

Factoring Simple Quadratic Trinomials  
in the form  $x^2 + bx + c$

Apr. 1/2016

1. Using Alge-tiles or area model

Model the expression as an area. The tiles must form a rectangle (or square).

The lengths of the sides are factors.

Mar 26-8:24 AM

Factor:  $x^2 + 4x + 3 = (x+3)(x+1)$  f

The diagram illustrates the factoring process using algebra tiles. A legend at the top shows positive tiles (red) for  $x^2$ ,  $x$ , and  $1$ , and negative tiles (blue) for  $-x^2$ ,  $-x$ , and  $-1$ . The main diagram shows the expression  $x^2 + 4x + 3$  being factored into  $(x+3)(x+1)$ . The area model consists of a large red square labeled  $x^2$  with side length  $x$ . To its right are three vertical red rectangles, each labeled  $x$ , with side length  $1$ . Below the  $x^2$  tile are four horizontal red rectangles, each labeled  $x$ , with side length  $1$ . Dashed lines indicate the overall dimensions of the rectangle formed: the width is  $x+3$  and the height is  $x+1$ .

Mar 25-8:02 AM

Factor:  $x^2 + x - 6 = (x + 3)(x - 2)$  f

Diagram illustrating the factoring of  $x^2 + x - 6$  using algebra tiles. The tiles are arranged in a grid, showing the trinomial  $x^2 + x - 6$  on the left and the factored form  $(x + 3)(x - 2)$  on the right.

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## 2. Algebraically

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

What relationship is there between the factors and the coefficients of the answer?

$$2, 3 \xrightarrow{?} 5, 6$$

$$\underbrace{2 \times 3 = 6}_{\text{product}}$$

$$\underbrace{2 + 3 = 5}_{\text{sum}}$$

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Ex. Factor

(a)  $x^2 + 4x + 3$

$$\begin{array}{l} \text{sum} = 4 \\ \text{product} = 3 \end{array}$$

$1 \times 3 = 3$

$1 + 3 = 4$

$x^2 + 4x + 3$

$= x^2 + x + 3x + 3$

$= x(x+1) + 3(x+1)$

$= (x+1)(x+3)$

(b)  $x^2 - 8x + 12$

$= (x-2)(x-6)$

$S = -8$

$P = +12$

$I =$

$-1 \times -12 \times$

$-2 \times -6 \checkmark$

$-3 \times 4 \times$

$~~4 \times 3~~$

Mar 30-9:10 PM

Ex. Factor  $x^2 + x - 6$  using an area model.

	$x$	$+3$
$x$	$x^2$	$3x$
$-2$	$-2x$	$-6$

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

OR

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

$S = 1$   
 $\rightarrow P = -6$

$I = -1 \times 6$

$-2 \times 3 \checkmark$

$~~3 \times 2~~$

Mar 22-7:35 PM

Assigned Work:

p.211 # 2, 4

# (6, 7, 8)(ace)

# 9ace (look for common factors first)

# 12ace 13ac

$$9(e) \quad x^3 + 5x^2 + 4x$$

$$= x(x^2 + 5x + 4)$$

S	5
P	4
I	1, 4

$$= x(x^2 + x + 4x + 4)$$

$$= x[x(x+1) + 4(x+1)]$$

$$= x[(x+1)(x+4)]$$

$$= x(x+1)(x+4)$$

Mar 26-9:06 AM

$$12(e) \quad x^3 - 3x^2 - 10x$$

$$= x(x^2 - 3x - 10)$$

S	-3
P	-10
I	

$$= x(x^2 + 2x - 5x - 10)$$

$$= x \left[ \underset{a}{x(x+2)} - \underset{a}{5(x+2)} \right]$$

	x	10	-9
	2	x	5
	5	x	2

$$= x(x+2)(x-5)$$

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$$13.(c) \quad y = \underline{x^2 - 8x + 15} \quad \begin{array}{l} S \ -8 \\ P \ 15 \\ I \ -3, -5 \end{array}$$

$$(i) \quad y = (x-3)(x-5) \quad I \ -3, -5$$

(ii) zeroes  $\leftrightarrow$  x-intercepts  $\leftrightarrow$  roots

$$\text{Set } y = 0$$

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

$$x-3=0$$

$$x=3$$

$$x-5=0$$

$$x=5$$

$$(iii) \quad x_v = x_m = \frac{3+5}{2} \\ = 4$$

for  $y_v$ , sub  $x_v = 4$

$$y = (4-3)(4-5)$$

$$= -1$$

$$\therefore V(4, -1)$$

Apr 4-2:03 PM