10-3b Solving Quadratic Equations

An important distinction to note is the difference in solving a **linear equation** as compared to solving a **quadratic equation**. Remember there are different rules involved.

Linear Equation

$$8x-2=3x+28$$

$-3x \quad -3x$

$5x-2=28$

$+2 \quad +2$

$\frac{5x}{5}=\frac{30}{5}$

$\boxed{x=6}$

Quadratic Equation

$$2x^2-14x=-20$$

$+20 \quad +20$

$2x^2-14x+20=0$

$2(x^2-7x+10)=0$

$2(x-5)(x-2)=0$

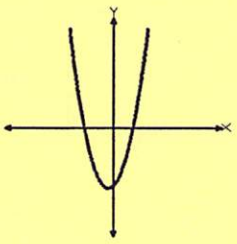
$2 \neq 0$

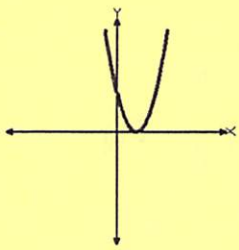
$x-5=0$ $\quad +5 \quad +5$ $\quad \boxed{x=5}$

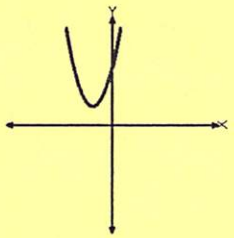
$x-2=0$ $\quad +2 \quad +2$ $\quad \boxed{x=2}$

Remember that the **solutions** to the quadratic equations are also called the **roots.** If you recall, the roots are where the parabola intersects the *x*-axis.

How many roots?







2 roots

1 root

0 roots

15

$x^2-2x-15=0$

$(x-5)(x+3)=0$

$x-5=0$ $\quad +5 \quad +5$ $\quad \boxed{x=5}$

$x+3=0$ $\quad -3 \quad -3$ $\quad \boxed{x=-3}$

$x^2-6x+9=0$

$(x-3)(x-3)=0$

$x-3=0$ $\quad +3 \quad +3$ $\quad \boxed{x=3}$

$x-3=0$ $\quad \boxed{x=3}$

$x^2+4x+6=0$

Not Factorable

More Examples:

1. $x(x-3)=4$

$x^2-3x=4$

$-4\quad -4$

$x^2-3x-4=0$

$(x+1)(x-4)=0$

$x+1=0$ | $x-4=0$

$-1\ -1$ | $+4\ +4$

$x=-1$ | $x=4$

2. $4x-48=-2x^2$

$+2x^2\qquad +2x^2$

$2x^2+4x-48=0$

$2(x^2+2x-24)=0$

$2\neq 0$ | $(x+6)(x-4)=0$

$x+6=0$ | $x-4=0$

$x=-6$ | $x=4$

3. $\frac{x}{9}=\frac{4}{x}$

$x^2=36$

-36

$x^2-36=0$

$(x+6)(x-6)=0$

$x+6=0$ | $x-6=0$

$x=-6$ | $x=6$

4. $\frac{8}{x-4}=\frac{x+6}{3}$

$24=(x-4)(x+6)$

$24=x^2+6x-4x-24$

$24=x^2+2x-24$

$-24\qquad -24$

$0=x^2+2x-48$

$x^2+2x-48=0$

$(x-6)(x+8)=0$

$x-6=0$ | $x+8=0$

$x=6$ | $x=-8$

Check

$x=6$	$x=-8$
$\frac{8}{6-4}=\frac{6+6}{3}$	$\frac{8}{-8-4}=\frac{-8+6}{3}$
$4=4$ ✓	$-\frac{2}{3}=-\frac{2}{3}$ ✓

Solving Quadratic Equations Day #2 Name _____

1. $3x^2 - 3x = 36$

2. $x^2 + 12x = -36$

3. $x(x+1) = 30$

4. $x^2 + 4x = -6$

5. $\frac{x}{2} = \frac{8}{x}$

6. $x^2 - 8x + 16 = 0$

7. $\frac{9}{x} = \frac{x+6}{3}$