Solving Quadratics (3)

*30

We solve quadratics by taking a square root when given an equation in vertex form ($y = a(x-h)^2 + k$) or an equation in standard form that is missing the "b" term ($y = ax^2 + c$).

If $x^2 = a$ and a is a nonnegative real number, then $x = \pm\sqrt{a}$.

EX.1: Find x.

A) $x^2 = 16$

$\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

B) $x^2 = 81$

$\sqrt{x^2} = \sqrt{81}$

$x = \pm 9$

C) $x^2 = 3$

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

$x = \pm\sqrt{3}$

D) $x^2 = 8$

$\sqrt{x^2} = \sqrt{8}$

$x = \pm\sqrt{8}$

$= \pm\sqrt{4}\cdot\sqrt{2}$

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

EX.2: $3x^2 - 4 = 68$

$+4 \quad +4$

$\frac{3x^2}{3} = \frac{72}{3}$

$x^2 = 24$

$\sqrt{x^2} = \sqrt{24}$

$x = \pm\sqrt{6}\cdot\sqrt{4}$

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

EX.3: $(x-5)^2 = 27$

$\sqrt{(x-5)^2} = \sqrt{27}$

$x - 5 = \pm\sqrt{9}\cdot\sqrt{3}$

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

$+5 \quad +5$

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

EX.4: $4x^2 - 20 = 5$

$+20 \quad +20$

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

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

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

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

EX.5: $\frac{2}{3}(x+8)^2 - 66 = 0$

$+66 \quad +66$

$\frac{\frac{2}{3}(x+8)^2}{\frac{2}{3}} = \frac{66}{\frac{2}{3}}$

$(x+8)^2 = 99$

$\sqrt{(x+8)^2} = \sqrt{99}$

$x+8 = \pm\sqrt{9}\cdot\sqrt{11}$

$x+8 = \pm 3\sqrt{11}$

$-8 \quad -8$

$x = -8 \pm 3\sqrt{11}$

Solve each quadratic by taking a square root.
(Add these problems to you #30 notes.)

1. $x^2 = 289$
2. $2x^2 - 512 = 0$
3. $\frac{1}{2}x^2 - 8 = 16$
4. $3(x^2 + 2) = 18$
5. $(3x+2)^2 - 49 = 0$
6. $(4x-5)^2 = 64$
7. $\frac{1}{2}(x-4)^2 = 8$
8. $\frac{2}{3}(x+8)^2 - 66 = 0$

① $x^2 = 289$

$\sqrt{x^2} = \sqrt{289}$

$x = \pm 17$

② $2x^2 - 512 = 0$

$+512 \quad +512$

$\frac{2x^2}{2} = \frac{512}{2}$

$x^2 = 256$

$\sqrt{x^2} = \sqrt{256}$

$x = \pm 16$

③ $\frac{1}{2}x^2 - 8 = 16$

$+8 \quad +8$

$\frac{\frac{1}{2}x^2}{\frac{1}{2}} = \frac{24}{\frac{1}{2}}$

$x^2 = 48$

$\sqrt{x^2} = \sqrt{48}$

$x = \pm\sqrt{16}\cdot\sqrt{3}$

$x = \pm 4\sqrt{3}$

④ $\frac{3(x^2+2)}{3} = \frac{18}{3}$

$x^2+2=6$

$-2 \quad -2$

$x^2=4$

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

$\boxed{x=\pm 2}$

⑤ $(3x+2)^2-49=0$

$+49 \quad +49$

$(3x+2)^2=49$

$\sqrt{(3x+2)^2} = \sqrt{49}$

$3x+2=\pm 7$

$-2 \quad -2$

$\frac{3x}{3} = \frac{-2\pm 7}{3}$

$x = \frac{-2\pm 7}{3}$

$\boxed{x=\frac{5}{3}, -3}$

⑥ $(4x-5)^2=64$

$\sqrt{(4x-5)^2} = \sqrt{64}$

$4x-5=\pm 8$

$+5 \quad +5$

$\frac{4x}{4} = \frac{5\pm 8}{4}$

$x = \frac{5\pm 8}{4}$

$\boxed{x=\frac{13}{4}, -\frac{3}{4}}$

⑦ $\frac{\frac{1}{2}(x-4)^2}{\frac{1}{2}} = \frac{8}{\frac{1}{2}}$

$(x-4)^2=16$

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

$x-4=\pm 4$

$+4 \quad +4$

$x=4\pm 4$

$\boxed{x=0, 8}$

⑧ $\frac{2}{3}(x+8)^2-66=0$

$+66 \quad +66$

$\frac{\frac{2}{3}(x+8)^2}{\frac{2}{3}} = \frac{66}{\frac{2}{3}}$

$(x+8)^2=99$

$\sqrt{(x+8)^2} = \sqrt{99}$

$x+8=\pm\sqrt{9}\cdot\sqrt{11}$

$x+8=\pm 3\sqrt{11}$

$-8 \quad -8$

$\boxed{x=-8\pm 3\sqrt{11}}$