

ALGEBRAIC FRACTIONS

ANSWER SHEET

Q1

$$\begin{aligned} & \frac{x^2 + 6x}{x^2 + 8x + 12} \\ & \frac{x(x+6)}{x^2 + 6x + 2x + 12} \\ = & \frac{x(x+6)}{x(x+6) + 2(x+6)} \\ = & \frac{x(\cancel{x+6})}{(x+2)(\cancel{x+6})} \\ = & \frac{x}{x+2} \end{aligned}$$

Q2

$$\begin{aligned} & \frac{x^2 + 7x + 12}{x^2 + 9x + 20} \\ = & \frac{x^2 + 4x + 3x + 12}{x^2 + 5x + 4x + 20} \\ = & \frac{x(x+4) + 3(x+4)}{x(x+5) + 4(x+5)} \\ = & \frac{(x+3)(\cancel{x+4})}{(x+5)(\cancel{x+4})} \\ = & \frac{x+3}{x+5} \end{aligned}$$

Q3

$$\begin{aligned} & \frac{4n^2 + 16n}{n^2 - 16} \\ &= \frac{4n(n \cancel{+ 4})}{(n-4)(n \cancel{+ 4})} \\ &= \frac{4n}{n-4} \end{aligned}$$

Q4

$$\begin{aligned} & \frac{n+3}{n^2-9} \\ &= \frac{1(n \cancel{+ 3})}{(n \cancel{+ 3})(n-3)} \\ &= \frac{1}{n-3} \end{aligned}$$

Q5

$$\begin{aligned}
 & \frac{5n^2 + 12n + 4}{n^2 + 4n + 4} \\
 &= \frac{5n^2 + 10n + 2n + 4}{n^2 + 2n + 2n + 4} \\
 &= \frac{5n(n+2) + 2(n+2)}{n(n+2) + 2(n+2)} \\
 &= \frac{(5n+2)(\cancel{n+2})}{(n+2)(\cancel{n+2})} \\
 &= \frac{5n+2}{n+2} \quad \Rightarrow \quad \frac{an+b}{n+c}
 \end{aligned}$$

Q6

$$\begin{aligned}
 & \frac{n^2 + 10n + 24}{2n^2 + 16n + 32} \\
 &= \frac{n^2 + 6n + 4n + 24}{2n^2 + 8n + 8n + 32} \\
 &= \frac{n(n+6) + 4(n+6)}{2n(n+4) + 8(n+4)} \\
 &= \frac{(\cancel{n+4})(n+6)}{(2n+8)(\cancel{n+4})} \\
 &= \frac{n+6}{2n+8} \quad \Rightarrow \quad \frac{n+a}{bn+c}
 \end{aligned}$$

Q7

$$\frac{3n+6}{n-3} \div \frac{2n^2+9n+10}{n^2-3n}$$

$$\frac{3n+6}{(n-3)} \times \frac{n^2-3n}{2n^2+9n+10}$$

$$\frac{3(\cancel{n/2}) \cancel{n}(\cancel{n/3})}{(\cancel{n/3})(2n+5)(\cancel{n/2})}$$

$$\frac{3n}{2n+5}$$

Q8

$$\frac{2n-2}{n+1} \div \frac{n^2-4n+3}{4n^2+19n+15}$$

$$= \frac{2n-2}{n+1} \times \frac{4n^2+19n+15}{n^2-4n+3}$$

$$= \frac{2(\cancel{n/1}) (4n+15)(\cancel{n/1})}{(\cancel{n/1}) (n-3)(\cancel{n/1})}$$

$$= \frac{2(4n+15)}{n-3}$$

Q9

$$\frac{16}{n+3} + \frac{6}{n+8} = 2$$

$$\frac{16(n+8) + 6(n+3)}{(n+3)(n+8)} = 2$$

$$16n + 128 + 6n + 18 = 2(n^2 + 8n + 3n + 24)$$

$$22n + 146 = 2(n^2 + 11n + 24)$$

$$2\cancel{n} + 146 = 2n^2 + 2\cancel{2}n + 48$$

$$2n^2 - 98 = 0$$

$$n^2 - 49 = 0$$

$$(n+7)(n-7) = 0$$

$$n = 7 \quad \text{or} \quad n = -7$$

Q10

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

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

$$4n + 4 + 9n - 6 = 3n^2 + 3n - 2n - 2$$

$$13n - \cancel{2} = 3n^2 + n - \cancel{2}$$

$$3n^2 + n - 13n = 0$$

$$3n^2 - 12n = 0$$

$$3n(n-4) = 0$$

$$n = 0$$

$$n = 4$$

Q11

$$\frac{4}{5-x} + \frac{6}{x+7} = 2$$

$$\frac{4(x+7) + 6(5-x)}{(5-x)(x+7)} = 2$$

$$4x + 28 + 30 - 6x = 2[5x + 35 - x^2 - 7x]$$

$$-2x + 58 = 2[-x^2 - 2x + 35]$$

$$-2x + 58 = -2x^2 - 4x + 70$$

$$2x^2 + 2x - 12 = 0$$

$$2(x^2 + x - 6) = 0$$

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

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

$$x = -3 \quad \text{and} \quad x = 2$$

Q12

$$\frac{14}{x+1} - \frac{8}{3x-2} = 2$$

$$\frac{14(3x-2) - 8(x+1)}{(x+1)(3x-2)} = 2$$

$$42x - 28 - 8x - 8 = 2[3x^2 - 2x + 3x - 2]$$

$$34x - 36 = 2[3x^2 + x - 2]$$

$$34x - 36 = 6x^2 + 2x - 4$$

$$6x^2 - 32x + 32 = 0$$

$$2(3x^2 - 16x + 16) = 0$$

$$3x^2 - 16x + 16 = 0$$

$$(3x-4)(x-4) = 0$$

$$x = \frac{4}{3} \quad x = 4$$

Q13

$$2n+1 : n+2 = n+4 : 3n-4$$

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

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

$$6n^2 - 8n + 3n - 4 = n^2 + 4n + 2n + 8$$

$$6n^2 - 5n - 4 = n^2 + 6n + 8$$

$$5n^2 - 11n - 12 = 0$$

$$5n^2 - 15n + 4n - 12 = 0$$

$$5n(n-3) + 4(n-3) = 0$$

$$(5n+4)(n-3) = 0$$

$$n = -\frac{4}{5}, \quad n = 3$$

Q14

$$2n-2 : 2n-3 = 2n+4 : 3n-2$$

$$\frac{2n-2}{2n-3} = \frac{2n+4}{3n-2}$$

$$(2n-2)(3n-2) = (2n+4)(2n-3)$$

$$6n^2 - 4n - 6n + 4 = 4n^2 - 6n + 8n - 12$$

$$6n^2 - 10n + 4 = 4n^2 + 2n - 12$$

$$2n^2 - 12n + 16 = 0$$

$$2(n^2 - 6n + 8) = 0$$

$$n^2 - 6n + 8 = 0$$

$$(n-2)(n-4) = 0$$

$$n = 2, \quad n = 4$$

Q15

$$2x + 18 : 5x - 1 = 2x + 14 : 2x - 3$$

$$\frac{2x+18}{5x-1} = \frac{2x+14}{2x-3}$$

$$(2x+18)(2x-3) = (2x+14)(5x-1)$$

$$4x^2 - 6x + 36x - 54 = 10x^2 - 2x + 70x - 14$$

$$4x^2 + 30x - 54 = 10x^2 + 68x - 14$$

$$6x^2 + 38x + 40 = 0$$

$$2(3x^2 + 19x + 20) = 0$$

$$3x^2 + 19x + 20 = 0$$

$$3x^2 + 15x + 4x + 20 = 0$$

$$3x(x+5) + 4(x+5) = 0$$

$$(3x+4)(x+5) = 0$$

$$x = -\frac{4}{3}, \quad x = -5$$

Q16

$$5-3x : 18-2x = 3x+7 : 8-2x$$

$$\frac{5-3x}{18-2x} = \frac{3x+7}{8-2x}$$

$$(5-3x)(8-2x) = (3x+7)(18-2x)$$

$$40 - 10x - 24x + 6x^2 = 54x - 6x^2 + 126 - 14x$$

$$40 - 34x + 6x^2 = 54x - 6x^2 + 126 - 14x$$

$$40 - 34x + 6x^2 = 40x - 6x^2 + 126$$

$$12x^2 - 74x - 86 = 0$$

$$2(6x^2 - 37x - 43) = 0$$

$$6x^2 - 37x - 43 = 0$$

$$(6x-43)(x+1) = 0$$

$$x = \frac{43}{6}, \quad x = -1$$