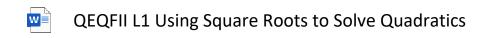# QEQFII L1 Using Square Roots to Solve Quadratics

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QEQFII L1 Using Square Roots to Solve Quadratics

Lesson 1 Using Square Roots to Solve Quadratic Equations____

Solving Quadratic Equations Using the Square Root Principle
When $b = 0$, the quadratic equation $ax^2 + bx + c = 0$, where $a \neq 0$,
becomes $ax^2 + c = 0$. If this equation has a solution, it can be solved using square roots.

Example 1
Solve each equation. Verify the solution.

a) $3x^2 - 7 = 8$

$3x^2 = 15$

$x^2 = 5$

$x = \pm\sqrt{5}$

$3(\pm\sqrt{5})^2 - 7 = 8$

$3(5) - 7 = 8$

$8 = 8 \checkmark$

b) $(x + 3)^2 = 20$

$x + 3 = \pm\sqrt{20}$

$x = -3 \pm\sqrt{4 \cdot 5}$

$x = -3 \pm 2\sqrt{5}$

$x = -3 + 2\sqrt{5}$
or
$x = -3 - 2\sqrt{5}$
$\left.\right\}$ exact values

c) $3x^2 + 12 = 0$

$3x^2 = -12$

$x^2 = -4$ ← can't square root a negative number

$\emptyset$
or
No sol'n

Example 2
Solve, by completing the square.
a.) $x^2 + 6x = 16$

$\underbrace{x^2 + 6x + 9}_{\text{perfect square trinomial}} = 16 + 9$ ↖ balance the eqn

$\left(\dfrac{6}{2}\right)^2$

$(x + 3)^2 = 25$

$x + 3 = \pm 5$

$x = -3 \pm 5$

$x = -3 + 5$ $x = -3 - 5$

$x = 2$ $x = -8$

b.) $x^2 + 8x - 10 = 0$

$x^2 + 8x = 10$

$x^2 + 8x + 16 = 10 + 16$

$(x+4)^2 = 26$

$x + 4 = \pm\sqrt{26}$

$x = -4 \pm\sqrt{26}$

If we needed approximate values (ie to plot x-intercepts), use calc.

$x = -4 + \sqrt{26}$ $x = -4 - \sqrt{26}$

$x \approx 1.099$ $x \approx -9.099$

$\times(-2)$

c.) $\left(-\frac{1}{2}x^2 + 6x - 1\right) = 0$ $\times(-2)$ * Mult by (-2) on both sides

$x^2 - 12x + 2 = 0$

$x^2 - 12x + 36 = -2 + 36$

$(x-6)^2 = 34$

$x - 6 = \pm\sqrt{34}$

$x = 6 \pm\sqrt{34}$

Example 3

A football is kicked vertically. The approximate height of the football, h metres, after t seconds is modelled by this formula: $h = 1 + 20t - 5t^2$. Determine when the football will hit the ground (to the nearest tenth of a second).

↳ height at ground level is 0m

∴ $h = 0$

$h = 1 + 20t - 5t^2$

$0 = 1 + 20t - 5t^2$

The ball hits the ground at $t = 4.0$s.

Assign
pg. 273
2b,c,d,g,i
5b
6a,c,e,g,i,k
7b,f

$5t^2 - 20t - 1 = 0$

$5(t^2 - 4t + 4) = 1 + 20$

     20

$5(t-2)^2 = 21$

$(t-2)^2 = \frac{21}{5}$

$t - 2 = \pm\sqrt{\frac{21}{5}}$

$t = 2 + \sqrt{\frac{21}{5}}$ or $t = 2 - \sqrt{\frac{21}{5}}$

$t = 4.049...$ $t = -0.049...$

$\boxed{t = 4.0 s}$ $t = -0.05 s$

time can't be -ve