Exercise 3

Paper 2 style · Graphic display calculator

3 6 marks SL 2.6 · 2.7 ●●○ Typical

A stone is thrown upwards from the top of a wall. Its height, in metres, t seconds later is $h(t) = -5t^2 + 20t + 2$, until it hits the ground.

(a) Find the maximum height of the stone. **[2]**

(b) Find the time at which the stone hits the ground. **[2]**

(c) Find the length of time for which the stone is more than 10 metres above the ground. **[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.
© 2026 Hence

Exercise 3 — markscheme

Paper 2 style · Graphic display calculator

3 6 marks SL 2.6 · 2.7 ●●○ Typical

A stone is thrown upwards from the top of a wall. Its height, in metres, t seconds later is $h(t) = -5t^2 + 20t + 2$, until it hits the ground.

(a) Find the maximum height of the stone. **[2]**

(b) Find the time at which the stone hits the ground. **[2]**

(c) Find the length of time for which the stone is more than 10 metres above the ground. **[2]**

MARKSCHEME (a)

$t = \dfrac{20}{10} = 2$ **(M1)**

$h(2) = 22$ m **A1**

Total 2 marks

MARKSCHEME (b)

$-5t^2 + 20t + 2 = 0$ **(M1)**

$t = 4.10$ s $(4.09761\ldots)$ **A1**

Total 2 marks

MARKSCHEME (c)

$-5t^2 + 20t + 2 = 10$: $t = 0.451$ or $t = 3.55$ **(M1)**

$3.55 - 0.451 = 3.10$ s $(3.09838\ldots)$ **A1**

Total 2 marks