Simplifying Algebraic Expressions

Ex1 $$\frac{x^2-9}{x^2+5x+6} = \frac{\cancel{(x+3)}(x-3)}{(x+2)\cancel{(x+3)}} = \frac{x-3}{x+2}$$

Ex2 $$\frac{4x^2-25}{2x^2-9x-5} = \frac{(2x+5)(2x-5)}{(x-5)(2x+1)}$$

-10

$+1 \quad -10$ ✓

$-1 \quad +10$

$2x^2 + x - 10x - 5$

$x(2x+1) - 5(2x+1)$

$(x-5)(2x+1)$

Exercise 20A Q 9

a) $$\frac{x^2+2x-3}{2x^2+7x+3} = \frac{\cancel{(x+3)}(x-1)}{\cancel{(x+3)}(2x+1)} = \frac{x-1}{2x+1}$$

$2x^2 + 7x + 3$

$2 \times 3 = 6$

$+1 \quad +6$

$2x^2 + x + 6x + 3$

$x(2x+1) + 3(2x+1)$

$(x+3)(2x+1)$

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b) $$\frac{4x^2-1}{2x^2+5x-3} = \frac{(2x+1)\cancel{(2x-1)}}{(x+3)\cancel{(2x-1)}} = \frac{2x+1}{x+3}$$

$2x^2 + 5x - 3$

$2 \times -3 = -6$

$-1 + 6$

$2x^2 - x + 6x - 3$

$x(2x-1) + 3(2x-1)$

$= (x+3)(2x-1)$

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c) $$\frac{6x^2 + x - 2}{9x^2 - 4} = \frac{\cancel{(3x+2)}(2x-1)}{\cancel{(3x+2)}(3x-2)} = \frac{2x-1}{3x-2}$$

$6x^2 + x - 2$

$6 \times -2 = -12$

$-3 + 4$

$6x^2 - 3x + 4x - 2$

$3x(2x-1) + 2(2x-1)$

$(3x+2)(2x-1)$

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d) $$\frac{4x^2 + x - 3}{4x^2 - 7x + 3} = \frac{(x+1)\cancel{(4x-3)}}{(x-1)\cancel{(4x-3)}} = \frac{x+1}{x-1}$$

$4x^2 + x - 3$

$4 \times -3 = -12$

$-3 + 4$

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

$x(4x-3) + 1(4x-3)$

$(x+1)(4x-3)$

$4x^2 - 7x + 3$

$4 \times 3 = 12$

$-3 - 4$

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

$x(4x-3) - 1(4x-3)$

$(x-1)(4x-3)$

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e) $$\frac{4x^2 - 25}{8x^2 - 22x + 5} = \frac{(2x+5)\cancel{(2x-5)}}{\cancel{(2x-5)}(4x-1)} = \frac{2x+5}{4x-1}$$

$8x^2 - 22x + 5$

$8 \times 5 = 40$

$-2 - 20$

$8x^2 - 2x - 20x + 5$

$2x(4x-1) - 5(4x-1)$

$(2x-5)(4x-1)$

Equations

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

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

$$3(3x-1) - 4(2x-1) = (2x-1)(3x-1)$$

$$9x - 3 - 8x + 4 = 6x^2 - 3x - 2x + 1$$

$$x + 1 = 6x^2 - 5x + 1$$

$$0 = 6x^2 - 5x + 1 - x - 1$$

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

$$0 = 6x(x-1)$$

Either $\underline{x = 0}$ or $x - 1 = 0$

$\underline{x = 1}$

8a) $$\frac{4}{x+1} + \frac{5}{x+2} = 2$$

$$\frac{4\cancel{(x+1)}(x+2)}{\cancel{(x+1)}} + \frac{5(x+1)\cancel{(x+2)}}{\cancel{(x+2)}} = 2(x+1)(x+2)$$

$$4(x+2) + 5(x+1) = 2(x^2+x+2x+2)$$

$$4x+8 + 5x+5 = 2x^2+2x+4x+4$$

$$9x+13 = 2x^2+6x+4$$

$$0 = 2x^2+6x+4-9x-13$$

$$0 = 2x^2-3x-9$$

$$0 = 2x^2+3x-6x-9$$

$2x-9$
$=-18$
$+3 \quad -6$

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

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

Either $x-3=0$ or $2x+3=0$

$\underline{x=3}$ $\qquad$ $2x=-3$

$\underline{x=-\frac{3}{2}}$