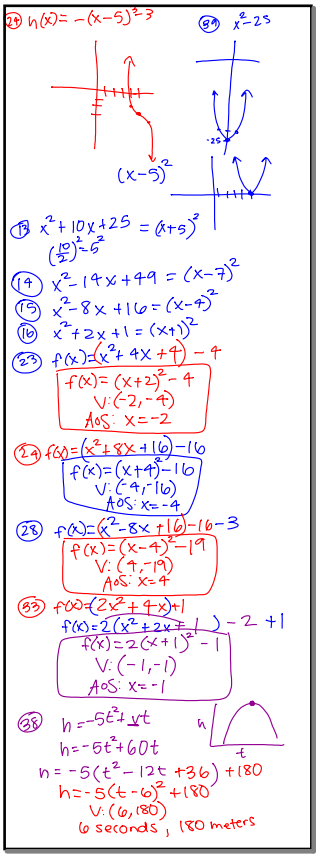
4-1 The Quadratic Formula

Content Objective: The student recognizes the advantages of being able to use the quadratic formula for any quadratic equation.

Language Objective: Students will communicate the quadratic formula by singing a song and practicing algorithmic procedures with a partner. Student should also be able to communicate using the following vocabulary:

- Quadratic Formula
- roots
- solution
- zeros



Appreciating the Quadratic Formula
Task

Solve each equation by "Completing the Square."

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

2. $3a^2 - 6a - 34 = 0$

4. $4n^2 + 11n = 15$

Solve Completing the Square Yikes!

$$4n^2 + 11n = 15$$

Honors: Deriving the quadratic formula

Quadratic Formula - "Short Cut"

"Complete the square" of a general equation in standard form to discover a "short cut"

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

Quadratic Formula

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

Solve each equation using the Quadratic Formula
(equations on task)

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

2. $3a^2 - 6a - 34 = 0$

3. $4n^2 + 11n = 15$

4. $4n^2 + 11n = 15$

Practice (simplify completely):

Solve for x. $ax^2+bx+c=0$ $\quad a=1 \quad b=-2 \quad c=-10$

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

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

$4+40$

$$x=\frac{2\pm\sqrt{44}}{2}$$

$44 < 4, 11$; $4 < 2, 2$

$$x=\frac{2\pm2\sqrt{11}}{2}$$

$$x=\frac{2}{2}\pm\frac{2\sqrt{11}}{2}$$

$$x=1\pm\sqrt{11}$$

$1+\sqrt{11} \qquad 1-\sqrt{11}$

Solve for x.

$$3x^2+4x+8=2x^2+7$$

$$-2x^2 \quad -7 \quad -2x^2 \quad -7$$

$$x^2+4x+1=0$$

$a=1 \quad b=4 \quad c=1$

$$x=\frac{-4\pm\sqrt{16-4(1)(1)}}{2(1)}=\frac{-4\pm\sqrt{12}}{2}$$

$12 < 4, 3$; $4 < 2, 2$

$$=\frac{-4\pm2\sqrt{3}}{2}=-2\pm\sqrt{3}=x$$

$$x^2 + 9x = -7$$

$$x = \frac{-9 \pm \sqrt{81 - 4(1)(7)}}{2}$$

$$\boxed{x = \frac{-9 \pm \sqrt{53}}{2}}$$

$$x^2 - 2x - 24 = 0 \qquad a = 1,\ b = -2,\ c = -24$$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(-24)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{100}}{2} = \frac{2 \pm 10}{2}$$

$$\frac{2+10}{2} = \boxed{6}$$

$$\frac{2-10}{2} = \boxed{-4}$$