Brackets and factorising – Lesson 13

We have started to learn how to factorise an expression into a pair of brackets. Today we will take time to consolidate the work we have done before we introduce anything new.

Over the last few days we have learned how to factorise three different types of expression.

First we practiced on expressions where all the signs were plus, therefore all the signs in the brackets were plus, for example: -

$x^2 + 9x + 14 = (x + 2)(x + 7)$ ¬ **Find factors of 14 (last term) which add to give 9 (middle term).**

$x^2 + 17x + 70 = (x + 7)(x + 10)$ ¬ **Find factors of 70 (last term) which add to give 17 (middle term).**

$x^2 + 8x + 15 = (x + 5)(x + 3)$ ¬ **Find factors of 15 (last term) which add to give 8 (middle term).**

Let's warm up with a few examples like this: -

1) $x^2 + 9x + 18$ **2)** $x^2 + 10x + 16$ **3)** $x^2 + 11x + 24$ **4)** $x^2 + 12x + 32$

5) $x^2 + 13x + 42$ **6)** $x^2 + 14x + 49$ **7)** $x^2 + 15x + 56$ **8)** $x^2 + 16x + 15$

We also discovered that, if an expression ends with a negative number, we must have a plus in one bracket and a minus in the other, for example: -

$x^2 - 5x - 14 = (x + 2)(x - 7)$ ¬ **Find factors of - 14 (last term) which add to give - 5 (middle term).**

$x^2 + 3x - 70 = (x - 7)(x + 10)$ ¬ **Find factors of - 70 (last term) which add to give 3 (middle term).**

$x^2 + 2x - 15 = (x + 5)(x - 3)$ ¬ **Find factors of $-$ 15 (last term) which add to give + 2 (middle term).**

Now try these examples: -

9) $x^2 - 5x - 14$ **10)** $x^2 - x - 42$ **11)** $x^2 + 5x - 14$ **12)** $x^2 + x - 42$

13) $x^2 + 2x - 35$ **14)** $x^2 - 2x - 35$ **15)** $x^2 + 3x - 28$ **16)** $x^2 - 3x - 28$

Finally, we discovered that, if an expression has a negative sign followed by a positive sign, there must be a minus sign in both brackets, for example: -

$x^2 - 5x + 6 = (x - 2)(x - 3)$ ¬ **Find <u>negative</u> factors of 6 (last term) which add to give - 5 (middle term).**

$x^2 - 13x + 40 = (x - 5)(x - 8)$ ¬ **Find <u>negative</u> factors of 40 (last term) which add to give -13 (middle term).**

$x^2 - 8x + 12 = (x - 6)(x - 2)$ ¬ **Find <u>negative</u> factors of 12 (last term) which add to give -8 (middle term).**

Now try these examples: -

17) $x^2 - 6x + 5$ **18)** $x^2 - 7x + 12$ **19)** $x^2 - 8x + 12$ **20)** $x^2 - 9x + 14$

21) $x^2 - 10x + 16$ **22)** $x^2 - 11x + 18$ **23)** $x^2 - 12x + 27$ **24)** $x^2 - 13x + 30$

Finally factorise this mixture of three different types: -

25) $x^2 + 3x + 2$ **26)** $x^2 - 3x + 2$ **27)** $x^2 - 3x - 10$ **28)** $x^2 + 3x - 10$

29) $x^2 + 4x + 4$ **30)** $x^2 - 4x + 4$ **31)** $x^2 - 4x - 12$ **32)** $x^2 + 4x - 12$

33) $x^2 + 5x + 6$ **34)** $x^2 - 5x - 14$ **35)** $x^2 - 5x + 6$ **36)** $x^2 + 5x - 14$