

0 Adding and Subtracting

Algebraic Fractions

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(1) Combine each of the following into one single simplified fraction:

(a) $\frac{a}{2} + \frac{a}{3}$

(b) $\frac{2a}{7} + \frac{a}{4}$

(c) $\frac{a}{3} - \frac{a}{5}$

(d) $\frac{a}{4} + \frac{b}{3}$

(e) $\frac{3a}{5} - \frac{2b}{7}$

(f) $\frac{6a}{5} + \frac{4b}{15}$

(2) Fred combines $\frac{2}{a} + \frac{3}{b}$ into a single fraction. Which of the following 4 answers is the correct one?

$\frac{2b+3a}{a+b}$ $\frac{2b+3a}{ab}$ $\frac{b+a}{6ab}$ $\frac{2b+3a}{6(a+b)}$

(3) Write each of the following as a single, simplified fraction:

(a) $\frac{1}{p} + \frac{1}{q}$

(b) $\frac{2}{p} - \frac{1}{q}$

(c) $\frac{5}{2p} + \frac{3}{q}$

(d) $\frac{6}{7p} - \frac{2}{3q}$

(e) $\frac{1}{3} + \frac{4}{q}$

(4) Show that:

$$\frac{1}{x} + \frac{2}{(x+1)} \equiv \frac{3x+1}{x(x+1)}$$

(5) Show that:

$$\frac{5}{(x-1)} + \frac{3}{(x+2)} \equiv \frac{8x+7}{(x-1)(x+2)}$$

(6) Combine each of the following into one single simplified fraction:

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

(b) $\frac{2}{(x+3)} + \frac{5}{(x+1)}$

(c) $\frac{5}{(x+5)} - \frac{2}{(x+1)}$

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

(e) $\frac{5}{(x-3)} + \frac{6}{(x+2)}$

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

(g) $\frac{10}{(x-5)} + \frac{6}{(x-3)}$

(7) By considering the LCM of the denominators, show that:

$$\frac{1}{x(x+1)} + \frac{3}{x} \equiv \frac{3x+4}{x(x+1)}$$

(8) By considering the LCM of the denominators, show that:

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

(9) Simplify each:

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

(b) $\frac{5}{(x+4)(x+1)} + \frac{3}{(x+1)}$

(c) $\frac{1}{(x+2)} - \frac{4}{(x+2)(x+6)}$

(d) $\frac{4}{(x-3)} + \frac{5}{x(x-3)}$

(e) $\frac{7}{(x-2)} - \frac{21}{(x+1)(x-2)}$

(f) $\frac{6}{(x-3)} + \frac{x}{(x+5)(x-3)}$

(g) $\frac{2x}{(x+3)(x+2)} + \frac{2x}{(x+3)}$

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

(10) Show that:

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

simplifies to $\frac{5x+12}{x(x+1)(x+4)}$

(11) Show that:

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

simplifies to $\frac{2(x+5)}{(x-3)(x+1)(x+4)}$

(12) Simplify each:

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

(b) $\frac{6}{x(x-2)} - \frac{2}{x(x+4)}$

(c) $\frac{x}{(x+4)(x-4)} + \frac{4}{(x+4)(x+2)}$

(13) (a) Factorise the expressions:

(i) $x^2 - x - 12$

(ii) $x^2 + x - 20$

(b) Hence, show that

$$\frac{5}{x^2-x-12} + \frac{3}{x^2+x-20} \text{ simplifies}$$

to give $\frac{2(4x+17)}{(x+3)(x-4)(x+5)}$

(14) Simplify each into a single fraction

(a) $\frac{2}{x^2-x-6} + \frac{3}{x(x+2)}$

(b) $\frac{5}{x^2+6x+8} - \frac{3}{x^2+4x}$

(c) $\frac{5}{x^2+6x-7} + \frac{7}{x^2+3x-28}$

(d) $\frac{8}{x^2-25} - \frac{2}{x^2+x-30}$

(e) $\frac{4}{25x^2-36} + \frac{1}{x(5x+6)}$

(f) $\frac{1}{6x^2+5x+1} + \frac{4x}{3x^2-20x-7}$