

Adding and Subtracting Algebraic Fractions

ANSWERS

1

Simplify $\frac{x}{3} + \frac{x}{4}$

cut both bars into 12 equal pieces

x into 3
 x into 4

make the bottoms the same

$$\frac{x \times 4}{3 \times 4} + \frac{x \times 3}{4 \times 3}$$

now add or subtract the tops

$$= \frac{4x + 3x}{12}$$

Answer $\frac{7x}{12}$

2

Simplify $\frac{2x}{5} + \frac{x}{2}$

cut both bars into 10 equal pieces

x into 5
 x into 2

make the bottoms the same

$$\frac{2x \times 2}{5 \times 2} + \frac{x \times 5}{2 \times 5}$$

now add or subtract the tops

$$= \frac{4x + 5x}{10}$$

Answer $\frac{9x}{10}$

3

Simplify $\frac{x}{2} + \frac{x}{5}$

make the bottoms the same

$$\frac{x \times 5}{2 \times 5} + \frac{x \times 2}{5 \times 2}$$

now add or subtract the tops

$$= \frac{5x + 2x}{10}$$

Answer $\frac{7x}{10}$

4

Simplify $\frac{3x}{4} - \frac{x}{3}$

make the bottoms the same

$$\frac{3x \times 3}{4 \times 3} - \frac{x \times 4}{3 \times 4}$$

now add or subtract the tops

$$= \frac{9x - 4x}{12}$$

Answer $\frac{5x}{12}$

5

Simplify $\frac{2}{x+1} + \frac{3}{x+2}$

make the bottoms the same

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

now add or subtract the tops

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

expand and collect the top

$$= \frac{5x + 7}{(x+1)(x+2)}$$

Answer $\frac{5x + 7}{(x+1)(x+2)}$

6

Simplify $\frac{5}{x+1} - \frac{2}{x+3}$

make the bottoms the same

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

now add or subtract the tops

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

expand and collect the top

$$= \frac{3x + 13}{(x+1)(x+3)}$$

Answer $\frac{3x + 13}{(x+1)(x+3)}$

7

Solve $\frac{x}{2} + \frac{x}{3} = 10$

$$\frac{5x}{6} = 10$$

$$x = 12$$

Answer $x = 12$

8

Simplify $\frac{3}{x} + \frac{2}{x+1}$

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

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

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

Adding and Subtracting Algebraic Fractions *further practice*

ANSWERS

9

Simplify $\frac{x+3}{4} - \frac{x-1}{6}$

$$\frac{3(x+3) - 2(x-1)}{12}$$

Answer $\frac{x+11}{12}$

10

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

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

Answer $\frac{2x+26}{(x-2)(x+4)}$

11

An isosceles triangle has two sides of $\frac{2}{x-1}$ cm and one side of $\frac{3}{x^2-1}$ cm. Find its perimeter as a single fraction.

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

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

Answer $\frac{4x+7}{(x-1)(x+1)}$ cm

12

$\frac{a}{x+1} + \frac{b}{x-2} = \frac{5x-1}{(x+1)(x-2)}$
Find a and b .

$$a(x-2) + b(x+1) = 5x-1$$

$$a + b = 5 \text{ and } -2a + b = -1$$

Answer $a = 2, b = 3$

13

Kai cycles 12 km at x km/h, then runs 5 km at $(x-10)$ km/h. Write his total time, in hours, as a single fraction.

$$\frac{12}{x} + \frac{5}{x-10}$$

$$\frac{12(x-10) + 5x}{x(x-10)}$$

Answer $\frac{17x-120}{x(x-10)}$ hours

14

Solve $\frac{3}{x} + \frac{5}{x+4} = 1$

$$3(x+4) + 5x = x(x+4)$$

$$x^2 - 4x - 12 = 0, (x-6)(x+2) = 0$$

Answer $x = 6 \text{ or } x = -2$

15

Pipe A fills a tank in x minutes, so each minute it fills $\frac{1}{x}$ of the tank. Pipe B fills the same tank in $(x+5)$ minutes. Together they fill it in 6 minutes. Find x .

$$\frac{1}{x} + \frac{1}{x+5} = \frac{1}{6}$$

$$x^2 - 7x - 30 = 0, \text{ so } x = 10 \text{ (not } -3)$$

Answer $x = 10$

16

Zara writes $\frac{2}{x} + \frac{3}{y} = \frac{5}{x+y}$. Explain her mistake and write the right answer.

she added tops and added bottoms

$$x = y = 1: 2 + 3 = 5, \text{ not } \frac{5}{2}$$

Answer $\frac{2x+3y}{xy}$