

Adding and Subtracting Algebraic Fractions

Starter

1. (Review of last lesson)

Simplify: (a) $\frac{ab^2}{15} \div \frac{a^2}{5b}$ (b) $\frac{y^2 - 5y + 6}{y^2 + y - 20} \div \frac{y - 2}{3y - 12}$

Working: (a) $\frac{ab^2}{15} \div \frac{a^2}{5b} = \frac{ab^2}{15} \times \frac{5b}{a^2} = \frac{ab^3}{3a^2} = \frac{a^{1-2}b^3}{3} = \frac{a^{-1}b^3}{3} = \frac{b^3}{3a}$

(b) $y^2 - 5y + 6 = y^2 - 3y - 2y + 6 = y(y - 3) - 2(y - 3) = (y - 3)(y - 2)$

$y^2 + y - 20 = y^2 + 5y - 4y - 20 = y(y + 5) - 4(y + 5) = (y + 5)(y - 4)$

$3y - 12 = 3(y - 4)$

$$\begin{aligned} \frac{y^2 - 5y + 6}{y^2 + y - 20} \div \frac{y - 2}{3y - 12} &= \frac{y^2 - 5y + 6}{y^2 + y - 20} \times \frac{3y - 12}{y - 2} \\ &= \frac{(y - 3)(y - 2)}{(y + 5)(y - 4)} \times \frac{3(y - 4)}{y - 2} \\ &= \frac{3(y - 3)}{y + 5} \end{aligned}$$

2. Find the value of: (a) $\frac{2}{5} + \frac{3}{7}$ (b) $\frac{5}{9} - \frac{3}{8}$

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

Working: (a) $\frac{2}{5} + \frac{3}{7} = \frac{14}{35} + \frac{15}{35} = \frac{29}{35}$

(b) $\frac{5}{9} - \frac{3}{8} = \frac{40}{72} - \frac{27}{72} = \frac{13}{72}$

(c) $\frac{x}{5} + \frac{x}{4} = \frac{4x}{20} + \frac{5x}{20} = \frac{9x}{20}$

(d) $\frac{2x - 5}{3} - \frac{x - 2}{4} = \frac{4(2x - 5)}{12} - \frac{3(x - 2)}{12}$
 $= \frac{8x - 20}{12} - \frac{3x - 6}{12}$
 $= \frac{5x - 14}{12}$

N.B. $-20 - (-6) = -14$

E.g. 1 Express as a single fraction: (a) $\frac{2x}{5} - \frac{x}{6}$ (b) $\frac{2d}{7} + \frac{5d}{6}$ (c) $\frac{5z}{6} - \frac{4z}{9}$

Working: (a) $\frac{2x}{5} - \frac{x}{6} = \frac{12x}{30} - \frac{5x}{30} = \frac{7x}{30}$

(b) $\frac{2d}{7} + \frac{5d}{6} = \frac{12d}{42} + \frac{35d}{42} = \frac{47d}{42}$ *leave as improper fraction*

(c) $\frac{5z}{6} - \frac{4z}{9} = \frac{15z}{18} - \frac{8z}{18} = \frac{7z}{18}$

E.g. 2 Express as a single fraction: (a) $\frac{x-2}{5} + \frac{x+1}{3}$ (b) $\frac{2t+1}{4} - \frac{t-1}{3}$

Working: (a) $\frac{x-2}{5} + \frac{x+1}{3} = \frac{3(x-2)}{15} + \frac{5(x+1)}{15}$ *common denominator*
 $= \frac{3x-6}{15} + \frac{5x+5}{15}$ *expand brackets*
 $= \frac{8x-1}{15}$ *add the numerators*

(b) $\frac{2t+1}{4} - \frac{t-1}{3} = \frac{3(2t+1)}{12} - \frac{4(t-1)}{12}$ *common denominator*
 $= \frac{6t+3}{12} - \frac{4t-4}{12}$ *expand brackets*
 $= \frac{2t+7}{12}$ *subtract the numerators*

N.B. $(6t+3) - (4t-4) = 6t+3-4t+4 = 2t+7$

Video: [Adding algebraic fractions](#)

[Solutions to Starter and E.g.s](#)

Exercise

- 9-1 class textbook: p520 E16.6 Qu 1-13
- A*-G class textbook: p479 E16.3 Qu 1-13
- 9-1 homework book: p176 E16.6 Qu 1-8
- A*-G homework book: p133 E16.3 Qu 1-8

Homework book answers (only available during a lockdown)