

Algebraic Fractions

Simplifying Algebraic Fractions / Adding & Subtracting Algebraic Fractions /
Multiplying & Dividing Algebraic Fractions / Solving Equations with Algebraic
Fractions

Medium (16 questions)	/38
Hard (14 questions)	/50
Very Hard (15 questions)	/63
Total Marks	/151

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Medium Questions

1 Write as a single fraction in its simplest form

$$\frac{2}{y+3} - \frac{1}{y-6}$$

(3 marks)

2 Write $\frac{5}{x-3} - \frac{4}{x+3}$ as a single fraction in its simplest form.

(3 marks)

3 Simplify $\frac{x+1}{2} + \frac{x+3}{3}$

(3 marks)

4 Simplify $\frac{4(x+5)}{x^2 + 2x - 15}$

(2 marks)

5 Simplify $\frac{3(x+1)}{(x+1)^2}$

(1 mark)

6 Express

$$\frac{3}{x} + \frac{x+2}{2x} + \frac{1}{4}$$

as a single fraction in its simplest form.

(3 marks)

7 Express $\frac{4}{x-2} - \frac{3}{x+1}$ as a single fraction.

Give your answer in its simplest form.

(3 marks)

8 Write $\frac{2x+1}{4} + \frac{x-2}{3}$ as a single fraction in its simplest form.

(3 marks)

9 Write as a single fraction $\frac{2}{3x} + \frac{4}{5x} - \frac{9}{10x}$

Give your answer in its simplest form.

(2 marks)

10 Simplify fully $\frac{10x^2 + 23x + 12}{4x^2 - 9}$

(3 marks)

11 Simplify $\frac{3}{x} + \frac{4}{x}$

A. $\frac{7}{x}$

B. $\frac{7}{2x}$

C. $\frac{12}{x}$

D. $\frac{12}{x^2}$

(1 mark)

12 Simplify $\frac{25a}{8} \times \frac{2a}{5}$

Give your answer as a single fraction in its simplest form.

(2 marks)

13 Show that, for $x \neq 0$

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

can be written in the form $\frac{ax + b}{cx}$ where a , b and c are integers.

(3 marks)

14 Choose the expression that is equivalent to $\frac{3x^2}{6x^2 + 3}$

A. $\frac{x^2}{2x^2 + 3}$

B. $\frac{x^2}{6x^2 + 1}$

C. $\frac{x^2}{2x^2 + 1}$

D. $\frac{1}{2} + x^2$

(1 mark)

15 Write as a single fraction in its simplest form.

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

(3 marks)

16 Express as a single fraction.

$$\frac{m+1}{n+1} - \frac{m}{n}$$

Simplify your answer.

(2 marks)

Hard Questions

1 Simplify fully $\frac{2x^2 - 5x + 3}{x^2 + 5x - 6}$

(3 marks)

2 Write as a single fraction in its simplest form $\frac{5}{2-x} - \frac{4}{x}$

(3 marks)

3 Simplify $\frac{x^2 - 16}{2x^2 - 5x - 12}$

(3 marks)

4 Simplify fully $\frac{3x^2 - 8x - 3}{2x^2 - 6x}$

(3 marks)

- 5 Show that $\frac{2x^2 - 3x - 5}{x^2 + 6x + 5}$ can be written in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.

(3 marks)

6 (a) Simplify fully $\frac{x^2 + 3x - 4}{2x^2 - 5x + 3}$

(3 marks)

- (b) Write $\frac{4}{x+2} + \frac{3}{x-2}$ as a single fraction in its simplest form.

(3 marks)

7 Show that $\frac{a}{b+1} - \frac{a}{(b+1)^2}$ can be written as $\frac{ab}{(b+1)^2}$

(2 marks)

8 Simplify $\frac{x^2 - 9}{2x^2 + 5x - 3}$

(3 marks)

9 Solve $\frac{4 - 3x}{5} - \frac{3x - 5}{2} = -3$

Show clear algebraic working.

$X = \dots\dots\dots$

(3 marks)

10 Solve the equation

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

Show clear algebraic working.

(5 marks)

11 Simplify fully $\frac{x^5 - 4x^3}{3x - 6}$

(3 marks)

12 Show that, for $x \neq -1$

$\frac{8x^2 - 8}{4x + 4}$ simplifies to the form $ax + b$
where a and b are integers.

(3 marks)

13 Show that $\frac{x+9}{x^2-1} + \frac{4}{x+1}$ can be written in the form $\frac{a}{x-1}$ where a is an integer.

(4 marks)

14 Show that $\frac{5x}{x+5} + \frac{25}{x-7} - \frac{300}{(x+5)(x-7)}$ simplifies to an integer.

(6 marks)

Very Hard Questions

1 $2 - \frac{x+2}{x-3} - \frac{x-6}{x+3}$ can be written as a single fraction in the form $\frac{ax+b}{x^2-9}$

where a and b are integers.

Work out the value of a and the value of b .

(4 marks)

2 Show that $\frac{1}{6x^2 + 7x - 5} \div \frac{1}{4x^2 - 1}$ simplifies to $\frac{ax+b}{cx+d}$ where a, b, c and d are integers.

(3 marks)

3 (a) Simplify fully $\frac{3-x}{3x^2 - 5x - 12}$

(2 marks)

(b) Write $\frac{x}{x-1} - \frac{x}{x+1}$ as a single fraction in its simplest form.

(3 marks)

4 Write

$$4 - \left[(x+3) \div \frac{x^2 + 5x + 6}{x-2} \right]$$

as a single fraction in its simplest form.
You must show your working.

(4 marks)

5 Show that $\frac{3x+6}{x^2-3x-10} \div \frac{x+5}{x^3-25x}$ simplifies to ax where a is an integer.

(4 marks)

6 Show that $6 + \left[(x+5) \div \frac{x^2 + 3x - 10}{x-1} \right]$ simplifies to $\frac{ax-b}{cx-d}$ where a, b, c and d are integers.

(4 marks)

7 Write $\frac{25x^2 - 64}{5x^2 - 13x - 6} \times \frac{x^2 - 8x + 15}{5x + 8} - (x - 7)$

as a single fraction in its simplest form.

Show clear algebraic working.

(4 marks)

8 Given that $x = \frac{5}{9y+5}$ and that $y = \frac{5}{5a-2}$

find an expression for x in terms of a .

Give your expression as a single fraction in its simplest form.

(4 marks)

9 Express $\frac{1}{9x^2 - 25} - \frac{1}{6x + 10}$ as a single fraction in its simplest form.

(3 marks)

10 Simplify $\frac{2^n - 1}{4^n - 1}$

(2 marks)

11 The flight of a plane was in two stages.

The table shows information about the flight.

	Distance (miles)	Speed (mph)	Time (hours)
1st stage	731	x	$\frac{731}{x}$
2nd stage	287	$x - 24$	$\frac{287}{x - 24}$

In total, the flight lasted 2 hours.
Work out the value of x .

(5 marks)

12 Solve $\frac{5}{4x+1} = \frac{2x}{x^2+3}$

Give your solutions to 3 significant figures.
You **must** show your working.

(5 marks)

13 Solve $\frac{x}{x+4} + \frac{7}{x-2} = 1$

You **must** show your working.

$x = \dots\dots\dots$

(4 marks)

14 Solve $\frac{x}{4} - \frac{2x}{x+2} = 1$

Give your solutions to 2 decimal places.

You **must** show your working.

(6 marks)

15 Solve this equation, giving your answers correct to 1 decimal place.

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

$x = \dots\dots\dots$ or $x = \dots\dots\dots$

(6 marks)