1.5) Algebraic division

Worked example	Your turn
Find the values of A, B and C: $$\frac{x^2 + 9x - 5}{x + 3} = Ax + B + \frac{C}{x + 3}$$	Find the values of A, B and C: $$\frac{x^2 + 5x - 9}{x + 2} = Ax + B + \frac{C}{x + 2}$$ $A = 1, B = 3, C = -15$

Worked example	Your turn
Find the values of A, B and C: $$\frac{x^2 - 5x + 9}{x - 2} = Ax + B + \frac{C}{x - 2}$$	Find the values of A, B and C: $$\frac{x^2 + 5x - 9}{x - 3} = Ax + B + \frac{C}{x - 3}$$ $$A = 1, B = 8, C = 15$$

Worked example	Your turn
Find the values of A, B, C and D: $$\frac{x^3 - x^2 + 7}{x + 3} = Ax^2 + Bx + C + \frac{D}{x + 3}$$	Find the values of A, B, C and D: $$\frac{x^3 + x^2 - 7}{x + 2} = Ax^2 + Bx + C + \frac{D}{x + 2}$$ $A = 1, B = -1, C = 2, D = -11$

Worked example	Your turn
Find the values of A, B, C and D: $$\frac{x^3 - x^2 + 7}{x - 2} = Ax^2 + Bx + C + \frac{D}{x - 2}$$	Find the values of A, B, C and D: $$\frac{x^3 + x^2 - 7}{x - 3} = Ax^2 + Bx + C + \frac{D}{x - 3}$$ $$A = 1, B = 4, C = 12, D = 29$$

Worked example	Your turn
Find the values of A, B, C, D and E: $$\frac{x^4 - x^3 - x + 10}{x^2 - 2x - 3} = Ax^2 + Bx + C + \frac{Dx + E}{x^2 + 2x - 3}$$	Find the values of A, B, C, D and E: $$\frac{x^4 + x^3 + x - 10}{x^2 + 2x - 3} = Ax^2 + Bx + C + \frac{Dx + E}{x^2 + 2x - 3}$$ $$A = 1, B = -1, C = 5, D = -12, E = 5$$

Worked example	Your turn
Find the values of A, B, C and D $$\frac{2x^3 + 3x^2 - 4x + 5}{x - 3} = Ax^2 + Bx + C + \frac{D}{x - 3}$$	Find the values of A, B, C and D $$\frac{2x^3 - 3x^2 + 4x - 5}{x + 3} = Ax^2 + Bx + C + \frac{D}{x + 3}$$ $$A = 2, B = -9, C = 31, D = -160$$

Worked example	Your turn
Find the values of A, B, C, D and E:	Find the values of A, B, C, D and E:
$$\frac{3x^4 - 2x^3 + 5x^2 - 4}{x^2 - 16} = Ax^2 + Bx + C + \frac{Dx + E}{x^2 - 16}$$	$$\frac{3x^4 - 2x^3 - 5x^2 - 4}{x^2 - 4} = Ax^2 + Bx + C + \frac{Dx + E}{x^2 - 4}$$
	$A = 3, B = -2, C = 7, D = -8, E = 24$

Worked example	Your turn
Simplify: $$\frac{x^4 - 81}{x + 3}$$	Simplify: $$\frac{x^4 - 16}{x + 2}$$ $(x - 1)(x^2 + 1)$

Worked example	Your turn
Split into partial fractions: $$\frac{3x^2 - 3x - 2}{(x+1)(x-2)}$$	Split into partial fractions: $$\frac{3x^2 - 3x - 2}{(x-1)(x-2)}$$ $$3 + \frac{2}{x-1} + \frac{4}{x-2}$$

Worked example	Your turn
Split into partial fractions: $$\frac{9x^2 + 20x - 10}{(x-2)(3x+1)}$$	Split into partial fractions: $$\frac{9x^2 + 20x - 10}{(x+2)(3x-1)}$$ $$3 + \frac{2}{x+2} - \frac{1}{3x-1}$$

Worked example	Your turn
Split into partial fractions: $$\frac{9x^2 + 16}{9x^2 - 16}$$	Split into partial fractions: $$\frac{16x^2 + 9}{16x^2 - 9}$$ $$1 - \frac{3}{4x + 3} + \frac{3}{4x - 3}$$

Worked example	Your turn
Split into partial fractions: $$\frac{16x^3 - 36x^2 + 4x + 22}{4x^2 - 12x + 9}$$	Split into partial fractions: $$\frac{18x^3 - 15x^2 + 5x + 2}{9x^2 - 12x + 4}$$ $$2x + 1 + \frac{3}{3x - 2} + \frac{4}{(3x - 2)^2}$$

Worked example	Your turn
Split into partial fractions: $$\frac{5x^4 - 9x^2 - 7x^2 + 4x - 10}{x^2 - x - 2}$$	Split into partial fractions: $$\frac{5x^4 + 9x^3 - 6x^2 - 2x - 6}{x^2 + x - 2}$$ $$5x^2 + 4x + 3 + \frac{2}{x + 2} + \frac{1}{x - 1}$$