

5TH YEAR HONOURS MATHEMATICS

SIMPLIFYING ALGEBRAIC EXPRESSIONS AND FRACTIONS

If algebraic fractions contain powers factorise these terms first: $\frac{4x^2 - 10x}{9x^2 + 6x} = \frac{2x(2x - 5)}{3x(3x + 2)}$

When adding or subtracting algebraic fractions, factorise any term that has a power and then find a common denominator.

EXAMPLE: Simplify $\frac{a}{ab + b^2} - \frac{b}{a^2 + ab}$.

Since both denominators have powers, factorise them and then get a common denominator as follows:

$$\Rightarrow \frac{a}{b(a+b)} - \frac{b}{a(a+b)} = \frac{a^2 - b^2}{ab(a+b)} = \frac{(a+b)(a-b)}{ab(a+b)} = \frac{a-b}{ab}$$

The common denominator of two or more fractions is the least common multiple of the denominators of those fractions. (*Basically each different denominator from the individual fractions is represented once in the common denominator. So here since $(a+b), a, b$ are in the old denominators they must all be represented once in the new common denominator This gives us a common denominator of $ab(a+b)$.)*

When multiplying algebraic fractions you may cancel common factors vertically and diagonally.

EXAMPLE: Simplify $\frac{4x^2 - 10x}{9x^2 + 6x} \div \frac{2x - 5}{3x + 2}$

Here we must factorise the top and bottom of the first fraction as before, then invert the second and multiply. Remember to cancel common factors and multiply out what remains!

$$\Rightarrow \frac{4x^2 - 10x}{9x^2 + 6x} \div \frac{2x - 5}{3x + 2} = \frac{2x(2x - 5)}{3x(3x + 2)} \times \frac{3x + 2}{2x - 5} = \frac{2}{3}$$