

Name

Class



www.MathsTeacherHub.com

Algebraic fractions

(9 – 1) Topic booklet

Higher

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
 - *there may be more space than you need.*
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out**.
- If the question is a **1H** question you are not allowed to use a calculator.
- If the question is a **2H** or a **3H** question, you may use a calculator to help you answer.

Information

- The marks for **each** question are shown in brackets
 - *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.**



10 Simplify $\frac{4(y+3)^3}{(y+3)^2}$

.....
(1)

November 2019 – Paper 3H

(Total for Question 10 is 1 mark)

10 Simplify $\frac{x-1}{5(x-1)^2}$

.....
(1)

November 2018 – Paper 1H

(Total for Question 10 is 1 mark)

11 Solve $\frac{3x - 2}{4} - \frac{2x + 5}{3} = \frac{1 - x}{6}$



$x = \dots$

12 Express $\frac{x}{x+2} + \frac{2x}{x-4}$ as a single fraction in its simplest form.



.....
(3)

12 (a) Write $\frac{4x^2 - 9}{6x + 9} \times \frac{2x}{x^2 - 3x}$ in the form $\frac{ax + b}{cx + d}$ where a, b, c and d are integers.



..... (3)

(b) Express $\frac{3}{x+1} + \frac{1}{x-2} - \frac{4}{x}$ as a single fraction in its simplest form.

..... (3)

13 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.



13 (a) Write $\frac{5}{x+1} + \frac{2}{3x}$ as a single fraction in its simplest form.

.....
(2)

November 2019 – Paper 1H

(Total for Question 13 is 2 marks)

14 The ratio $(y+x):(y-x)$ is equivalent to $k:1$

Show that $y = \frac{x(k+1)}{k-1}$

November 2017 – Paper 1H

(Total for Question 14 is 3 marks)

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



.....
(3)

June 2017 – Paper 3H

(Total for Question 14 is 3 marks)

14 Solve $\frac{x+2}{3x} + \frac{x-2}{2x} = 3$

$x = \dots$

Specimen 1 – Paper 1H

(Total for Question 14 is 3 marks)

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



14 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.

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



..... (1)

(b) Simplify fully $\frac{4-x^2}{x^2+3x} \div \frac{x+2}{x+3}$

..... (3)

15 Show that $\frac{4x+3}{2x} + \frac{3}{5}$ can be written in the form $\frac{ax+b}{cx}$ where a , b and c are integers.

15 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.

Specimen 1 – Paper 1H

(Total for Question 15 is 3 marks)

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

Specimen 2 – Paper 3H

(Total for Question 15 is 2 marks)

16 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.



Sample 1 – Paper 2H

(Total for Question 16 is 3 marks)

17 Given that

$$x^2 : (3x + 5) = 1 : 2$$

find the possible values of x .

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

19 Solve $\frac{1}{2x-1} + \frac{3}{x-1} = 1$

Give your answer in the form $\frac{p \pm \sqrt{q}}{2}$ where p and q are integers.

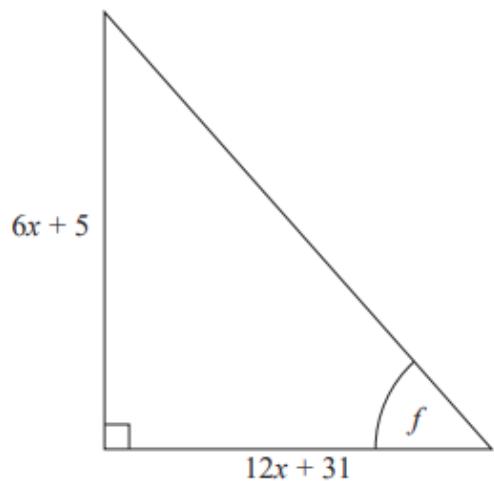
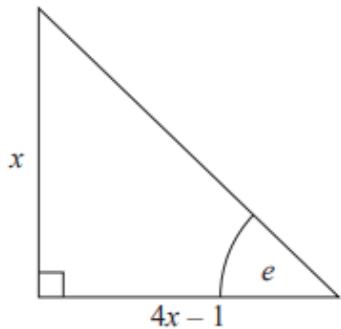
19 Show that $\frac{3x}{x+2} - \frac{2x+1}{x-2} - 1$ can be written in the form $\frac{ax+b}{x^2-4}$ where a and b are integers.



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

Give your answer in the form $a \pm b\sqrt{2}$ where a and b are fractions.

19 Here are two right-angled triangles.



Given that

$$\tan e = \tan f$$

find the value of x .

You must show all your working.

19 $2 - \frac{x+2}{x-3} - \frac{x-6}{x+3}$ 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 .

$a = \dots$

$b = \dots$

20 Write



$$\frac{14}{3x-21} + \left[(x+4) \div \frac{2x^2 - 6x - 56}{2x+3} \right] \text{ in the form } \frac{ax+b}{cx+d} \text{ where } a, b, c \text{ and } d \text{ are integers.}$$

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

Specimen 2 – Paper 1H

(Total for Question 20 is 4 marks)

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



22 Show that $\frac{6x^3}{(9x^2 - 144)} \div \frac{2x^4}{3(x - 4)}$ can be written in the form $\frac{1}{x(x + r)}$ where r is an integer.



22 $\frac{2x+3}{x-5} + \frac{x-4}{x+5} - 3$ can be written in the form $\frac{ax+b}{x^2-25}$ where a and b are integers.



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

You must show all your working.

$a = \dots$

$b = \dots$

22 Show that $\frac{7x - 14}{x^2 + 4x - 12} \div \frac{x - 6}{x^3 - 36x}$ simplifies to ax where a is an integer.



23 Given that $\frac{2x^2 + y^2}{4x^2 - y^2} = \frac{43}{11}$ where $x > 0$ and $y > 0$



find, in its simplest form, the ratio $x:y$