2 Data for the Earth and the Moon are given below:

$$\frac{\text{Radius of Earth}}{\text{Radius of Moon}} = 3.7$$

$$\frac{\text{Mass of Earth}}{\text{Mass of Moon}} = 81$$

Separation of the Moon from Earth is 3.84×10^8 m and the gravitational field strength due to Earth at its surface is 9.8 N kg^{-1}.

(a) Calculate the gravitational field strength due to the Moon at its surface.

gravitational field strength = ………………… N kg^{-1} [3]

(b) There is a point on the line between the Earth and the Moon at which their combined gravitational field strength is zero.

Calculate the distance between this point and the centre of the Earth.

distance = ……………………………… m [2]

(c) The Moon orbits around the Earth with a period of 27.3 days.

(i) Calculate the angular speed of the Moon.

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

(ii) Calculate the mass of the Earth.

mass = ………………………………… kg [2]

(iii) Determine the gravitational force between the Earth and the Moon.

gravitational force = ……………………………….. N [2]

(iv) The force calculated in **(c)(iii)** is very large. Suggest why this force has negligible effect on the motion of the Earth.

…………………………………………………………………………………………………..

………………………………………………………………………………………………….

[2]

[Total: 12]