

Algebraic fractions

Exam questions

Higher tier

Please write clearly in block capitals.

Name

Class

Teacher

Time allowed: 70 minutes

Materials

For this booklet you need a black pen, a pencil, a ruler, a rubber and a calculator for Section B.

Instructions

- Use black ink or black ballpoint pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- **Section A** (questions 1 to 12): you must not use a calculator.
- **Section B** (questions 13 to 16): you may use a calculator.
- Do all rough work in this booklet. Cross through any work you do not want marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this booklet is 63.

Advice

- Read each question carefully.
- In all calculations, show clearly how you work out your answer.

For teacher’s use

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
TOTAL	

Section A



You must not use a calculator

Do not
write
outside
the box

- 1 Simplify fully $\frac{x^2 + 5x}{x^2 - 25}$

Answer _____

[3 marks]

- 2 Write $\frac{x}{4} + \frac{2x-1}{6}$ as a single fraction in its simplest form.

Answer _____

[2 marks]

- 3 Ben says,
“ $\frac{x^2 - 16}{x - 4}$ simplifies to $x - 4$ ”

Is Ben correct?

You must show your working.

[2 marks]

4 Simplify fully $\frac{2x^2 + 7x + 3}{4x^2 - 1}$

Answer _____

[3 marks]

5 Simplify fully $\frac{x^2 - 9}{4x} \times \frac{2x^2}{x - 3}$

Answer _____

[3 marks]

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

Answer _____

[3 marks]

- 7** Solve $\frac{2}{x+1} + \frac{3}{x+3} = 1$
You must show your working.

Do not
write
outside
the box

Answer _____

[4 marks]

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

Answer _____

[3 marks]

- 9** (a) Show that $\frac{6}{x-2} - \frac{7}{x} = 2$ can be written as $2x^2 - 3x - 14 = 0$

[3 marks]

- (b) Hence, solve $\frac{6}{x-2} - \frac{7}{x} = 2$

Answer _____

[2 marks]

10 $\frac{x+a}{x-2} - \frac{x}{x+3} \equiv \frac{bx+6}{(x-2)(x+3)}$

Work out the values of a and b .

$$a = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}}$$

[4 marks]

- 11** A school garden club spends £36 on bags of compost.
Each bag costs £ x .
The next year the price of a bag goes up by £1.50
Now £36 buys 2 fewer bags.

(a) Show that $2x^2 + 3x - 54 = 0$

[4 marks]

- (b) Work out the price of a bag before the price went up.
You must show your working.

Answer £ _____

[3 marks]

12

Show that the equation $\frac{x^2 - 9}{x^2 + x - 6} = \frac{x}{5}$ has no solutions.

Do not
write
outside
the box

[4 marks]

Section B**You may use a calculator**Do not
write
outside
the box

13 Solve $\frac{5}{x-1} = x + 2$

Give your answers to 2 decimal places.

You must show your working.

Answer _____

[4 marks]

14

Two printers print a batch of leaflets.

Printer A, working on its own, takes x minutes to print the batch.

Printer B, working on its own, takes 10 minutes longer than printer A.

Working together, the two printers take 18 minutes to print the batch.

In one minute, printer A prints $\frac{1}{x}$ of the batch.

(a) Show that $x^2 - 26x - 180 = 0$

[3 marks]

(b) Work out how long printer A takes to print the batch on its own.
Give your answer to 1 decimal place.

Answer _____ minutes

[2 marks]

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

Answer _____

[2 marks]

(b) Hence solve $\frac{x^2 + 5x + 6}{x^2 - 4} = x$

Give your answers to 2 decimal places.

Answer _____

[3 marks]

16

Leah cycles 30 km to visit a friend.

Her average speed on the way there is x km/h.

On the way home she cycles into the wind, and her average speed is 4 km/h less than on the way there.

Altogether she spends 3 hours 30 minutes cycling.

- (a) Show that $7x^2 - 148x + 240 = 0$

[3 marks]

- (b) Work out Leah's average speed on the way there.
Give your answer to 1 decimal place.
You must give a reason for any value you reject.

Answer _____ km/h

[2 marks]

- (c) How long does Leah's ride home take?
Give your answer in hours and minutes, to the nearest minute.

Answer _____

[1 mark]

END OF QUESTIONS