Exercise 3

Paper 2 style · Graphic display calculator

3 6 marks AHL 3.10 · 3.11 ●●○ Typical

Let $g(x) = 2\cos\left(x - \frac{\pi}{3}\right) + \sin 2x$, for $0 \leq x \leq 2\pi$.

(a) Show that $g(x) = \cos x + \sqrt{3}\sin x + \sin 2x$. **[2]**

(b) Find the maximum value of g, and the value of x at which it occurs. **[2]**

(c) Solve the equation $g(x) = 0$. **[2]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$2\left(\cos x \cos\frac{\pi}{3} + \sin x \sin\frac{\pi}{3}\right) + \sin 2x$ **M1**

$= 2\left(\frac{1}{2}\cos x + \frac{\sqrt{3}}{2}\sin x\right) + \sin 2x = \cos x + \sqrt{3}\sin x + \sin 2x$ **A1**

Total 2 marks

Note AG.

MARKSCHEME (b)

$2.95\ \ (2.95442\ldots)$ **A1**

at $x = 0.873\ \ (\frac{5\pi}{18})$ **A1**

Total 2 marks

MARKSCHEME (c)

$x = 2.14$ **A1**

$x = 6.02$ **A1**

Total 2 marks