Section A

Answer **all** the questions in this Section in the spaces provided.

1 **(a) (i)** State what is meant by *gravitational field strength*.

....

....

.... [1]

(ii) State Newton's law of gravitation and hence, show that the gravitational field strength g at a distance R from a point mass M is given by

$$g = \frac{GM}{R^2}$$

[3]

(b) A star is spherical in shape, has mass 6.2×10^{30} kg and radius 2.7×10^{4} m.

(i) Calculate the average density of the star.

average density = …………………………………. kg m^{-3} [2]

(ii) It is found that the density inside a star is non-uniform.

State and explain how the density is likely to vary with distance from the centre of the star.

....

....

....

.... [2]

(iii) Find the minimum speed needed for a mass of 250 kg at the surface of the star to escape the effects of the gravitational field due to the star.

Show your working clearly.

speed = ………………………………… m s^{-1} [2]

[Total: 10]