No Solution

Some equations have no real solution (bummer... ☹)

$$x+3=x+5$$

subtract an x?
subtract 3

$$0 \neq 2$$

Solving Equations With Fractions

use LCD on both sides

$$\frac{x}{2}+\frac{1}{5}=4.2$$

$$10\left(\frac{x}{2}+\frac{1}{5}\right)=4.2\cdot 10$$] LCD of 2 & 5 is 10

$$5x+2=42$$

$$5x=40$$

$$x=8$$

If x is negative...

just multiply both sides by -1

$$-x = 4y + 3$$

$$(-1)-x = (-1)(4y+3)$$] see...!

$$x = -4y - 3$$

Solving Equations

Get the variable on one side

$$-3x+5=20$$

$$-3x+\cancel{5}\cancel{-5}=20-5$$ ← subtract 5 from both sides

$$-3x=15$$

$$\frac{\cancel{-3}x}{\cancel{-3}}=\frac{15}{-3}$$ ← Divide by -3 on both sides

$$x=-5$$

Solving Equations

Get the variable on one side

$$\frac{x}{10} = 5$$

$$10\left(\frac{x}{10}\right) = 5 \cdot 10$$

] multiply each side by 10

$$x = 50$$

Solving Equations

Get the variable on one side

$3x = 21$

$\frac{3x}{3} = \frac{21}{3}$] Divide each side by 3

$x = 7$

Solving Equations

Get the variable on one side

$$x + 7 = 21$$

$$x + 7 - 7 = 21 - 7$$] subtract 7 from both sides

$$x = 14$$

Equivalent Equations

Have the same solution

$3x=12$, $5x=20$

$x=4$ solves both

Linear Equation

$$ax+b=c$$

$$3x+7=12$$

Sets of parentheses

Do innermost first

$5(3(x+1)+7)=$

$5(3x+3+7)=$

$5(3x+10)=$

$15x+50$

can use brackets for outer group!

$5[3(x+1)+7]$

Distributing A Negative

All signs change

$$-x(3x+4y-7)=$$

$$-3x^2-4xy+7x$$

Double Negative

$$-(-x) = x$$

Multiply & Divide Negatives

Two negatives = positive

One negative, One positive = negative

$-3 \cdot -4 = 12$

$- \cdot - = +$

$-3 \cdot 4 = -12$

$- \cdot + = -$

Adding Negative Numbers

Same as subtracting

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

Simplify Expressions

Distribute & Combine Like Terms

$$10(x+7)+5x=$$

$$10x+70+5x=$$

$$15x+70$$

Combine Like Terms

$$3x + 5x = (3+5)x = 8x$$

"pull the x out"

Absolute Value

The distance from a number to 0

Always Positive!

$|-3| = 3$ $|4| = 4$ $-|x| = -x$

negative is on outside, so still negative

Add & Subtract Fractions

If different denominator,
use Least common denominator (LCD)

$$\frac{1}{2}+\frac{1}{5}=\frac{1\cdot5}{2\cdot5}+\frac{1\cdot2}{5\cdot2}=\frac{5}{10}+\frac{2}{10}=\frac{7}{10}$$

LCD = 2·5 = 10

Same denominator

Add & Subtract Fractions

If same denominator,
go straight across.

$$\frac{5}{10} - \frac{3}{10} = \frac{5-3}{10} = \frac{2}{10} = \frac{1}{5}$$

Divide Fractions

Flip & Multiply!

$$\frac{7}{10} \times \frac{3}{4} = \frac{7}{10} \cdot \frac{4}{3} = \frac{7 \cdot 4}{10 \cdot 3} = \frac{28}{30} = \frac{14}{15}$$

Simplify!

Multiply Fractions

Go straight across!

$$\frac{7}{10} \cdot \frac{2}{3} = \frac{7 \cdot 2}{10 \cdot 3} = \frac{14}{30}$$

Lowest Terms

when numerator & demoninator have no more common factors

$$\frac{4}{8} = \frac{1 \cdot \cancel{4}}{2 \cdot \cancel{4}} = \frac{1}{2}$$

Improper Fractions

Numerator is larger than Denominator

$\frac{42}{7}$ ← Numerator

← Denominator

Mixed Number

Natural Number + Fraction

$7\frac{3}{4}$ $2\frac{1}{2}$ $12\frac{3}{10}$

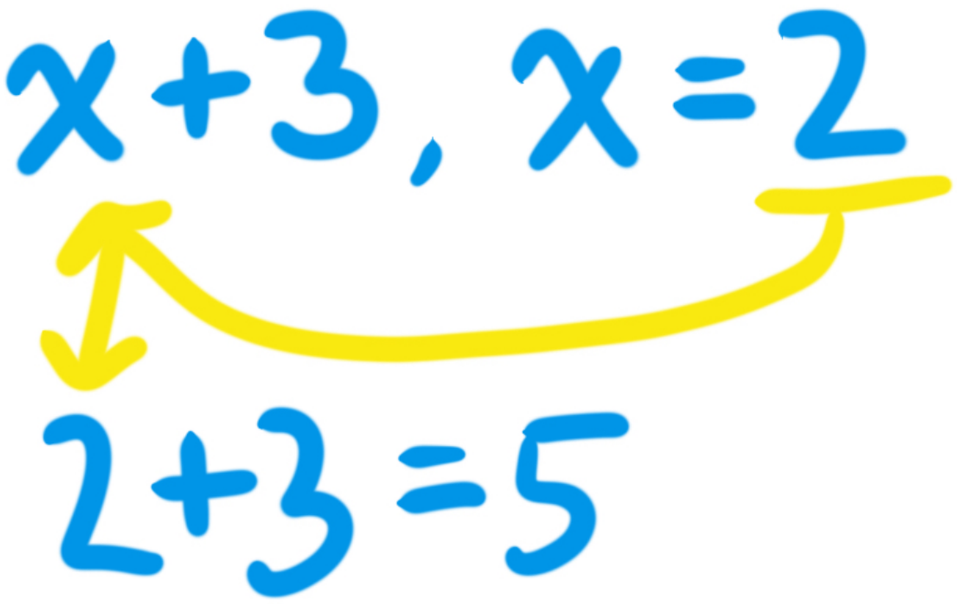
Formulas

Express relationships between variables

$$y = 2x + 77$$

Variables

A letter that stands for a number



Imaginary Numbers

$$i = \sqrt{-1}$$

$$i^2 = -1$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exponents

$$x^{-\frac{a}{b}} = \frac{1}{x^{\frac{a}{b}}}$$

$$= \frac{1}{(\sqrt[b]{x})^a}$$

$$= \frac{1}{\sqrt[b]{x^a}}$$

Exponents

$$x^{\frac{a}{b}} = \left(\sqrt[b]{x}\right)^a$$

$$= \sqrt[b]{x^a}$$

Exponents

$$x^{\frac{1}{a}} = \sqrt[a]{x}$$

Radicals

$$\frac{\sqrt[a]{x}}{\sqrt[a]{y}} = \sqrt[a]{\frac{x}{y}}, \quad y \neq 0$$

Radicals

$$\sqrt[a]{x} \cdot \sqrt[a]{y} = \sqrt[a]{xy}$$

Difference of Two Cubes

$$A^3 - B^3 = (A-B)(A^2+AB+B^2)$$

Sum of Two Cubes

$$A^3+B^3=(A+B)(A^2-AB+B^2)$$

Perfect Square Trinomals

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

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

Difference of Two Squares

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