Question	Scheme	Marks	AOs
9 (a)	$\dfrac{\sin x}{1-\cos x}+\dfrac{1-\cos x}{\sin x}$		
	$=\dfrac{\sin^2 x+(1-\cos x)^2}{(1-\cos x)\sin x}$	M1	2.1
	$=\dfrac{\sin^2 x+1-2\cos x+\cos^2 x}{(1-\cos x)\sin x}$	A1	1.1b
	$=\dfrac{1+1-2\cos x}{(1-\cos x)\sin x}$	M1	1.1b
	$=\dfrac{2-2\cos x}{(1-\cos x)\sin x}=\dfrac{2(1-\cos x)}{(1-\cos x)\sin x}=\dfrac{2}{\sin x}=2\operatorname{cosec}x \quad \{k=2\}$	A1	2.1
		(4)	
(b)	$\left\{\dfrac{\sin x}{1-\cos x}+\dfrac{1-\cos x}{\sin x}=1.6\Rightarrow\right\}\ 2\operatorname{cosec}x=1.6\Rightarrow \operatorname{cosec}x=0.8$ As $\operatorname{cosec}x$ is undefined for $-1<\operatorname{cosec}x<1$ then the given equation has no real solutions.	B1	2.4
		(1)	
(b) Alt 1	$\left\{\dfrac{\sin x}{1-\cos x}+\dfrac{1-\cos x}{\sin x}=1.6\Rightarrow\right\}\ 2\operatorname{cosec}x=1.6\Rightarrow \sin x=1.25$ As $\sin x$ is only defined for $-1\leqslant\sin x\leqslant 1$ then the given equation has no real solutions.	B1	2.4
		(1)	
		(5 marks)	

Question 9 Notes:

(a)	
M1:	Begins proof by applying a complete method of rationalising the denominator **Note:** $\dfrac{\sin^2 x}{(1-\cos x)\sin x}+\dfrac{(1-\cos x)^2}{(1-\cos x)\sin x}$ is a valid attempt at rationalising the denominator
A1:	Expands $(1-\cos x)^2$ to give the correct result $\dfrac{\sin^2 x+1-2\cos x+\cos^2 x}{(1-\cos x)\sin x}$
M1:	Evidence of applying the identity $\sin^2 x+\cos^2 x\equiv 1$
A1:	Uses $\sin^2 x+\cos^2 x\equiv 1$ to show that $\dfrac{\sin x}{1-\cos x}+\dfrac{1-\cos x}{\sin x}\equiv 2\operatorname{cosec}x$ with no errors seen
(b)	
B1:	See scheme
(b) Alt 1	
B1:	See scheme