Marked example 2

Paper 2 style · Graphic display calculator

2 6 marks SL 5.9 ●●○ Typical

A particle moves along a straight line. Its velocity, v metres per second, at time t seconds is given by

$$v(t) = 5\sin(0.8t) - 1, \qquad 0 \le t \le 6,$$

where the angle is measured in radians.

(a) Find the maximum velocity of the particle, and the time at which it occurs. **[2]**

(b) Find the values of t for which the particle is at rest. **[2]**

(c) Find the acceleration of the particle when $t = 2$. **[2]**

MARKSCHEME (a)

maximum velocity $4\ \text{m s}^{-1}$ **A1**

at $t = 1.96$ $(1.96349\ldots,\ = \frac{5\pi}{8})$ **A1**

Total 2 marks

MARKSCHEME (b)

$v(t) = 0$ **(M1)**

$t = 0.252$ $(0.251713\ldots)$, $t = 3.68$ $(3.67528\ldots)$ **A1**

Total 2 marks

Note Both values are needed for A1.

MARKSCHEME (c)

$a = v'(t)$, or use of GDC **(M1)**

$a(2) = -0.117\ \text{m s}^{-2}$ $(-0.116798\ldots)$ **A1**

Total 2 marks

Note Units are not required.

ON THE CALCULATOR

NumWorks Radians. Functions: $f(x) = 5\sin(0.8x) - 1$; Axes: x from 0 to 6. (a) Graph → Calculate → Find → Maximum → $x = 1.963495$, $f(x) = 4$. (b) Find → Zeros → 0.2517128, then → → 3.675283. (c) Calculation: Toolbox → Calculus → Derivative, value 2 → −0.1167981.

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