HOW TO USE THE QUADRATIC FORMULA TO DETERMINE THE ROOTS OF A QUADRATIC EQUATION.

If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Examples:

$ax^2+bx+c=0$

① $3x^2 - 5 = 2x + 4$

$a=3 \quad b=-2 \quad c=-9$

$3x^2-2x-9=0$

$x = \frac{2 \pm \sqrt{4-4(3)(-9)}}{2 \cdot 3}$

$= \frac{2 \pm \sqrt{4+108}}{6} = \frac{2 \pm \sqrt{112}}{6}$

$= \frac{2 \pm 4\sqrt{7}}{6} = \frac{2(1 \pm 2\sqrt{7})}{2 \cdot 3} = \frac{1 \pm 2\sqrt{7}}{3}$

$\frac{1}{3} + \frac{2\sqrt{7}}{3}, \frac{1}{3} - \frac{2\sqrt{7}}{3}$

$\sqrt{112} = \sqrt{4} \cdot \sqrt{28}$

$= \sqrt{4} \cdot \sqrt{4} \sqrt{7}$

$= 4\sqrt{7}$

② $2x^2 - x - 6 = 0$

$a=2 \quad b=-1 \quad c=-6$

$2x^2-x-6 = (x+3)(x-2)=0$

$x = \frac{1 \pm \sqrt{1-4(2)(-6)}}{4} = \frac{1 \pm \sqrt{1+48}}{4} = \frac{1 \pm \sqrt{49}}{4}$

$\frac{1 \pm 7}{4} \Rightarrow \frac{1+7}{4} \quad \frac{1-7}{4}$

$2, \frac{-6}{4} = -\frac{3}{2}$

$2, -\frac{3}{2}$

$-\frac{3}{2}, 2$

Same roots

③

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

$x = \frac{4 \pm \sqrt{16+24}}{6} = \frac{4 \pm \sqrt{40}}{6} = \frac{4 \pm 2\sqrt{10}}{6}$

$= \frac{2 \pm \sqrt{10}}{3} \rightarrow \frac{2+\sqrt{10}}{3}, \frac{2-\sqrt{10}}{3}$

$\frac{2}{3}+\frac{\sqrt{10}}{3}, \frac{2}{3}-\frac{\sqrt{10}}{3}$ } 2 value

④

$5x^2 - 2x + 3 = 0$

$x = \frac{2 \pm \sqrt{4-60}}{10} = \frac{2 \pm \sqrt{-54}}{10}$ ← imaginary