Factoring Polynomials

To factor a polynomial is to write it as a product.

Example: $5x^2+10x$ can be written as $5x(x+2)$.

a) Removing the Greatest Common Factor

A common factor divides evenly into each term of the polynomial.

Example: Factor $4ab+6b^2$ $\Rightarrow 4ab+6b^2 = F_1 \times F_2$

i) Determine the GCF for the coefficients and the variables.

4 & 6

2 is the GCF of 4 and 6.

b & b^2

b is the GCF of ab and b^2. (always choose the smallest power)

$\therefore$ $2b$ is the GCF of the polynomial (and the first factor).

ii) Divide the polynomial by the GCF (to get the second factor).

$$\frac{4ab+6b^2}{2b}=2a+3b$$ second factor

iii) Write the polynomial as the product of the two factors.

$$\therefore 4ab+6b^2=2b(2a+3b)$$

Example: Factor $12x^2y^3 - 27xy^2z$

GCF = $3xy^2$

F_1

$\frac{12x^2y^3 - 27xy^2z}{3xy^2}$

F_2: $4xy - 9z$

$$3xy^2(4xy - 9z)$$

Example:

Factor $24x^3y^2 - 8xy^3 + 32x^2y^2z^2$

GCF = $8xy^2$

$$\frac{24x^3y^2 - 8xy^3 + 32x^2y^2z^2}{8xy^2}$$

$$3x^2 - y + 4xz^2$$

$$8xy^2(3x^2 - y + 4xz^2)$$

Example:

Factor $18a^2b^3c + 27ab^2c^3 + 45abc - 36a^4b^5c^6$

$9abc(2ab^2 + 3bc^2 + 5 - 4a^3b^4c^5)$

GCF F_2

Example: Factor $3a(a-7)+5(a-7)$

term 1 term 2

GCF = $(a-7)$

$3a(a-7) + 5(a-7)$

$(a-7)$

$(3a+5)$: F2

$$(a-7)(3a+5)$$

Factor each of the following:

a) $21xy - 28xyz$ = $7xy(3-4z)$

GCF = $7xy$

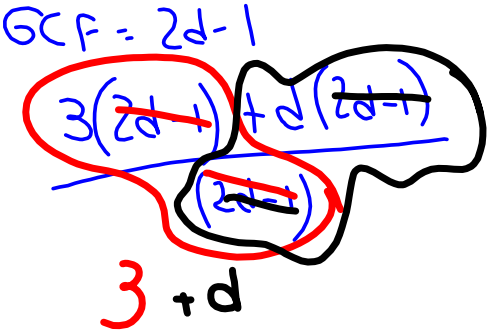
$\frac{21xy - 28xyz}{7xy} = 3 - 4z$

b) $18a^2b + 30ab^2c^3$

$6ab(3a + 5bc^3)$

c) $3(2d-1) + d(2d-1)$ = $(2d-1)(3+d)$

GCF = $2d-1$



d) $(b-4)(b+2)+(b-5)(b+2)$

$(b+2)$ = GCF

$$\frac{(b-4)(b+2)+(b-5)(b+2)}{(b+2)}$$

$(b-4)+(b-5)$ or $2b-9$

$(b+2)[(b-4)+(b-5)] = (b+2)(2b-9)$