Example 1 – Factor $x(x+5)+7(x+5)$

Step 1- Identify for the repeating factor

Which factor appears in both terms?

$$x(x+5)+7(x+5)$$

Step 2 – Factor out what repeats; put what is leftover in its own set of parentheses.

$$(x+5)(x+7)$$

Repeating factor

Leftover stuff

$$\boldsymbol{(x+5)(x+7)}$$

Example 2 – Factor $10m(m-8)-(m-8)$

Step 1- Identify for the repeating factor

Which factor appears in both terms?

$$10m(m-8)-1(m-8)$$

We know there is a **1** here, so we'll write it!

Step 2 – Factor out what repeats; put what is leftover in its own set of parentheses.

$$(m-8)(10m-1)$$

Repeating factor

Leftover stuff

$$\boldsymbol{(m-8)(10m-1)}$$

YOU – Factor $3c(c+8)-11(c+8)$

When we see a four-term polynomial, a good factoring strategy may be ***factoring by grouping***.

Example 3 – Factor $10c^2 - 5c + 2cd - d$

Step 1 – Make two groups of two terms with a + operator between them (look for common factors within each group).

$$10c^2 - 5c + 2cd - d$$
$$(10c^2 - 5c) + (2cd - d)$$

Step 2 – Factor out the GCF for both groups (we hope to end up with the same thing in both sets of parentheses).

$$(10c^2 - 5c) + (2cd - d)$$
$$5c(2c - 1) + d(2c - 1)$$

Step 3 – Identify the repeating factor.

It is $2c - 1$.

Step 4 – Factor out what repeats; put what is leftover in its own set of parentheses.

$$(2c - 1)(5c + d)$$

$$\boxed{(\mathbf{2c - 1})(\mathbf{5c + d})}$$

YOU - Factor $8w^2 - 36wy + 6w - 27y$

Example 3 – Factor $12x^2 + 21xy - 20x - 35y$

Step 1 – Make two groups of two terms with a + operator between them (look for common factors within each group).

$$12x^2 + 21xy - 20x - 35y$$
$$(12x^2 + 21xy) + (-20x - 35y)$$

Step 2 – Factor out the GCF for both groups (we hope to end up with the same thing in both sets of parentheses).

$$(12x^2 + 21xy) + (-20x - 35y)$$
$$3x(4x - 7) + -5(4x - 7)$$
$$3x(4x - 7) - 5(4x - 7)$$

Step 3 – Identify the repeating factor.

It is $4x - 7$.

Step 4 – Factor out what repeats; put what is leftover in its own set of parentheses.

$$(4x - 7)(3x - 5)$$

$$\boxed{(\mathbf{4x - 7})(\mathbf{3x - 5})}$$

TIP: If you get the opposite of what you want, you may need to factor -1.

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