Algebraic Fractions (Equations)

SCAN ME

REVISE THIS TOPIC

1 Solve $\frac{x+9}{5} + \frac{x+2}{4} = 5$

$$\frac{4(x+9) + 5(x+2)}{20} = 5$$

$$4x + 36 + 5x + 10 = 100$$

$$9x + 46 = 100$$

$$9x = 54$$

$$x = 6$$

(Total for Question 1 is 3 marks)

2 Solve $\frac{x-1}{2} + \frac{x+4}{5} = 8$

$$\frac{5(x-1) + 2(x+4)}{10} = 8$$

$$5x - 5 + 2x + 8 = 80$$

$$7x + 3 = 80$$

$$7x = 77$$

$$x = 11$$

(Total for Question 2 is 3 marks)

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

$$\frac{4(x+5)-3(x-2)}{12} = 3$$

$$4x+20-3x+6=36$$

$$x+26=36$$

$$x=10$$

(Total for Question 3 is 3 marks)

4 Solve $\frac{x+2}{8} + \frac{5-x}{3} = 2$

$$\frac{3(x+2)+8(5-x)}{24} = 2$$

$$3x+6+40-8x=48$$

$$46-5x=48$$

$$-5x=2$$

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

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(Total for Question 4 is 3 marks)

[or $x=-0.4$]

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

$$\frac{3(x+3) + x+5}{(x+5)(x+3)} = 2$$

$$3x + 9 + x + 5 = 2(x^2 + 8x + 15)$$
$$4x + 14 = 2x^2 + 16x + 30$$
$$0 = 2x^2 + 12x + 16$$
$$0 = x^2 + 6x + 8$$
$$0 = (x+4)(x+2)$$

$x = -4$ $x = -2$

(Total for Question 5 is 4 marks)

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

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

$$2x - 4 + 6x + 9 = 2x^2 - x - 6$$
$$8x + 5 = 2x^2 - x - 6$$
$$0 = 2x^2 - 9x - 11$$
$$0 = (2x-11)(x+1)$$

$x = \frac{11}{2}$ $x = -1$

(Total for Question 6 is 4 marks)

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

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

$$3x^2+10x+3-x-1 = 4(x^2+4x+3)$$

$$3x^2+9x+2 = 4x^2+16x+12$$

$$0 = x^2+7x+10$$

$$0 = (x+5)(x+2)$$

$x = -5$ $x = -2$

(Total for Question 7 is 5 marks)

8 Solve $\frac{7}{3x+1} - \frac{2}{x-3} = 3$

$$\frac{7(x-3)-2(3x+1)}{(3x+1)(x-3)} = 3$$

$$7x-21-6x-2 = 3(3x^2-8x-3)$$

$$x-23 = 9x^2-24x-9$$

$$0 = 9x^2-25x+14$$

$$0 = (9x-7)(x-2)$$

$x = \frac{7}{9}$ $x = 2$

(Total for Question 8 is 5 marks)

9 Solve $\frac{6}{x+7} + \frac{2}{x-5} = \frac{2}{3}$

$$\frac{6(x-5)+2(x+7)}{(x+7)(x-5)} = \frac{2}{3}$$

$$6x - 30 + 2x + 14 = \frac{2}{3}(x^2 + 2x - 35)$$

$$3(8x - 16) = 2x^2 + 4x - 70$$

$$24x - 48 = 2x^2 + 4x - 70$$

$$0 = 2x^2 - 20x - 22$$

$$0 = x^2 - 10x - 11$$

$$0 = (x - 11)(x + 1)$$

$x = 11$ $x = -1$

(Total for Question 9 is 5 marks)

10 Solve $\frac{5x+2}{x+1} - \frac{x+8}{x+3} = 2$

$$\frac{(5x+2)(x+3) - (x+8)(x+1)}{(x+1)(x+3)} = 2$$

$$5x^2 + 17x + 6 - x^2 - 9x - 8 = 2(x^2 + 4x + 3)$$

$$4x^2 + 8x - 2 = 2x^2 + 8x + 6$$

$$2x^2 - 8 = 0$$

$$x^2 - 4 = 0$$

$$(x + 2)(x - 2) = 0$$

$x = -2$ $x = 2$

(Total for Question 10 is 5 marks)

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

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

$$2x - x^2 + 2x^2 - 7x + 3 = \frac{1}{4}(5x - 2 - 2x^2)$$

$$4(x^2 - 5x + 3) = 5x - 2 - 2x^2$$

$$4x^2 - 20x + 12 = 5x - 2 - 2x^2$$

$$6x^2 - 25x + 14 = 0$$

$$(3x-2)(2x-7) = 0$$

$x = \frac{2}{3}$ $x = \frac{7}{2}$

(Total for Question 11 is 5 marks)

12 Solve $\frac{1}{x-2} + \frac{x}{x+1} = -2$ giving your answer in the form $\frac{a \pm \sqrt{b}}{c}$

where a, b and c are integers.

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

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

$$x^2 - x + 1 = -2x^2 + 2x + 4$$

$$3x^2 - 3x - 3 = 0$$

$$a = 3 \quad b = -3 \quad c = -3$$

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 3 \times -3}}{6}$$

$$x = \frac{3 \pm \sqrt{45}}{6}$$

$$\sqrt{45} = \sqrt{9} \times \sqrt{5} = 3\sqrt{5}$$

$$x = \frac{3 \pm 3\sqrt{5}}{6}$$

$$x = \frac{1 \pm \sqrt{5}}{2}$$

(Total for Question 12 is 6 marks)