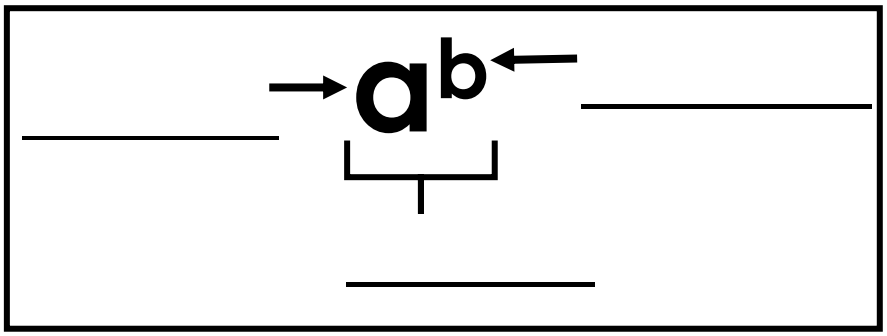
Exponent Rules



What is the number "out in front" called?

$7x^3$

_____

Evaluate means _____

_____

Evaluate the following:

1. 5^4
2. $2^7 + 2^2$
3. $(-3)^4$
4. $(-4)^4$

What is the difference here?

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

IMPORTANT: When you plug a negative number in for x always _____

Evaluate the following:

1. x^3 for x = -2
2. x^5 for x = 3
3. -5^2
4. $(-2)^7$

Find the Pattern and use it to complete the tables

Exponential Form	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}
Standard Form	32	16	8	4	2				

Exponential Form	3^5	3^4	3^3	3^2	3^1	3^0	3^{-1}	3^{-2}	3^{-3}
Standard Form	243	81	27	9	3				

Zero Exponents:

- Anything to the zero power is _____

Negative Exponents:

Rule: $x^{-n} =$

- Negative exponent: 1 over the _____

_____

Examples

1) 9^0
2) k^0
3) $\left(\frac{3}{8}q\right)^0$
4) $(5x)^0$

Write each using negative exponents

6) $\frac{1}{8^3}$
7) $\frac{1}{c^5}$
8) $\frac{1}{16}$
9) $\frac{1}{27}$

Evaluate:

1) $\mathbf{4^{-2}}$
2) $\mathbf{(-2)^{-3}}$
3) $\mathbf{10^{-3}}$
4) $\mathbf{2^{-4}}$
5) $\mathbf{(-7)^{-1}}$

Simplify:

10) $\boldsymbol{x^{-2}}$
11) $\frac{1}{x^{-2}}$
12) $\boldsymbol{a^{-3}}$
13) $\frac{1}{a^{-3}}$

REMEMBER:

Mathematicians say to never leave negative exponents or zero exponents _____

How would you simplify these four to have ONE base and ONE exponent?

1. $6^3 \cdot 6^{14}$
2. $h^8 \cdot h^{10}$
3. $\frac{2^5}{2^3}$
4. $\frac{x^6}{x^3}$

Multiplying Powers with the same base

- Keep the base, _____ the exponents

Dividing Powers with the same base

- Keep the base, _____ the exponents

Example: Multiplying

1. $a^{45} \cdot a^{22}$

2. $6^5 \cdot 6^3$

3. $x^3 \cdot y^5 \cdot y^2 \cdot x$

4. $12j^5 \cdot 3j^2$

5. $(7a^5)(4a^3)$

Example: Dividing

1. $\frac{a^{45}}{a^{22}}$

2. $\frac{6^5}{6^3}$

3. $\frac{x^3y^5}{xy^2}$

4. $\frac{12j^5}{3j^2}$

5. $\frac{5p^7}{25p^2}$

Note:

What do you do when there are coefficients?

Bonus: $\frac{7^3x^2y^2}{7^2x^4y^6}$

Practice:

1. $\frac{15x^2}{45x^7}$

2. $\frac{16y}{32y^8}$

3. $\frac{20z^{25}}{4z^{25}}$

4. $\frac{100xy^2}{5xy^{40}}$

5. $\frac{10s^{-3}}{5t^{-5}}$

6. $\frac{4fg^{-3}}{16x^{-5}}$

7. $(-3)^3x^2x^4$

8. $-2^2x^2y^5y^3$

9. $\frac{25a^3b}{5ab^3}$

10. $\frac{10x^2y^2x}{y^3}$

11. $\frac{1{,}000{,}000^0x^{-3}}{x^{-5}}$

12. $\frac{2x^{-3}y^{-2}}{16w^0z^{-3}}$