

A Level Physics A
H556/01 Modelling physics

Question Set 11

1 (a) Write an expression for the gravitational potential V_g at the surface of a planet of mass M and radius r . [1]

(b) The table below shows some data for Mercury and Pluto.

	Mass/kg	Radius/m	Mean distance from Sun/m
Mercury	3.30×10^{23}	2.44×10^6	57.9×10^9
Pluto	0.131×10^{23}	1.19×10^6	5910×10^9

(i) Show that the escape velocity v of a gas molecule on the surface of Pluto is given by the equation

$$v = \sqrt{\frac{2GM}{r}}$$

where M is the mass of Pluto and r is its radius. [2]

(ii) Calculate the escape velocity v of gas molecules on the surface of Pluto.

$$v = \dots\dots\dots \text{m s}^{-1} \quad [1]$$

(iii) Explain why Mercury has no atmosphere whilst Pluto still has a thin atmosphere. Use data from the table to support your explanation. [3]

Total Marks for Question Set 11: 7

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