[3]

[Total: 8]

3 The Earth may be assumed to be a uniform sphere of radius R and mass M. At its surface, the gravitational field strength is g. A satellite orbits the Earth at a height $0.30R$ above its surface.

(a) Show that the gravitational field strength at this height is $0.59g$.

[2]

(b) Determine the angular speed of the satellite about the Earth. The radius R of the Earth is 6.4×10^6 m.

angular speed = ... rad s^{-1} [2]

(c) Calculate the time, in hours, for one complete orbit of the satellite.

time = ... h [2]

(d) Explain why the satellite does not fall towards the Earth even though the gravitational force is directed toward the centre of the Earth.

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.....[2]

[Total: 8]