

ALGEBRAIC EXPRESSIONS: SIMPLIFYING FRACTIONS

10 FEBRUARY 2014



Lesson Description

In this lesson we:

- Use factors to simplify algebraic fractions



Summary

When dealing with fractions remember the basic operations and that the denominator of a fraction cannot be equal to 0:

Multiplication

$$\frac{p}{q} \times \frac{r}{s} = \frac{pr}{qs} \quad (q, s \neq 0)$$

Division

$$\frac{p}{q} \div \frac{r}{s} = \frac{p \times s}{q \times r} \quad (q, s \neq 0)$$

Invert and multiply rule explained:

$$\text{e.g. } \frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{2}{4} = \frac{1}{2}$$

To get rid of the complex fraction we do the ffl: $\frac{\frac{1}{4} \times \frac{2}{1}}{\frac{1}{2} \times \frac{1}{1}} = \frac{1}{2}$

Addition/Subtraction

$$\frac{p}{q} + \frac{r}{q} = \frac{p+r}{q} \quad (q \neq 0)$$

Adding and subtracting fractions by finding the LCM

To add or subtract fractions find the LCM. The LCM is the smallest multiple that the denominators have in common.

Equivalent fractions:

$$\text{e.g. } \frac{2a}{b} = \frac{2ab}{b^2}$$

Simplifying algebraic fractions

$$\text{Example: } \frac{2x^2+x}{x}$$

NB: you can't cancel across terms



Test Yourself

Question 1

What is the LCM of 2a, 3b,c?

- A 2a
- B 3b
- C 6abc
- D c

Question 2

What are the restrictions on the following: $\frac{x^2+x-6}{3x-12} \div \frac{x^2}{x^2-16}$

- A $x \neq 0; x \neq 16$
- B $x \neq 0; x \neq 4; x \neq -4$
- C $x \neq -3; x \neq 2; x \neq 0$
- D $x \neq 0; x \neq 4$

Question 3

The LCM of $\frac{x^2+x-6}{3x^2-12x} \div \frac{x^3-2x^2}{x^2-16}$ is:

- A $3x(x-4)(x+4)$
- B $3x^2(x-2)(x-4)$
- C $x^2(x+3)(x-2)$
- D undefined

Question 4

$\frac{2x+2}{2} + 1$ simplified is:

- A $2x+1$
- B $\frac{2x+3}{2}$
- C $x+1$
- D $x+2$

Question 5

True or false:

- a.) When dividing fractions invert the numerator and multiply by the denominator
- b.) You can add, subtract, multiply and divide fractions in algebra in the same way that you do in simple arithmetic.
- c.) $\frac{x+2}{x+4} + \frac{1}{x}$ is undefined when $x=-4$ and $x=0$
- d.) $\frac{(x-2)^3}{x^2-4}$ simplified is equal to 1

**Improve your Skills****Question 1**

Simplify:

$$\frac{ax^2 - x + 2a^2x - 2a}{x + 2a}$$

Question 2

Simplify:

$$\frac{x^2 + x - 6}{3x^2 - 12x} \div \frac{x^3 - 2x^2}{x^2 - 16} \times \frac{1}{x + 4}$$

Question 3

Simplify:

$$\frac{4x - 9y}{8x^3 + 27y^3} - \frac{1}{2x^2 + xy - 3y^2}$$