

Algebraic Fractions - Lesson 6

Adding and Subtracting Algebraic Fractions (Difficult Types)

LI

- +, - difficult algebraic fractions.

SC

- Multiplying brackets.
- +, - numerical fractions.

Example 1

$$\frac{x \times 3}{2 \times 3} + \frac{x - 7}{6}$$

$$= \frac{3x}{6} + \frac{x - 7}{6}$$

$$= \frac{3x + x - 7}{6}$$

$$= \frac{4x - 7}{6}$$

Example 2

$$\frac{x - 1}{3} \overset{\times 2}{\underset{\times 2}{+}} \frac{x + 10}{6}$$

$$= \frac{2(x - 1)}{6} + \frac{x + 10}{6}$$

$$= \frac{2x - 2}{6} + \frac{x + 10}{6}$$

$$= \frac{2x - 2 + x + 10}{6}$$

$$= \frac{3x + 8}{6}$$

Example 3

$$\frac{2x + 3}{5} - \frac{x - 7}{4}$$

$$= \frac{4(2x + 3)}{20} - \frac{5(x - 7)}{20}$$

$$= \frac{4(2x + 3) - 5(x - 7)}{20}$$

$$= \frac{8x + 12 - 5x + 35}{20}$$

$$= \frac{3x + 47}{20}$$

Example 4

$$\begin{aligned}
& \frac{3x + 1}{x - 1} \times \frac{x(x-3)}{x(x-3)} - \frac{x + 3}{x - 3} \times \frac{x(x-1)}{x(x-1)} \\
= & \frac{(3x + 1)(x - 3)}{(x - 1)(x - 3)} - \frac{(x + 3)(x - 1)}{(x - 1)(x - 3)} \\
= & \frac{(3x + 1)(x - 3) - (x + 3)(x - 1)}{(x - 1)(x - 3)} \\
= & \frac{3x^2 - 8x - 3 - (x^2 + 2x - 3)}{(x - 1)(x - 3)} \\
= & \frac{3x^2 - 8x - 3 - x^2 - 2x + 3}{(x - 1)(x - 3)} \\
= & \frac{2x^2 - 10x}{(x - 1)(x - 3)}
\end{aligned}$$

1 Express each of the following as a single fraction in its simplest form.

$$\begin{array}{llll} \mathbf{a} & \frac{x}{3} + \frac{x-2}{6} & \mathbf{b} & \frac{x+1}{4} + \frac{x-3}{8} & \mathbf{c} & \frac{2x-1}{3} - \frac{x}{4} & \mathbf{d} & \frac{x-3}{3} + \frac{x-2}{5} \\ \mathbf{e} & \frac{2x-2}{3} - \frac{x+1}{2} & \mathbf{f} & \frac{2x-1}{3} - \frac{x-3}{4} & \mathbf{g} & \frac{2x-1}{3} + \frac{x-3}{4} - \frac{2x-3}{6} \end{array}$$

2 Express each of the following as a single fraction in its simplest form.

$$\begin{array}{lll} \mathbf{a} & \frac{3}{x+1} - \frac{2}{x} & \mathbf{b} & \frac{4}{x-2} + \frac{3}{x} & \mathbf{c} & \frac{5}{x-2} + \frac{3}{x+3} \\ \mathbf{d} & \frac{3}{x+1} - \frac{2}{1-x} & \mathbf{e} & \frac{2}{2x+1} + \frac{3}{x-1} & \mathbf{f} & \frac{7}{3x-1} - \frac{2}{x+1} \\ \mathbf{g} & \frac{x+1}{x-2} + \frac{3}{x-1} & \mathbf{h} & \frac{x^2+1}{x+3} - \frac{x-1}{x+1} & \mathbf{i} & \frac{x+3}{2x+1} - \frac{1-2x^2}{x-1} \end{array}$$

3 Express each of the following as a single fraction in its simplest form.

$$\begin{array}{lll} \mathbf{a} & \frac{1}{x^2-16} - \frac{1}{x+4} & \mathbf{b} & \frac{1}{3x^2-3} + \frac{1}{x+1} & \mathbf{c} & \frac{2}{x+2} - \frac{5}{x^2-x-6} \\ \mathbf{d} & \frac{x+1}{x^2-4} + \frac{3}{x^2+3x+2} & \mathbf{e} & \frac{4x+12}{x^2-9} - \frac{3}{x+3} & \mathbf{f} & \frac{1}{x^2+x-12} - \frac{1}{x^2+3x-4} \end{array}$$

Answers

1 a $\frac{3x-2}{6}$

b $\frac{3x-1}{8}$

c $\frac{5x-4}{12}$

d $\frac{8x-21}{15}$

e $\frac{x-7}{6}$

f $\frac{5(x+1)}{12}$

g $\frac{7x-7}{12}$

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

b $\frac{7x-6}{x(x-2)}$

c $\frac{8x+9}{(x-2)(x+3)}$

d $\frac{1-5x}{1-x^2}$

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

f $\frac{x+9}{(3x-1)(x+1)}$

g $\frac{x^2+3x-7}{(x-2)(x-1)}$

h $\frac{x^3-x+4}{(x+3)(x+1)}$

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

3 a $\frac{5-x}{x^2-16}$

b $\frac{3x-2}{3(x^2-1)}$

c $\frac{2x-11}{(x-3)(x+2)}$

d $\frac{x^2+5x-5}{(x^2-4)(x+1)}$

e $\frac{x+21}{x^2-9}$

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