

## Year 11 to Year 12 Transition Paper

### Algebraic Methods

#### Mark Scheme

Question	Working	Answer	Mark	Notes
1		$\frac{x-1}{x+8}$	2	M1 for $(x-1)(x+8)$ A1cao
2	$\frac{2x(x-3)+7(x+3)}{(x+3)(x-3)}$	$\frac{2x^2+x+21}{(x+3)(x-3)}$	3	M1 for using a correct common denominator, eg $(x+3)(x-3)$ M1 for $\frac{2x(x-3)+7(x+3)}{(x+3)(x-3)}$ oe A1 for $\frac{2x^2+x+21}{(x+3)(x-3)}$ or $\frac{2x^2+x+21}{x^2-9}$
3		$\frac{5x^2-6x-12}{(3x+4)(2x-1)}$	3	M1 for using a correct common denominator A1 for $\frac{x(2x-1)+(x-3)(3x+4)}{(3x+4)(2x-1)}$ A1 for $\frac{5x^2-6x-12}{(3x+4)(2x-1)}$ or $\frac{5x^2-6x-12}{6x^2+5x-4}$
4		$\frac{1}{x^2-9}$	2	M1 for $x^2-9=(x+3)(x-3)$ or for $(x-3)^2(x+3)^2=(x^2-9)^2$ A1 for $\frac{1}{x^2-9}$ or $\frac{1}{(x+3)(x-3)}$
5	$\frac{(x-3)(x+3)}{(x-3)(x-1)}$	$\frac{x+3}{x-1}$	3	B1 for $(x-3)(x+3)$ B1 for $(x-3)(x-1)$ B1 cao

Question	Working	Answer	Mark	Notes
6		$\frac{1}{u-2}$	2	M1 for factorisation of $u^2 - 4u + 4$ A1
7	$\frac{(x)(x+3) + (x-2)(x-3)}{(x-3)(x+3)}$	$\frac{2x^2 - 2x + 6}{(x-3)(x+3)}$	3	M1 for using a correct common denominator A1 $\frac{(x)(x+3) + (x-2)(x-3)}{(x-3)(x+3)}$ oe A1 $\frac{2x^2 - 2x + 6}{(x-3)(x+3)}$ or $\frac{2(x^2 - x + 3)}{(x-3)(x+3)}$ or $\frac{2x^2 - 2x + 6}{(x^2 - 9)}$ or $\frac{2(x^2 - x + 3)}{(x^2 - 9)}$
8		$\frac{x-7}{x}$	3	M1 for complete factorisation or multiplying and inverting second fraction M1 for complete factorisation <b>AND</b> multiplying and inverting second fraction A1 for $\frac{x-7}{x}$ or $1 - \frac{7}{x}$
9		$\frac{20x-3}{4x^2-9}$	3	M1 for using $(2x-3)(2x+3)$ as the common denominator M1 (dep M1) for a complete method to simplify to a single fraction A1 $\frac{20x-3}{4x^2-9}$ or $\frac{20x-3}{(2x-3)(2x+3)}$
10	$\frac{2(3x-5)}{(3x-5)(2x-4)}$	$\frac{1}{x-2}$	2	M1 for a correct factorisation of denominator into linear factors, $(3x-5)(2x-4)$ or $2(3x-5)(x-2)$ or $(6x-10)(x-2)$ A1 for $\frac{1}{x-2}$

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11		$\frac{3x - 8y}{5(x - y)(x + y)}$	4	<p>M1 for correct factorisation of <math>x^2 - y^2</math>, e.g. <math>(x - y)(x + y)</math></p> <p>M1 for finding a common denominator, e.g. <math>5(x - y)(x + y)</math> or <math>(5x + 5y)(x^2 - y^2)</math></p> <p>M1 (dep M1) for correct method to combine fractions</p> <p>A1 for <math>\frac{3x - 8y}{5(x - y)(x + y)}</math> or <math>\frac{3x - 8y}{(5x - 5y)(x + y)}</math> or <math>\frac{3x - 8y}{(x - y)(5x + 5y)}</math> or <math>\frac{3x - 8y}{5(x^2 - y^2)}</math> or <math>\frac{3x - 8y}{5x^2 - 5y^2}</math></p>
12		$\frac{-3}{x(3x - 2)}$	3	<p>M1 for correct method to combine the fractions</p> <p>M1(dep) for full simplification of the numerator</p> <p>A1 for <math>\frac{-3}{x(3x - 2)}</math> or <math>\frac{3}{x(2 - 3x)}</math> or <math>\frac{-3}{3x^2 - 2x}</math> or <math>\frac{3}{2x - 3x^2}</math></p>
13	$\frac{x(x + 2)}{(x + 2)(x + 5)}$	$\frac{x}{x + 5}$	2	<p>M1 for factorisation of numerator or denominator</p> <p>A1 for <math>\frac{x}{x + 5}</math></p>
14	$\frac{x(3 - x)}{(x - 3)(x + 3)} \div \frac{2(x + 3)}{(x + 3)^2}$ $\frac{x(3 - x)}{(x - 3)(x + 3)} \times \frac{(x + 3)^2}{2(x + 3)}$	$-\frac{x}{2}$	4	<p>M1 for factorisation of one term</p> <p>M1 for factorisation of both numerators and both denominators</p> <p>M1 for multiplying by the reciprocal of the second fraction</p> <p>A1 cao</p>

Question	Working	Answer	Mark	Notes
15	$\frac{x^3 + 3x^2 - 4x - 12}{x^3 + 5x^2 + 6x} = \frac{\dots}{x(x^2 + 5x + 6)}$ $= \frac{(x+3)(x+2)(x-2)}{x(x+3)(x+2)}$ $= \frac{(x-2)}{x} = 1 - \frac{2}{x}$	$= \frac{(x-2)}{x} = 1 - \frac{2}{x}$	3	<p>M1 Takes a common factor of <math>x</math> out of the denominator and writes the numerator in factors.</p> <p>dM1 Further factorises the denominator and cancels</p> <p>A1 Shows that <math>\frac{x^3 + 3x^2 - 4x - 12}{x^3 + 5x^2 + 6x} = 1 - \frac{2}{x}</math> with no errors or omissions</p>