

A/A* - Algebraic Fractions



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Question	Maximum Mark	Mark Awarded
1	3	
2	7	
3	7	
4	7	
5	11	
Total Mark		



1.

Express $\frac{3x}{3x+2} - \frac{2x}{2x+7}$ as a single fraction in its simplest form.

[3]

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2.

(a) Simplify $(3x + 7y)(2x - 5y) + xy$.

[3]

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(b) Express $\frac{7x}{2x+3} + \frac{2}{3x-2}$ as a single fraction in its simplest form.

[4]

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4.

(a) Express $\frac{4}{2x-3} + \frac{8}{x+6}$ as a single fraction in its simplest form. [3]

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(b) Simplify $\frac{9x^2 - 25}{6x + 10}$. [4]

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Marking Scheme

1.

$3x(2x + 7) - 2x(3x + 2)$ <p>as a <u>numerator</u> within a single fraction</p> $(3x + 2)(2x + 7) \text{ as a } \underline{\text{denominator.}}$ $17x / (3x + 2)(2x + 7)$	M1	Accept intention of brackets when working not shown e.g. $6x^2 + 21x - 6x^2 + 4x$. C.A.O. If M1M1A1 awarded penalise further <u>incorrect work</u> -1. If no marks awarded then SC1 for sight of $17x$.
	M1	
	A1	

2.

$14(a) \ 6x^2 + 14xy - 15xy - 35y^2 (+ xy)$ $= 6x^2 - 35y^2$ <p>(b) $7x(3x - 2) + 2(2x + 3)$ as a numerator $(2x + 3)(3x - 2)$ as a denominator</p> $21x^2 - 14x + 4x + 6$ $\frac{21x^2 - 10x + 6}{(2x + 3)(3x - 2)}$	B2	B1 for any 2 of the expansion terms correct FT from B1. Mark final answer. Allow $6x^2 + -35y^2$ Mark final answer. If the denominator is expanded it must be correct. FT from 1 error in numerator expansion, provided it is a trinomial
	B1	
	M1	
	M1	
	A1	
	A1	
	7	

3.

Linear GCSE Mathematics Higher Tier November 2015 Paper 1		FINAL MARK SCHEME Comments
18. $8(3x+1) + (5x+9)(2x-1) = 4(2x-1)(3x+1)$ or $\frac{8(3x+1) + (5x+9)(2x-1)}{(2x-1)(3x+1)} = 4$	M1	For expansion of LHS or numerator brackets, ignore '=' ...' or denominator. Independent of first M mark Independent of first M mark CAO A1 for any two of $14x^2$, $-41x$ and -3 correct in a similar equation '='0', or terms $-14x^2$, $41x$ and 3 in an equivalent equation (e.g. $14x^2 = 41x + 3$) A1 for the expression $14x^2 - 41x - 3$, unless '=' reappears later or shows correct solutions, then award A2
$24x + 8 + 10x^2 + 18x - 5x - 9$ or equivalent	M1	
$4(6x^2 - 3x + 2x - 1)$ or $24x^2 - 12x + 8x - 4$ or equivalent	M1	
$14x^2 - 41x - 3 = 0$ or equivalent	A2	
$(14x + 1)(x - 3) (=0)$	A1	
$x = -1/14$ and $x = 3$	A1	FT correct factorisation of quadratic of equivalent level of difficulty provided M3 previously awarded Allow use of quadratic formula, for this A1, need to see their substitution correct with $b^2 - 4ac$ correctly simplified. <i>No marks for trial and improvement method</i>
	7	

4.

<p>(a) $4(x+6) + 8(2x-3)$ as a <u>numerator</u> $(2x-3)(x+6)$ as a <u>denominator</u> $20x / (2x-3)(x+6)$</p>	<p>M1 M1 A1</p>	<p>CAO, mark final answer If $(2x-3)(x+6)$ expanded, must be correct (Note: $(2x-3)(x+6) = 2x^2 + 9x - 18$) <i>If no marks then award SC1 for sight of</i> $4(x+6) + 8(2x-3) = 20x$ in working</p>
<p>(b) $(3x + 5)(3x - 5)$ $2(3x + 5)$ $(3x - 5)/2$</p>	<p>B2 B1 B1</p>	<p>B1 for $(3x \dots 5)(3x \dots 5)$ including being written as either $(3x - 5)^2$ or $(3x + 5)^2$ FT provided no more than 1 previous error and provided simplification required. Mark final answer. Accept $1.5x - 2.5$ Award B4 for sight of a correct answer</p>

5.

<p>18.(a) $(x + 9)(x - 9)$ $(2x - 5)(x + 9)$ $\frac{x-9}{2x-5}$ (b)(i) $a = 6$ $x^2 + 12x + 36$ (-22) OR method to find b $b = -22$ (ii) $(x + 6)^2 - 22 = 0$ $(x + 6)^2 = 22$ $x + 6 = (\pm)\sqrt{22}$ $x = \pm\sqrt{22} - 6$</p>	<p>B1 B2 B1 B1 M1 A1 B1 M1 M1 A1 11</p>	<p>B1 for $(2x \dots 5)(x \dots 9)$ FT if possible for similar level of difficulty Mark final answer, do not ISW Accept embedded answers Use of completing the square from (i), FT Must show \pm</p>
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Examiner's Comments

1. It was encouraging to observe some secure algebraic skills here, though there was often a sign error in the last term of the numerator. Weaker candidates were unable to begin to form a common denominator.

This comment originally referred to question 12 on paper 3300/05 (08/11/2016)

2. In part (a), the squaring of x and y caused the problem, with many incorrect first terms of $6x$ instead of $6x^2$

In part (b), a number of candidates did not appear to have techniques available to them to use in order to simplify

This comment originally referred to question 14 on paper 4363/02 (01/10/2014)

3. Those candidates with good algebraic knowledge and skills made a good start in answering this standard question. There were however, many candidates with poor skills or knowledge. Somehow, the third M1 mark was occasionally awarded for having the appropriate brackets expanded, which should have been the numerator, showing that a number of candidates would have the skills to answer the question had they had the understanding of common denominator in adding fractions. In this case, they seemed to have done a sort of 'cross multiply' so established what should have been 'their numerator', hence picking up the third M mark.

This comment originally referred to question 18 on paper 4370/05 (04/11/2015)

4. Candidates with good algebraic skills found this question routine, whilst other candidates did not have the skills to answer the question.

This comment originally referred to question 16 on paper 4370/05 (26/05/2016)

5. Q18 Candidates with good algebra skills were able to demonstrate their manipulative skills. However, quite a number of candidates had poor algebraic skills.

This comment originally referred to question 18 on paper 4363/02 (06/11/2013)