Exercise 3

Paper 2 style · Graphic display calculator

3 6 marks AHL 3.9 ●●○ Typical

Let $g(x) = \arcsin\left(\frac{x}{2}\right) + \arctan x$, for $-2 \leq x \leq 2$.

(a) Find the exact value of $g(1)$. **[1]**

(b) Solve the equation $g(x) = 1$. **[2]**

(c) Find the range of g. **[3]**

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)

$\frac{\pi}{6} + \frac{\pi}{4} = \frac{5\pi}{12}$ **A1**

Total 1 mark

MARKSCHEME (b)

$\arcsin\left(\frac{x}{2}\right) + \arctan x = 1$ **(M1)**

$x = 0.726$ **A1**

Total 2 marks

Note For example, the graphs of $y = g(x)$ and $y = 1$ intersected.

MARKSCHEME (c)

g is increasing, since $\arcsin\frac{x}{2}$ and $\arctan x$ both increase **R1**

$g(-2) = -\frac{\pi}{2} - \arctan 2 = -2.68,\ g(2) = \frac{\pi}{2} + \arctan 2 = 2.68$ **A1**

$-2.68 \leq g(x) \leq 2.68$ **A1**

Total 3 marks