

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

Q1.

- (a) technique one
- (1)**

information derived from it **(1)**technique two **(1)**information derived from it **(1)**

4

- (b) (i) gravitational
- attraction**
- to...
- (1)**

...**centre of gravity** (mass) of mountain **(1)**

- (ii) cancellation of some systematic errors
- (1)**

3

- (c) (i) calculates volume of cone
- (1)**

mass = density × volume seen **(1)** 2.2×10^{12} kg **(1)**

- (ii) sideways force/mg = tan (0.0011)
- (1)**

sideways force = $Gm_{sch} 0.5/(1400)^2$ subst seen **(1)** 2.4×10^{24} kg **(1)**

- (iii) his density estimate was too low
- (1)**

or mean density of the Earth is higher than that of the mountain **(1)**

7

[14]**Q2.**

- (a) work done/energy change (against the field) per unit mass
- (1)**
-
- when moved from infinity to the point
- (1)**

2

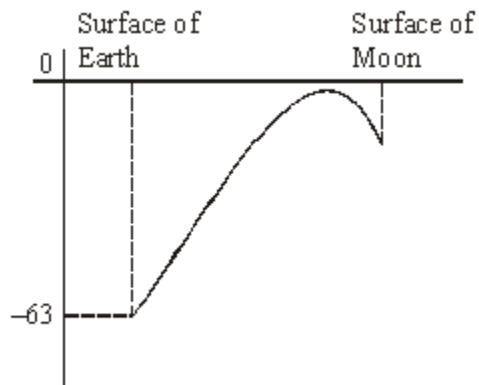
- (b)
- $V_E = -\frac{GM_E}{R_E}$
- and
- $V_M = -\frac{GM_M}{R_M}$
- (1)**

$$V_M = -G \times \frac{M_E}{r} \times \frac{3.7}{2} = \frac{3.7}{2} V_E \text{ (1)}$$

$$= 4.57 \times 10^{-2} \times (-63) = -2.9 \text{ MJ kg}^{-1} \text{ (1)} \quad (2.88 \text{ MJ kg}^{-1})$$

3

(c)



limiting values $(-63, -V_M)$ on correctly curving line (1)

rises to value close to but below zero (1)

falls to Moon (1)

from point much closer to M than E (1)

max 3

[8]