



Learning Goal:

To factor trinomials with a leading coefficient $\neq 1$ using the "slide and divide" method.

In this lesson, we will take a quadratic equation with a leading coefficient $\neq 1$ and rewrite it in standard form.

$$3x^2 - 7x - 6 \rightarrow (3x + 2)(x - 3)$$

Factoring Trinomials Using the "Slide and Divide" Method

Steps

- 1) Factor out the GCF, if possible.
- 2) Verify the leading coefficient (a) $\neq 1$.
- 3) **SLIDE** the leading coefficient to the back of the polynomial and multiply it by the constant (ac).
- 4) Rewrite the polynomial without the leading coefficient and replace the constant with the product of the leading coefficient and the constant.
- 5) Factor the polynomial using a multiplication table.
- 6) Rewrite the polynomial as a product of binomial factors.
- 7) **DIVIDE** the last term of each binomial factor by the leading coefficient (a).
- 8) Reduce the fractions, if possible.
- 9) For fractions that remain, **SLIDE** the denominator in front of the first term of the binomial factor.

Example 1: $3x^2 + 7x + 2$

Steps

- 1) There is no GCF.
- 2) $3 \neq 1$
- 3) $3 \cdot 2 = 6$
- 4) $x^2 + 7x + 6$ (*3 is no longer the leading coefficient and the constant term is the product of $3 \cdot 2$*)
- 5)

	x	$+6$
x	x^2	$6x$
$+1$	$1x$	6

<u>Factor Pairs of 6</u>	<u>Sum</u>
1 and 6	7
2 and 3	5

6) $x^2 + 7x + 6 = (x + 1)(x + 6)$

7) $\left(x + \frac{1}{3}\right)\left(x + \frac{6}{3}\right)$

8) $\left(x + \frac{1}{3}\right)(x + 2)$

$\left(\frac{6}{3} \text{ reduces to } 2\right)$

9) $3x^2 + 7x + 2 = (3x + 1)(x + 2)$

Example 2: $3x^2 + 14x + 8$

Steps

1) There is no GCF.

2) $3 \neq 1$

3) $3 \cdot 8 = 24$

4) $x^2 + 7x + 24$

(3 is no longer the leading coefficient and the constant term is the product of $3 \cdot 8$)

5)

	x	$+12$
x	x^2	$12x$
$+2$	$2x$	24

Factor Pairs of 24

Sum

1 and 24	25
2 and 12	14
3 and 8	11
4 and 6	10

6) $x^2 + 7x + 24 = (x + 2)(x + 12)$

7) $\left(x + \frac{2}{3}\right)\left(x + \frac{12}{3}\right)$

8) $\left(x + \frac{2}{3}\right)(x + 4)$

$\left(\frac{12}{3} \text{ reduces to } 4\right)$

9) $3x^2 + 14x + 8 = (3x + 2)(x + 4)$

Example 3: $6t^2 + 4t - 2$

Steps

1) The GCF = 2.

$$\frac{6t^2}{2} + \frac{4t}{2} - \frac{2}{2} = 3t^2 + 2t - 1$$

$$6t^2 + 4t - 2 = 2(3t^2 + 2t - 1)$$

2) $3 \neq 1$

3) $3 \cdot (-1) = -3$

4) $t^2 + 2t - 3$ (3 is no longer the leading coefficient and the constant term is the product of $3 \cdot (-1)$)

5)

	t	$+3$
t	t^2	$3t$
-1	$-1t$	-3

<u>Factor Pairs of -3</u>	<u>Sum</u>
1 and -3	-2
-1 and 3	2

6) $t^2 + 2t - 3 = (t - 1)(t + 3)$

$$7) \left(t - \frac{1}{3}\right)\left(t + \frac{3}{3}\right)$$

$$8) \left(t - \frac{1}{3}\right)(t + 1)$$

$$\left(\frac{3}{3} \text{ reduces to } 1\right)$$

9) $3t^2 + 2t - 1 = (3t - 1)(t + 1) \rightarrow 6t^2 + 4t - 2 = 2(3t - 1)(t + 1)$

(Don't forget the GCF!)