**Foundation Mathematics 1017SCG**
**Week 4 Summary Sheet**

# Expanding

## Distributive Law

$$\begin{aligned} a(b+c) &= a \times b + a \times c \\ &= ab + ac \end{aligned}$$

**Examples** Expand the following

$$\begin{aligned} x(5x+4) &= x \times 5x + x \times 4 \\ &= 5x^2 + 4x \end{aligned}$$

$$\begin{aligned} 6x(2x-1) &= 6x \times 2x + 6x \times -1 \\ &= 12x^2 - 6x \end{aligned}$$

$$\begin{aligned} 2x^3(5x-4) &= 2x^3 \times 5x + 2x^3 \times -4 \\ &= 10x^4 - 8x^3 \end{aligned}$$

## Expanding with Multiple Brackets

**F** - First
**O** - Outer
**I** - Inner
**L** - Last

$$(a+b)(c+d) = ac + ad + bc + bd$$

**Examples** Expand and simplify the following

$$\begin{aligned} &(x+1)(x+3) \\ &= x \times x + x \times 3 + 1 \times x + 1 \times 3 \\ &= x^2 + 3x + 1x + 3 \\ &= x^2 + 4x + 3 \end{aligned}$$

Note that $3x$ and $1x$ are **like terms**

$$\begin{aligned} &(3x+4)(2x-1) \\ &= 3x \times 2x + 3x \times -1 + 4 \times 2x + 4 \times -1 \\ &= 6x^2 - 3x + 8x - 4 \\ &= 6x^2 + 5x - 4 \end{aligned}$$

$$\begin{aligned} &(4x-5)^2 \\ &= (4x-5)(4x-5) \\ &= 4x \times 4x + 4x \times -5 - 5 \times 4x - 5 \times -5 \\ &= 16x^2 - 20x - 20x + 25 \\ &= 16x^2 - 40x + 25 \end{aligned}$$

# Factoring

## Common Factor

When factorising, the first step is to look for a common factor.
**Examples** Factorise the following

$$\begin{aligned} 4x^2 + 3x &= x(4x+3) \\ 7x^3 - 8x^2 &= x^2(7x-8) \\ 15x - 6y &= 3(5x-2y) \\ 6x^5 + 10x^3 &= 2x^3(3x^2+5) \end{aligned}$$

## Difference of Two Squares (DOTS)

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

**Examples** Factorise the following

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

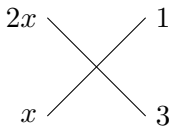
$$\begin{aligned} x^2 - 25 &= x^2 - 5^2 \\ &= (x+5)(x-5) \end{aligned}$$

$$\begin{aligned} 4x^2 - 9 &= (2x)^2 - 3^2 \\ &= (2x+3)(2x-3) \end{aligned}$$

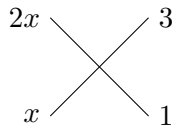
## Cross Method

The cross method can be used to factorise quadratics of the form $ax^2 + bx + c$ (where $a$, $b$ and $c$ are constants).

Factorise $2x^2 + 5x + 3$

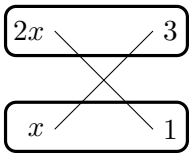



$6x + x = 7x$ ✗




$2x + 3x = 5x$ ✓

Always check to make sure that the cross method has been set up correctly. (The correct cross method is on the right).




$$2x^2 + 5x + 3 = (2x+3)(x+1)$$