Adv. Alg. With Trig, Glawe **Name:** _____ **Date:** _____ **Pd:**_____

Solve Quadratic Equations by Finding Square Roots (4.5)

You can use square roots to solve some types of quadratic equations. For example, if $s > 0$, then the equation $x^2 = s$ has two real-number solutions: $x = \sqrt{s}$ and : $x = -\sqrt{s}$. These solutions are often written in condensed form as $x = \pm\sqrt{s}$ (read as "plus or minus the square root of s").

Example: **Solve $3x^2 + 5 = 41$.** *(When you solve and isolate x, you are doing the reverse order of GEMS)*

$3x^2 + 5 = 41$	Write the original equation.
$3x^2 = 36$	Subtract 5 from each side.
$x^2 = 12$	Divide each side by 3.
$x = \pm\sqrt{12}$	Take the square root of each side.
$x = \pm\sqrt{4} \cdot \sqrt{3}$	Find the largest perfect square that goes into your radicand and use the product property to separate factors.
$x = \pm 2\sqrt{3}$	Simplify.

Therefore the solutions are $2\sqrt{3}$ or $-2\sqrt{3}$.

You can always check to see if your solutions are correct by substituting them back into the original equation and seeing if they produce a true statement.

Example 2: **Solve $\frac{1}{5}(z + 3)^2 = 7$.**

$\frac{1}{5}(z + 3)^2 = 7$	Write the original equation.
$(z + 3)^2 = 35$	Multiply each side by 5.
$z + 3 = \pm\sqrt{35}$	Take the square root of each side.
$z = -3 \pm \sqrt{35}$	Subtract 3 from each side.

Therefore the solutions are $-3 + \sqrt{35}$ and $-3 - \sqrt{35}$.

G rouping

E xponents

M ultiplication/ Division

S ubtraction/Addition

Model a dropped object with a quadratic function:
For a science competition, students must design a container that prevents an egg from breaking when dropped from a height of 50 feet. How long does the container take to hit the ground?

$h = -16t^2 + h_0$	Write height function where *h* represents the height, *t* represents the time, and h_0 represents the initial height
$0 = -16t^2 + 50$	Substitute 0 for *h* and 50 for h_0.
$-50 = -16t^2$	Subtract 50 from each side.
$\frac{50}{16} = t^2$	Divide each side by -16.
$\pm\sqrt{\frac{50}{16}} = t$	Take the square root of each side.
$\pm 1.8 \approx t$	Use a calculator to find an approximate solution.

Reject the negative solution, -1.8, because time must be positive.
The container will fall for about 1.8 seconds before it hits the ground.

Homework: p. 270: 23-33 (odds), 38 AND p. 323: 14, 25

p. 270: 23-33 (odds), 38:
Solve the following equations.

23) $a^2 = 50$

25) $6z^2 = 150$

27) $-3w^2 = -213$

29) $\frac{x^2}{25} - 6 = -2$

31) $4(x-1)^2 = 8$

33) $2(x+2)^2 - 5 = 8$

38) A cliff diver divers off a cliff 40 feet above water. Write an equation giving the diver's height *h* (in feet) above the water after *t* seconds. How long is the diver in the air?

p. 323: 14, 25:
Solve the following equations:

14) $2(m-7)^2 = 16$

15) $(x+2)^2 - 12 = 36$