



"Full Coverage": Algebraic Fractions

This worksheet is designed to cover one question of each type seen in past papers, for each GCSE Higher Tier topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to www.drfrostmaths.com/homework, logging on, *Practise* → *Past Papers/Worksheets* (or *Library* → *Past/Past Papers* for teachers), and using the 'Revision' tab.

Question 1

Categorisation: Simplify algebraic fractions where the numerator and denominator are single terms (and no factorisation is required).

[Edexcel IGCSE Jan2013-4H Q15a]

Simplify

$$\frac{5x^5y^6}{x^2y^4}$$

.....

Question 2

Categorisation: As above but where "÷" is used.

[Edexcel IGCSE May2016(R)-4H Q2c]

Simplify fully $4wxy \div (8xy)$

.....

Question 3

Categorisation: Simplify using division by a bracketed expression to a power (or laws of indices).

[Edexcel GCSE Nov2010-4H Q25b]

Simplify fully

$$\frac{(x + 10)^5}{(x + 10)^4}$$

.....

Question 4

Categorisation: Simplify algebraic fractions where factorisation of one of the numerator or denominator is required.

[Edexcel GCSE June2007-5H Q21d]

Simplify

$$\frac{x - 3}{x^2 - 9}$$

.....

Question 5

Categorisation: As above but where both numerator and denominator must be factorised.

[Edexcel GCSE June2008-3H Q28]

Simplify fully

$$\frac{x^2 + x - 6}{x^2 - 7x + 10}$$

.....

Question 6

Categorisation: As above but where one of the expressions involves a common term to factorise out.

[Edexcel IGCSE May2013(R)-4H Q23a]

Show that

$$\frac{x^2 + 3x}{2x^2 + 5x - 3}$$

can be written as $\frac{x}{kx-1}$.

State the value of k .

$k =$

Question 7

Categorisation: As above, but involving more difficult factorisations.

[Edexcel IGCSE Jan2013-3H Q17]

Simplify fully

$$\frac{4x^2 - 25}{6x^2 + 13x - 5}$$

.....

Question 8

Categorisation: As above, but where the numerator or denominator is a negative quadratic. Recognise in general that $(a - b) \div (b - a) = -1$.

[Edexcel GCSE(9-1) Mock Set 3 Autumn 2017 1H Q17b]

Simplify fully

$$\frac{3 - 4x - 4x^2}{2x^2 - 7x + 3}$$

.....

Question 9

Categorisation: Simplify an algebraic fraction where multiple different factorisation techniques are required in the numerator or in the denominator.

[Edexcel IGCSE May2014(R)-4H Q17b]

Simplify fully

$$\frac{2x^2 - 8}{4x^2 - 8x}$$

.....

Question 10

Categorisation: Divide algebraic fractions.

[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 1H Q17b]

Show that

$$\frac{1}{2x^2 + x - 15} \div \frac{1}{3x^2 + 9x}$$

simplifies to $\frac{ax}{bx+c}$, where a , b and c are integers to be found.

.....

Question 11

Categorisation: Understand order of operations in order to combine multiple algebraic fraction techniques.

[Edexcel IGCSE Jan2015-4H Q23]

Write

$$5 - (x + 2) \div \left(\frac{x^2 - 4}{x - 3} \right)$$

as a single fraction. Simplify your answer fully.

.....

Question 12

Categorisation: Multiply (and subsequently simplify) algebraic fractions.

[Edexcel GCSE June2003-5H Q20c]

Simplify fully

$$\frac{n^2 - 1}{n + 1} \times \frac{2}{n - 2}$$

.....

Question 13

Categorisation: Add algebraic fractions with integer denominators.

[Edexcel IGCSE May2016-4H Q15a]

Write

$$\frac{x + 3}{5} + \frac{x - 2}{3}$$

as a single fraction in its simplest form.

.....

Question 14

Categorisation: Add algebraic fractions with algebraic denominators.

[Edexcel IGCSE Jan2012-3H Q20]

Simplify fully

$$\frac{4}{x} + \frac{3}{2 - x}$$

.....

Question 15

Categorisation: Subtract algebraic fractions.

[Edexcel IGCSE Jan2014(R)-4H Q20]

Express

$$\frac{4}{x-1} - \frac{3}{x+1}$$

as a single fraction.

Give your answer as simply as possible.

.....

Question 16

Categorisation: Solve equations involving algebraic fractions.

[Edexcel IGCSE Jan2016-4H Q22]

Solve the equation

$$\frac{6}{x-2} - \frac{6}{x+1} = 1$$

Show clear algebraic working.

.....

Question 17

Categorisation: Add or subtract algebraic fractions where prior factorisation is required.

[Edexcel IGCSE May2014-4H Q25]

Simplify fully

$$\frac{5}{2x-6} - \frac{x+2}{x^2-4x+3}$$

.....

Question 18

Categorisation: Solve equations involving algebraic fractions where prior factorisation of one of the denominators is required.

[Edexcel IGCSE Jan2015(R)-4H Q20b Edited]

Solve

$$\frac{4}{2x + 1} + \frac{1}{4x^2 - 1} = 3$$

.....

Question 19

Categorisation: Simplify algebraic fractions in the context of functions.

[Edexcel IGCSE Jan2014(R)-3H Q22a]

The functions f and g are such that $f(x) = x + 3$ and $g(x) = \frac{1}{x-2}$

Find $fg(x)$

Give your answer as a single algebraic fraction expressed as simply as possible.

$fg(x) = \dots\dots\dots$

Answers

Question 1

$$5x^3y^2$$

Question 2

$$\frac{w}{2}$$

Question 3

$$x + 10$$

Question 4

$$\frac{1}{x+3}$$

Question 5

$$\frac{x+3}{x-5}$$

Question 6

$$k = 2$$

Question 7

$$\frac{2x-5}{3x-1}$$

Question 8

$$\frac{3+2x}{3-x}$$

Question 9

$$\frac{x+2}{2x}$$

Question 10

$$a = 3, b = 2, c = -5$$

Question 11

$$\frac{4x-7}{x-2}$$

Question 12

$$\frac{2(n-1)}{n-2}$$

Question 13

$$\frac{8x-1}{15}$$

Question 14

$$\frac{8-x}{x(2-x)}$$

Question 15

$$\frac{x+7}{x^2-1}$$

Question 16

$$x = 5 \text{ or } x = -4$$

Question 17

$$\frac{3}{2x-2}$$

Question 18

$$x = 0 \text{ or } x = \frac{2}{3}$$

Question 19

$$fg(x) = \frac{3x-5}{x-2}$$