

Algebraic Fractions

Mark Scheme

Level	GCSE
Subject	Maths
Exam Board	Edexcel GCSE
Topic	Algebraic Fractions
Grade Level	Grade 7
Booklet	Mark Scheme

Time Allowed: 65 minutes

Score: /54

Percentage: /100

Grade Boundaries:

1. Simplify fully

$$\frac{x^2 - 3x}{x^2 - 8x + 15}$$

$$\frac{\cancel{x(x-3)}}{(\cancel{x-3})(x-5)}$$

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

(3)

(Total 3 marks)

2. (a) Simplify $\frac{5a^2}{4ab^2}$

$$\frac{5a}{b^2}$$

(2)

(b) Simplify $\frac{x-3}{x^2-9}$

$$\frac{1(\cancel{x-3})}{(x+3)(\cancel{x-3})}$$

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

(2)

(Total 4 marks)

3. Simplify fully

$$\frac{4a-20}{a^2-25}$$

$$\frac{4(\cancel{a-5})}{(a+5)(\cancel{a-5})}$$

$$\frac{4}{a+5}$$

(Total 3 marks)

4. Simplify $\frac{x^2 + 5x + 6}{x + 2}$

$$\frac{(\cancel{x+2})(x+3)}{(\cancel{x+2})}$$

$$x + 3$$

.....
(Total 2 marks)

5. Simplify $\frac{4x^2 - 9}{2x^2 - 5x + 3}$

$$\frac{(2x+3)(\cancel{2x-3})}{(\cancel{2x-3})(x-1)}$$

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

.....
(Total 3marks)

6. Write as a single fraction $\frac{4}{x(x+3)} + \frac{5}{(x+3)}$

$$\frac{4}{x(x+3)} + \frac{5x}{x(x+3)}$$

$$\frac{4+5x}{x(x+3)}$$

$$\frac{5x+4}{x(x+3)}$$

.....
(Total 2 marks)

7. Write as a single fraction in its simplest form

$$\frac{4}{x+5} + \frac{1}{x-3}$$

$$\frac{4(x-3)}{(x+5)(x-3)} + \frac{1(x+5)}{(x+5)(x-3)}$$

$$\frac{4(x-3) + 1(x+5)}{(x+5)(x-3)}$$

$$\frac{4x - 12 + x + 5}{(x+5)(x-3)}$$

$$\frac{5x - 7}{(x+5)(x-3)}$$

$$\frac{5x - 7}{(x+5)(x-3)}$$

(Total 4 marks)

8. Simplify fully

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

$$\frac{3(2x+1)}{(2x+1)(2x-1)}$$

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

(Total 2 marks)

9. Solve the equation

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

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

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

$$x(x+1) + 4(2x-3) = (2x-3)(x+1)$$

$$x^2 + x + 8x - 12 = 2x^2 + 2x - 3x - 3$$

$$0 = x^2 - 10x + 9$$

$$0 = (x-9)(x-1)$$

$$x = 9 \text{ and } x = 1$$

$$x = \underline{9 \text{ and } x = 1}$$

(Total 5 marks)

10. Simplify fully $\frac{3x+6}{x^2-4}$

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

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

(Total 3 marks)

11. Solve the equation

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

$$\frac{3(x-3)}{(x+3)(x-3)} - \frac{4(x+3)}{(x+3)(x-3)} = \frac{5x}{x^2-9}$$

$$\frac{3(x-3) - 4(x+3)}{x^2-9} = \frac{5x}{x^2-9}$$

$$3x - 9 - 4x - 12 = 5x$$

$$-x - 21 = 5x$$

$$-21 = 6x$$

$$x = \frac{-21}{6} = \frac{-7}{2}$$

$$x = -3.5$$

(Total 4 marks)

12. Solve $\frac{5(2x+1)}{3} = 4x+7$

$$5(2x+1) = 3(4x+7)$$

$$10x+5 = 12x+21$$

$$5 = 2x+21$$

$$-16 = 2x$$

$$x = -8$$

$$x = -8$$

(Total 3 marks)

13. Simplify

$$\frac{6x^2 + 7x - 3}{9x^2 - 6x + 1}$$

$$\frac{(\cancel{3x-1})(2x+3)}{(\cancel{3x-1})(3x-1)}$$

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

(3)

(Total 5 marks)

14. (a) Solve $\frac{40-x}{3} = 4 + x$

$$40 - x = 3(4 + x)$$

$$40 - x = 12 + 3x$$

$$40 = 12 + 4x$$

$$28 = 4x$$

$$x = 7$$

$$x = 7$$

(3)

(b) Simplify fully $\frac{4x^2 - 6x}{4x^2 - 9}$

$$\frac{2x(\cancel{2x-3})}{(2x+3)(\cancel{2x-3})}$$

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

(3)

(Total 6 marks)

15. (a) Solve $\frac{3}{x} + \frac{3}{2x} = 2$

$$\frac{6}{2x} + \frac{3}{2x} = 2$$

$$\frac{9}{2x} = 2$$

$$9 = 4x$$

$$x = \frac{9}{4}$$

$$x = \frac{9}{4}$$

(2)

(b) Using your answer to part (a), or otherwise,

solve $\frac{3}{(y-1)^2} + \frac{3}{2(y-1)^2} = 2$

$$x = (y-1)^2$$

$$\frac{9}{4} = (y-1)^2$$

$$\pm \sqrt{\frac{9}{4}} = y-1$$

$$\pm \frac{3}{2} = y-1$$

$$y = 1 \pm \frac{3}{2}$$

$$y = \frac{5}{2}$$

$$\text{or } y = -\frac{1}{2}$$

(3)

(Total 5 marks)