Question	Scheme	Marks	AOs
15	$(\sin x - \cos x)^2 < 1 \Rightarrow \sin^2 x - 2\sin x\cos x + \cos^2 x \ \ (< 1)$ o.e.	**M1**	1.1b
	Examples: $1 - 2\sin x\cos x < 1,\ 1 - \sin 2x < 1,\ -2\sin x\cos x < 0,\ -\sin 2x < 0$	**A1**	2.2a
	As x is obtuse then $-2\sin x\cos x$ is positive because $\sin x > 0$ and $\cos x < 0$ so we have a contradiction. Therefore $\sin x - \cos x \ldots 1$ *	**A1***	2.4
			(3 marks)

Notes

Condone poor notation e.g. $\sin x^2$ **or e.g.** $-2\sin\theta\cos x < 1$ **for the first two marks only.**

M1: Expands $(\sin x - \cos x)^2$ to obtain $\sin^2 x \pm k\sin x\cos x + \cos^2 x$ where k = 1 or 2 o.e. May be implied.

A1: Uses a correct identity $\sin^2 x + \cos^2 x = 1$ or e.g. $-\sin^2 x - \cos^2 x = -1$ to obtain a correct inequality in any form that does not include the $\sin^2 x$ and $\cos^2 x$ terms. Condone e.g. $-2\sin\ \cos x < 0$

A1*: Fully correct work which includes

- a convincing argument that explains why their inequality is not true
- a statement that indicates there is a contradiction
- a conclusion that $\sin x - \cos x \ldots 1$ (there is no need to repeat "when x is obtuse")
- no contradictory statements
- no mixed/missed variables, e.g., $-2\sin\theta\cos x < 1$ or $1 - \sin 2 < 1$

Examples:

From $-2\sin x\cos x < 0$:

In the second quadrant $-2\sin x\cos x$ is $- \times + \times - = +$

"(this is a) contradiction" or equivalent (therefore) $\sin x - \cos x \ldots 1$

or

As x is obtuse, $\sin x > 0$, $\cos x < 0$ so $-2\sin x\cos x > 0$

"(this is a) contradiction" or equivalent (therefore) $\sin x - \cos x \ldots 1$

From $-\sin 2x < 0$:

As x is obtuse, $2x$ is reflex o.e. (i.e. $\pi < 2x < 2\pi$) so $-\sin 2x > 0$

"(this is) wrong" or equivalent (therefore) $\sin x - \cos x \ldots 1$

From $1 - \sin 2x < 1$:

As x is obtuse, $2x$ is reflex o.e. (i.e. $180 < 2x < 360$) so $\sin 2x < 0$ so $1 - \sin 2x > 1$

"(this is a) contradiction" or equivalent (therefore) $\sin x - \cos x \ldots 1$

From $\sin 2x > 0$:

As x is obtuse, $2x$ is reflex o.e. (i.e. $180 < 2x < 360$) so $\sin 2x < 0$

"(this is) incorrect" or equivalent (therefore) $\sin x - \cos x \ldots 1$

Note that you may condone the absence of a statement referring to the fact that $(\sin x - \cos x)^2 < 1$ is only valid since $\sin x - \cos x > 0$ when x is obtuse.