B.3 - Solving Equations Algebraically & Graphically

 **What will you learn?** 

- To solve linear equations
- To find x- and y- intercepts of graphs of equations
- To find solutions of equations graphically
- To find the points of intersection of two graphs
- To solve polynomial equations
- To solve equations involving radicals, fractions, and absolute values

Example 1 - Solving an Equation Involving Fractions

$$\frac{x}{3} + \frac{3x}{4} = 2$$

CHECK!

See p. A59; exercise 15

Example 2 - An Equation with an Extraneous Solution

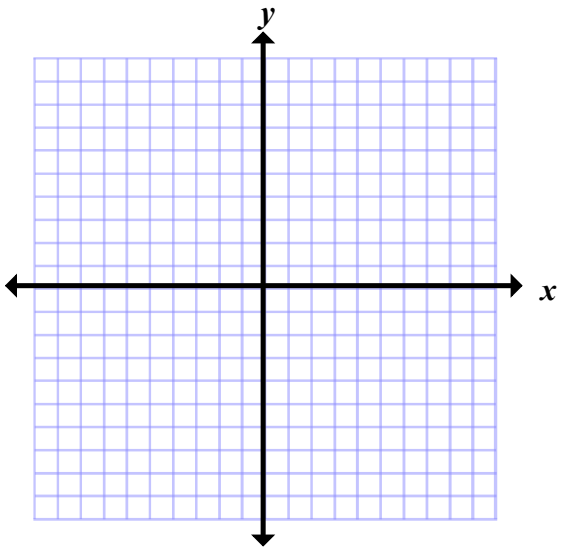
$$\frac{1}{x-2} = \frac{3}{x+2} - \frac{6x}{x2-4}$$

Algebraic

LCD

Graphical

Use *dot mode*
Set *y1* = left side of equation
Set *y2* = right side of equation



Check

See p. A60; exercise 29

Definition of Intercepts

x - intercept

To find numerically...

To find graphically...

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y - intercept

To find numerically...

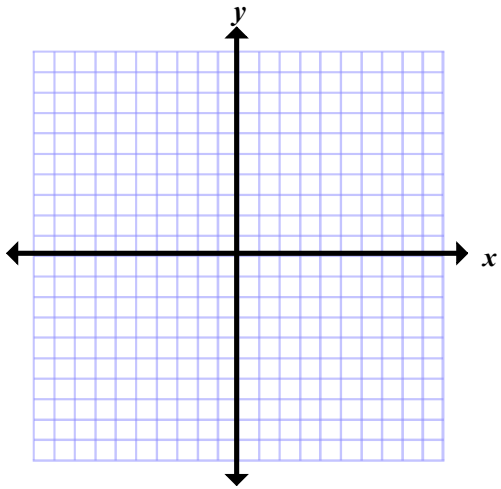
To find graphically...

Example 3 - Finding *x*- and *y*- intercepts

$$2x + 3y = 5$$

Numerically **Graphically**

***x*-intercept**



***y*-intercept**

See p. A60; exercise 31

Finding Solutions Graphically

Write in $y =$ **Form**

Check Window - include all relevant features of graph

Use *zero or root* feature or *zoom and trace* feature to approximate *x*-intercepts

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Example 4 - Finding Solutions of an Equation Graphicall y

Approximate the solutions of: $2x3 - 3x + 2 = 0$

See p. A60; exercise 47

Example 5 - Approximating Solutions of an Equation Graphically

Approximate the solutions of : $x2+3=5x$

See p. A60; exercise 49

Points of Intersection of Two Graphs

solution to two different equations

Example 6 - Finding Points of Intersection

Find the points of intersection of :

$$2x - 3y = -2$$
$$4x - y = 6$$

Algebraic

Graphical

Use the *intersect* feature on the calc menu

See p. A61; exercise 77

Example 7 - Approximating Points of Intersection Graphically

$$y = x2 - 3x - 4$$
$$y = x3 + 3x2 - 2x - 1$$

See p. A61; exercise 81

NOW...
Try setting the two equations equal to each other
Move all terms to one side
Graph
How do you solve?????

Solving Polynomial Equations Algebraically

Degree	Name	Example
1		
2		
3		
4		
5		

Do you remember how to solve Quadratic Equations*Algebraically*????

Factoring

$$x2 - x - 6 = 0$$

Square Roots

$$(x + 3)\,2 = 16$$

Completing the Square

$$x2 + 6x = 5$$

Quadratic Formula

$$2x2 + 3x - 1 = 0$$

- The higher the degree, the more difficult the equation is to solve
- Sometimes methods used to solve quadratics can bee used to solve higher degree equations

Example 8 - Solving an Equation of Quadratic Type

$$x4 - 3x2 + 2 = 0$$

See p. A61; exercise 125

Example 9 - Solving a Polynomial by Factoring

$$2x^3 - 6x^2 - 6x + 18 = 0$$

See p. A61; exercise 127

Example 10 - Solving an Equation Involving Radicals

$$\sqrt{2x + 7} - x = 2$$

Algebraic

Graphical

See p. A61; exercise 137

Example 11 - Solving an Equation Involving Two Radicals

$$\sqrt{2x+6} - \sqrt{x+4} = 1$$

Algebraic

Graphical

See p. A60; exercise 141

Example 12 - Solving an Equation with Rational Exponents

$$(x + 1)^{2/3} = 4$$

Algebraic

Graphical

See p. A 61; exercise 143

Example 13 - Solving an Equation Involving Fractions

$$\frac{2}{x} = \frac{3}{x-2} - 1$$

See p. A61; exercise 147

Example 14 - Solving an Equation Involving Absolute Value

$$|x2 - 3x| = -4x + 6$$

Algebraic

Graphical

See p. A62; exercise 153