Trinomial Factoring

Pre-Practice: Multilpy the following pairs of binomials using the FOIL rule.

factoring

a) $(x+2)(x+5)$

$= x^2+5x+2x+10$

$= x^2+7x+10$

b) $(x+5)(x-4)$

$= x^2-4x+5x-20$

$= x^2+1x-20$

c) $(x-3)(x+6)$

$= x^2+6x-3x-18$

$= x^2+3x-18$

The answers above take the form of: $x^2 + bx + c$

Look at answer a)...

How were the numbers 2 and 5 used to make the 7? → they were added

How were the numbers 2 and 5 used to make the 10? → they were multiplied

When factoring a trinomial, we are doing the opposite of FOIL/expanding. We are looking for two binomials that multiply to make the trinomial.

Example

Factor the following:

a) $x^2 + 6x + 8$ (+, ×) → 8,1; 4,2

$= (x+4)(x+2)$

b) $x^2 + 9x + 18$ (+, ×) → 18,1; 9,2; 6,3

$= (x+6)(x+3)$

c) $x^2 + 2x - 24$ (+, ×) → 24,1; 12,2; 8,3; 6,4

$= (x+6)(x-4)$

d) $x^2 - 4x - 21$ (+, ×) → 7,3

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

(+ −, − +)

e) $x^2 - 8x + 15$ (+, ×) → 5,3

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

(+ +, − −)

f) $x^2 + 10x + 25$ (− +, + −, ×) → 5,5

$= (x+5)(x+5)$

$= (x+5)^2$

g) $2x^2 + 8x + 6$ (×, +)

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

$= 2(x+3)(x+1)$ ✓

h) $-3x^2 - 6x + 45$ (✓, ×, +)

$= -3(x^2+2x-15)$

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

$(5)+(-3)$

$= 5-3$

$= 2$

i) $x^2 + 11x + 18$ (+, ×)

$= (x+9)(x+2)$

Check

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

$= x^2+2x+9x+18$

$= x^2+11x+18$ ✓

Practice – Common Factoring and Trinomial Factoring

1. Common factor the following:

a) $12x - 8$

$= 4(3x-2)$

b) $-3x^2 + 9x$

$= -3x(x-3)$

c) $4x^2 - 12x + 24$

$= 4(x^2-3x+6)$

d) $13x - 7x^2$

$= x(13-7x)$

e) $3xy - 6x$

$= 3x(y-2)$

f) $15x^2 - 10x + 13$

= can't be common factored

2. Trinomial factor the following:

a) $x^2 + 9x + 20$

$= (x+4)(x+5)$

b) $x^2 - 7x + 12$

$= (x-3)(x-4)$

c) $x^2 - 3x - 54$

$= (x-9)(x+6)$

d) $x^2 + x - 12$

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

e) $x^2 + 2x - 48$

$= (x+8)(x-6)$

f) $x^2 - 5x - 6$

$= (x-6)(x+1)$

3. Common factor then trinomial factor.

a) $2x^2 + 12x + 16$

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

$= 2(x+2)(x+4)$

b) $3x^2 - 15x + 12$

$= 3(x^2-5x+4)$

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

c) $-2x^2 - 20x - 32$

$= -2(x^2+10x+16)$

$= -2(x+2)(x+8)$