Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic: Fields And Their Consequences(Gravitational Field)

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

Mark Schemes

Q1.

(a) (i) *g* gravitational field strength, *G* gravitational constant

C1

g force on 1 kg (on or close to) Earth's surface

A1

G universal constant relating attraction of any two masses to their separation/constant in Newton's law of gravitation

A1

3

(ii) equates *w* and cancels *m*

B1

1

(iii) substitutes values into equation

B1

correct calculation 5.99×10^{24}

C1

answer to two significant figures 6.0×10^{24} (kg)

A1

3

(b) (i) 1 day/24 hours/86400 (s)

B1

1

(ii) 4.24×10^{7} (m)

B1

1

(iii) $v = 2\pi r/T$ or equivalent

C1

conversion of period to seconds (allow in (b)(i))

C1

3.08 (cao)

A1

3

(iv) communication/specific example of communication (eg satellite TV/weather)

B1

1

(v) avoids dish having to track/stationary **footprint**

B1

1

[14]

Q2.

(a) attractive **force** between point masses **(1)**
proportional to (product of) the masses **(1)**
inversely proportional to square of separation/distance apart **(1)**

3

(b) $m\omega^2 R = (-)\ \frac{GMm}{R^2}\left(\text{or} = \frac{mv^2}{R}\right)$ **(1)**

(use of $T = \frac{2\pi}{\omega}$ gives) $\frac{4\pi^2}{T^2} = \frac{GM}{R^3}$ **(1)**

G and M are constants, hence $T^2 \propto R^3$ **(1)**

3

(c) (i) (use of $T^2 \propto R^3$ gives) $\frac{365^2}{(1.50\times10^{11})^3} = \frac{T_m^2}{(5.79\times10^{10})^3}$ **(1)**

T_m = 87(.5) days **(1)**

(ii) $\frac{1^2}{(1.50\times10^{11})^3} = \frac{165^2}{R_N^3}$ **(1)** (gives $R_N = 4.52 \times 10^{12}$ m)

ratio = $\frac{4.51\times10^{12}}{1.50\times10^{11}}$ = 30(.1) **(1)**

4

[10]