

## 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

The image shows algebra tiles used to factor the quadratic trinomial  $x^2 + 4x + 3$ . The tiles are arranged in two rows. The top row contains a red square labeled  $x^2$ , a red vertical rectangle labeled  $x$ , a red horizontal rectangle labeled  $x$ , and a small red square labeled  $1$ . The bottom row contains a blue square labeled  $-x^2$ , a blue vertical rectangle labeled  $-x$ , a blue horizontal rectangle labeled  $-x$ , and a small blue square labeled  $-1$ .

---

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

An area model for the same trinomial is shown below. It consists of a large red square labeled  $x^2$ , four smaller red rectangles labeled  $x$ , and three tiny red squares labeled  $1$ . The entire figure is enclosed in a dashed rectangular frame. The left side of the frame is labeled  $x$  and the bottom side is labeled  $1$ .

Mar 25-8:02 AM

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

Mar 25-8:02 AM

## 2. Algebraically

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

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

$$\underbrace{2 \times 3 = 6}_{\text{product}} \quad \underbrace{2 + 3 = 5}_{\text{sum}}$$

$$\begin{array}{l} 2 \times 3 \\ 1 \times 6 \\ (-2) \times (-3) \\ (-1) \times (-6) \end{array}$$

Mar 26-8:24 AM

Ex. Factor

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

$$\begin{aligned} &= \underline{x^2 + x} + \underline{3x + 3} \\ &= 1x(x+1) + 3(x+1) \\ &= (x+1)(x+3) \end{aligned}$$

Sum = 4

Product = 3

Integers 1, 3

1	x	3
-1	x	-3

4
-4

Mar 30-9:10 PM

Ex. Factor

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

$$\begin{aligned} &= x^2 - 6x - 2x + 12 \\ &= 1x(x-6) - 2(x-6) \\ &= x \cancel{a} - 2\cancel{a} \\ &= a(x-2) \\ &= (x-6)(x-2) \end{aligned}$$

$P = 12$	$S = -8$
$-12 \times -1$	$-13 \times$
$-6 \times -2$	$-8 \checkmark$
$-4 \times -3$	$-7 \times$
$\cancel{-3 \times 4}$	

I: -6, -2

Mar 30-9:10 PM

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

Mar 22-7:35 PM

Assigned Work:

p.211 # 2, 4

# (6, 7)(8)(ace)

# 9ace (look for common factors first)

# 12ace, 13ac

$$\begin{array}{c} x - 6 \\ \hline x | x^2 | -6x \end{array}$$

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

$$\begin{array}{c} x - 6 \\ \hline -2 | -2x | +12 \end{array}$$

$$\begin{aligned} -2x + 12 \\ = -2(x-6) \end{aligned}$$

Mar 26-9:06 AM

$$8(c) \quad \begin{array}{c} 1a^2 - 1a - 56 \\ \hline S \quad P \end{array}$$

$S = -1$   
 $P = -56$

$$\begin{aligned} &= a^2 + 7a - 8a - 56 && | \times -56 \\ &= a(a+7) - 8(a+7) && | \times -28 \\ &= (a+7)(a-8) && | \boxed{7 \times -8} \end{aligned}$$

Apr 4-12:38 PM

9 c e

$$\begin{aligned} (c) \quad &3v^2 + 9v + 6 \\ &= 3(v^2 + 3v + 2) && S = 3 \\ &= 3(v^2 + v + 2v + 2) && P = 2 \\ &= 3[v(v+1) + 2(v+1)] && I = 1, 2 \\ &= 3[1(v+1)(v+2)] \\ &= 3(v+1)(v+2) \end{aligned}$$

Apr 4-12:43 PM

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

$$\begin{aligned}
 &= x(x^2 + 5x + 4) & S = 5 \\
 &= x(x^2 + x + 4x + 4) & P = 4 \\
 &= x^2[x(x+1) + 4(x+1)] & I = 1, 4 \checkmark \\
 &\Rightarrow x^2(x+1)(x+4)
 \end{aligned}$$

Apr 4-12:46 PM

$$\begin{aligned}
 13(c) \quad y &= \underline{x^2 - 8x + 15} & S = -8 \\
 &\text{factor} & P = 15 \\
 &y = (x-3)(x-5) & I = -3, -5
 \end{aligned}$$

for zeroes (x-intercepts), set  $y = 0$

$$\begin{aligned}
 0 &= (x-3)(x-5) \\
 x-3 &= 0 & x-5 &= 0 \\
 x &= 3 & x &= 5
 \end{aligned}$$

$$\begin{aligned}
 x_v &= \frac{3+5}{2} & \text{sub } x = 4 \\
 &= 4 & y_v &= (4-3)(4-5) \\
 & & &= -1
 \end{aligned}$$

Apr 4-12:49 PM