Question number	Scheme	Marks
2 (a)(i)	$(\tan\alpha =)\dfrac{4}{3}$	B1
(a)(ii)	$(\tan\beta =)-\dfrac{1}{\sqrt{3}}\quad\left(=-\dfrac{\sqrt{3}}{3}\right)$	B1 B1 (3)
(b)	$\tan(\alpha+\beta)=\dfrac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$	
	$=\dfrac{\frac{4}{3}+\left(-\frac{1}{\sqrt{3}}\right)}{1-\left(\frac{4}{3}\right)\left(-\frac{1}{\sqrt{3}}\right)}$	M1
	$=\dfrac{\frac{4\sqrt{3}\pm 3}{3\sqrt{3}}}{\frac{3\sqrt{3}\pm 4}{3\sqrt{3}}}$ or $\dfrac{\frac{12+\left(-3\sqrt{3}\right)}{9}}{\frac{9+4\sqrt{3}}{9}}$	dM1
	$=\dfrac{4\sqrt{3}-3}{3\sqrt{3}+4}$	A1 cso (3)
	Total 6 marks	

<table>
<tr><th>Part</th><th>Mark</th><th>Notes</th></tr>
<tr><td>(a)(i)</td><td>B1</td><td>For $(\tan\alpha =)\dfrac{4}{3}$ accept $1.\dot{3}$ or 1.3^r or 1.3 recurring</td></tr>
<tr><td rowspan="2">(a)(ii)</td><td>B1</td><td>For $(\tan\beta =)\pm\dfrac{1}{\sqrt{3}}$ (i.e. 1st B mark allow + or – sign with the exact value shown oe)</td></tr>
<tr><td>B2</td><td>$(\tan\beta =)-\dfrac{1}{\sqrt{3}}$ or $-\dfrac{\sqrt{3}}{3}$ oe (i.e. 2 B marks correct sign with correct exact value)</td></tr>
<tr><td></td><td colspan="2">B marks are awarded independent of method, so award for the exact values stated oe</td></tr>
<tr><td rowspan="3">(b)</td><td>M1</td><td>For using the correct formula for $\tan(\alpha+\beta)=\dfrac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$
Note: The formula is given on page 2 of this paper and there must be correct substitution for their exact values obtained in part (a)
$$\tan(\alpha+\beta)=\frac{\frac{4}{3}+\left(-\frac{1}{\sqrt{3}}\right)}{1-\left(\frac{4}{3}\right)\left(-\frac{1}{\sqrt{3}}\right)}.$$</td></tr>
<tr><td>dM1</td><td>For attempting to simplify their expression for $\tan(\alpha+\beta)$ as far as $\dfrac{a\pm b\sqrt{c}}{d\sqrt{c}\pm e}$ where a, b, c, d and e are integers.
Ft the correct substitution of their values and check the common denominators are correct for their values in both the numerator and denominator of $\tan(\alpha+\beta)$
The numerator and denominator must be of the form $p\pm q$ where q contains a surd.
If they use $\tan\beta=\pm\dfrac{1}{\sqrt{3}}$ they will get to:
$$\tan(\alpha+\beta)=\frac{\frac{4}{3}+\left(\pm\frac{1}{\sqrt{3}}\right)}{1-\left(\frac{4}{3}\right)\left(\pm\frac{1}{\sqrt{3}}\right)}=\frac{\frac{4\sqrt{3}\pm3}{3\sqrt{3}}}{\frac{3\sqrt{3}\mp4}{3\sqrt{3}}}=\frac{4\sqrt{3}\pm3}{3\sqrt{3}\mp4}$$
If they use $\tan\beta=-\dfrac{\sqrt{3}}{3}$ they will get to:
$$\tan(\alpha+\beta)=\frac{\frac{4}{3}+\left(\pm\frac{\sqrt{3}}{3}\right)}{1-\left(\frac{4}{3}\right)\left(\pm\frac{\sqrt{3}}{3}\right)}=\frac{\frac{4+\left(\pm\sqrt{3}\right)}{3}}{\frac{9\mp4\sqrt{3}}{9}}\text{ or }\frac{\frac{12+\left(\pm3\sqrt{3}\right)}{9}}{\frac{9\mp4\sqrt{3}}{9}}=\frac{12+\left(\pm3\sqrt{3}\right)}{9\mp4\sqrt{3}}$$
Note: This mark is dependent on the previous M mark.</td></tr>
<tr><td>A1</td><td>For simplifying to the correct final answer with no errors seen.
$\tan(\alpha+\beta)=\dfrac{4\sqrt{3}-3}{3\sqrt{3}+4}$ o.e. for example $\dfrac{12\sqrt{3}-9}{9\sqrt{3}+12}$
Must be in the form $\dfrac{m\sqrt{3}-n}{n\sqrt{3}+m}$</td></tr>
</table>