Date: 04.23.19

Comparing & Contrasting Typical Linear and Quadratic Equations:

Linear Equations

$3x+2 = 23$

Degree → 1

Solutions → 1

Quadratic Equations

$x^2+5x+6 = 0$

Degree → 2

Solutions → 2

Three methods for solving quadratic equ:

1. The factoring method:

$$x^2+5x+6 = 0$$

$$(x+2)(x+3) = 0$$

$x+2=0$; $x+3=0$

$\boxed{x=-2}$; $\boxed{x=-3}$

1) Set to 0
2) Factor the polynomial.
3) Set each factor $=0$ and solve.

The property of zero

If $a \cdot b = 0$ then $a=0$ or, $b=0$

$$(-2)^2 + 5(-2) + 6 \stackrel{?}{=} 0$$

$$\Rightarrow 4 - 10 + 6 \stackrel{?}{=} 0$$

$$\Rightarrow 0 = 0 \checkmark$$

$16x^2 + 2x = 0$

$$\Rightarrow 2x(8x+1) = 0$$

$$\Rightarrow 2x = 0 \; ; \quad 8x + 1 = 0$$
$$ -1 \quad\; -1$$

$$\Rightarrow \boxed{x = 0} \; ; \quad \frac{8x}{8} = \frac{-1}{8}$$

$$\Rightarrow \boxed{x = -1/8}$$

$49x^2 - 1 = 0$

$$\Rightarrow (7x)^2 - 1^2 = 0$$

$$\Rightarrow (7x+1)(7x-1) = 0$$

$$\Rightarrow 7x + 1 = 0 \; ; \quad 7x - 1 = 0$$
$$ -1 \quad -1 \qquad\qquad +1 \quad +1$$

$$\Rightarrow \frac{7x}{7} = -1/7 \; ; \quad \Rightarrow \frac{7x}{7} = 1/7$$

$$\therefore \boxed{x = -1/7} \; ; \quad \therefore \boxed{x = 1/7}$$

$4x^2 - 25 = 0$

$\Rightarrow (2x+5)(2x-5) = 0$

$\Rightarrow 2x+5 = 0$; $2x-5 = 0$

$\quad -5 \quad -5 \qquad +5 \quad +5$

$\Rightarrow \frac{2x}{2} = -\frac{5}{2}$; $\frac{2x}{2} = +\frac{5}{2}$

$\Rightarrow \boxed{x = -5/2}$; $\boxed{x = \frac{5}{2}}$

$64x^2 + 80x + 25 = 0$

$\Rightarrow (8x)^2 + 2 \cdot 8x \cdot 5 + (5)^2 = 0$

$\Rightarrow (8x+5)^2 = 0$

$\Rightarrow 8x+5 = 0$

$\quad -5 \quad -5$

$\Rightarrow \frac{8x}{8} = -\frac{5}{8}$

$\therefore \boxed{x = -5/8}$

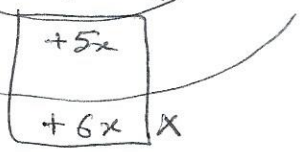
Perfect square = 0.

Solutions will be the same.

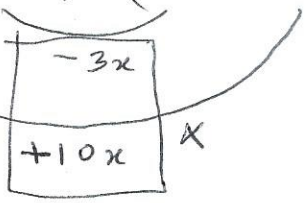
$2x^2 = 7x + 15$

$\Rightarrow 2x^2 - 7x - 15 = 0$

$\Rightarrow$ ~~$2x$~~ $(2x + 5)(x - 3) = 0$



$\Rightarrow (2x - 3)(x + 5) = 0$



$\Rightarrow (2x + 3)(x - 5) = 0$

$\Rightarrow 2x + 3 = 0$; $x - 5 = 0$

$-3 \quad -3 \qquad +5 \quad +5$

$\Rightarrow \frac{2x}{2} = \frac{-3}{2}$; $\boxed{x = 5}$

$\therefore \boxed{x = -3/2}$

$$13\left(\frac{1}{13}x^2 - x - 26\right) = (0)\,13$$

$$\Rightarrow x^2 - 13x - 338 = 0$$

$$\Rightarrow (x+13)(x-26) = 0$$

$$\Rightarrow \underset{-13}{x+13} = \underset{-13}{0} \;;\; \underset{+26}{x-26} = \underset{+26}{0}$$

$$\Rightarrow \boxed{x = -13} \;;\; \boxed{\therefore x = 26}$$

2. The square root method :

Perfect square = #

$$\sqrt{16x^2} = \pm\sqrt{400}$$

$$\Rightarrow \frac{4x}{4} = \frac{\pm 20}{4}$$

$$\therefore x = \pm 5$$

$$\boxed{\therefore x = 5, -5}$$

1) Take the square root of both sides.

$\#\ (x-7)^2 = 49$

$\Rightarrow \sqrt{(x-7)^2} = \pm\sqrt{49}$

$\Rightarrow x - 7 = \pm 7$
$\quad\ +7 \qquad +7$

$\Rightarrow x = \pm 7 + 7$

$\therefore x = 7+7 \ ; \quad x = -7+7$

$\therefore \boxed{x = 14} \ ; \quad \boxed{x = 0}$