5.5 Solving Quadratics, Part 2

Taking the Square Root

Standards:

A.REI.4

A.REI.4a

Old Solving Quadratics

① $m^2+7m+10=0$ (1·10, 2·5)

$=(m+5)(m+2)=0$

$m+5=0$ or $m+2=0$

$m=-5$ or $m=-2$

② $(4m+3)(2m+3)=0$

$4m+3=0$ or $2m+3=0$

$-3=-3$ $\quad -3=-3$

$\frac{4m}{4}=\frac{-3}{4}$ $\quad \frac{2m}{2}=\frac{-3}{2}$

$m=-\frac{3}{4}$ $\quad m=-\frac{3}{2}$

③ $x^2-11x+19=-5$

$+5=+5$

$x^2-11x+24=0$ (1·24, 2·12, -3·-8, 4·6)

$(x-3)(x-8)=0$

$x-3=0$ or $x-8=0$

$x=3$ or $x=8$.

④ $x^2=25$

$-25=-25$

$x^2-25=0$

$(x-5)(x+5)=0$

$x-5=0$ or $x+5=0$

$x=5$ or $x=-5$.

⑤ $x^2=25x$

$-25x=-25x$

$x^2-25x=0$

$x(x-25)=0$

$x=0$ or $x-25=0$.

$x=0$ or $x=25$

Ways to SOLVE QUADRATICS

(Quad & Linear or Constant) 2 Terms	3 Terms (Quad, Linear, Constant)
· GCF Factoring (set = 0)	· GCF Factoring (set = 0)
· Difference of Squares (set = 0)	· Factoring Trinomials (set = 0)

new Solving Quadratics- Taking the Square Root

Let's consider the equation $x^2-20=0$. Factor the equation.

$x^2-20=0 \Longrightarrow$ This Quadratic Binomial is not factorable.

How do we solve a Quadratic Binominal that is not factorable?

To use the "Taking the Square Root" method, you must:

- isolate the Quadratic Term
- take the square root on both sides of the equal sign
- the unknown will be a positive or negative number.

note: MUST HAVE 2 Terms (one Quadratic Term and Constant Term)

Let's consider $x^2-20=0$. Solve for x.

$$x^2-20=0$$
$$+20=+20$$
$$x^2=20$$
$$\sqrt{x^2}=\sqrt{20}$$
$$x=\pm\sqrt{20}$$
$$x=\pm 2\sqrt{5}.$$

[Examples] Solve for x by Taking the Square Root.

① $x^2 - 25 = 0$

$+25 = +25$

$x^2 = 25$

$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

② $4x^2 - 25 = 0$

$+25 = +25$

$\frac{4x^2}{4} = \frac{25}{4}$

$x^2 = \frac{25}{4}$

$\sqrt{x^2} = \sqrt{\frac{25}{4}}$

$x = \pm \frac{5}{2}$.

③ $m^2 - 34 = 0$

$+34 = +34$

$m^2 = 34$

$\sqrt{m^2} = \sqrt{34}$

$m = \pm\sqrt{34}$.

④ $x^2 = 4$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$.

⑤ $\frac{1}{2}x^2 + 3 = 12$

$-3 = -3$

$(2)\ \frac{1}{2}x^2 = 9\ (2)$

$x^2 = 18$

$\sqrt{x^2} = \sqrt{18}$

$x = \pm 3\sqrt{2}$.

⑥ $2(x^2 - 5) = -x^2 - 1$

$2x^2 - 10 = -x^2 - 1$

$+x^2 + 1 = +x^2 + 1$

$3x^2 - 9 = 0$

$+9 = +9$

$\frac{3x^2}{3} = \frac{9}{3}$

$x^2 = 3$

$\sqrt{x^2} = \sqrt{3}$

$x = \pm\sqrt{3}$.

⑦ $5(x-4)^2 = 125$

$\frac{5(x-4)^2}{5} = \frac{125}{5}$

$(x-4)^2 = 25$

$\sqrt{(x-4)^2} = \sqrt{25}$

$x - 4 = \pm 5$

$+4 = +4$

$x = 4 \pm 5$

$x = 4+5$ or $x = 4-5$

$x = 9$ $\quad$ $x = -1$.

⑧ $4(x+5)^2 = 64$

$\frac{4(x+5)^2}{4} = \frac{64}{4}$

$(x+5)^2 = 16$

$\sqrt{(x+5)^2} = \sqrt{16}$

$x+5 = \pm 4$

$-5 = -5$

$x = -5 \pm 4$

$x = -5+4 = -1$

$x = -5-4 = -9$

⑨ $2x^2 - 338 = 0$

$+338 = +338$

$\frac{2x^2}{2} = \frac{338}{2}$

$x^2 = 169$

$\sqrt{x^2} = \sqrt{169}$

$x = \pm 13.$

WAYS to SOLVE QUADRATICS

(Quad & Linear or Constant) 2 Terms

- GCF Factoring (set = 0)
- Difference of Squares (set = 0)
- Taking Sq Root (isolate Quad Term)

3 Terms (Quad, Linear, Constant)

- GCF Factoring (set = 0)
- Factoring Trinomials (set = 0)