

## SINGLE CORRECT ANSWER

If  $x \in \left(0, \frac{\pi}{2}\right)$ , then show that

$$\begin{aligned} & \cos^{-1}\left(\frac{7}{2}(1 + \cos 2x) + \sqrt{(\sin^2 x - 48 \cos^2 x)} \sin x\right) \\ &= x - \cos^{-1}(7 \cos x) \end{aligned}$$

### SOLUTION

$$\begin{aligned} y &= \cos^{-1}\left(\frac{7}{2}(1 + \cos 2x) + \sqrt{(\sin^2 x - 48 \cos^2 x)} \sin x\right) \\ &= \cos^{-1}((7 \cos x)(\cos x) + \sqrt{1 - 49 \cos^2 x} \sqrt{1 - \cos^2 x}) \\ &= \cos^{-1}(\cos x) - \cos^{-1}(7 \cos x) \quad [\because \cos x < 7 \cos x \text{ for } \\ &\qquad\qquad\qquad x \in \left(0, \frac{\pi}{2}\right)] \\ &= x - \cos^{-1}(7 \cos x) \end{aligned}$$