~~24~~ 11/5/2012 - Sec 9.2 Math 1010

42

84 #24 $\sqrt{(x-4)^2} = \sqrt{64}$

$x - 4 = \pm 8$

$+4 \quad +4$

$x = 4 \pm 8$

$4+8, \quad 4-8$

$\boxed{x = 12, -4}$

#42

$x^2 - 20x + \underline{100} = (x-10)^2$

$\frac{-20}{2} = -10$

$(-10)^2 = 100$

#84 $\frac{4x^2}{4} + \frac{5x}{4} + \frac{5}{4} = \frac{0}{4}$

$x^2 + \frac{5}{4}x + \left(\frac{5}{4}\right) = 0$

$x^2 + \frac{5}{4}x + \frac{25}{64} = -\frac{5}{4} + \frac{25}{64}$

$\frac{5}{4} \cdot \frac{1}{2} = \frac{5}{8}$

$\left(\frac{5}{8}\right)^2 = \frac{25}{64}$

$\sqrt{\left(x + \frac{5}{8}\right)^2} = \pm\sqrt{-\frac{55}{64}}$

$$X + \frac{5}{8} = \pm\sqrt{\frac{-55}{64}}$$

$$X + \frac{5}{8} = \frac{\pm\sqrt{-55}}{\sqrt{64}}$$

$$X + \frac{5}{8} = \frac{\pm i\sqrt{55}}{8}$$

$-5/8$

$$X = -\frac{5}{8} \pm \frac{i\sqrt{55}}{8}$$

$$X = \frac{-5 \pm i\sqrt{55}}{8}$$

55
^
5.11

#78 $\sqrt{(t+6)^2} = \sqrt{-9}$

$t + 6 = \pm\sqrt{-9}$

$t + 6 = \pm 3i$

$-6 \quad -6$

$$t = -6 \pm 3i$$

Sec 9.2 The Quadratic Formula

Every Quadratic Equation can be written in the form:

$$ax^2+bx+c=0$$ ← General form

$$\frac{ax^2}{a}+\frac{bx}{a}+\frac{c}{a}=\frac{0}{a}$$

LCD: $4a^2$

$$x^2+\frac{b}{a}x+\frac{c}{a}=0$$

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

$\frac{b}{a}\cdot\frac{1}{2}=\frac{b}{2a}$

$\left(\frac{b}{2a}\right)^2=\frac{b^2}{4a^2}$

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

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

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

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

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

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

Quadratic Formula

Remember

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

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

Quadratic Formula: $ax^2+bx+c=0$

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

Solve: $6x^2-5x-4=0$

$a=6 \quad b=-5 \quad c=-4$

$$x=\frac{+(+5)\pm\sqrt{(-5)^2-4(6)(-4)}}{2(6)}$$

$$=\frac{5\pm\sqrt{25+96}}{12}$$

$$=\frac{5\pm\sqrt{121}}{12}$$

$$=\frac{5\pm 11}{12}$$

$$=\frac{5+11}{12}, \quad \frac{5-11}{12}$$

$$=\frac{16}{12}, \quad \frac{-6}{12}$$

$$=\boxed{4/3, -1/2}$$

Solve by factoring

ac	b
-24	-5
-8, 3	-5 ✓

$\frac{-8}{6}, \frac{3}{6}$

$-4/3, 1/2$

$(3x-4)(2x+1)$

$3x-4=0 \quad 2x+1=0$

$\frac{3x}{3}=\frac{4}{3} \quad 2x=-1$

$x=4/3 \quad x=-1/2$

#10 $9x^2 + 6x = 1$

$9x^2 + 6x - 1 = 0$

$a = 9 \quad b = 6 \quad c = -1$

$$x = \frac{-6 \pm \sqrt{6^2 - 4(9)(-1)}}{2(9)}$$

$$x = \frac{-6 \pm \sqrt{36 + 36}}{18}$$

$$x = \frac{-6 \pm \sqrt{72}}{18}$$

$$x = \frac{-6 \pm 6\sqrt{2}}{18} = \frac{6(-1 \pm \sqrt{2})}{18\ 3}$$

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

72
8 9
2 2 2
3 3

#11 $x^2 + 18 = 10x$

$-10x \quad -10x$

$x^2 - 10x + 18 = 0$

$a = 1 \quad b = -10 \quad c = 18$

$$x = \frac{10 \pm \sqrt{100 - 4(1)(18)}}{2(1)}$$

$$= \frac{10 \pm \sqrt{100 - 72}}{2}$$

$$= \frac{10 \pm \sqrt{28}}{2}$$

$x = 5 \pm \sqrt{7}$

$$\frac{10 \pm 2\sqrt{7}}{2}$$

$$\frac{2(5 \pm \sqrt{7})}{2}$$

$5 \pm \sqrt{7}$

Types of Solutions

2 Rational Solutions: $4/3, -1/2$

2 irrational Solutions: $5 \pm \sqrt{7}$

2 complex Solutions: $5 \pm i\sqrt{7}$

1 Rational Solution: 3

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

$(x-3)^2 = 0$

Discriminant: $b^2 - 4ac$

Discriminant	Solutions
Positive & perfect Square	→ 2 Rational
Positive & Not a perfect Square	→ 2 irrational
Negative	→ 2 complex
Zero	→ 1 Rational

Ex: $10x^2 - x - 2 = 0$

$a=10 \quad b=-1 \quad c=-2$

Discriminint: $(-1)^2 - 4(10)(-2) = 1 + 80 = 81$, 2 Rational Solutions