

Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Further Mechanics

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

- (a) (i) correct period read from graph or use of $f=1/T$ 0.84 ± 0.01

C1

2.4 Hz gets C1

correct frequency 1.2 (1.18 – 1.25 to 3 sf)

A1

- (ii) correct shape (inverse)

B1

Crossover $PE = KE$

B1

- (b) (i) *Use of $T = 2\pi \sqrt{\frac{l}{g}}$*

C1

48.7 (49) m

A1

- (ii) $v = 120\,000 / 3600 = 33(.3) \text{ m s}^{-1}$

B1

Use of $F = m v^2/r$ (allow v in km h^{-1})

B1

Total tension = $6337 + (280 \times 9.81) = 9.083 \times 10^3 \text{ N}$
 Allow their central force

B1

Divide by 4 $2.27 \times 10^3 \text{ N}$
 Allow their central force

B1

(iii) $mgh = \frac{1}{2} mv^2$

B1

Condone: Use of $v = 2\pi fA$ (max2)

$9.8 \times 44 = 0.5 v^2$ Allow 45 in substitution

B1

Condone 22 m s^{-1}

29.4 m s^{-1} (Use of 45 gives 29.7)

B1

106 km h^{-1} (their m s^{-1} correctly converted)
Or compares with 33 m s^{-1}

B1

(iv) $1/16^{\text{th}}(0.625)$ % of KE left if correct

M1

Allow $1/8$ (0.125) or $1/32$ (0.313)

KE at start = $5.6 \times 10^4 \text{ J}$ or states energy $\propto \text{speed}^2$ so speed is $\frac{1}{4}$

M1

Allow for correct subⁿ $E = \frac{1}{2} 280 \times 20^2$ x factor from incorrect number of swings calculated correctly

Final speed calculated = 5 m s^{-1}

A1

Must be from correct working

[17]