7-4 Factoring $ax^2 + bx + c$

Objective

Factor quadratic trinomials of the form $ax^2 + bx + c$.

7-4 Factoring $ax^2 + bx + c$

In the previous lesson you factored trinomials of the form $x^2 + bx + c$. Now you will factor trinomials of the form $ax^2 + bx + c$, where $a \neq 0$.

Check for GCF!

7-4 Factoring $ax^2 + bx + c$

To factor a trinomial like $ax^2 + bx + c$ into its binomial factors, write two sets of parentheses (□x + □)(□x + □).

Write two numbers that are factors of *a* next to the *x*'s and two numbers that are factors of *c* in the other blanks. Multiply the binomials to see if you are correct.

$3 \cdot 2 = 6$ $\quad 2 \cdot 5 = 10$

$$(3x + 2)(2x + 5) = 6x^2 + 19x + 10$$

7-4 Factoring $ax^2 + bx + c$

Check It Out! Example 1a

Factor each trinomial by guess and check.

$6x^2 + 11x + 3$

GCF = 1

+bx +c → same (add)

6

1 6

2 3

$(3x + 1)(2x + 3)$

3

1 3

$6x^2 + 9x + 2x + 3$

$6x^2 + 11x + 3$ ✓

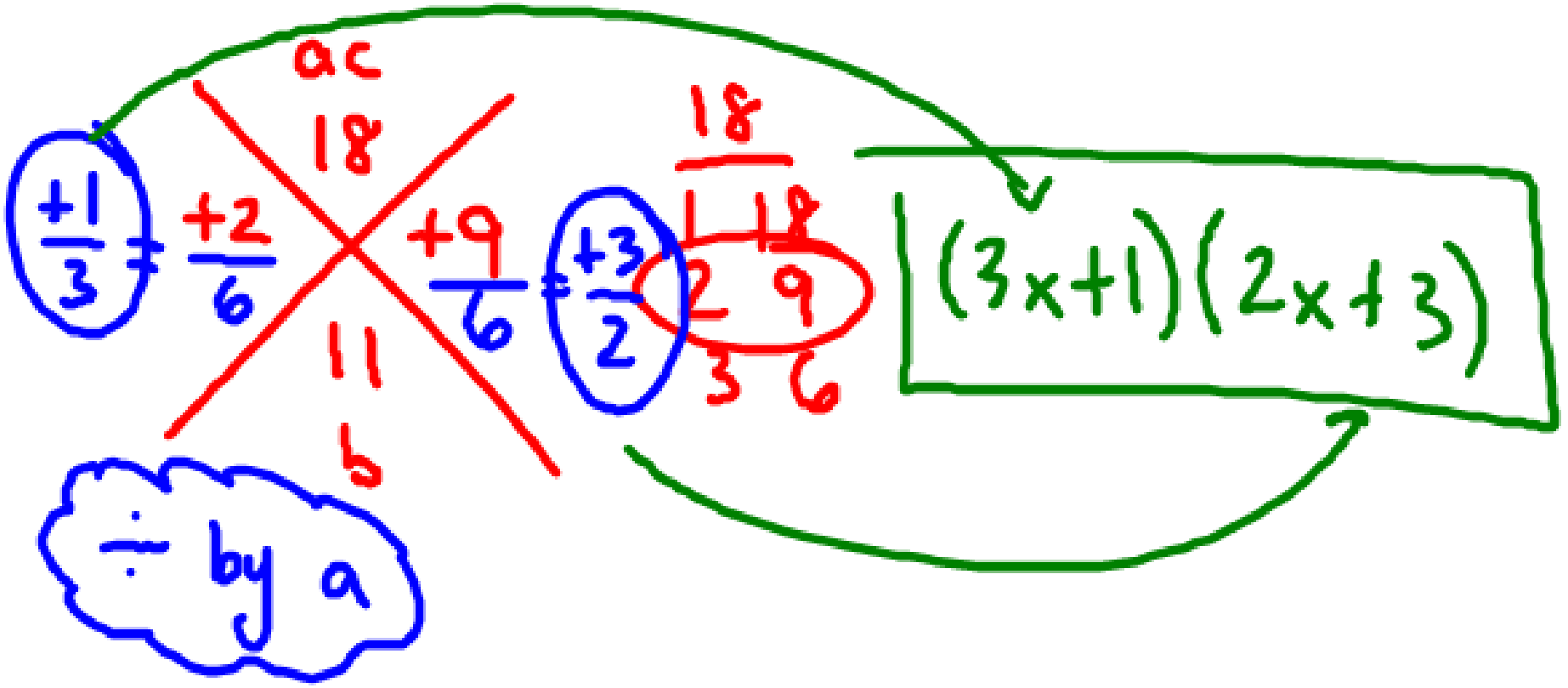
7-4 Factoring $ax^2 + bx + c$

Check It Out! Example 1a X-Method

Factor each trinomial by ~~guess and check~~.

$6x^2 + 11x + 3$ GCF = 1

$+bx$ $+c \rightarrow$ same (add)



Check It Out! Example 1b

Factor each trinomial by guess and check.

$3x^2 - 2x - 8$ GCF = 1

$-bx - c \rightarrow$ opp (subtract)

↑ Bigger Product

3 = 1 3

8 = 1 8 = 2 4

$(1x - 2)(3x + 4)$

$3x^2 + 4x - 6x - 8$

$3x^2 - 2x - 8$ ✓

7-4 Factoring $ax^2 + bx + c$

Check It Out! Example 1b

X-Method

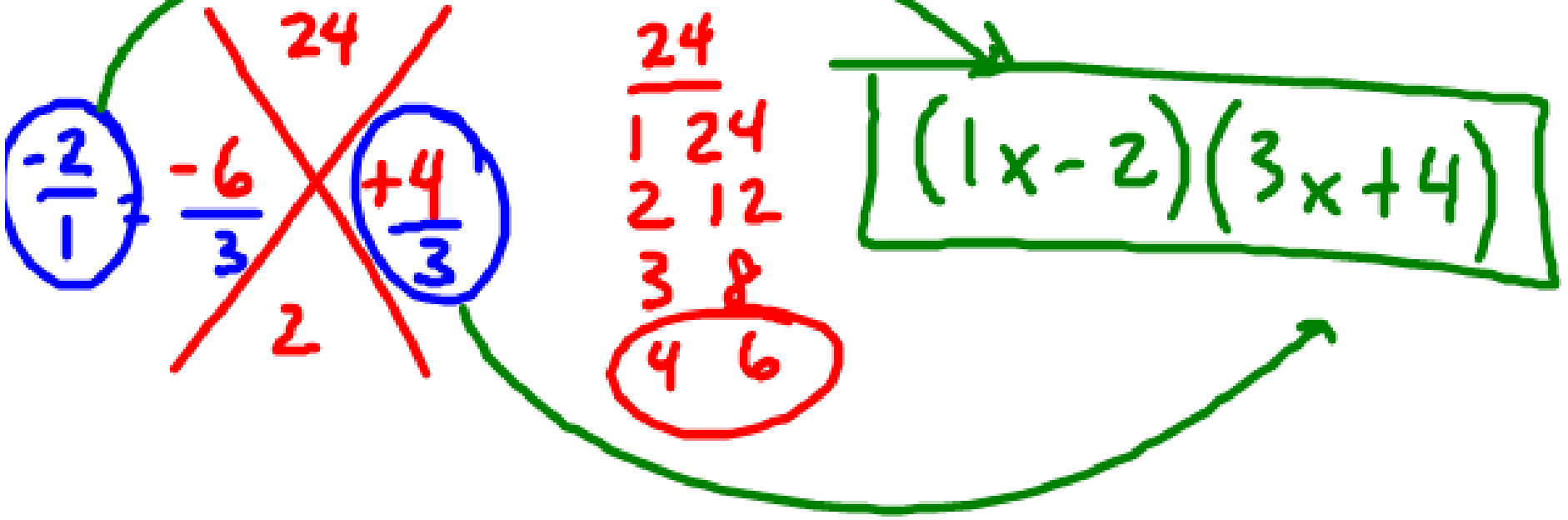
Factor each trinomial by ~~guess and check~~.

$3x^2 - 2x - 8$

GCF = 1

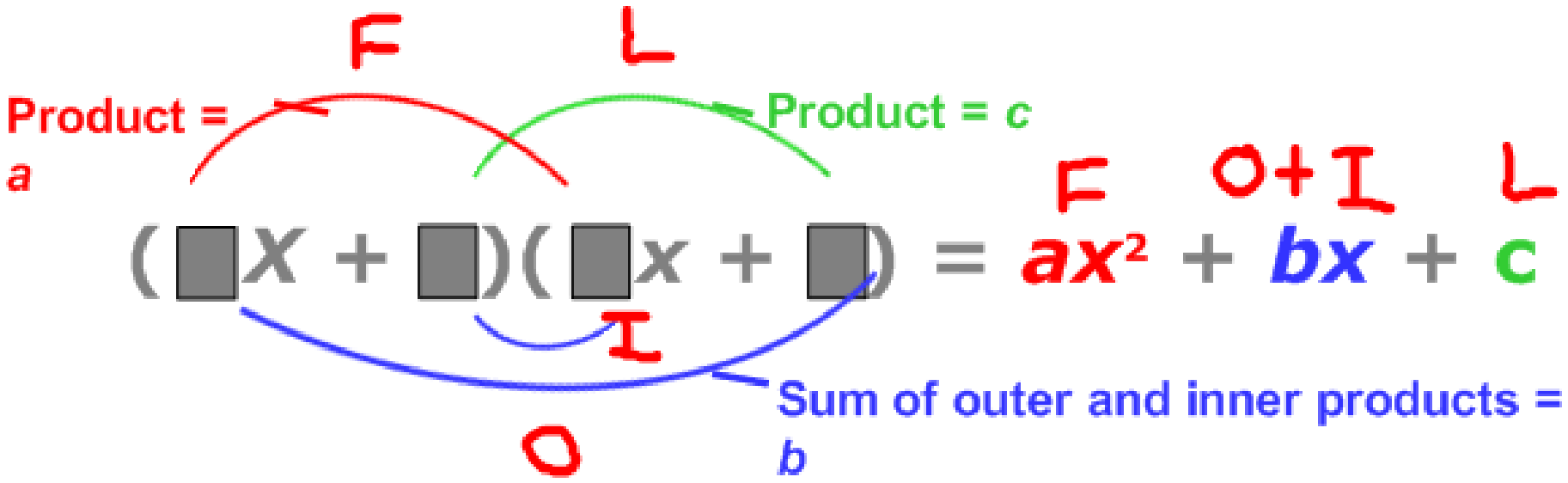
$-bx - c \rightarrow$ opp (subtract)

bigger #



7-4 Factoring $ax^2 + bx + c$

So, to factor $a^2 + bx + c$, check the factors of a and the factors of c in the binomials. The sum of the products of the outer and inner terms should be b.



Check It Out! Example 2a

Factor each trinomial. Check your answer.

$6x^2 + 17x + 5$

Check It Out! Example 2a

Factor each trinomial. Check your answer.

$6x^2 + 17x + 5$

7-4 Factoring $ax^2 + bx + c$

Check It Out! Example 2b

Factor each trinomial. Check your answer.

$9x^2 - 15x + 4$

GCF = 1

$-bx$ $+c \rightarrow$ same (add)

9 → 1 9 → 3 3

$(3x - 1)(3x - 4)$

4 → 1 4 → 2 2

$9x^2 - 12x - 3x + 4$

$9x^2 - 15x + 4$ ✓

7-4 Factoring $ax^2 + bx + c$

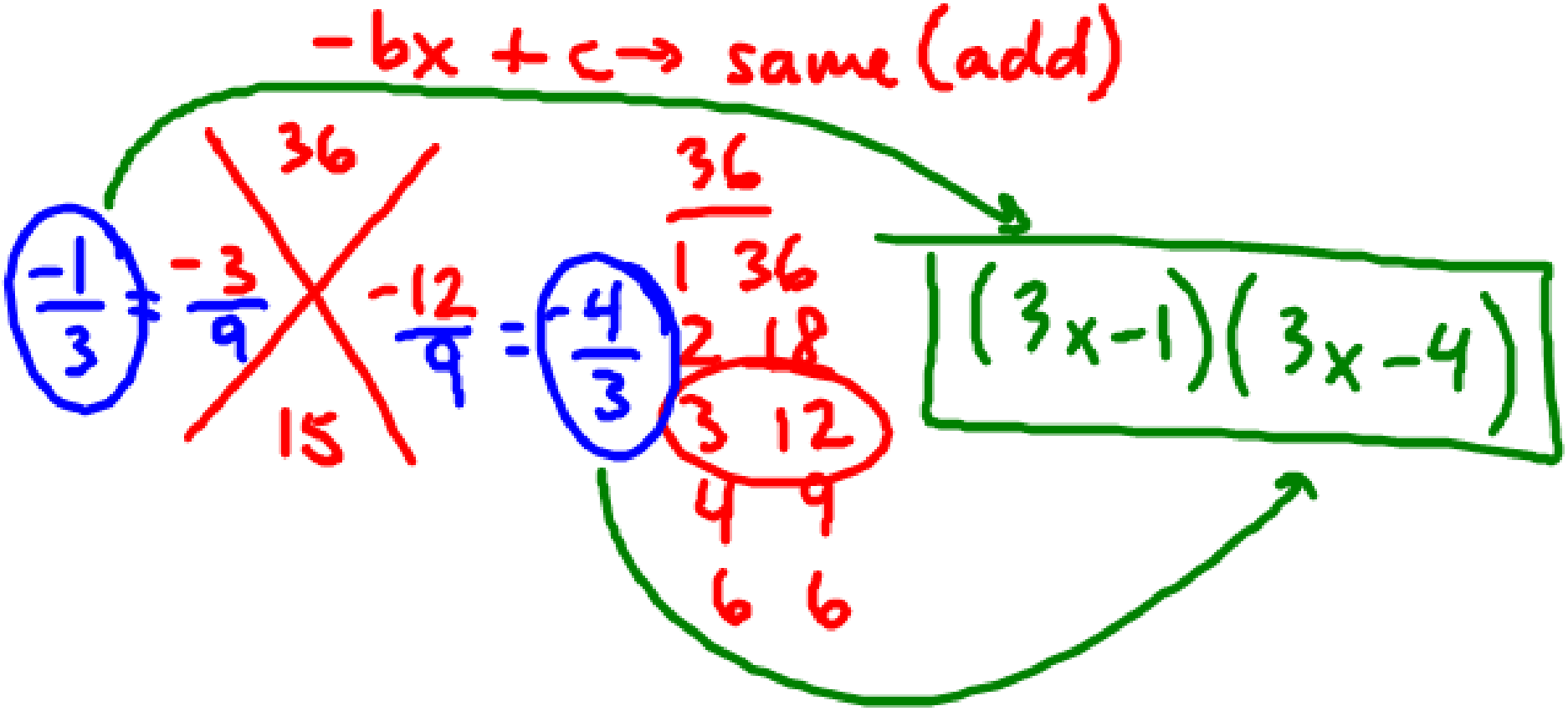
Check It Out! Example 2b

Factor each trinomial. Check your answer.

$9x^2 - 15x + 4$

GCF = 1

$-bx + c \rightarrow$ same (add)



Check It Out! Example 2c

Factor each trinomial. Check your answer.

$3x^2 + 13x + 12$

Check It Out! Example 2c

Factor each trinomial. Check your answer.

$3x^2 + 13x + 12$

Check It Out! Example 3a

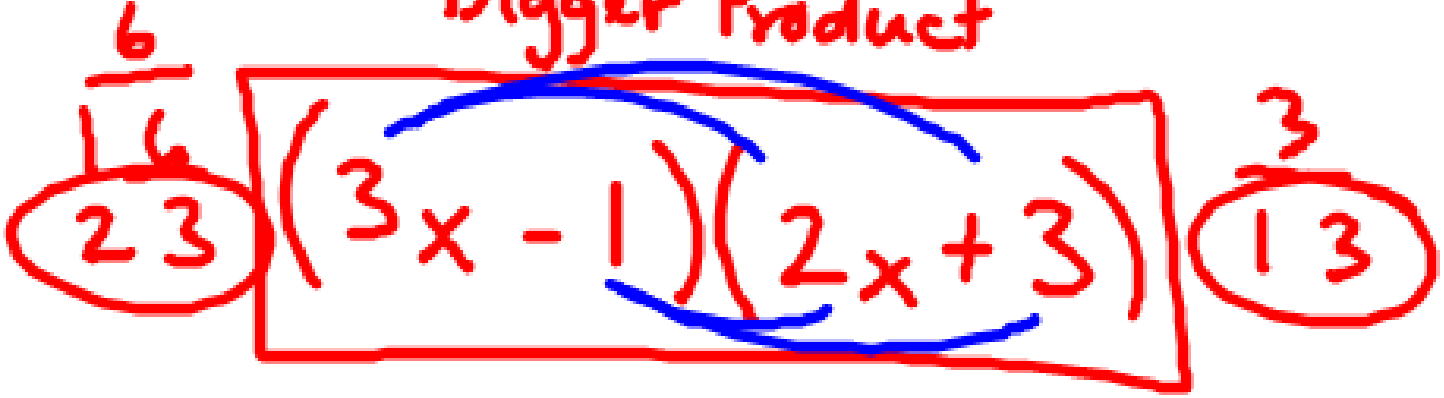
Factor each trinomial. Check your answer.

$6x^2 + 7x - 3$

GCF = 1

$+bx - c \rightarrow$ opp (subtract)

↖ Bigger Product



$6x^2 + 9x - 2x - 3$

$6x^2 + 7x - 3$ ✓

7-4 Factoring $ax^2 + bx + c$

Check It Out! Example 3a

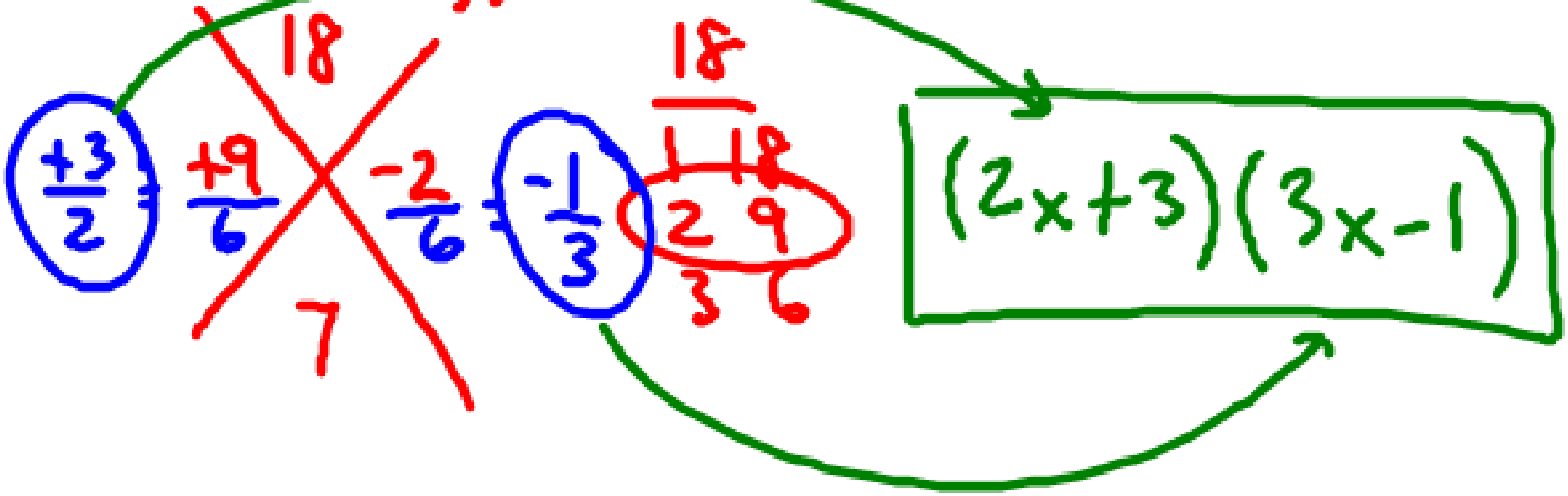
Factor each trinomial. Check your answer.

$6x^2 + 7x - 3$

GCF = 1

$+bx - c \rightarrow$ opp (subtract)

↑ Bigger #



Check It Out! Example 3b

Factor each trinomial. Check your answer.

$4n^2 - 1n - 3$ GCF = 1

$-bn \quad -c \rightarrow$ opp (subtract)

↑ Bigger Product

4	
1	4
2	2

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

3	
1	3

$4n^2 + 3n - 4n - 3$

$4n^2 - 1n - 3$ ✓

7-4 Factoring $ax^2 + bx + c$

Check It Out! Example 3b

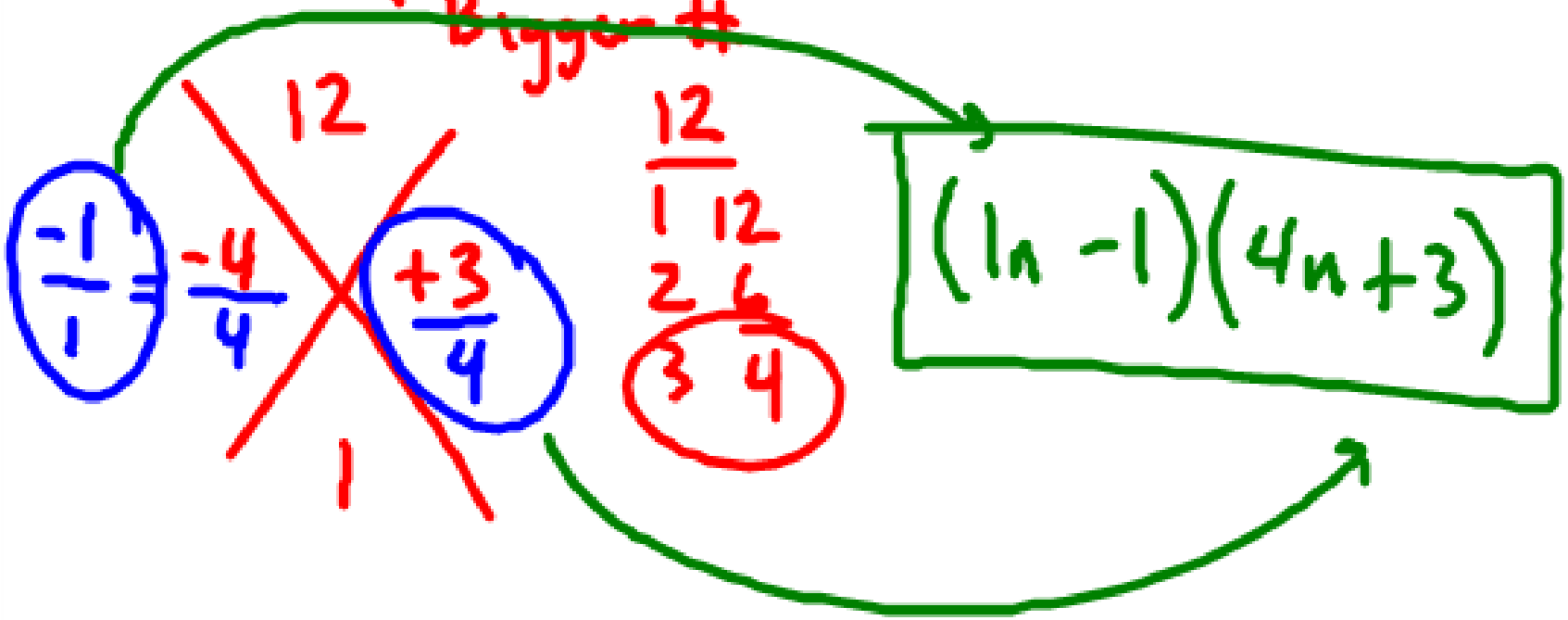
Factor each trinomial. Check your answer.

$4n^2 - n - 3$

GCF = 1

$-bn - c \rightarrow$ opp (subtract)

↑ Bigger #



7-4 Factoring $ax^2 + bx + c$

When the leading coefficient is negative, factor out –1 from each term before using other factoring methods.

Caution

When you factor out –1 in an early step, you must carry it through the rest of the steps.

Check It Out! Example 4a

Factor each trinomial.

$-6x^2 - 17x - 12$ GCF = -1

$-1(6x^2 + 17x + 12)$

$+bx \quad +c \rightarrow$ same (add)

72

$+\frac{14}{3} = +\frac{8}{6}$ $\quad +\frac{9}{6} = +\frac{3}{2}$

17

72
1 72
2 36
3 24
4 18
6 12
8 9

$-1(3x+4)(2x+3)$

Check It Out! Example 4a

Factor each trinomial.

$-6x^2 - 17x - 12$

Check It Out! Example 4b

Factor each trinomial.

$-3x^2 - 17x - 10$

GCF = −1

$-1(3x^2 + 17x + 10)$

+bx +c → same (add)

30, 17

$\frac{+2}{3}$ $\frac{+15}{3}$ $\frac{+5}{1}$

$-1(3x+2)(1x+5)$

Check It Out! Example 4b

Factor each trinomial.

$-3x^2 - 17x - 10$

7-4 Factoring $ax^2 + bx + c$

HOMEWORK

not # 49-51, 60

BASIC: p. 484 #25-64, 68-74, 76

AVERAGE: p. 484 #25-70, 75-76

Inclass

HOMEWORK HELP?

#30, 35, 48, 50, 58, 64