HIGHER

7.6 Algebraic Fractions: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Algebraic Fractions: Fluency and Exam Drill

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This worksheet opens with short fluency questions on cancelling common factors, adding, subtracting, multiplying and dividing algebraic fractions, before moving into exam-style questions that combine these skills with solving fractional equations, showing given identities and a real-life journey-time problem. It finishes with two grade-9 items: a compound fraction and a solve-and-reject question that tests whether a solution is actually valid once excluded values are considered.

1 Simplify fully $(5x + 20)/(x + 4)$

(Total for Question 1 is 2 marks)

2 Solve $x/4 + x/6 = 10$

(Total for Question 2 is 3 marks)

3 Solve $(x + 3)/4 + (x - 2)/6 = 5/2$

(Total for Question 3 is 3 marks)

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

(Total for Question 4 is 3 marks)

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5 Write $-3/(x + 6) - 3/(x + 1)$ as a single fraction in the form $(ax + b)/((x + p)(x + q))$.

(Total for Question 5 is 3 marks)

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6 Simplify $(x^2 + 2x - 15)/(x^2 - x - 30)$

(Total for Question 6 is 3 marks)

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7 Simplify $(x^2 - 4x - 12)/(x^2 + 8x + 12)$

(Total for Question 7 is 3 marks)

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8 Solve $5/(x + 1) = 3/(x - 5)$

(Total for Question 8 is 3 marks)

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9 Simplify fully $(x^2 - 4x - 5)/(x^2 + 2x + 1)$

(Total for Question 9 is 3 marks)

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10 Write $-3/(x + 6) - 3/(x - 5)$ as a single fraction in the form $(ax + b)/((x + p)(x + q))$.

(Total for Question 10 is 3 marks)

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

(Total for Question 11 is 3 marks)

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12 Show that $3/(x - 1) + 4/(x + 2) = (7x + 2)/[(x - 1)(x + 2)]$, stating any value(s) of x for which the expression is not defined.

(Total for Question 12 is 4 marks)

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13 Simplify fully $[(x^2 - 4)/(x + 3)] * [(2x + 6)/(x^2 - 5x + 6)]$

(Total for Question 13 is 3 marks)

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14 Solve $3/(x - 3) = 1 + 18/(x^2 - 9)$, stating clearly why one of your solutions must be rejected.

(Total for Question 14 is 4 marks)

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Mark scheme · 7.6 Algebraic Fractions: Test Pack

Question 1

factorises numerator: 5(x + 4)	M1
5 cao	A1

Answer: 5

Question 2

multiplies every term by the common denominator 12: 3x + 2x = 120	M1
collects to 5x = 120	M1
x = 24 cao	A1

Answer: x = 24

Question 3

multiplies every term by the common denominator 12: 3(x + 3) + 2(x - 2) = 30	M1
expands and collects: 5x + 5 = 30	M1
x = 5 cao	A1

Answer: x = 5

Question 4

common denominator 15 used	M1
numerator 5(x + 1) - 3(x - 2) formed and expanded	M1
(2x + 11)/15 oe cao	A1

Answer: (2x + 11)/15

Question 5

common denominator (x + p)(x + q)	M1
correct numerator over common denominator	M1
(-6x - 21)/((x + 6)(x + 1))	A1

Answer: (-6x - 21)/((x + 6)(x + 1))

Question 6

numerator factorised (x + 5)(x - 3)	M1
denominator factorised	M1
(x - 3)/(x - 6)	A1

Answer: (x - 3)/(x - 6)

Question 7

numerator factorised (x + 2)(x - 6)	M1
denominator factorised	M1
(x - 6)/(x + 6)	A1

Answer: (x - 6)/(x + 6)

Question 8

cross multiplies: 5(x - 5) = 3(x + 1)	M1
expands and collects x terms	M1
x = 14	A1

Answer: x = 14

Question 9

numerator factorised	M1
denominator factorised	M1
(x - 5)/(x + 1)	A1

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

Question 10

common denominator (x + p)(x + q)	M1
correct numerator over common denominator	M1
(-6x - 3)/((x + 6)(x - 5))	A1

Answer: (-6x - 3)/((x + 6)(x - 5))

Question 11

common denominator (x - 2)(x + 3) used	M1
numerator 5(x + 3) - 2(x - 2) formed and expanded	M1
$(3x + 19)/(x^2 + x - 6)$ oe cao	A1

Answer: $(3x + 19)/(x^2 + x - 6)$

Question 12

common denominator (x - 1)(x + 2) used	M1
numerator 3(x + 2) + 4(x - 1) expanded correctly	M1
(7x + 2)/[(x - 1)(x + 2)] cso, answer printed	A1
states x not equal to 1 and x not equal to -2	B1

Answer: (7x + 2)/[(x - 1)(x + 2)] (shown); x not equal to 1 or -2

Question 13

factorises $x^2 - 4 = (x - 2)(x + 2)$, $2x + 6 = 2(x + 3)$ and $x^2 - 5x + 6 = (x - 2)(x - 3)$	M1
cancels common factors (x + 3) and (x - 2)	M1
2(x + 2)/(x - 3) oe cao	A1

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

Question 14

multiplies every term by $(x^2 - 9) = (x - 3)(x + 3)$ to clear denominators	M1
expands and rearranges to $x^2 - 3x = 0$	M1
factorises x(x - 3) = 0	M1
x = 0 only cao, with x = 3 correctly rejected because it makes (x - 3) and $(x^2 - 9)$ equal to zero, so the original equation is not defined there	A1

Answer: x = 0 (x = 3 is rejected as the equation is undefined there)

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