Common Factoring

Part A - Common Factoring

Steps when common factoring:

1. Identify the GCF.
2. Write the GCF outside a set of brackets.
3. Inside the brackets, write the result of dividing each previous term by the GCF.

Ex. 1 Common factor each expression, if possible.

a) $12x^2 + 18$ Look at the numerical parts first. What is common?
The GCF is 6.

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

$\frac{18}{6}$ This is the second term of the original expression, divided by the GCF.

$\frac{12x^2}{6}$ This is the first term of the original expression, divided by the GCF.

b) $14x^2 + 21y$
$= 7(2x^2 + 3y)$

c) $7x^2 + 9x$ There is nothing common in the numerical parts.
$= x(7x + 9)$ But in the variable parts of the original terms, an x is common.
So the GCF in this case is x, therefore we factor out the x.

d) $21x^3 + 28x$ In this case a numerical and variable part are common.
$= 7x(3x^2 + 4)$ So, the GCF is $7x$ and it is factored out.

e) $11x^2 + 17y$ In this case, there is nothing common in the numerical parts.
And there is nothing common in the variable parts.
There is no GCF (other than 1). So there is nothing to do!
We say it is not possible to factor this expression.

Part B - Factoring by Grouping

Steps:
1. Group terms with common factors beside each other.
2. Common factor within the grouped terms.

Ex. 1 Factor, if possible.

a) $wx+wy+xz+yz$ Nothing is common among all four terms.
However, among the first two terms, a w is common.
Among the last two terms, a z is common.

$=w(x+y)+z(x+y)$ So, factor what is common out of each group.
When factoring, always look to see if you can continue and factor some more.

$=(x+y)(w+z)$ An $(x+y)$ is common to the terms, so factor it out.

b) $a^2x+bx-a^2z-bz$ x is common to the first two terms.
z is common to the last two terms.

$=x(a^2+b)+z(a^2+b)$ Now factor out the common (a^2+b).

$=(a^2+b)(x-z)$

c) x^4-2x^3+3x-6

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

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

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P.2 Factor out a monomial

P.7 Factor by grouping