

Algebraic Fractions

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Simplify $(x^2 - 4)/(x^2 - x - 2)$.

Step 1 · Factorise the top (difference of two squares)

$$(x + 2)(x - 2)$$

Step 2 · Factorise the bottom

$$(x - 2)(x + 1)$$

Step 3 · Cancel the common factor $(x - 2)$

$$(x + 2)/(x + 1)$$

Answer: $(x + 2)/(x + 1)$

Check: $x = 3$: $5/4$ and $5/4$ ✓

2. Now try one with the steps

Simplify $(x^2 + 5x)/(x^2 - 25)$.

Step 1 · Factorise

Step 2 · Cancel $(x + 5)$

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Simplify $(x^2 + 3x)/x$. [2]

2. Simplify $(6x + 9)/3$. [1]

3. Simplify $(x^2 - 9)/(x^2 + 5x + 6)$. [3]

4. Simplify $(x^2 + 7x + 10)/(x + 5)$. [2]

5. Simplify $(2x^2 - 8)/(x - 2)$. [3]

6. Simplify $(x^2 - 4x)/(x^2 - 16)$. [3]

7. Simplify $(3x^2 + x - 2)/(x^2 - 1)$. [4]

8. Write $1/x + 1/y$ single fraction. [2]

9. Write $x/3 + x/4$ single fraction. [2]

10. Write $2/(x + 1) + 3/(x - 2)$ single fraction. [3]

11. Write $5/(x - 1) - 2/x$ single fraction. [3]

12. Write $(x + 1)/2 - (x - 3)/5$ single fraction. [3]

13. Simplify $x/(x + 2) \times (x^2 - 4)/x^2$. [3]

14. Simplify $2x/(x - 3) \div 4x^2/(x^2 - 9)$. [4]

15. Show that $3/(x + 1) - 2/(x + 3) = (x + 7)/((x + 1)(x + 3))$. [3]

4. Before you hand it in

$(x + 2)/(x + 3) = 2/3$, 'cancelling the x'

Only whole factors cancel. Try $x = 3$: $5/6$ is not $2/3$. $(x + 2)/(x + 3)$ cannot be simplified.

$1/x + 1/y = 2/(x + y)$

Use a common denominator: $y/(xy) + x/(xy) = (x + y)/(xy)$.

$5/(x - 1) - 2/x \rightarrow$ numerator $5x - 2x - 1$

$-2(x - 1) = -2x + 2$, so the numerator is $3x + 2$.

$(2x^2 - 8)/(x - 2)$ left because nothing seems to cancel

Take out the 2 first: $2(x^2 - 4) = 2(x + 2)(x - 2)$. Then $(x - 2)$ cancels.