Exercise 3

Paper 2 style · Graphic display calculator

3 6 marks AHL 2.14 ●●○ Typical

Let $f(x) = x^2 + 6x + 5$, for $x \geq k$.

(a) Find the smallest value of k for which f has an inverse. **[1]**

(b) For this value of k, find $f^{-1}(x)$ and state its domain. **[3]**

(c) Solve the equation $f(x) = f^{-1}(x)$. **[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)

$k = -3$ **A1**

Total 1 mark

MARKSCHEME (b)

$y = (x+3)^2 - 4,\ x = -3 + \sqrt{y+4}$ **M1**

$f^{-1}(x) = -3 + \sqrt{x+4}$ **A1**

$x \geq -4$ **A1**

Total 3 marks

MARKSCHEME (c)

$x^2 + 6x + 5 = x$ **(M1)**

$x = -1.38$ **A1**

Total 2 marks

Note Exact value $\frac{-5+\sqrt{5}}{2}$; the other root, -3.62, is not in the domain.