Multiplying Polynomials

When multiplying polynomials you multiply the numerical coefficients and then use the rules of exponents for the variables with a common base.

e.g. (1) $3x\,(2x) = (3)(2)(x)(x)$
$= 6x^2$

(2) $4x^2\,(5x) = (4)(5)(x^2)(x)$
$= 20x^3$

(3) $3a^3\,(3a^2) = (3)(3)(a^3)(a^2)$
$= 9a^5$

(4) $4ab\,(3a^2b) = (4)(3)(a)(a^2)(b)(b)$
$= 12a^3b^2$

(5) $3x\,(2x^2 + 4) = ?$

↳ Multiply the term on the outside with both terms on the inside

↳ $3x\,(2x^2 + 4) = 6x^3 + 12x$

(6) $4b\,(6c + 3b) = 24bc + 12b^2$

(7) $-2w\,(3w + 1) = -6w^2 - 2w$

(8) $-3v\,(-2c - 4) = 6cv + 12v$

Multiplying Binomials

When multiplying binomials you multiply the first term in the first bracket with both terms in the second bracket then you multiply the second term in the first bracket with both terms in the second bracket.

e.g.

$(x + 3)(x + 4) = x^2$

$(x + 3)(x + 4) = 4x$

$(x + 3)(x + 4) = 3x$

$(x + 3)(x + 4) = 12$

When we put it all together:

$(x + 3)(x + 4) = x^2 + 4x + 3x + 12$

$x^2 + 7x + 12$ Collect like-terms

OR

You can use the following set up:

$(x + 3)(x + 4)$

$= x(x + 4) + 3(x + 4)$

$= x^2 + 4x + 3x + 4$

$= x^2 + 7x + 12$

How to multiply a trinomial with a binomial

Like multiplying binomials, each term in the first bracket needs to multiply each term in the second bracket.

e.g.

$(x^2 + x + 3)(x + 4) = x^3$

$(x^2 + x + 3)(x + 4) = 4x^2$

$(x^2 + x + 3)(x + 4) = x^2$

$(x^2 + x + 3)(x + 4) = 4x$

$(x^2 + x + 3)(x + 4) = 3x$

$(x^2 + x + 3)(x + 4) = 12$

When we put it all together:

$(x^2 + x + 3)(x + 4) = x^3 + 4x^2 + x^2 + 4x + 3x + 12$

Collect like-terms

$x^3 + 5x^2 + 7x + 12$