

2.2 Solving Quadratics by Factoring

A quadratic equation is any equation that can be written in the form

$$ax^2 + bx + c = 0,$$

where a, b, and c are constants and $a \neq 0$. Degree of a quadratic is 2.

Ex.) Which of the following are quadratic equations?

- a) $x^2 - 9 = 0$ ✓
- b) $2x^2 - 3x = 10$ ✓
- c) $3x - 9 = 0$ ✗
- d) $2x^3 + 3x^2 + x + 9 = 0$ Cubic ✗



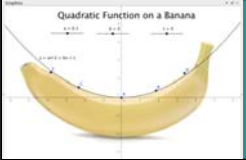


To solve a quadratic equation we need to use the zero product property. The zero product property states that if $(a)(b) = 0$ then either $a = 0$ or $b = 0$ or both.

$$\underline{(x+a)}\underline{(x+b)}=0 \quad \begin{matrix} x+a=0 \\ -a \\ x=-a \end{matrix}$$

- Steps:
- 1) Rearrange to have 0 on one side of the equation.
 - 2) Factor.
 - 3) Set each factor equal to zero and solve.

"Solving" a quadratic means find the x-intercepts. We have several ways we can ask this:

- What are the roots?
- Find the solutions.
- State the zeros.
- What are the x-intercepts?

Ex.) Solve the following quadratics by factoring:

a) $x^2 + x - 56 = 0$

-56
-7 8

$= (x-7)(x+8) = 0$

$x-7=0$ $x+8=0$
 $x=7$ $x=-8$

b) $5x^2 = -20x$

$+20x + 20x$

$\frac{5x^2 + 20x}{5x} = 0$

$5x(x+4) = 0$

$\frac{5x}{5} = 0$ $x+4=0$
 $x=0$ $x=-4$

c) $(2x-3)(x+1) = 3$

$(2x-3)(x+1) - 3 = 0$

$2x^2 + 2x - 3x - 3 - 3 = 0$

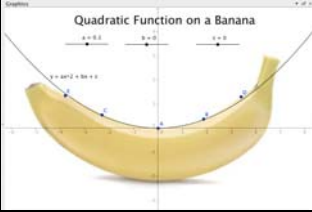


$2x^2 - x - 6 = 0$

$2x^2 - 4x + 3x - 6 = 0$

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

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

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

Shortcut: When factoring we have 3 possibilities:

$4x$
 $x=0$

$(x-7)$
 switch sign
 $x=7$

$(2x+3)$
 switch sign
 $x = -\frac{3}{2}$

Ex.) What are the solutions to the following quadratics?

a) $(x+2)(x-8) = 0$

$x = -2, 8$

OR

$x = -2$
 $x = 8$

b) $-2x(x-1) = 0$

$x = 0, 1$

c) $x(3x-4) = 0$

$x = 0, \frac{4}{3}$



Ex.) Factor to find the zeros:

a) $x^2 - 2x - 8 = 0$

$-4 \diamond 2$

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

$x = -2, 4$

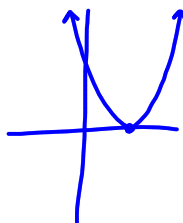
b) $2x^2 + 18 = 12x$

$2x^2 - 12x + 18 = 0$

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

$2(x-3)^2 = 0$

$x = 3$



c) $2x^2 = 4x$

$2x^2 - 4x = 0$

$2x(x-2) = 0$

$x = 0, 2$

Pg. 230 # 7, 8acd, 9abe, 10.