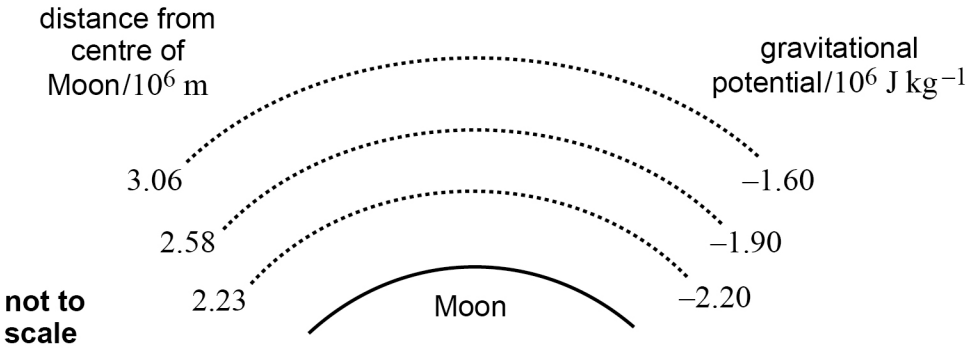
Do not write outside the box

0 3 . 1 Define gravitational potential at a point.

[1 mark]

0 3 . 2 **Figure 2** shows the positions of equipotential surfaces at different distances from the centre of the Moon.

Figure 2



Explain how the equipotential surfaces in **Figure 2** show that the gravitational field is **not** uniform.

[1 mark]

Do not write outside the box

0 3 . 3 Calculate, using **Figure 2**, the escape velocity at the surface of the Moon.

radius of Moon = 1.74×10^6 m

[4 marks]

escape velocity = _____ m s^{-1}

6

Turn over for the next question

Do not write outside the box

0 9 What is the angular speed of a satellite in a geostationary orbit around the Earth?

[1 mark]

A 1.2×10^{-5} rad s^{-1} ⬭

B 7.3×10^{-5} rad s^{-1} ⬭

C 4.2×10^{-3} rad s^{-1} ⬭

D 2.6×10^{-1} rad s^{-1} ⬭

1 0 A planet of mass M and radius R rotates so quickly that material at its equator only just remains on its surface.

What is the period of rotation of the planet?

[1 mark]

A $2\pi\sqrt{\frac{R}{GM}}$ ⬭

B $2\pi\sqrt{\frac{GM}{R}}$ ⬭

C $2\pi\sqrt{\frac{R^3}{GM}}$ ⬭

D $2\pi\sqrt{\frac{GM}{R^3}}$ ⬭

Do not write outside the box

1 1 Satellites **N** and **F** have the same mass and are in circular orbits about the same planet. The orbital radius of **F** is greater than that of **N**.

Which is greater for **F** than for **N**?

[1 mark]

A gravitational force on the satellite ⬭

B angular speed ⬭

C kinetic energy ⬭

D orbital period ⬭

1 2 An object moves freely at $90°$ to the direction of a gravitational field.

The acceleration of the object is

[1 mark]

A zero. ⬭

B opposite to the direction of the gravitational field. ⬭

C in the direction of the gravitational field. ⬭

D at $90°$ to the direction of the gravitational field. ⬭

Turn over for the next question