

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
21	$\frac{6-\sqrt{8}}{\sqrt{2}-1} \times \frac{\sqrt{2}+1}{\sqrt{2}+1}$ $\frac{6\sqrt{2}+6-\sqrt{8}\sqrt{2}-\sqrt{8}}{2-1}$ $=6\sqrt{2}+6-4-2\sqrt{2}$	$2+4\sqrt{2}$	M1  M1  A1	<p>for correct first step eg multiplies numerator and denominator by <math>\sqrt{2}+1</math> condone missing brackets</p> <p>(dep) for expansion of numerator with 4 terms correct with or without signs <b>or</b> 3 out of exactly 4 terms correct</p> <p>for <math>2+4\sqrt{2}</math> oe <b>or</b> for stating <math>a=2</math> and <math>b=4</math></p>

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	5	M1	for $\sqrt{40}$ or $\sqrt{90}$	
Q2			<b>OR</b> $2\sqrt{2}$ or $3\sqrt{2}$	
		M1	for $2\sqrt{10}$ or $3\sqrt{10}$ or $\sqrt{4} \times \sqrt{10}$ or $\sqrt{9} \times \sqrt{10}$ or $\sqrt{4 \times 10}$ or $\sqrt{9 \times 10}$	
			<b>OR</b> $2\sqrt{2} + 3\sqrt{2}$	
		A1	cao	Answer of $5\sqrt{10}$ from correct working gets M2 A0

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
20 (a)	explanation	C1	for a correct explanation, eg $\sqrt{3} \times -\sqrt{3} = -3$ , not 3	
<b>Q3</b> (b)	explanation	C1	for correct explanation, eg $\sqrt{12} = 2\sqrt{3}$ , not $3\sqrt{2}$	

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Question	Answer	Mark	Mark scheme	Additional guidance
18 (a)	$3\sqrt{3}$	M1	for working unambiguously with $\sqrt{12}$ , eg $\sqrt{4 \times 3}$ <b>or</b> $\sqrt{4} \times \sqrt{3}$ <b>or</b> $2\sqrt{3}$	May be seen as the first step
		A1	cao	
(b)	$\frac{\sqrt{3}}{81}$	M1	for simplifying the power eg $(\sqrt{3})^7 = 27\sqrt{3}$	
<b>Q4</b>		M1	for method to rationalise the denominator eg multiplying by $\frac{\sqrt{3}}{\sqrt{3}}$	
		A1	for $\frac{\sqrt{3}}{81}$ <b>or</b> equivalent fraction in form $\frac{\sqrt{b}}{c}$ , eg $\frac{\sqrt{2187}}{2187}$	

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Question	Answer	Mark	Mark scheme	Additional guidance
20	$1 + \frac{\sqrt{5}}{5}$	P1	for writing $\sqrt{180}$ as $6\sqrt{5}$	This process mark can be awarded whenever this is seen, which might be later in the process.
Q5		P1	for process to rationalising the denominator eg $\frac{\sqrt{180} - 2\sqrt{5}}{5\sqrt{5} - 5} \times \frac{5\sqrt{5} + 5}{5\sqrt{5} + 5}$ or $\frac{4\sqrt{5}}{5\sqrt{5} - 5} \times \frac{5\sqrt{5} + 5}{5\sqrt{5} + 5}$ oe	
		P1	(dep on previous P1) for expanding terms eg $\frac{5\sqrt{5}\sqrt{180} + 5\sqrt{180} - 50 - 10\sqrt{5}}{125 - 25}$ or $\frac{100 + 20\sqrt{5}}{100}$ oe	
		A1	for $1 + \frac{\sqrt{5}}{5}$	

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19	Result shown	M1	(indep) for writing $\sqrt{12}$ as $2\sqrt{3}$	This mark can be awarded whenever this is seen, which might be later in the process.
Q6		M1	for method to rationalise the denominator eg $\frac{8+\sqrt{12}}{5+\sqrt{3}} \times \frac{5-\sqrt{3}}{5-\sqrt{3}}$ or $\frac{8+2\sqrt{3}}{5+\sqrt{3}} \times \frac{5-\sqrt{3}}{5-\sqrt{3}}$ oe	
		M1	(dep on previous M1) for expanding terms, condone one error in numerator or denominator eg $\frac{40-8\sqrt{3}+5\sqrt{12}-\sqrt{12}\sqrt{3}}{25-5\sqrt{3}+5\sqrt{3}-\sqrt{3}\sqrt{3}}$ or $\frac{40-8\sqrt{3}+10\sqrt{3}-2\sqrt{3}\sqrt{3}}{25-5\sqrt{3}+5\sqrt{3}-\sqrt{3}\sqrt{3}}$ or $\frac{34+2\sqrt{3}}{22}$ oe	
		A1	for a complete chain of reasoning leading to $\frac{17+\sqrt{3}}{11}$	

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Question	Answer	Mark	Mark scheme	Additional guidance
20	fully correct working leading to $16(1+\sqrt{2})$	C1	for expanding the numerator, eg $18 + 2\sqrt{2}\sqrt{18} + 2$ or $\sqrt{324} + \sqrt{36} + \sqrt{36} + \sqrt{4}$ (= 32) <b>or</b> for simplifying $\sqrt{18}$ , eg. $\sqrt{18} = 3\sqrt{2}$ or $\sqrt{18} + \sqrt{2} = 4\sqrt{2}$	Expanded terms need not be simplified
<b>Q7</b>		C1	(indep) for method to rationalise the denominator, eg. $\frac{\text{"numerator"}}{\sqrt{8}-2} \times \frac{\sqrt{8}+2}{\sqrt{8}+2}$	
		C1	for fully correct working leading to $16(1+\sqrt{2})$	Accept $a = 16, b = 1$

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Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	$2\sqrt{11}$	M1	for method to multiply numerator and denominator by $\sqrt{11}$ or a multiple of $\sqrt{11}$ , eg $\frac{22}{\sqrt{11}} \times \frac{\sqrt{11}}{\sqrt{11}}$	
		A1	for $2\sqrt{11}$	
(b)	$\frac{6 + \sqrt{3}}{11}$	M1	for method to multiply numerator and denominator by $2\sqrt{3} + 1$ or a multiple of $2\sqrt{3} + 1$ , eg $\frac{\sqrt{3}}{2\sqrt{3} - 1} \times \frac{2\sqrt{3} + 1}{2\sqrt{3} + 1}$	
<b>Q8</b>		M1	(dep) for $\sqrt{3} \times 2\sqrt{3} = 6$ or $2\sqrt{3} \times 2\sqrt{3} = 12$	
		A1	for $\frac{6 + \sqrt{3}}{11}$ (accept $a = 6$ and $b = 11$ )	