explore.....**

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

Top - bottom

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

$$\frac{x^4}{x^{10}} = x^{4-10} = x^{-6} = \frac{1}{x^6}$$

$$\bullet \bullet \bullet \left| x^3 \cdot x^7 = \right.$$

$$2w^6 \cdot 5w^{-4} = 10w^{6+(-4)} = 10w^2$$

$$m^{-5} \cdot m^{-4} =$$

...

$$\frac{x^3 y^4 z^8}{x^7 y^7 z^8} =$$

$$x^{-4} y^3 z^0$$

$$\frac{y^3}{x^4}$$

- ① Simplify the numerator
- ② Simplify the denominator
- ③ Divide like bases

$$\begin{array}{c} \bullet \bullet \bullet \\ | \\ (x^3 y^{-2})^5 = \\ x^{3 \cdot 5} y^{-2 \cdot 5} = x^{15} y^{-10} = \frac{x^{15}}{y^{10}} \end{array}$$

$$\dots \left| \left( \frac{x^3 y^{-1}}{x^{-2} y^2} \right)^{-5} \right. \quad y^{-3}$$

$$\left( \frac{x^5}{y^3} \right)^{-5} = \frac{x^{-25}}{y^{-15}} = \frac{y^{15}}{x^{25}}$$

$$\frac{x^{-25}}{y^{15}} \quad \frac{x^{25}}{y^{-15}}$$

$$\frac{x^{-25}}{x^{25}} \cdot \frac{y^{15}}{y^{-15}} = \frac{y^{15}}{x^{25}}$$