Exercise 3

Paper 2 style · Graphic display calculator

3 7 marks SL 5.6 ●●○ Typical

Let $h(x) = \sqrt{x}\cos x$, for $0 < x \leq 6$, where x is in radians.

(a) Find $h'(x)$. **[3]**

(b) Find the gradient of the graph of h at the point where $x = 1.2$. **[1]**

(c) Find the values of x for which the gradient of the graph of h is -1. **[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.
© 2026 Hence

Exercise 3 — markscheme

Paper 2 style · Graphic display calculator

3 7 marks SL 5.6 ●●○ Typical

Let $h(x) = \sqrt{x}\cos x$, for $0 < x \leq 6$, where x is in radians.

(a) Find $h'(x)$. **[3]**

(b) Find the gradient of the graph of h at the point where $x = 1.2$. **[1]**

(c) Find the values of x for which the gradient of the graph of h is -1. **[3]**

MARKSCHEME (a)

attempt at the product rule **M1**

$h'(x) = \dfrac{1}{2\sqrt{x}}\cos x - \sqrt{x}\sin x$ **A1A1**

Total 3 marks

Note A1 for each term. Accept $\frac{1}{2}x^{-\frac{1}{2}}\cos x - x^{\frac{1}{2}}\sin x$.

MARKSCHEME (b)

$h'(1.2) = -0.856 \ \ (-0.855604\ldots)$ **A1**

Total 1 mark

MARKSCHEME (c)

$h'(x) = -1$ (seen or implied by a sketch) **(M1)**

$x = 1.32 \ \ (1.31576\ldots)$ **A1**

$x = 2.68 \ \ (2.68206\ldots)$ **A1**

Total 3 marks

Note The graph of h' meets $y = -1$ twice on $0 < x \leq 6$.