

1. Given $\frac{5}{x-5} - \frac{4}{x-4}$

a) Give the LCD

$$(x-5)(x-4)$$

b) Perform the operation and simplify.

$$\begin{aligned} \frac{5(x-4)}{(x-5)(x-4)} - \frac{4(x-5)}{(x-5)(x-4)} &= \frac{5(x-4) - 4(x-5)}{(x-5)(x-4)} \\ &= \frac{5x - 20 - 4x + 20}{(x-5)(x-4)} = \frac{x}{(x-5)(x-4)} \end{aligned}$$

2. Given $\frac{15}{x^2-9} + \frac{5}{2x+6}$

a) Rewrite the entire expression with factored denominators.

$$\frac{15}{(x+3)(x-3)} + \frac{5}{2(x+3)}$$

b) Give the LCD

$$2(x+3)(x-3)$$

c) Perform the operation and simplify. [Hint: After combining, factor the numerator and cancel to simplify further.]

$$\begin{aligned} \frac{2 \cdot 15}{2(x+3)(x-3)} + \frac{5(x-3)}{2(x+3)(x-3)} &= \frac{30 + 5(x-3)}{2(x+3)(x-3)} \\ &= \frac{30 + 5x - 15}{2(x+3)(x-3)} = \frac{5x + 15}{2(x+3)(x-3)} = \frac{5(x+3)}{2(x+3)(x-3)} = \boxed{\frac{5}{2(x-3)}} \end{aligned}$$

same as $\frac{5}{2x-6}$

3. Given $\frac{x^2}{x^2-4} - \frac{3}{x+2} = \frac{2x}{x^2-4}$

a) Rewrite the entire equation, but factor the denominators, which need to be factored.

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

b) Give the values of x for which the equation is not defined.

$$x \neq -2, x \neq 2$$

c) Give the LCD

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

d) Solve the equation. [Don't forget to check if your solutions "candidates" are actual solutions]

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

$$\begin{aligned} x^2 - 3(x-2) &= 2x \\ x^2 - 3x + 6 &= 2x \\ -2x & \quad -2x \end{aligned}$$

$$x^2 - 5x + 6 = 0$$

$$(x-2)(x-3) = 0$$

$$x \neq 2 \quad \text{or} \quad \boxed{x = 3}$$

↑
extraneous
solution

e) State the answer(s)

$$\boxed{x = 3}$$