

## Denominator includes Algebra

### Starter

1. (Review of last lesson)

Express  $\frac{3x-1}{4} - \frac{2x-5}{6}$  as a single fraction as simplified as possible

### Notes

When algebraic expressions form the denominators, we find the common denominator by multiplying them together.

**N.B.** Do not expand the brackets in the denominator.

### Success Criteria – adding/subtracting when the denominator is a number

1. Find a **common denominator by finding the product of the denominators**
2. Put both fractions over the common denominator
3. Combine the fractions into one fraction
4. **Expand** any **brackets** in the **numerator**
5. Collect like terms

**E.g. 1** Express as a single simplified fraction:

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

(b)  $\frac{4}{x-6} - \frac{3}{2x+7}$

**Working:**

$$\begin{aligned} \text{(a)} \quad \frac{2}{x+1} + \frac{1}{x-3} &= \frac{2(x-3)}{(x+1)(x-3)} + \frac{1(x+1)}{(x+1)(x-3)} \\ &= \frac{2x-6}{(x+1)(x-3)} + \frac{x+1}{(x+1)(x-3)} \\ &= \frac{2x-6+x+1}{(x+1)(x-3)} \\ &= \frac{3x-5}{(x+1)(x-3)} \end{aligned}$$

**N.B.** Do not expand the brackets in the denominator.

**E.g. 2** Express as a single simplified fraction:

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

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

**Working:**

$$\begin{aligned} \text{(a)} \quad \frac{x-2}{x-1} + \frac{x+1}{x+2} &= \frac{(x-2)(x+2)}{(x-1)(x+2)} + \frac{(x+1)(x-1)}{(x-1)(x+2)} \\ &= \frac{x^2+2x-2x-4}{(x-1)(x+2)} + \frac{x^2-x+x-1}{(x-1)(x+2)} \\ &= \frac{x^2-4}{(x-1)(x+2)} + \frac{x^2-1}{(x-1)(x+2)} \\ &= \frac{x^2-4+x^2-1}{(x-1)(x+2)} \\ &= \frac{2x^2-5}{(x-1)(x+2)} \end{aligned}$$

- E.g. 3** (a) When finding  $\frac{7}{16} + \frac{3}{4}$  what is the **best** common denominator to use.
- (b) Using the idea from (a), express  $\frac{x-2}{(x+1)^2} + \frac{x+5}{x+1}$  as a single simplified fraction

**Video:** [Algebraic fractions equations](#)

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

### Exercise

9-1 class textbook:	p520 E16.6 Qu 14-15
A*-G class textbook:	p479 E16.3 Qu 14-15
9-1 homework book:	p176 E16.6 Qu 9-23
A*-G homework book:	p133 E16.3 Qu 9-20

### Summary

Adding/subtracting when the denominator is a number

1. Find a **common denominator by finding the product of the denominators**
2. Put both fractions over the common denominator
3. Combine the fractions into one fraction
4. **Expand** any **brackets** in the **numerator**
5. Collect like terms

[Homework book answers \(only available during a lockdown\)](#)