

## Solution

Simplify  $\frac{1}{x-2} + \frac{x-1}{x+2} - 1$ :  $\frac{-2x+8}{(x-2)(x+2)}$

### Steps

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

Join  $\frac{1}{x-2} + \frac{x-1}{x+2}$ :  $\frac{x+2+(x-1)(x-2)}{(x-2)(x+2)}$

Hide Steps 

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

Least Common Multiplier of  $x-2, x+2$ :  $(x-2)(x+2)$

Show Steps 

Adjust Fractions based on the LCM

Hide Steps 

Multiply each numerator by the same amount needed to multiply its corresponding denominator to turn it into the LCM  $(x-2)(x+2)$

For  $\frac{1}{x-2}$ : multiply the denominator and numerator by  $x+2$

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

For  $\frac{x-1}{x+2}$ : multiply the denominator and numerator by  $x-2$

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

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

Apply the fraction rule:  $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$

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

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

Apply the fraction rule:  $a + \frac{b}{c} = \frac{ac+b}{c}$

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

Apply rule:  $a \cdot 1 = a$

$$-1 \cdot (x-2)(x+2) = -(x-2)(x+2)$$

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

Simplify  $-(x-2)(x+2) + x + 2 + (x-1)(x-2)$ :  $-2x + 8$

Hide Steps 

$$-(x-2)(x+2) + x + 2 + (x-1)(x-2)$$

Expand  $-(x-2)(x+2)$ :  $-x^2 + 4$

Hide Steps 

$$-(x-2)(x+2)$$

Apply Difference of Two Squares Formula:  $(a-b)(a+b) = a^2 - b^2$

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

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

$$2^2 = 4$$

$$= -(x^2 - 4)$$

Apply the distributive law:  $-(a-b) = -a + b$

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

$$= -x^2 + 4$$

$$= -x^2 + 4 + x + 2 + (x-1)(x-2)$$

Expand  $(x-1)(x-2)$ :  $x^2 - 3x + 2$

Hide Steps 

$$(x-1)(x-2)$$

Apply FOIL method:  $(a+b)(c+d) = ac + ad + bc + bd$

$$(x-1)(x-2) = xx + x(-2) - 1 \cdot x - 1 \cdot (-2)$$

$$= xx + x(-2) - 1 \cdot x - 1 \cdot (-2)$$

Simplify  $xx + x(-2) - 1 \cdot x - 1 \cdot (-2)$ :  $x^2 - 3x + 2$

Hide Steps 

$$xx + x(-2) - 1 \cdot x - 1 \cdot (-2)$$

$$xx = x^2$$

Show Steps 

$$x(-2) = -2x$$

Show Steps 

$$-1 \cdot x = -x$$

Show Steps 

$$-1 \cdot (-2) = 2$$

Show Steps 

$$= x^2 - 2x - x + 2$$

Add similar elements:  $-2x - x = -3x$

$$= x^2 - 3x + 2$$

$$= x^2 - 3x + 2$$

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

Simplify  $-x^2 + 4 + x + 2 + x^2 - 3x + 2$ :  $-2x + 8$

Show Steps 

$$= -2x + 8$$

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