$y = a(x-p)^2 + q$

4.3 Part 1 Solving by completing the Square / Square Rooting

Solving by Square Rooting – use this process when the initial quadratic equation is in Vertex form.

① isolate the squared term

② square root both sides.

1. $x^2 - \cancel{64} = 0$

$+\cancel{64} \quad +64$

$\sqrt{x^2} = \sqrt{64}$

$\boxed{x = \pm 8}$

2. $2x^2 - \cancel{18} = 0$

$+\cancel{18} \quad +18$

$\frac{\cancel{2}x^2}{\cancel{2}} = \frac{18}{2}$

$\sqrt{x^2} = \sqrt{9}$

$\boxed{x = \pm 3}$

3. $(x+2)^2 - 6 = 0$

$+6 \quad +6$

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

$x + \cancel{2} = \pm\sqrt{6}$

$-\cancel{2} \quad -2$

$\boxed{x = -2 \pm \sqrt{6}}$

$-2 + \sqrt{6} = .449...$

$-2 - \sqrt{6} = -4.44...$

4. $2(x-3)^2 - \cancel{14} = 0$

$+\cancel{14} \quad +14$

$\frac{\cancel{2}(x-3)^2}{\cancel{2}} = \frac{14}{2}$

$\sqrt{(x-3)^2} = \sqrt{7}$

$x - \cancel{3} = \pm\sqrt{7}$

$+\cancel{3} \quad +3$

$\boxed{x = 3 \pm \sqrt{7}}$

$3 + \sqrt{7}$

$3 - \sqrt{7}$

$y = ax^2 + bx + c$

Solving by Completing the Square and Square Rooting – use when the quadratic equation is initially in standard form.

1. $(x^2 + 6x) - 3 = 0$

$(x^2 + 6x + 9 - 9) - 3 = 0$

$(x+3)^2 - \cancel{12} = 0$

$+\cancel{12} \quad +12$

$\sqrt{(x+3)^2} = \sqrt{12}$

$x + 3 = \pm\sqrt{12}$

$-3 \quad -3$

$\boxed{x = -3 \pm \sqrt{12}}$

2. $(-x^2 + 4x + 7 = 0) \div -1$

we can do this because equation is $=0$ & we're dividing the entire equation.

$(x^2 - 4x) - 7 = 0$

$(x^2 - 4x + 4 - 4) - 7 = 0$

$(x-2)^2 - \cancel{11} = 0$

$+\cancel{11} \quad +11$

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

$x - \cancel{2} = \pm\sqrt{11}$

$+\cancel{2} \quad +2$

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

3. $(2x^2 + 8x) - 5 = 0$

$2(x^2 + 4x + 4 - 4) - 5 = 0$

$2(x+2)^2 - \cancel{13} = 0$

$+\cancel{13} \quad +13$

$\frac{\cancel{2}(x+2)^2}{\cancel{2}} = \frac{13}{2}$

$\sqrt{(x+2)^2} = \sqrt{\frac{13}{2}}$

$x + \cancel{2} = \pm\sqrt{\frac{13}{2}}$

$-\cancel{2} \quad -2$

$\boxed{x = -2 \pm \sqrt{\frac{13}{2}}}$