

# Precalculus

## Factor quadratic with rational roots

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$$ax^2 + bx + c = a(x - x_1)(x - x_2)$$

$$\begin{aligned} x_1 + x_2 &= -\frac{b}{a} \\ x_1 x_2 &= \frac{c}{a} \end{aligned}$$

Vieta's formulas

## Example

Factor the quadratic.

$$x^2 + 5x + 6 = (x + 2)(x + 3)$$

- The product of the two roots:  $x_1 x_2 = 6$ .
- The divisors of 6 are  $\pm 1, \pm 2, \pm 3, \pm 6$ .
- Therefore the pair  $x_1, x_2$  is  $\pm 1, \pm 6$  or  $\pm 2, \pm 3$ .
- The sum of the two roots:  $x_1 + x_2 = -5$