Question	Scheme	Marks	AOs
1	$\cos\theta - \sin\left(\dfrac{1}{2}\theta\right) + 2\tan\theta = \dfrac{11}{10}$		
(a)	$1 - \dfrac{1}{2}\theta^2 - \dfrac{1}{2}\theta + 2\theta \approx \dfrac{11}{10}$	M1	1.2
		A1	1.1b
	$\Rightarrow \dfrac{1}{2}\theta^2 - \dfrac{3}{2}\theta + \dfrac{1}{10} \approx 0 \Rightarrow 5\theta^2 - 15\theta + 1 \approx 0$ *	A1*	2.1
		(3)	
(b)	$\theta = 0.068$ is valid because θ is small $\theta = 2.932$ is not valid because θ is large	B1	2.3
		(1)	
			(4 marks)

Question 1 Notes:

(a)

M1: At least two of either $\cos\theta \approx 1 - \dfrac{1}{2}\theta^2$, $\sin\left(\dfrac{1}{2}\theta\right) \approx \dfrac{1}{2}\theta$ or $\tan\theta \approx \theta$ substituted into the given equation

A1: Substitutes $\cos\theta \approx 1 - \dfrac{1}{2}\theta^2$, $\sin\left(\dfrac{1}{2}\theta\right) \approx \dfrac{1}{2}\theta$ and $\tan\theta \approx \theta$ into the given equation to obtain a correct (un-simplified) approximation or equation. E.g. $1 - \dfrac{1}{2}\theta^2 - \dfrac{1}{2}\theta + 2\theta \approx \dfrac{11}{10}$ or $= \dfrac{11}{10}$

A1*: Obtains $5\theta^2 - 15\theta + 1 \approx 0$ (condone $5\theta^2 - 15\theta + 1 = 0$) with no errors seen in their working

(b)

B1: States $\theta = 0.068$ is valid because θ is small; and $\theta = 2.932$ is not valid because θ is large

(b)	
Alt 1	LHS $= \cos\theta - \sin\left(\dfrac{1}{2}\theta\right) + 2\tan\theta$
B1:	States $\theta = 0.068$ is valid and $\theta = 2.932$ is not valid based on testing these two values in the original equation **Note:** $\theta = 0.068 \Rightarrow$ LHS $= 1.0999...$ & $\theta = 2.932 \Rightarrow$ LHS $= -2.3980...$
	Note: $\theta = 0.068218... \Rightarrow$ LHS $= 1.1002...$ & $\theta = 2.931782... \Rightarrow$ LHS $= -2.3984...$