Question	Scheme	Marks	AOs
3(a)	$\cos\left(\frac{\theta}{2}\right) \to 1-\frac{\left(\frac{\theta}{2}\right)^2}{2}$ or $\sin\theta \to \theta$	M1	1.1b
	$1-\frac{\left(\frac{\theta}{2}\right)^2}{2}+4\theta-\theta^2=\frac{5}{4}$	dM1	1.1b
	$1-\frac{\theta^2}{8}+4\theta-\theta^2=\frac{5}{4}$ $9\theta^2-32\theta+2\approx 0$ *	A1*	2.1
		(3)	
(b)	$\theta=0.0636$ is a valid solution but $\theta=3.49$ is not a valid solution as it is not small.	B1	2.3
		(1)	
			(4 marks)

Notes:

(a)

M1: Attempts either $\cos\left(\frac{\theta}{2}\right) \to 1-\frac{\left(\frac{\theta}{2}\right)^2}{2}$ or $\sin\theta \to \theta$ o.e.

Condone missing brackets on the $\frac{\theta}{2}$ so $\cos\left(\frac{\theta}{2}\right) \to 1-\frac{\frac{\theta^2}{2}}{2}$ would score the method mark.

dM1: Attempts to use both $\cos\left(\frac{\theta}{2}\right) \to 1-\frac{\left(\frac{\theta}{2}\right)^2}{2}$ and $\sin\theta \to \theta$ o.e. in the given equation.

A1*: Achieves $9\theta^2-32\theta+2\approx 0$ with no errors. Accept $9\theta^2-32\theta+2=0$

There must be a correct intermediate equation where the brackets have been expanded before the given answer, such as $1-\frac{\theta^2}{8}+4\theta-\theta^2=\frac{5}{4}$

(b)

B1: Requires both:

- $\theta=0.0636$ is a valid solution as it is small,
- $\theta=3.49$ is not a valid solution as it is not small.