

Dividing Algebraic Fractions

Starter

1. **(Review of last lesson)** Simplify $\frac{t}{2} \times \frac{24st}{6t}$.

Working:
$$\frac{t}{2} \times \frac{24st}{6t} = \frac{2st^2}{t} = 2st$$

2. **(Review of last lesson)**

Express $\frac{x^2 - 3x - 4}{x^2 + 5x + 6} \times \frac{x^2 + 4x + 4}{x - 4}$ as a simplified single fraction

Working: $x^2 - 3x - 4 = x^2 - 4x + x - 4 = x(x - 4) + 1(x - 4) = (x - 4)(x + 1)$

$$x^2 + 5x + 6 = x^2 + 3x + 2x + 6 = x(x + 3) + 2(x + 3) = (x + 3)(x + 2)$$

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

$$\begin{aligned} \frac{x^2 - 3x - 4}{x^2 + 5x + 6} \times \frac{x^2 + 4x + 4}{x - 4} &= \frac{(x - 4)(x + 1)}{(x + 3)(x + 2)} \times \frac{(x + 2)(x + 2)}{x - 4} \\ &= \frac{(x + 1)(x + 2)}{(x + 3)(x + 2)} \\ &= \frac{(x + 1)}{(x + 3)} \end{aligned}$$

3. Find the value of $\frac{3}{5} \div \frac{9}{20}$.

Working:
$$\frac{3}{5} \div \frac{9}{20} = \frac{3}{5} \times \frac{20}{9} = \frac{4}{3}$$

E.g. 1 Simplify: (a) $\frac{4x}{y^2} \div \frac{2x}{12y^4}$ (b) $\frac{18a}{6b^2} \div \frac{a}{20b}$ (c) $\frac{3x^3y^5}{4x^5y} \div \frac{xy}{28}$

Working: (a)
$$\frac{4x}{y^2} \div \frac{2x}{12y^4} = \frac{4x}{y^2} \times \frac{12y^4}{2x} = \frac{24xy^4}{xy^2} = 24x^{1-1}y^{4-2} = 24y^2$$

(b)
$$\frac{18a}{6b^2} \div \frac{a}{20b} = \frac{18a}{6b^2} \times \frac{20b}{a} = \frac{60ab}{ab^2} = 60a^{1-1}b^{1-2} = 60b^{-1} = \frac{60}{b}$$

(c)
$$\frac{3x^3y^5}{4x^5y} \div \frac{xy}{28} = \frac{3x^3y^5}{4x^5y} \times \frac{28}{xy} = \frac{21x^3y^5}{x^6y^2} = 21x^{3-6}y^{5-2} = 21x^{-3}y^3 = \frac{21y^3}{x^3}$$

E.g. 2 Simplify: (a) $\frac{3x+6}{x^2-9} \div \frac{x+2}{x^2+4x+3}$ (b) $\frac{x^2-4x+4}{x^2+6x+5} \div \frac{2x-4}{3x+15}$

Working: (a) $3x+6 = 3(x+2)$
 $x^2-9 = (x-3)(x+3)$

$$x^2+4x+3 = x^2+3x+x+3 = x(x+3)+1(x+3) = (x+3)(x+1)$$

$$\begin{aligned} \frac{3x+6}{x^2-9} \div \frac{x+2}{x^2+4x+3} &= \frac{3x+6}{x^2-9} \times \frac{x^2+4x+3}{x+2} \\ &= \frac{3(x+2)}{3(x+2)} \times \frac{(x+3)(x+1)}{x+2} \\ &= \frac{(x-3)(x+3)}{3(x+1)} \times \frac{x+2}{x+2} \\ &= \frac{3(x+1)}{(x-3)} \end{aligned}$$

(b) $x^2-4x+4 = x^2-2x-2x+4 = x(x-2)-2(x-2) = (x-2)(x-2)$

$$x^2+6x+5 = x^2+5x+x+5 = x(x+5)+1(x+5) = (x+5)(x+1)$$

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

$$3x+15 = 3(x+5)$$

$$\begin{aligned} \frac{x^2-4x+4}{x^2+6x+5} \div \frac{2x-4}{3x+15} &= \frac{x^2-4x+4}{x^2+6x+5} \times \frac{3x+15}{2x-4} \\ &= \frac{(x-2)(x-2)}{(x+5)(x+1)} \times \frac{3(x+5)}{2(x-2)} \\ &= \frac{3(x-2)}{2(x+1)} \end{aligned}$$

Video: [Dividing algebraic fractions](#)

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

Exercise

9-1 class textbook:	p519 E16.5 Qu 7-14, 15ceghjl
A*-G class textbook:	p477 E16.2 Qu 7-14, 15ceghjl
9-1 homework book:	p175 E16.5 Qu 5-7, 12-14, 16
A*-G homework book:	p133 E16.2 Qu 5-7, 12-14, 16

Homework book answers (only available during a lockdown)