Algebra 1 8.7

Factor trinomials with a leading coefficient

Solve quadratic equations by factoring

coefficient
leading coefficient
x-factor
factor by grouping
prime polynomial
zero product property
whiteboards?

( )·( ) = 0

$(2x \times a + 3a) + (-2x \times b + -3b)$

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

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

132
2+b
4 8

$x^2+12x+32$

32
-4 8
12

$(x+4)(x+8)$

$x^2 + 6x - 16 = (x-2)(x+8)$

-16 | 1 16
-2 | 8 | 2 8
6 | 4 4

1 6
2 3

1 30
2 15
-3 -10
5 6

$(5x^2 - 3x - 10x + 6)$
$x(5x-3) - 2(5x-3)$

30

$5x^2 - 13x + 6$

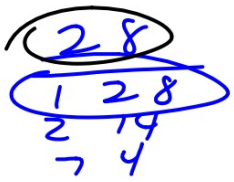
$-3x + -10x$

What is different about this one?
More complicated: x-factor is not helpful. (Why?)
What are factor pairs for 30?
Factor by grouping

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

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

Factor pairs and re-write



What are factor pairs for 28?

Example 1 Factor $ax^2 + bx + c$

Factor each trinomial.

a. $7x^2 + 29x + 4$

$28x + 1x$

$(7x^2 + 28x) + (1x + 4)$

$7x$ $7x$

$7x(x + 4) + 1(x + 4)$

$(7x + 1)(x + 4)$

b. $3x^2 + 15x + 18$

$6x + 9x$

$(x+6)(x+9)$

$(3x\quad)(x\quad)$

$(3x^2+6x)+(9x+18)$

$3x \quad 3x \quad 9 \quad 9$

$3x(x+2)+9(x+2)$

$(x+2)(3x+9)$

$3 \quad 3$

$=3(x+2)(x+3)$

1	54
2	27
3	18
6	9

Factor pairs for 54

$3x^2+15x+18$

$3(x^2+5x+6)$

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

2 × 3 = 6

2 + 3 = 5

Guided Practice

1A. $5x^2 + 13x + 6$

30

1 30
2 15
3 10
5 6

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

x 2

2

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

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

Is there a GCF? Always check first...

1B. $6x^2 + 22x - 8$

$2(3x^2+11x-4)$

-12

$-1 \quad +12$

$2 \quad 6$

$3 \quad 4$

$(3x^2-x)+(12x-4)$

$x \quad 4$

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

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

Example 2 Factor $ax^2 - bx + c$

Factor $3x^2 - 17x + 20$.

60

1 60
2 30
3 20
4 ~~15~~
5 12
6 10

$(3x^2 - 5x)(-12x + 20)$

x x -4 -4

$x(3x-5) - 4(3x-5)$

$(3x-5)(x-4)$

GuidedPractice

2

2A. $2n^2 - n - 1$

Is there a GCF?

2B. $10y^2 - 35y + 30$

Some things are just not factorable: but you have to try everything first...

Example 3 Determine Whether a Polynomial is Prime

Factor $4x^2 - 3x + 5$, if possible. If the polynomial cannot be factored using integers, write *prime*.

GCF
x-factor
factor by grouping

GuidedPractice

Factor each polynomial, if possible. If the polynomial cannot be factored usin integers, write *prime*.

3A. $4r^2 - r + 7$

3B. $2x^2 + 3x - 5$

How is this problem different?

6. $3x^2 + 17x + 20 = 0$

5. $2x^2 + 9x + 9 = 0$