Marked example 3

Paper 2 style · Graphic display calculator

3 6 marks SL 3.7 ●●○ Typical

The height, h metres, of a seat on a Ferris wheel t minutes after it starts is $h(t) = 20 - 18\cos\left(\frac{\pi t}{15}\right)$, for $t \geq 0$.

(a) Write down the greatest height of the seat. **[1]**

(b) Find the time for one revolution. **[1]**

(c) Find the height of the seat when $t = 10$. **[1]**

(d) Find, for one revolution, the length of time during which the seat is higher than 30 m. **[3]**

MARKSCHEME (a)

38 m — **A1**

Total 1 mark

MARKSCHEME (b)

$\frac{2\pi}{\pi/15} = 30$ minutes — **A1**

Total 1 mark

MARKSCHEME (c)

29 m — **A1**

Total 1 mark

Note $\cos\frac{2\pi}{3} = -\frac{1}{2}$.

MARKSCHEME (d)

$20 - 18\cos\left(\frac{\pi t}{15}\right) = 30$ — **(M1)**

$t = 10.3124\ldots$ and $t = 19.6875\ldots$ — **(A1)**

9.38 minutes $(9.37516\ldots)$ — **A1**

Total 3 marks

Note Or the graph of h with the line $h = 30$.

Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software.
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