2.2 Algebraic Fractions: Adding, Subtracting and Solving Equations: 1-hour Pack

AQA 8365 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve $7/(2x + 1) = 2$.

(Total for Question 1 is 3 marks)

2 Solve $4/(x + 1) = 3$

(Total for Question 2 is 1 mark)

3 Simplify each fraction fully.

(a) Simplify $(3x - 2)/6 - (x - 1)/4$ **(1)**

(b) Simplify $(2x + 3)/5 + (x - 2)/10$ **(1)**

(Total for Question 3 is 2 marks)

4 Solve $8/(2x - 1) = 2$

(Total for Question 4 is 1 mark)

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5 Write $3/(x + 2) + 4/(x - 1)$ as a single fraction in its simplest form.

(Total for Question 5 is 1 mark)

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6 Write $6/(x - 3) - 2/(x + 4)$ as a single fraction in its simplest form.

(Total for Question 6 is 1 mark)

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7 Write $4/(x + 5) - 1/(x^2 + 5x)$ as a single fraction in its simplest form.

(Total for Question 7 is 4 marks)

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8 Solve $(x + 4)/7 - (x + 7)/5 = -1$.

(Total for Question 8 is 3 marks)

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9 Solve $(x - 1)/(x - 4) = (x + 1)/(x - 3)$.

(Total for Question 9 is 4 marks)

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10 Write $(2x - 2)/7 + (2x + 12)/3$ as a single fraction in its simplest form.

(Total for Question 10 is 3 marks)

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11 Solve $(x + 6)/5 - (x - 3)/3 = 13/15$.

(Total for Question 11 is 3 marks)

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12 Write $4/(x + 1) + 6/(x + 3)$ as a single fraction, simplifying the numerator.

(Total for Question 12 is 3 marks)

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13 Write $(2x + 6)/5 - (2x - 10)/8$ as a single fraction in its simplest form.

(Total for Question 13 is 3 marks)

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14 Solve $1/(x + 1) + 1/(x + 7) = 1/4$.

(Total for Question 14 is 5 marks)

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15 Solve $(x + 8)/9 - (x - 4)/6 = 2$.

(Total for Question 15 is 3 marks)

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16 Write $(3x - 6)/3 + (x - 6)/5$ as a single fraction in its simplest form.

(Total for Question 16 is 3 marks)

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17 Write $2/(x - 5) + 2/(x + 1)$ as a single fraction, simplifying the numerator.

(Total for Question 17 is 3 marks)

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18 A cyclist rides 40 km at x km/h and then 40 km at (x + 6) km/h. The total time for the two stages is 46/13 hours. Form an equation in x and show that it can be written as a quadratic. Hence find the value of x, given that $x > 0$.

(Total for Question 18 is 4 marks)

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19 Show that $4/(x - 3) - 1/(x + 2) = (3x + 11)/(x^2 - x - 6)$, stating any value(s) of x for which the expression is not defined.

(Total for Question 19 is 3 marks)

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Mark scheme · 2.2 Algebraic Fractions: Adding, Subtracting and Solving Equations: 1-hour Pack

Question 1

multiply both sides by (2x + 1): 7 = 2(2x + 1) **M1**

expand and rearrange: 4x = 5 **M1**

x = 5/4 oe cao, e.g. x = 1.25 **A1**

Answer: x = 5/4

Question 2

x = 1/3 oe cao **B1**

Answer: x = 1/3

Question 3

(a) (3x - 1)/12 cao **B1**

(a) Answer: (3x - 1)/12

(b) (5x + 4)/10 cao **B1**

(b) Answer: (5x + 4)/10

Question 4

x = 5/2 oe cao, e.g. x = 2.5 **B1**

Answer: x = 5/2

Question 5

$(7x+5)/(x^2+x-2)$ oe cao **B1**

Answer: $(7x + 5)/(x^2 + x - 2)$

Question 6

$(4x+30)/(x^2+x-12)$ oe cao **B1**

Answer: $(4x + 30)/(x^2 + x - 12)$

Question 7

factorise $x^2 + 5x = x(x + 5)$ **M1**

rewrite first fraction with denominator x(x+5), e.g. 4x/[x(x+5)] **M1**

combine numerators: 4x - 1 **M1**

$(4x - 1)/(x^2 + 5x)$ oe cao **A1**

Answer: $(4x - 1)/(x^2 + 5x)$

Question 8

multiplies through by 35 or combines fractions **M1**

5(x +4) - 7(x +7) = -35 **M1**

x = 3 cao **A1**

Answer: x = 3

Question 9

cross-multiplies **M1**

expands both sides; x^2 terms cancel **M1**

collects x terms **M1**

x = 7 cao **A1**

Answer: x = 7

Question 10

common denominator 21 **M1**

numerators scaled and combined **M1**

(20x + 78)/21 oe cao **A1**

Answer: (20x + 78)/21

Question 11

multiplies through by 15 or combines fractions **M1**

3(x +6) - 5(x -3) = 13 **M1**

x = 10 cao **A1**

Answer: x = 10

Question 12

common denominator (x + p)(x + q) used **M1**

numerator expanded with at most one error **M1**

(10x + 18)/((x + 1)(x + 3)) oe cao **A1**

Answer: (10x + 18)/((x + 1)(x + 3))

Question 13

common denominator 40 **M1**

numerators scaled and combined **M1**

(3x + 49)/20 oe cao **A1**

Answer: (3x + 49)/20

Question 14

combines the left-hand side into a single fraction **M1**

cross-multiplies **M1**

$x^2 - 25 = 0$ oe **A1**

factorises or uses the formula **M1**

x = -5 or x = 5 cao **A1**

Answer: x = -5 or x = 5

Question 15

multiplies through by 54 or combines fractions **M1**

6(x +8) - 9(x -4) = 108 **M1**

x = -8 cao **A1**

Answer: x = -8

Question 16

common denominator 15 **M1**

numerators scaled and combined **M1**

(6x - 16)/5 oe cao **A1**

Answer: (6x - 16)/5

Question 17

common denominator (x + p)(x + q) used **M1**

numerator expanded with at most one error **M1**

(4x - 8)/((x - 5)(x + 1)) oe cao **A1**

Answer: (4x - 8)/((x - 5)(x + 1))

Question 18

40/x + 40/(x + 6) = 46/13 **M1**

multiplies through to remove denominators **M1**

correct quadratic obtained **A1**

x = 20 cao **A1**

Answer: x = 20

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Question 19

common denominator $(x-3)(x+2) = x^2 - x - 6$ used **M1**

numerator $4(x+2) - (x-3)$ expanded correctly **M1**

$(3x + 11)/(x^2 - x - 6)$ cso, answer printed, with x not equal to 3 or -2 **A1**

Answer: $(3x + 11)/(x^2 - x - 6)$ (shown); x not equal to 3 or -2

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