2.2 Algebraic Fractions: Adding, Subtracting and Solving Equations: 30-minute Pack

AQA 8365 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Simplify $2x/3 - x/6$

(Total for Question 1 is 1 mark)

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2 Solve $5/(x + 2) = 1$

(Total for Question 2 is 1 mark)

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

(Total for Question 3 is 3 marks)

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4 Show that $3/(x - 2) - 1/(x + 1) = (2x + 5)/(x^2 - x - 2)$, stating any value(s) of x for which the expression is not defined.

(Total for Question 4 is 3 marks)

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5 Solve $6/(x + 1) = x - 4$, giving all solutions.

(Total for Question 5 is 4 marks)

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6 Write $1/(x + 3) + 2/(x + 2)$ as a single fraction, simplifying the numerator.

(Total for Question 6 is 3 marks)

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7 A cyclist rides 45 km at x km/h and then 45 km at $(x + 2)$ km/h. The total time for the two stages is 80/7 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 7 is 4 marks)

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8 Simplify $(x^2 + 5x + 6)/(x^2 - 4)$ fully, stating any value(s) of x for which it is undefined.

(Total for Question 8 is 3 marks)

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9 Priya cycles 24 km from Leeds to Harrogate at an average speed of x km/h. Due to a strong headwind on the return journey, her average speed falls to (x - 2) km/h, and the return journey takes 1 hour longer than the outward journey.

(a) Show that $x^2 - 2x - 48 = 0$. **(3)**

(b) Solve the equation to find the value of x, given that x is greater than 2. **(3)**

(Total for Question 9 is 6 marks)

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Mark scheme · 2.2 Algebraic Fractions: Adding, Subtracting and Solving Equations: 30-minute Pack

Question 1

x/2 cao **B1**

Answer: x/2

Question 2

x = 3 cao **B1**

Answer: x = 3

Question 3

common denominator (x+4)(x-2) used **M1**

numerator 2(x-2) + 5(x+4) expanded correctly **M1**

$(7x + 16)/(x^2 + 2x - 8)$ oe cao, e.g. (7x+16)/((x+4)(x-2)) **A1**

Answer: $(7x + 16)/(x^2 + 2x - 8)$

Question 4

common denominator $(x-2)(x+1) = x^2 - x - 2$ used **M1**

numerator 3(x+1) - (x-2) expanded correctly **M1**

$(2x + 5)/(x^2 - x - 2)$ cso, answer printed, with x not equal to 2 or -1 **A1**

Answer: $(2x + 5)/(x^2 - x - 2)$ (shown); x not equal to 2 or -1

Question 5

multiply both sides by (x + 1): 6 = (x - 4)(x + 1) **M1**

expand and rearrange to $x^2 - 3x - 10 = 0$ **M1**

factorise (x - 5)(x + 2) = 0 **M1**

x = 5 and x = -2 **A1**

Answer: x = 5 or x = -2

Question 6

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

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

(3x + 8)/((x + 3)(x + 2)) oe cao **A1**

Answer: (3x + 8)/((x + 3)(x + 2))

Question 7

45/x + 45/(x + 2) = 80/7 **M1**

multiplies through to remove denominators **M1**

correct quadratic obtained **A1**

x = 7 cao **A1**

Answer: x = 7

Question 8

factorise numerator: (x + 2)(x + 3) **M1**

factorise denominator: (x - 2)(x + 2) **M1**

(x + 3)/(x - 2) oe cao, with x not equal to 2 or -2 **A1**

Answer: (x + 3)/(x - 2), x not equal to 2 or -2

Question 9

(a) form time expressions 24/x (outward) and 24/(x-2) (return) **M1**

(a) set up equation 24/(x-2) - 24/x = 1 and multiply through by x(x-2) **M1**

(a) $x^2 - 2x - 48 = 0$ cso, answer printed **A1**

(a) Answer: $x^2 - 2x - 48 = 0$ (shown)

(b) factorise (x - 8)(x + 6) = 0 **M1**

(b) x = 8 and x = -6 found **A1**

(b) reject x = -6 (speed must be positive/x > 2); x = 8 km/h cao, with units **A1**

(b) Answer: x = 8 km/h

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