Quiz

Fully factor each of the following.

a) 4a(2a - 1) - 5a(2a - 1)

$$= (2a - 1)(4a - 5a)$$

b) $3x^2 + 6x - 4x - 8$ (by grouping)

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

4.4 Factoring Monic (Simple) Trinomials
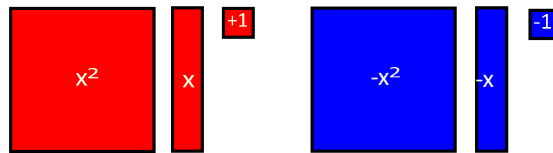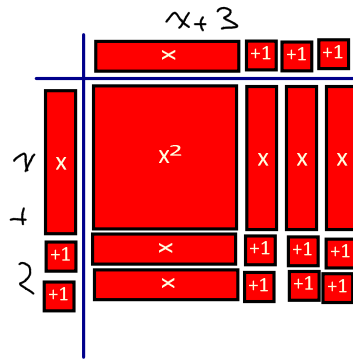
Recall: Expanding (take brackets out!)

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

The result is a simple trinomial: the coefficient of x^2 is 1.
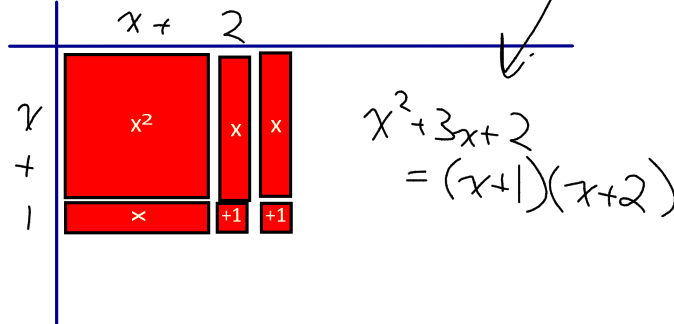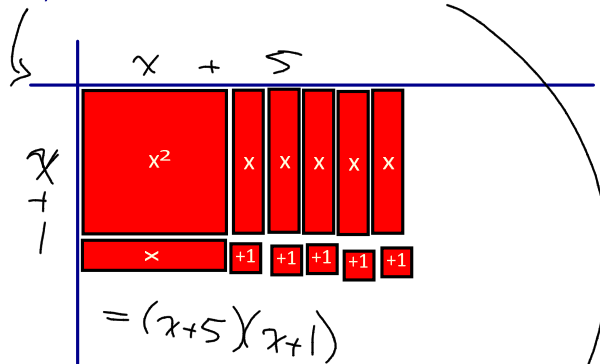
Now try to factor $x^2 + 5x + 6$ using algebra tiles

> Remember... create a rectangle whose length and width represent the factors of the trinomial

$x + 3$

| × | +1 | +1 | +1 |

y
$+$
2

x	x^2	x	x	x
+1	×	+1	+1	+1
+1	×	+1	+1	+1

x^2 x   +1 $-x^2$ -x   -1

Ex.1 Factor using algebra tiles.

a) $x^2 + 6x + 5$ b) $x^2 + 3x + 2$

$x + 5$

| x^2 | x | x | x | x | x |
| × | +1 | +1 | +1 | +1 | +1 |

x
$+$
1

$= (x+5)(x+1)$

$x + 2$

| x^2 | x | x |
| × | +1 | +1 |

y
$+$
1

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

Investigation.. look for patterns in factoring!

a) $x^2 + 6x + 8 = (x + 2)(x + 4)$ $2 + 4 = 6$
b) $x^2 + 9x + 20 = (x + 4)(x + 5)$ $2 \times 4 = 8$
c) $x^2 - 7x + 10 = (x - 5)(x - 2)$
d) $x^2 + 4x - 5 = (x + 5)(x - 1)$
e) $x^2 + (r + s)x + (r \times s) = (x + r)(x + s)$

Conclusion

To factor a quadratic expression $x^2 + bx + c$:
1. Find 2 numbers that multiply to c and add to b
2. Express as a product $(x + r)(x + s)$

Ex.2 Factor   1,15
                    ⟨3, 5⟩

a) $x^2 + 8x + 15$ Multiply: 15
$= (x+3)(x+5)$ Add: 8
                         Numbers: 3, 5

b) $x^2 - 8x + 12$ 1,12
                        ⟨2, 6⟩
                         3, 4
$= (x-2)(x-6)$ M 12
                         A −8
                         N −2, −6

c) $x^2 + 3x - 18$ 1, 18
                         2, 9
                         3, 6
                         M −18
$= (x-3)(x+6)$ A 3
                         N −3, 6

d) $x^2 - 3x - 4$ 1, 4
                         2, 2
                         M −4
$= (x+1)(x-4)$ A −3
                         N 1, −4

e) $x^2 - 4x + 6$ M 6   1, 6
                         A −4   2, 3
                         N

CANNOT FACTOR

Sneaky Simple Trinomials...

⭐ ALWAYS check to see if there is a **common factor first**!
If yes, then factor it out first before factoring the simple trinomial that's left
If no, then stay tuned for *Factoring Complex Trinomials* tomorrow

Ex. 3 Fully factor

a) $3x^2 + 3x - 36$

$1, 12$
$2, 6$
$3, 4$

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

M -12
A 1
N $-3, 4$

$1, 10$
$2, 5$

b) $2w^3 - 14w^2 + 20w$

$= 2w(w^2 - 7w + 10)$
$= 2w(w - 2)(w - 5)$

M 10
A -7
N $-2, -5$

c) $3a^2 - 27$
$= 3(a^2 - 9)$ ⟵ Difference of squares!
$= 3(a + 3)(a - 3)$ Could go straight
                              to answer.

M -9
A 0
N $3, -3$ $1, 9$
                $3, 3$

d) $5a^2 + 30a + 45$
$= 5(a^2 + 6a + 9)$ ⟵ Perfect Square!
$= 5(a + 3)(a + 3)$
$= 5(a + 3)^2$

M 9 $1, 9$
A 6 $3, 3$
N $3, 3$

FBUHL
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#C3, 1cd, 4-6, 7def, 13, 14