Warmup: Factor each of the following:

$x^2 - 3x - 28$

$(x-7)(x+4)$

$x^2 - 6x + 9$

$(x-3)(x-3)$

$(x-3)^2$

$4x^2 - 36$ $= 4(x^2-9)$

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

$2x$

$6x^2 + 11x - 10$

-60

15 -4

11

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

$2 \cdot 2(x+3)(x-3)$

$6x^2 + 15x - 4x - 10$

$3x(2x+5) - 2(2x+5)$

$(2x+5)(3x-2)$

Solve the following quadratic equations:

$-2x^2 + 16x = -96$

$-2x^2 = -450$

E.Q.: How do we solve quadratic equations using the square root method?

Solving Using Square Roots

-Another method of solving quadratic equations is by using square roots to get rid of the exponent.

-The square root method works when there is no bx term.

-The equations should look like $ax^2 + c$ after you set them equal to zero

-In order to solve using square roots:

1) Isolate the variable on one side of the equation.

2) Take the square root of both sides.

* When taking the square root you have positive and negative square root*

3) Simplify the radical expressions.

Examples:

1) $n^2 - 6 = 30$

$+6 \quad +6$

$\sqrt{n^2} = \pm\sqrt{36}$

$n = \pm 6$ $\Leftrightarrow$ $n = 6$ or $n = -6$

2) $-8a^2 = 216$

$\frac{}{-8} \quad \frac{}{-8}$

$\sqrt{a^2} = \sqrt{-27}$

No real solutions

3) $\frac{3b^2}{3} = \frac{-180}{3}$

~~$b^2 + 60 = 0$~~

$\sqrt{b^2} = \pm\sqrt{-60}$

No real roots

4) $4r^2 + 10 = 46$

$-10 \quad -10$

$\frac{4r^2}{4} = \frac{36}{4}$

$\sqrt{r^2} = \pm\sqrt{9}$

$r = \pm 3$

5) $5v^2 + 8 = 243$

$-8 \quad -8$

$\frac{5v^2}{5} = \frac{235}{5}$

$\sqrt{v^2} = \sqrt{47}$

$v = \pm\sqrt{47}$ or ± 6.86

6) $8n^2 + 8 = -120$

$-8 \quad -8$

$\frac{8n^2}{8} = \frac{-128}{8}$

$n^2 = -16$

No real sol.

7) $3x^2 + 1 = 52$

8) $2x^2 = 156$

- You can also use the square root method when you have a square binomial in the problem.

-The steps are the same, except now we isolate the binomial first and then take the square root.

Examples:

9) $(x-4)^2 - 3 = 13$

$+3 \quad +3$

$\sqrt{(x-4)^2} = \sqrt{16}$

$x - 4 = \pm 4$

$+4 \quad +4$

$x = 4 \pm 4$

$x = 8 \quad x = 0$

$x - 4 = 4$

$+4 \quad +4$

$x = 8$

or

$x - 4 = -4$

$+4 \quad +4$

$x = 0$

10) $\frac{-2(x+3)^2}{-2} = \frac{40}{-2}$

$\sqrt{(x+3)^2} = \sqrt{-20}$

No real roots!

11) $\frac{1}{2}(x-6)^2+2=10$
$-2 \quad -2$

$2 \cdot \frac{1}{2}\cdot(x-6)^2 = 8\cdot 2$

$\sqrt{(x-6)^2} = \sqrt{16}$

$x-6 = \pm 4$
$+6 \quad +6$
$x = 6 \pm 4$

$x = 10$
$x = 2$

12) $-(x-4)^2-12=0$
$+12 \quad +12$

$\frac{-(x-4)^2}{-1} = \frac{12}{-1}$

$\sqrt{(x-4)^2} = \sqrt{-12}$

no real roots

13) $5(x+7)^2+6=31$

14) $\frac{1}{3}(x+2)^2+4=-22$

15) $(x-11)^2+9=90$

$-9 \quad -9$

$\sqrt{(x-11)^2}=\sqrt{81}$

$x-11 = \pm 9$

$x = 11 \pm 9$

$x = 20$

$x = 2$

16) $-3(x+5)^2-2=22$

$+2 \quad +2$

$-3(x+5)^2$

$\frac{-3(x+5)^2}{-3} = \frac{24}{-3}$

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

No real roots!

Solving Using Square Roots Together

- Look at what you are given. Do you have just a letter squared? Or do you have a set of parentheses squared?

  - if you have just a letter squared, isolate that letter, take the square root, and solve

  - if you have a set of parentheses squared, isolate the parentheses, take the square root, and solve.

Examples:

1) $2(a + 3)^2 - 10 = 122$

2) $8x^2 - 9 = 583$

3) $4n^2 + 10 = 14$

4) $3(n - 10)^2 + 4 = 247$

Homework #5

Solving Quadratics by Square Roots