

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

Oct 27/2011

1. Using Alge-tiles

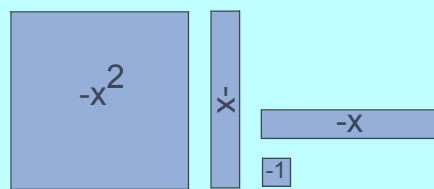
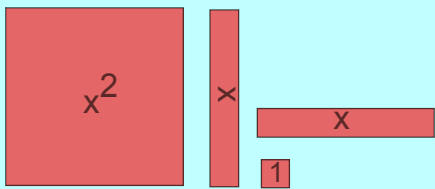
Model the expression as an area. The tiles must form a rectangle (or square).

The lengths of the sides are factors.

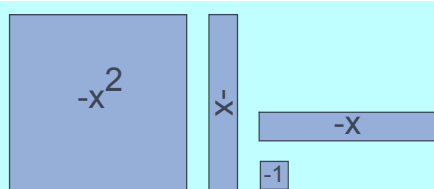
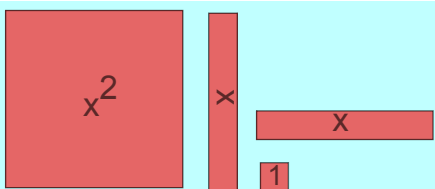
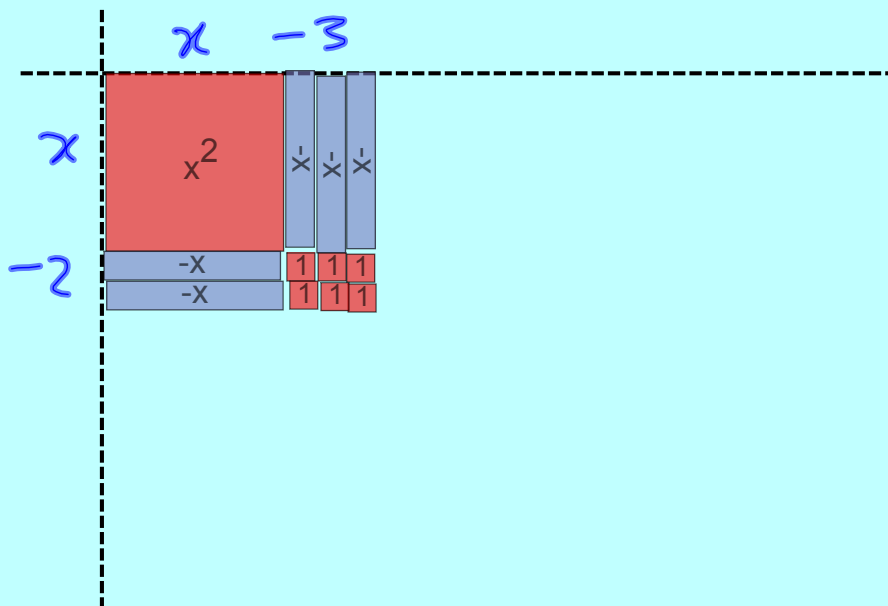
The diagram illustrates the use of algebra tiles to model quadratic trinomials. It shows two sets of tiles: red tiles for positive terms and blue tiles for negative terms. The red tiles include a large square labeled x^2 , a vertical rectangle labeled x , a horizontal rectangle labeled x , and a small square labeled 1 . The blue tiles include a large square labeled $-x^2$, a vertical rectangle labeled $-x$, a horizontal rectangle labeled $-x$, and a small square labeled -1 .

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

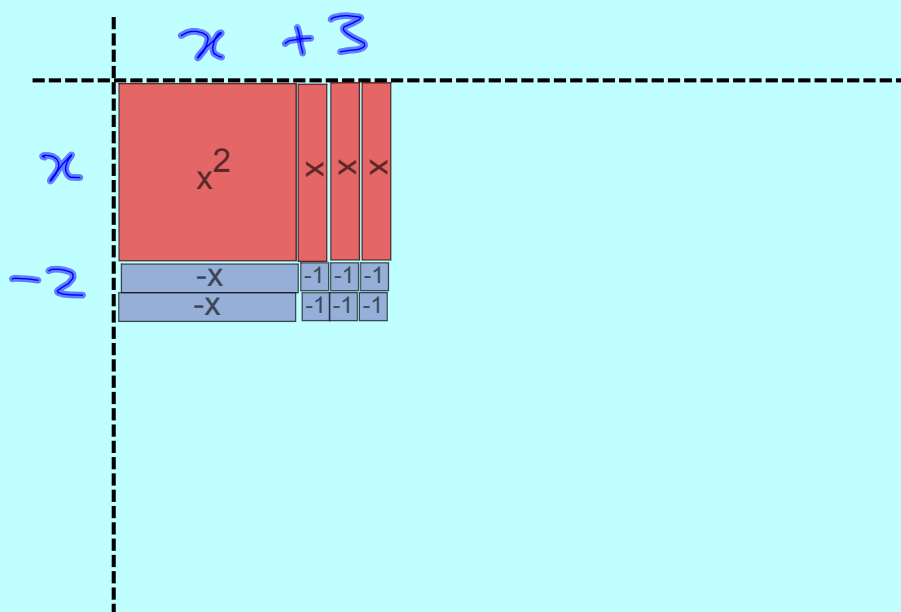
The area model for $x^2 + 4x + 3$ is shown below. The horizontal axis is labeled $x + 3$ and the vertical axis is labeled $x + 1$. The area is composed of red tiles: one large square labeled x^2 , three vertical rectangles labeled x , one horizontal rectangle labeled x , and three small squares labeled 1 .



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



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



2. Algebraically

Consider: $(x + \underline{2})(x + \underline{3}) = x^2 + \underline{5}x + \underline{6}$

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

$$2 + 3 = 5 \quad \text{addition}$$

$$2 \times 3 = 6 \quad \text{multiplication}$$

Ex.1 Factor

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

add to 4?

multiply to 3? *

$$1 + 3 = 4 \quad \checkmark$$

$$-1 + (-3) = -4$$

$$x^2 + 4x + 3$$

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

to check, expand
(e.g., FOIL, area model)

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

add to -8

multiply to 12 *

$$1 + 12 = 13$$

$$2 + 6 = 8$$

$$3 + 4 = 7$$

$$-1 + (-12) = -13$$

$$-2 + (-6) = -8 \quad \checkmark$$

$$-3 + (-4) = -7$$

$$x^2 - 8x + 12$$
$$= (x-2)(x-6)$$

Assigned Work:

p.211 # 2, 4

(6, 7, 8)(ace)

9ace (look for common factors first)

12ace, 13ac

8(c) $a^2 - 1a - 56$

add -1 multiply -56

1	-56	-55
2	-28	-26
4	-14	-10
✓ 7	-8	-1
8	7	

→ $= (a+7)(a-8)$

13. (c) $y = x^2 - 8x + 15$ Sum: -8
(i) $y = (x-5)(x-3)$ product: 15
-5, -3

(ii) for zeroes, set $y=0$

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

$$\begin{array}{l} \swarrow \quad \searrow \\ x-5=0 \quad x-3=0 \\ x=5 \checkmark \quad x=3 \checkmark \\ (5,0) \checkmark \quad (3,0) \checkmark \end{array}$$

(ii) x_{vertex} is MP of zeroes

$$\begin{aligned} x_v &= \frac{5+3}{2} \\ &= 4 \end{aligned}$$

for y_v , sub into equation

$$\begin{aligned} y &= (4-5)(4-3) \\ &= (-1)(1) \end{aligned}$$

$$y_v = -1$$

\therefore vertex is (4, -1)