Scientific Notation

Scientific notation is a way to write large & small #'s compactly & still be able to perform meaningful computations

$\text{Something} \times 10^{n}$ & $1 \leq \text{something} < 10$

Ex

Quantity	Size	Scientific Notation
Radius of the sun	695,500,000 m	$6.955 \cdot 10^{8}$ m
Student Loan Debt (total US)	$1,560,000,000	$1.56 \cdot 10^{9}$ dollars
Distance to Andromeda	24,340,000,000,000,000,000,000 m	$2.434 \cdot 10^{22}$ m
Diameter of a Red Blood Cell	0.0000075 m	$7.5 \cdot 10^{-6}$ m
Atomic Radius of Hydrogen	0.000000000025 m	$2.5 \cdot 10^{-11}$ m

Factoring

Common Factors: When factoring, the first thing you should always do is pull out common factors among the terms (it cleans it up).

Ex

- $15 + 10x - 15x^2$ common factor is 5

  $= 5(3 + 2x - 3x^2)$

  Can always check by multiplying it back out.

  $5 \cdot 3 + 5 \cdot 2x - 5 \cdot 3x^2 = 15 + 10x - 15x^2$

- $12x^2y^2 - 20x^3y$ common factor is $4x^2y$

  $= 2(6x^2y^2 - 10x^3y)$

  $= 2 \cdot 2(3x^2y^2 - 5x^3y) = 4(3x^2y^2 - 5x^3y)$

  $= 4x^2(3y^2 - 5xy)$

  $= 4x^2y(3y - 5x)$

- $30a^2bc^2 - 12ac^3$ common factor is $6ac^2$

  $= 6(5a^2bc^2 - 2ac^3)$

  $= 6a(5abc^2 - 2c^3)$

  $= 6ac^2(5ab - 2c)$

ac-method

$$ax^2+bx+c$$

The first goal is to find 2 numbers that multiply to $a \times c$ and add to b.

Ex

1) x^2+4x+4

$= (x+2)(x+2)$

2) x^2-4x+4

$= (x-2)(x-2)$

3) x^2-4

$= (x-2)(x+2)$

$A^2-B^2 = (A-B)(A+B)$

$9-4 = (3-2)(3+2)$

4) $9x^2-25$

$= (3x-5)(3x+5)$

5) $6x^2-6y^2$

$= 6(x^2-y^2)$

$= 6(x-y)(x+y)$

Ex

- Factor $3x^2-5x-2$

$3\times(-2) = -6$

Split the middle term using these numbers

Pairs of Factors		Sums of Factors
1	-6	-5 ←
-1	6	5
2	-3	-1
-2	3	1

$=3x^2+x-6x-2$

$=x(3x+1)-2(3x+1)$

If you did it correctly, you should have the same thing in the parentheses

$=(x-2)(3x+1)$

- Factor $12x^3+10x^2-8x$

$=2(6x^3+5x^2-4x)$

$=2x(6x^2+5x-4)$

factor

$6\times(-4) = -24$

Pairs of Factors		Sums of Factors
1	-24	-23
-1	24	23
2	-12	-10
-2	12	10
3	-8	-5
-3	8	5 ←
4	-6	-2
-4	6	2

Split the middle term using these numbers

$6x^2+5x-4$

$=6x^2-3x+8x-4$

Factor

$=3x(2x-1)+4(2x-1)$

$=(3x+4)(2x-1)$

So $12x^3+10x^2-8x = 2x(3x+4)(2x-1)$