

Algebraic Fractions - PDF Copy

The presentation contains the slides below with the objective of showing how to: **Simplify algebraic fractions into the lowest terms**. The explanation begins with numerical examples before progressing to algebraic fractions with quadratics for numerator and denominator

Algebraic Fractions

Objective
Simplify algebraic fractions into the lowest terms

☆ 1

What do we mean by 'write in the lowest terms' or 'simplify'?

$$\frac{12}{15}$$

You can see that $\frac{12}{15}$ is equal to $\frac{4}{5}$. Here is how to do this with numbers

☆ 2

What do we mean by 'write in the lowest terms' or 'simplify'?

$$\frac{12}{15} \rightarrow \frac{4 \times 3}{5 \times 3}$$

Factorise top and bottom

Cancel out common factors

☆ 3

What do we mean by 'write in the lowest terms' or 'simplify'?

$$\frac{12}{15} \rightarrow \frac{4 \times 3}{5 \times 3} \rightarrow \frac{4}{5}$$

The remaining numbers give the fraction in its lowest terms

☆ 4

We can use the same method to simplify algebraic fractions into the lowest terms.

$$\frac{x^2}{2x^3} \rightarrow \frac{\cancel{x} \times \cancel{x}}{2 \times \cancel{x} \times \cancel{x} \times x} \rightarrow \frac{1}{2x}$$

Factorise... This gives...

Cancel common terms...

☆ 5

Simplify these algebraic fractions

| | |
|--|---|
| $\frac{y^3}{4y^2} \rightarrow \frac{y}{4}$ | $\frac{2a^2}{a^3} \rightarrow \frac{2}{a}$ |
| $\frac{8h}{4h^2} \rightarrow \frac{2}{h}$ | $\frac{3t^3}{6t} \rightarrow \frac{t^2}{2}$ |

☆ 6

Sometimes, the fractions will have quadratics as the numerator and/or denominator. You will need to factorise these and to refresh your memory, below are examples of how three different types of quadratic are factorised.

| | | |
|---|--|--|
| $x^2 + 3x - 10$ $5x - 2 = -10$ $5 + -2 = 3$ $(x + 5)(x - 2)$ Finding two numbers that have a product of -10 and sum of +3 | $x^2 + 3x$ $x(x + 3)$ Common factor of x | $x^2 - 16$ $(x + 4)(x - 4)$ Difference between two squares |
|---|--|--|

☆ 7

Here is an example of how to simplify the algebraic fraction below:

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

The top terms have a common factor of x

Cancel common terms

The bottom is the difference between two squares

This is the fraction in its lowest terms

☆ 8

Another example of how to simplify a slightly more difficult the algebraic fraction:

$$\frac{x^2 - 9}{x^2 + x - 6} \rightarrow \frac{(x+3)(x-3)}{(x+3)(x-2)} \rightarrow \frac{x-3}{x-2}$$

The top is the difference between two squares

Cancel common terms

Factorise the bottom by finding two numbers that have a product of -6 and sum of 1

This give the fraction in its lowest terms

☆ 9

Write these algebraic fraction in the simplest terms:

| | | |
|---|--|---|
| 1. $\frac{x^2 + 4x}{x^2 - 16}$ | 2. $\frac{x^2 - 9}{x^2 - 3x}$ | 3. $\frac{x^2 + 5x + 6}{x^2 + 3x}$ |
| 4. $\frac{x^2 + 5x}{x^2 - 25}$ | 5. $\frac{x^2 - 16}{x^2 - 3x - 4}$ | 6. $\frac{x^2 - x - 12}{x^2 - 9}$ |
| 7. $\frac{x^2 + 7x + 10}{x^2 - 2x - 8}$ | 8. $\frac{x^2 + x - 6}{x^2 + 8x + 15}$ | 9. $\frac{x^2 - 5x - 6}{x^2 - 4x - 12}$ |

☆ 10

Here are the answers:

| | | |
|----------------------|----------------------|----------------------|
| 1. $\frac{x}{x-4}$ | 2. $\frac{x+3}{x}$ | 3. $\frac{x+2}{x}$ |
| 4. $\frac{x}{x-5}$ | 5. $\frac{x+4}{x+1}$ | 6. $\frac{x-4}{x-3}$ |
| 7. $\frac{x+5}{x-4}$ | 8. $\frac{x-2}{x+5}$ | 9. $\frac{x+1}{x+2}$ |

☆ 11