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

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Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) $a = v^2/r$

C1

$= (7.68 \times 10^3)^2/(6.760 \times 10^6)$ **or** $r = 6380 + 380$

C1

$= 8.73\ m\ s^{-2}$

A1

3

(b) (the scientist is in) free-fall (owtte)

B1

his/her **weight provides the centripetal force**

B1

(to maintain) the same orbit/same radius **and** velocity/same acceleration (as the ISS)

B1

his/her body experiences no motion/force relative to the ISS

B1

max 2

(c) (i) $k = 4\pi^2 m/T^2$ **or** $T = 2\pi(m/k)^{1/2}$ *and inferred transposition*

B1

$= 4 \times (3.142)^2 \times 2.0/ (1.2)^2$

(= 54.8)

B1

2

(ii) *use of* $T = 2\pi(m/k)^{1/2}$ *and* $f = 1/T$

C1

$f = 5.4 \times 10^{12}$ Hz

A1

2

[9]

Q2.

(a) 2.2 s

c.a.o.

B1

1

(b) *exactly two* reasonable sine wave cycles drawn

B1

displacement = 10 cm when time = 0

B1

time = 2.2 s after one cycle

B1

4

peaks decrease to approximately 7.0 cm after two cycles
or 8.4 cm after one cycle

B1

award two marks if half-cycle confused with full cycle but otherwise correct

(c) (i) the period would be decreased

B1

(ii) there would be less damping/more oscillations before the pendulum comes to rest

B1

2

[7]

Q3.

(a) accelerating to left **(1)**
net force to left on M due to compression on right and tension on left **(1)**/p>

(2)

(b) slider is at 33/50 of length **(1)**
(uniform track so) resistance ∝ length **(1)**

$V = \frac{33}{50}$ × 5.0 (V) **(1)** = 3.3 V **(1)**

ΔV = +0.8V **(1)**

(max 4)

(c) damping **(1)**
to prevent (reduce) oscillation of mass (during changes in motion) **(1)**

(2)

[8]