

11 Solve by Factoring

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FOM 11 Ch 7 Day 11 Solving Quadratic Equations by Factoring and by the Square Root Principle (7.5)

Methods for solving a Quadratic Equation:

- Graphing ✓
- Factoring ←
- Square Root Principle
- Quadratic Formula

To solve, rewrite so 1 side of the equation = 0!



Solving Quadratic Equations by Factoring

Example 1: Solve equation quadratic equation by factoring.

Factoring

$ax^2 + bx + c$

$\square \times \square = ac =$

$\square + \square = b =$

$\begin{array}{c|c} ax & ax \\ \hline \square & \square \end{array}$

Reduce columns
(like fractions!)

$(x \quad)(x \quad)$

To solve, set it equal to ZERO!

a. $x^2 - x - 6 = 0$
 $a = 1, b = -1, c = -6$

Shortcut because a=1!!

$\boxed{2} \times \boxed{3} = -6$
 $\boxed{2} + \boxed{3} = -1$

$(x+2)(x-3) = 0$
 $x+2 = 0$ OR $x-3 = 0$
 $x = -2$ OR $x = 3$

b. $2x^2 + 6x = 0$

$2x(x+3) = 0$
 $\frac{2x}{2} = 0$ OR $\frac{x+3}{-3 -3} = 0$
 $x = 0$ OR $x = -3$

c. $6x^2 - 7x - 5 = 0$ Rewrite so 1 side = 0!

$6x^2 - 7x - 5 = 0$
 $a = 6, b = -7, c = -5$
 $\boxed{3} \times \boxed{10} = ac = (6)(-5) = -30$
 $\boxed{3} + \boxed{10} = b = -7$

$\begin{array}{c|c} 6x & 6x \\ \hline 3 & 10 \end{array}$

$(2x+1)(3x-5) = 0$
 $2x+1 = 0$ OR $3x-5 = 0$
 $2x = -1$ OR $3x = 5$
 $x = -\frac{1}{2}$ OR $x = \frac{5}{3}$

d. $x(3x+1) = 2$

$3x^2 + x = 2$
 $3x^2 + x - 2 = 0$
 $\boxed{3} \times \boxed{2} = 6$
 $\boxed{3} + \boxed{2} = 5$

$\begin{array}{c|c} 3x & 3x \\ \hline 3 & 2 \end{array}$

$(x+1)(3x-2) = 0$
 $x+1 = 0$ OR $3x-2 = 0$
 $x = -1$ OR $3x = 2$
 $x = \frac{2}{3}$

$$x = -\frac{1}{2} \text{ OR } x = \frac{5}{3}$$

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

$$\{-1, \frac{2}{3}\}$$

Example 2: A soccer ball is kicked vertically. The approximate height, h , of the soccer ball in metres after t seconds is modelled by the formula: $h = 1 + 20t - 5t^2$.

a) How high is the soccer ball after 2 s?

$$t = 2$$

$$\begin{aligned} h &= 1 + 20t - 5t^2 \\ &= 1 + 20(2) - 5(2)^2 \\ &= 1 + 40 - 5(4) \\ &= 1 + 40 - 20 = 21 \text{ m} \end{aligned}$$



b) When is the soccer ball 16 m high?

$$h = 16, t = ?$$

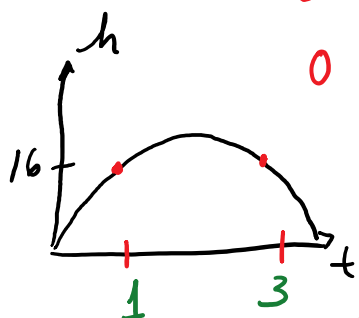
$$16 = 1 + 20t - 5t^2 \quad \text{Rewrite so 1 side = 0!}$$

$$\begin{array}{r} 16 \\ -16 \\ \hline 0 \end{array} = -5t^2 + 20t - 15$$

$$0 = -5(t^2 - 4t + 3)$$

$a=1, b=-4, c=3$

"a" cannot be negative so factor out the negative!



$$(-1) \times (-3) = 3$$

$$(-1) + (-3) = -4$$

$$0 = -5(x-1)(x-3)$$

$$x-1=0 \text{ OR } x-3=0$$

$$\boxed{x=1} \quad \boxed{x=3}$$

The ball is at 16 m at 1 sec & 3 sec.

Example 3: A quadratic function with zeroes at 2 and -1. Write the equation of the quadratic function a) in factored form b) in standard form.

$$y = (x-2)(x+1) \quad \text{take opp sign!}$$

Assignment: Solve by Factoring: Sec 7.5, p. 405, 1ac, 4abc, 7, 11. Write the equation of a quadratic function having zeroes at -3 and 2 in a) factored form b) standard form.