Name: SOLUTIONS

GCSE (1 - 9) Algebraic Fractions	Solutions:

These questions are compiled from *released* Pearson Edexcel GCSE maths exam papers
They contain exam questions from up until the ***November 2021*** exam series
More recent exam papers do exist but are withheld for mock exams
As new exam papers are released these worksheets will gradually be updated
The ***most current*** version of these worksheets will always be available at: kennethstafford.co.uk
These worksheets were made using examq.co.uk

Question	Paper where the question appeared
1	Edexcel, GCSE, Autumn 2021, Paper 1H, Q15
2	Edexcel, GCSE, Autumn 2021, Paper 3H, Q22
3	Edexcel, GCSE, Summer 2020, Paper 2H, Q10
4	Edexcel, GCSE, Summer 2020, Paper 3H, Q12
5	Edexcel, GCSE, Summer 2019, Paper 1H, Q13
6	Edexcel, GCSE, Summer 2019, Paper 3H, Q10
7	Edexcel, GCSE, Autumn 2019, Paper 3H, Q22
8	Edexcel, GCSE, Summer 2019, Paper 2H, Q13
9	Edexcel, GCSE, Autumn 2018, Paper 1H, Q10
10	Edexcel, GCSE, Autumn 2018, Paper 2H, Q12
11	Edexcel, GCSE, Summer 2018, Paper 1H, Q17
12	Edexcel, GCSE, Summer 2017, Paper 2H, Q11
13	Edexcel, GCSE, Summer 2017, Paper 2H, Q19
14	Edexcel, GCSE, Summer 2017, Paper 3H, Q14

1

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.

$5 \times \frac{4x+3}{2x} + \frac{3}{5} \times \frac{2x}{2x} = \frac{20x+15}{10x} + \frac{6x}{10x}$

$5 \times$

$= \frac{26x+15}{10x}$

(Total for Question 15 is 3 marks)

[Edexcel, GCSE, Autumn 2021, Paper 1H, Q15]

2

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.

$$\frac{6x^3}{(9x^2-144)} \div \frac{2x^4}{3(x-4)} = \frac{6x^3}{9x^2-144} \times \frac{3(x-4)}{2x^4}$$

$$\frac{6x^3(3x-12)}{(3x-12)(3x+12)2x^4}$$

$$= \frac{6x^3}{2x^4(3x+12)}$$

$$= \frac{3}{x(3x+12)}$$

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

(Total for Question 22 is 3 marks)

[Edexcel, GCSE, Autumn 2021, Paper 3H, Q22]

3

(a) Simplify $\left(\frac{1}{m^2}\right)^0$

1

(1)

(b) Simplify $\frac{8(x-4)}{(x-4)^2}$

$\frac{8(x-4)}{(x-4)(x-4)}$

$\frac{8}{x-4}$

(1)

(c) Simplify $(3n^4w^2)^3$

$(3n^4w^2)^3 = 3^3(n^4)^3(w^2)^3$

$= 27n^{12}w^6$

$27n^{12}w^6$

(2)

(Total for Question 10 is 4 marks)

[Edexcel, GCSE, Summer 2020, Paper 2H, Q10]

4

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

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

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

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

(3)

[Edexcel, GCSE, Summer 2020, Paper 3H, Q12]

5

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

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

$$= \frac{15x+2x+2}{3x(x+1)}$$

$$= \frac{17x+2}{3x(x+1)}$$

(2)

[Edexcel, GCSE, Summer 2019, Paper 1H, Q13]

6

(a) Solve $\frac{9+x}{7} = 11 - x$

$\frac{9+x}{7} = 11 - x$

$9 + x = 7(11 - x)$

$9 + x = 77 - 7x$

$8x = 68$

$x = \frac{68}{8} = 8.5$

$x =$ 8.5

(3)

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

$= \frac{4(y+3)(y+3)(y+3)}{(y+3)(y+3)}$

$4(y+3)$

(1)

(Total for Question 10 is 4 marks)

[Edexcel, GCSE, Summer 2019, Paper 3H, Q10]

7

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

$$\frac{7x-14}{x^2+4x-12} \div \frac{x-6}{x^3-36x} = \frac{7(x-2)}{(x+6)(x-2)} \times \frac{x(x+6)(x-6)}{(x-6)}$$

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

$$= 7x$$

(Total for Question 22 is 4 marks)

[Edexcel, GCSE, Autumn 2019, Paper 3H, Q22]

8

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.

$$6 + \left[\frac{(x+5)(x-1)}{x^2+3x-10} \right]$$

$$6 + \left[\frac{(x+5)\ (x-1)}{(x+5)(x-2)} \right]$$

$$6 + \frac{x-1}{x-2}$$

$$\frac{6(x-2)}{1(x-2)} + \frac{x-1}{x-2}$$

$$\frac{6x-12}{x-2} + \frac{x-1}{x-2}$$

$$= \frac{7x-13}{x-2}$$

(Total for Question 13 is 4 marks)

[Edexcel, GCSE, Summer 2019, Paper 2H, Q13]

9

(a) Simplify $\dfrac{x-1}{5(x-1)^2}$

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

$$\frac{1}{5(x-1)}$$

(1)

(b) Factorise fully $50 - 2y^2$

$$50-2y^2 = 2(25-y)^2 = 2(5-y)(5+y)$$

(2)

(Total for Question 10 is 3 marks)

[Edexcel, GCSE, Autumn 2018, Paper 1H, Q10]

10

(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.

$$\frac{4x^2-9}{6x+9} \times \frac{2x}{x^2-3x} = \frac{(2x+3)(2x-3)2x}{3(2x+3)x(x-3)}$$

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

$$= \frac{4x-6}{3x-9}$$

.....

(3)

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

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

.....

(3)

$$= \frac{[3x^2-6x]+[x^2+x]-[4x^2-4x-8]}{x(x+1)(x-2)}$$

(Total for Question 12 is 6 marks)

[Edexcel, GCSE, Autumn 2018, Paper 2H, Q12]

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

11

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

$$\frac{3x^2 - 8x - 3}{2x^2 - 6x} = \frac{(3x + 1)(x - 3)}{2x(x - 3)}$$

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

.....

(Total for Question 17 is 3 marks)

[Edexcel, GCSE, Summer 2018, Paper 1H, Q17]

12

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

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

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

$\frac{[9x-6]-[8x+20]}{12} = \frac{2-2x}{12}$

$\frac{x-26}{12} = \frac{2-2x}{12}$

$x-26 = 2-2x$

$3x-26 = 2$

$3x = 28$

$x = \frac{28}{3}$

$x = 9\frac{1}{3}$

$x =$ $9\frac{1}{3}$

(Total for Question 11 is 4 marks)

[Edexcel, GCSE, Summer 2017, Paper 2H, Q11]

13

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

$2 - \frac{x+2}{x-3} = \frac{2(x-3)}{x-3} - \frac{x+2}{x-3} = \frac{2x-6-x-2}{x-3} = \frac{x-8}{x-3}$

$\frac{x-8}{x-3} - \frac{x-6}{x+3} = \frac{(x+3)(x-8)-(x-3)(x-6)}{(x-3)(x+3)}$

$\frac{[x^2-5x-24]-[x^2-9x+18]}{x^2-9}$

$\frac{4x-42}{x-9}$

$a =$ 4

$b =$ -42

(Total for Question 19 is 4 marks)

[Edexcel, GCSE, Summer 2017, Paper 2H, Q19]

14

(a) Simplify $\dfrac{x^2 - 16}{2x^2 - 5x - 12}$

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

$= \dfrac{x+4}{2x+3}$

$\dfrac{x+4}{2x+3}$

(3)

(b) Make v the subject of the formula $w = \dfrac{15(t - 2v)}{v}$

$w = \dfrac{15(t-2v)}{v}$

$vw = 15t - 30v$

$vw + 30v = 15t$

$v(w + 30) = 15t$

$v = \dfrac{15t}{w+30}$

$V = \dfrac{15t}{w+30}$

(3)

(Total for Question 14 is 6 marks)

[Edexcel, GCSE, Summer 2017, Paper 3H, Q14]