

SURDS-SET-1

1	<p>Simplify.</p> $\sqrt{98} - \sqrt{50} + \sqrt{8}$ <p style="text-align: right;"><i>Answer (b)</i> [2]</p>		
MS-1	<p>(b) $4\sqrt{2}$ or $2\sqrt{8}$ or $\sqrt{32}$</p>	B2	<p>B1 for two of $7\sqrt{2}$ or $5\sqrt{2}$ or $2\sqrt{2}$ seen [3]</p>
2	<p>(a) Simplify $\sqrt{72} - \sqrt{50}$.</p> <p style="text-align: right;"><i>Answer(a)</i> [2]</p> <p>(b) Write $\frac{1}{2-\sqrt{3}}$ in its simplest form by rationalising the denominator.</p> <p style="text-align: right;"><i>Answer(b)</i> [2]</p>		
MS-2	<p>(a) $\sqrt{2}$</p> <p>(b) $2 + \sqrt{3}$ or $\frac{2+\sqrt{3}}{1}$</p>	B2	<p>If B0 award B1 for $6\sqrt{2}$ or $5\sqrt{2}$ seen</p> <p>If B0 then M1 for $\times \frac{2+\sqrt{3}}{2+\sqrt{3}}$ seen [4]</p>

3	<p>(a) Simplify.</p> $\sqrt{75} - \sqrt{27}$ <p style="text-align: right;"><i>Answer(a)</i> [2]</p> <p>(b) Rationalise the denominator.</p> $\frac{7}{5 - \sqrt{2}}$ <p style="text-align: right;"><i>Answer(b)</i> [2]</p>		
MS-3	<p>(a)</p> <p>(b)</p>	<p>$2\sqrt{3}$</p> <p>$\frac{7(5 + \sqrt{2})}{23}$</p>	<p>2 B1 for $5\sqrt{3}$ or $3\sqrt{3}$</p> <p>2 Accept other correct alternate numerators, but must see 23. M1 for $\times \frac{(5 + \sqrt{2})}{(5 + \sqrt{2})}$</p>

4	<p>(a) Simplify $8\sqrt{2} + 2\sqrt{8}$.</p> <p style="text-align: right;"><i>Answer(a)</i> [2]</p> <p>(b) Simplify by rationalising the denominator.</p> $\frac{3\sqrt{2}}{3-\sqrt{2}}$ <p style="text-align: right;"><i>Answer(b)</i> [2]</p>		
MS-4	<p>(a) $12\sqrt{2}$</p> <p>(b) $\frac{9\sqrt{2} + 6}{7}$ or $\frac{3(3\sqrt{2} + 2)}{7}$</p>	<p>B2</p> <p>B2</p>	<p>If B0 award B1 for $4\sqrt{2}$ seen</p> <p>If B0 award M1 for intention of multiplying numerator and denominator by $3 + \sqrt{2}$</p> <p style="text-align: right;">[4]</p>
5	<p>(a) Simplify.</p> $\sqrt{27} + \sqrt{147}$ <p style="text-align: right;"><i>Answer(a)</i> [2]</p> <p>(b) Rationalise the denominator.</p> $\frac{3-\sqrt{5}}{3+\sqrt{5}}$ <p style="text-align: right;"><i>Answer(b)</i> [3]</p>		

MS-5	(a)	$10\sqrt{3}$	2	M1 for $3\sqrt{3}$ or $7\sqrt{3}$
	(b)	$\frac{7-3\sqrt{5}}{2}$ or $\frac{14-6\sqrt{5}}{4}$	3	M1 for $\times \frac{3-\sqrt{5}}{3-\sqrt{5}}$ M1 for $\frac{a-b\sqrt{5}}{4}$ $a, b \neq 0$ oe
6	<p>(a) Simplify $\sqrt{75}$.</p> <p style="text-align: right;"><i>Answer(a)</i> [1]</p> <p>(b) Simplify $\frac{2}{5-\sqrt{3}}$ by rationalising the denominator.</p> <p style="text-align: right;"><i>Answer(b)</i> [2]</p>			
MS-6	(a)	$5\sqrt{3}$	B1	Only allow denominators of 11 or 22. If B0 give M1 for intention of multiplying by $\frac{5+\sqrt{3}}{5+\sqrt{3}}$
	(b)	$\frac{5+\sqrt{3}}{11}$ or $\frac{2(5+\sqrt{3})}{22}$ oe	B2	
	Final Answer		[3]	
7	<p>Expand and simplify $(\sqrt{2}+1)(3\sqrt{2}-1)$.</p> <p style="text-align: right;"><i>Answer(b)</i> [2]</p>			
MS-7	$5+2\sqrt{2}$	2	M1 for $3\sqrt{2}\sqrt{2}-\sqrt{2}+3\sqrt{2}-1$ or better [4]	

8	<p>(a) Simplify.</p> $\sqrt{12}$ <p style="text-align: right;"><i>Answer(a)</i> [1]</p>		
MS-8	(a) $2\sqrt{3}$	1	
9	<p>Simplify $(5 + \sqrt{3})^2$.</p> <p style="text-align: right;"><i>Answer</i> [2]</p>		
MS-9	$28 + 10\sqrt{3}$ or $2(14 + 5\sqrt{3})$ final answer	2	M1 for $25 + 5\sqrt{3} + 5\sqrt{3} + \sqrt{3} \times \sqrt{3}$ or better
10	<p>Simplify completely.</p> $\frac{\sqrt{27}}{\sqrt{3}}$ <p style="text-align: right;"><i>Answer(c)</i> [1]</p>		
MS-10	3	1	Accept ± 3 or -3 [3]

11	<p>(a) Simplify. $\sqrt{200} - \sqrt{98}$</p> <p style="text-align: right;"><i>Answer(a)</i> [2]</p> <p>(b) Rationalise the denominator.</p> $\frac{11}{5 - \sqrt{3}}$ <p style="text-align: right;"><i>Answer(b)</i> [3]</p>			
MS-11	(a)	$3\sqrt{2}$	2	B1 for either $10\sqrt{2}$ or $7\sqrt{2}$ seen
	(b)	$\frac{5 + \sqrt{3}}{2}$ o.e.	3	M1 Multiplying by $\frac{(5 + \sqrt{3})}{(5 + \sqrt{3})}$ M1 for $25 - 3$ seen