

A Equations with Algebraic Fractions

24 Solve.

$$\frac{1}{x+1} + \frac{9}{x+9} = 1$$

$$\frac{1}{x+1} \times \frac{(x+9)}{(x+9)} + \frac{9}{x+9} \times \frac{(x+1)}{(x+1)} = 1$$

$$\frac{(x+9) + 9(x+1)}{(x+1)(x+9)} = 1$$

$$\frac{x+9+9x+9}{(x+1)(x+9)} = 1$$

$$\frac{10x+18}{(x+1)(x+9)} = 1$$

$$10x+18 = (x+1)(x+9)$$

$$10x+18 = x^2+10x+9$$

$$10x = x^2+10x-9$$

$$x^2-9 = 0$$

$$(x+3)(x-3) = 0$$

$$x = -3 \text{ or } x = 3$$

$$x = -3 \text{ or } x = 3 \quad [5]$$

(c) Solve.

$$\frac{1}{x-3} + \frac{4}{2x+3} = 1$$

$$\frac{1}{x-3} \times \frac{(2x+3)}{(2x+3)} + \frac{4}{2x+3} \times \frac{(x-3)}{(x-3)} = 1$$

$$\frac{(2x+3) + 4(x-3)}{(x-3)(2x+3)} = 1$$

$$\frac{2x+3+4x-12}{(x-3)(2x+3)} = 1$$

$$\frac{6x-9}{(x-3)(2x+3)} = 1$$

$$6x-9 = (x-3)(2x+3)$$

$$6x-9 = 2x^2-3x-9$$

$$6x = 2x^2-3x-9$$

$$2x^2-9x = 0$$

$$x(2x-9) = 0$$

$$x = 0 \text{ or } 2x-9 = 0$$

$$2x = 9$$

$$x = \frac{9}{2}$$

$$x = 0 \text{ or } x = \frac{9}{2} \quad [5]$$

(b) Solve $\frac{x-1}{x+1} - \frac{6}{x-1} = 1$.

$$\frac{x-1}{x+1} \times \frac{(x-1)}{(x-1)} - \frac{6}{x-1} \times \frac{(x+1)}{(x+1)} = 1$$

$$\frac{(x-1)(x-1) - 6(x+1)}{(x+1)(x-1)} = 1$$

$$\frac{x^2 - 2x + 1 - 6x - 6}{(x+1)(x-1)} = 1$$

$$\frac{x^2 - 8x - 5}{(x+1)(x-1)} = 1$$

$\times (x+1)(x-1)$

$$x^2 - 8x - 5 = (x+1)(x-1)$$

$$x^2 - 8x - 5 = x^2 - 1$$

$$-8x - 5 = -1$$

$$+5 \quad +5$$

$$-8x = 4$$

$$\div -8 \quad \div -8$$

$$x = -\frac{1}{2}$$

$$x = -\frac{1}{2} \quad [5]$$