



# POWERS of EXponents

**ADDITION:** YOU MUST HAVE THE SAME BASE, THEN COMBINE LIKE TERMS

$$x^4 + x^4 = x^8$$

**SUBTRACTING:** JUST LIKE WITH ADDITION, YOU MUST HAVE THE SAME BASE.

$$3x^4 - x^4 = 2x^4$$

**MULTIPLYING:** MULTIPLY THE NUMBER OF UNKNOWN, THEN ADD EXPONENTS

$$(x^4)(x^2) = x^{4+2} = x^6$$

**DIVIDING:** SUBTRACT THE EXPONENTS

$$\frac{4x^4}{2x^2} = 2x^{4-2} = 2x^2$$

**POWER TO A POWER:** MULTIPLY THE EXPONENTS

$$(x^4)^2 = x^{4*2} = x^8$$

**$x^0$  ALWAYS EQUALS 1**

**NEGATIVE EXPONENTS:**  $x^{-2} = \frac{1}{x^2}$

# FACTOR $6m^2 - 25m - 9$

Ok, 2 ways to tackle this:

- Find factors of 6 and 9.
- Realize that in order to reverse distribute this, one of the factors of 6 multiplied by a factor of 9 and then added together, must equal -25.
- Create your two factors and start plugging in the numbers.
- Determine which one works with the FOIL method.

$$6m^2 - 25m - 9$$

3, 2	3, 3
6, 1	9, 1

$$(3m + 3)(2m - 3)$$

$$(2m + 3)(3m - 3)$$

$$(6m + 3)(1m - 3)$$

$$(1m + 3)(6m - 3)$$

$$(3m + 1)(2m - 9)$$

$$(2m + 9)(3m - 1)$$

$$(6m + 9)(1m - 1)$$

$$(1m + 1)(6m - 9)$$

# OR...

# FACTOR $6m^2 - 25m - 9$

Since the leading coefficient isn't a "1" (it is a "6"), this can be a little more complicated.

You decide which method is easiest for you!

- Find factors of  $(6)(9) = 54$  that add up to  $-25$ .
- We will use  $-27$  and  $+2$
- Then we can split that middle term ( $-25m$ ) into 2 terms

$$6m^2 - 27m + 2m - 9$$

- Now, factor in pairs

$$(6m^2 - 27m) + (2m - 9)$$
$$3m(2m - 9) + 1(2m - 9)$$

- Since they both have  $(2m-9)$ , you can combine the others to form the answer.

$$\underline{3m}(2m - 9) + \underline{1}(2m - 9)$$

$$(3m + 1)(2m - 9)$$

Personally, I think this way is simpler, but if you did not originally learn this way, it may take some getting used to.

## Solve each equation.

1.  $x^3 + 216 = 0$

2.  $x^3 - 512 = 0$

3.  $x^4 - 256 = 0$

4.  $x^3 - 1331 = 0$

5.  $x^4 - 2401 = 0$

6.  $3x^4 - 3888 = 0$

7.  $5x^3 + 625 = 0$

8.  $2x^5 - 64 = 0$

9.  $5x^5 - 500000 = 0$

## Simplify each expression and write in scientific notation.

1.  $\frac{6 \cdot 10^5}{3 \cdot 10^2}$  \_\_\_\_\_

6.  $\frac{3 \cdot 10^8}{1 \cdot 10^2}$  \_\_\_\_\_

2.  $\frac{12 \cdot 10^{11}}{2 \cdot 10^4}$  \_\_\_\_\_

7.  $\frac{25 \cdot 10^6}{5 \cdot 10^9}$  \_\_\_\_\_

3.  $\frac{8 \cdot 10^{15}}{4 \cdot 10^6}$  \_\_\_\_\_

8.  $\frac{14 \cdot 10^7}{2 \cdot 10^1}$  \_\_\_\_\_

4.  $\frac{15 \cdot 10^4}{5 \cdot 10^0}$  \_\_\_\_\_

9.  $\frac{20 \cdot 10^{12}}{5 \cdot 10^3}$  \_\_\_\_\_

5.  $\frac{9 \cdot 10^{14}}{9 \cdot 10^6}$  \_\_\_\_\_

10.  $\frac{2 \cdot 10^8}{1 \cdot 10^2}$  \_\_\_\_\_

5. 0.0098 \_\_\_\_\_

13. 2,935.00026 \_\_\_\_\_

6. 0.00425 \_\_\_\_\_

14. 78,005,261.0003 \_\_\_\_\_

7. 230,000,000 \_\_\_\_\_

15. 186,000 \_\_\_\_\_

8. 0.000000023 \_\_\_\_\_

16. 93,000,000 \_\_\_\_\_

## Write each number in standard notation

17.  $4.2 \cdot 10^8$  \_\_\_\_\_

25.  $4.8775 \cdot 10^{10}$  \_\_\_\_\_

18.  $9.7 \cdot 10^3$  \_\_\_\_\_

26.  $2.01 \cdot 10^{12}$  \_\_\_\_\_

19.  $1.8 \cdot 10^7$  \_\_\_\_\_

27.  $6.032 \cdot 10^{-3}$  \_\_\_\_\_

20.  $3.6 \cdot 10^{-5}$  \_\_\_\_\_

28.  $7.5 \cdot 10^{-8}$  \_\_\_\_\_