

1.
 $ax^2 + bx + c = 0$ Complete The Square

$$\frac{ax^2}{a} + \frac{bx}{a} = \frac{-c}{a}$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a} \quad \left\{ \left(\frac{b}{2a} \right)^2 = \frac{b^2}{4a^2} \right\}$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = -\frac{c}{a} + \frac{b^2}{4a^2}$$

$$\downarrow \quad \downarrow$$
$$\left(x + \frac{b}{2a} \right)^2 = \frac{-4ac + b^2}{4a^2} = \frac{b^2 - 4ac}{4a^2}$$

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

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

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

Quadratic Formula

A "pre-solved" completing the square for any quadratic.

Look at the discriminant

$\Rightarrow d = b^2 - 4ac$, it is under the $\sqrt{\quad}$

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

$\pm \sqrt{\text{Positive}} \Rightarrow 2 \text{ solutions}$

Perfect Sq
↓
RATIONAL

$\pm \sqrt{0} = 0 \Rightarrow 1 \text{ solution} \Rightarrow \frac{-b}{2a}$

$\pm \sqrt{\text{Negative}} \Rightarrow 0 \text{ real solutions, cannot have a real square root of a negative number}$

SEE TABLE ON PAGE 549

$$x = \frac{-b \pm \sqrt{d}}{2a}$$

$x = \frac{-b}{2a} \Rightarrow \text{Equation for Axis of Symmetry}$

9.

Ch. 10.4 Solving Quadratic Equations Using THE Quadratic Formula

EX1
pg 546

$$x^2 - 2x - 24 = 0$$

$$a = 1$$

$$b^2 - 4ac$$

$$b = -2$$

$$(-2)^2 - 4(1)(-24)$$

$$c = -24$$

$$4 + 96 = \boxed{100 = d}$$

$$x = \frac{-b \pm \sqrt{d}}{2a}$$

$$x = \frac{-(-2) \pm \sqrt{100}}{2(1)}$$

$$x = \frac{2 \pm 10}{2}$$

$$x = \frac{2+10}{2}$$

$$\left\{ \begin{array}{l} x = \frac{2-10}{2} \end{array} \right.$$

$$x = 6$$

$$\left\{ \begin{array}{l} x = -4 \end{array} \right.$$

$$\boxed{x = \{-4, 6\}}$$

Ex 2
Pg 547

$$24x^2 - 14x = 6$$

$$24x^2 - 14x - 6 = 0$$

$$2(12x^2 - 7x - 3) = 0$$

$$a = 12$$

$$b = -7$$

$$c = -3$$

$$b^2 - 4ac$$

$$(-7)^2 - 4(12)(-3)$$

$$49 + 144 = \boxed{193 = d}$$

$$x = \frac{-b \pm \sqrt{d}}{2a} = \frac{7 \pm \sqrt{193}}{24}$$

$$\boxed{x = \frac{7 \pm \sqrt{193}}{24}} \quad \text{EXACT}$$

$$x = \frac{7 + \sqrt{193}}{24}$$

$$x = \frac{7 + 13.89}{24}$$

$$x = 0.87$$

$$x = \frac{7 - \sqrt{193}}{24}$$

$$x = \frac{7 - 13.89}{24}$$

$$x = -0.28$$

$$\boxed{x = \{-0.3, 0.9\}} \quad \text{APPROXIMATE}$$

STEPS FOR SOLVING ANY QUADRATIC EQUATION IN ONE VARIABLE (2nd degree)

$$ax^2 + bx + c = 0$$

① PUT IN STANDARD FORM

$$ax^2 + bx + c = 0$$

② GCF, if ANY

③ SPECIAL PATTERN, if ANY:

$$a^2 \pm 2ab + b^2 = (a \pm b)^2 \Rightarrow \text{PST}$$

$$a^2 - b^2 = (a+b)(a-b) \Rightarrow \text{DOS}$$

④ Magic Number Method $\Rightarrow$ if easy
GCF $(ax^2 + bx = 0)$ is $\rightarrow$ TO FACTOR

⑤ Complete the Square or QUADRATIC FORMULA

Homework: Pg. 550 # 14-20

WATCH OUT, if discriminant
is negative $\Rightarrow$ NO REAL ROOTS.