Notes Solving Quadratic Equations by Square Root

Solve by Factoring (GCF, Trinomials, Grouping) Factor → Set each factor = 0 + solve for x

$2x^2 - 3x - 5 = 0$	$x^2 - 10x = 24$	$3x^2 - 27 = 0$
$(2x-5)(x+1)=0$ $2x-5=0 \quad x+1=0$ $x=\frac{5}{2} \quad x=-1$ $x=\{5/2, -1\}$	$x^2-10x-24=0$ $(x-12)(x+2)=0$ $x-12=0 \quad x+2=0$ $x=12 \quad x=-2$ $x=\{12, -2\}$	$\frac{3(x^2-9)}{3}=\frac{0}{3}$ $(x+3)(x-3)=0$ $x=\{3, -3\}$

If you can't factor, here is another option:

Use when quadratic is in the form $ax^2 - c = 0$ or $ax^2 = c$.

1) $\sqrt{x^2}=\sqrt{36}$	2) $2x^2 + 7 = 207$	3) $x^2 - 32 = 64$
$x = 6, -6$ $x = \pm 6$	$-7 \quad -7$ $\frac{2x^2}{2}=\frac{200}{2}$ $\sqrt{x^2}=\sqrt{100}$ $x = \pm 10$	$+32 \quad +32$ $\sqrt{x^2}=\sqrt{96}$ $x = \pm 4\sqrt{6}$
4) $64x^2 - 5 = 20$	5) $\sqrt{(x+7)^2}=\sqrt{9}$	6) $\sqrt{(x-3)^2}=\sqrt{24}$
$+5 \quad +5$ $\frac{64x^2}{64}=\frac{25}{64}$ $\sqrt{x^2}=\frac{\sqrt{25}}{\sqrt{64}}$ $x = \pm\frac{5}{8}$	$x+7 = \pm 3$ $x = -7 \pm 3$ $x = -4, -10$	$x - 3 = \pm 2\sqrt{6}$ $x = 3 \pm 2\sqrt{6}$

Your Turn ☺

$x^2 = 169$	$x^2 - 48 = 0$	$x^2 + 48 = 0$	$25x^2 + 7 = 25$
$x = \pm 13$	$x = \pm 4\sqrt{3}$	No real solution $\sqrt{x^2}=\sqrt{-48}$ $x=\sqrt{-48}$ $x = \pm 4i\sqrt{3}$ imaginary	$x = \frac{\pm 3\sqrt{2}}{5}$
$(y+5)^2 = 4$	$(x+4)^2 = 8$	$(x-2)^2 = 48$	
$y = -3, -7$	$y = -4 \pm 2\sqrt{2}$	$y = 2 \pm 4\sqrt{3}$	

Notes Solve Quadratic Equations by Completing the Square

How to Complete the Square (create a perfect square trinomial)

$x^2+10x+\frac{25}{2}\ \frac{25}{(5)^2}$ $(x+5)^2$	$x^2-12x+\frac{36}{2}\ \frac{36}{(-6)^2}$ $(x-6)^2$	$x^2-2x+\frac{1}{2}\ \frac{1}{(-1)^2}$ $(x-1)^2$	$x^2+15x+\frac{56.25}{2}\ \frac{56.25}{(7.5)^2}$ $(x+7.5)^2$

How to SOLVE by Completing the Square Use when in the form $(x^2+bx=c)$

→ a = 1
→ b is even
→ variables on one side

$x^2-10x-50=0$

$x^2-10x=50$

Step 1: Is the function in the form $x^2+bx=c$?

$x^2-10x+25=50+25$

Step 2: Build a Perfect Square Trinomial

$\sqrt{(x-5)^2}=\sqrt{75}$

Step 3: Add the new "c" to both sides

$x-5=\pm 5\sqrt{3}$

Step 4: Factor and simplify

$x=5\pm 5\sqrt{3}$

Step 5: Take Square Root of BOTH Sides and solve for x.

Complete the square to form a perfect square trinomial and the factor.

1) $x^2-14x=0$ $x^2-14x+49=0+49$ $\sqrt{(x-7)^2}=\sqrt{49}$ $x-7=\pm 7$ $x=7\pm 7$ $x=14, 0$	2) $x^2+20x=20$ $x^2+20x+100=20+100$ $\sqrt{(x+10)^2}=\sqrt{120}$ $x+10=\pm 2\sqrt{30}$ $x=-10\pm 2\sqrt{30}$	3) $x^2+6x=11$ $x=-3\pm 2\sqrt{5}$
4) $x^2+18x=-1$ $x=-9\pm 4\sqrt{5}$	5) $x^2-16x=26$ $x=8\pm 3\sqrt{10}$	6) $x^2+5x=5$ $x^2+5x+(5/2)^2=5+(5/2)^2$ $\sqrt{(x+5/2)^2}=\sqrt{\frac{45}{4}}$ $x+5/2=\pm\frac{3\sqrt{5}}{2}$ $x=-\frac{5}{2}\pm\frac{3\sqrt{5}}{2}$