Factorising Trinomials

Because 2 × 3 = 6 we say that 2 and 3 are factors of 6.
Because x(x + 2) = x^2 + 2x then x and x + 2 are the factors of x^2 + 2x

What are the factors of
x^2 + 3x
2x^2 + 5x
2x^2 + 6x

Note that the latter can be factorised in different ways in the same way that 12 can be factorised differently.

12 = 2 x 6 or 3 x 4 or 2 x 2 x 3
2x^2 + 6x = 2(x^2 + 3x) or x(2x + 6) or 2x(x + 3)

Show all the ways that the following can be factorised
4x^2 + 12x
20x - 5x^2
30x^2 + 20x

Because (x + 2)(x - 2) = x^2 - 4 then x + 2 and x - 2 are the factors of x^2 - 4.
What are the factors of
x^2 - 9
x^2 - 16
x^2 - 25
[x^2 - 11 if rational numbers are allowed]

Does x^2 + 4 have any factors? (in the real number field). If so, what are they?

Because (x + 4)(x + 3) = x^2 + 7x + 12 then x + 4 and x + 3 are the factors of x^2 + 7x + 12
Etc etc

Note
If x = 1, then for the last example we get 5 x 4 = 1 + 7 + 12 = 20. That is it works/makes sense
If x = 2, we get 6 x 5 = 4 + 14 + 12 = 30
If x = 3, we get 7 x 6 = 9 + 21 + 12 = 42
That is the statement (x + 4)(x +3) is a set of different factors depending on the value of x.

Factorising Quadratic Expressions – Revision Questions

1. Common factors

Example: Factorise completely: $4x^2 - 2x$
Solution: Think: the common factor is 2x.
$4x^2 - 2x = 2x(2x - 1)$

2. Quadratic expressions of the form $ax^2 + bx + c$

Example: Factorise completely: $2x^2 - 7x - 15$
Any common factors? No!
For this expression, a = 2, b = -7 and c = -15
What multiplies to give "ac" and adds to give "b"?
$2x^2 - 7x - 15$
$= 2x^2 - 10x + 3x - 15$
$= 2x(x - 5) + 3(x-5)$
$= (x-5)(2x+3)$

x ac	+ b	
-30	-7	
-30	1	No!
-15	2	No!
-10	3	Yes!

Factorising Quadratic Expressions

Name: _____

Time: 10 minutes

Reminder: Golden Rule of Factorising: Take out common factors first!

Common Factor: $ab \pm ac = a(b \pm c)$

Difference of squares $a^2 - b^2 = (a + b)(a - c)$

Perfect Square: $a^2 \pm 2ab + b^2 = (a \pm b)^2$

Factorise completely. Use the 'shortcuts' above to make it easier.

Q1) $4x^2 + 3x$

Q2) $x^2 - 9x + 18$

Q3) $2x^2 - 3x - 20$

Q4) $9x^2 - 16$

Q5) $x^2 + 10x + 25$

Q6) $3x^2 + 30x + 75$