Precalculus
Factor quadratic with rational roots

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

$$x_1 + x_2 = -\frac{b}{a}$$
$$x_1 x_2 = \frac{c}{a}$$

Vieta's formulas

Example

Factor the quadratic.

$$x^2 + 5x + 6$$

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Factor the quadratic.

$$x^2 + 5x + 6 = (x + \mathbf{?})(x + \mathbf{?})$$

- The product of the two roots: $x_1 x_2 = 6$.

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- The divisors of 6 are $\pm 1, \pm 2, \pm 3, \pm 6$.

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- Therefore the pair x_1, x_2 is $\pm 1, \pm 6$ or $\pm 2, \pm 3$.

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

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