Exercise 3

Paper 2 style · Graphic display calculator

3 7 marks SL 1.3 · 1.8 ●●● Demanding

A ball is dropped from a height of 3 m. After each bounce, it rises to 60 % of the height from which it last fell.

(a) Find the height the ball reaches after the fourth bounce. **[2]**

(b) Find the total vertical distance travelled by the ball before it comes to rest. **[3]**

(c) Find the number of bounces after which the ball first rises to less than 0.05 m. **[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)

3×0.6^4 (M1)

$= 0.389 \text{ m} \quad (0.3888)$ A1

Total 2 marks

MARKSCHEME (b)

up and down after the first fall: $2 \times \dfrac{1.8}{1 - 0.6}$ M1

$= 9$ (A1)

$3 + 9 = 12 \text{ m}$ A1

Total 3 marks

Note The heights after the bounces, $1.8,\ 1.08,\ \ldots$, are each travelled twice.

MARKSCHEME (c)

$3 \times 0.6^n < 0.05$ (M1)

$n = 9$ A1

Total 2 marks

Note $n > 8.02$: after 8 bounces the height is 0.0504 m.