3 A uniform spherical star has a mass of 6.0×10^{30} kg. The mass of the star may be assumed to be a point mass at the centre of the star.

The star may be considered to be isolated in space.

(a) Show that the gravitational field strength at a point 3.0×10^{9} m from the centre of the spherical star is 44.5 N kg^{-1}.

[1]

(b) The radius of the star is 1.0×10^{9} m.

On the axes of Fig. 3.1, sketch a graph to show the variation with distance x from the centre of the star of the gravitational field strength g of the star for values of x from $x = 1.0 \times 10^{9}$ m to $x = 4.0 \times 10^{9}$ m.

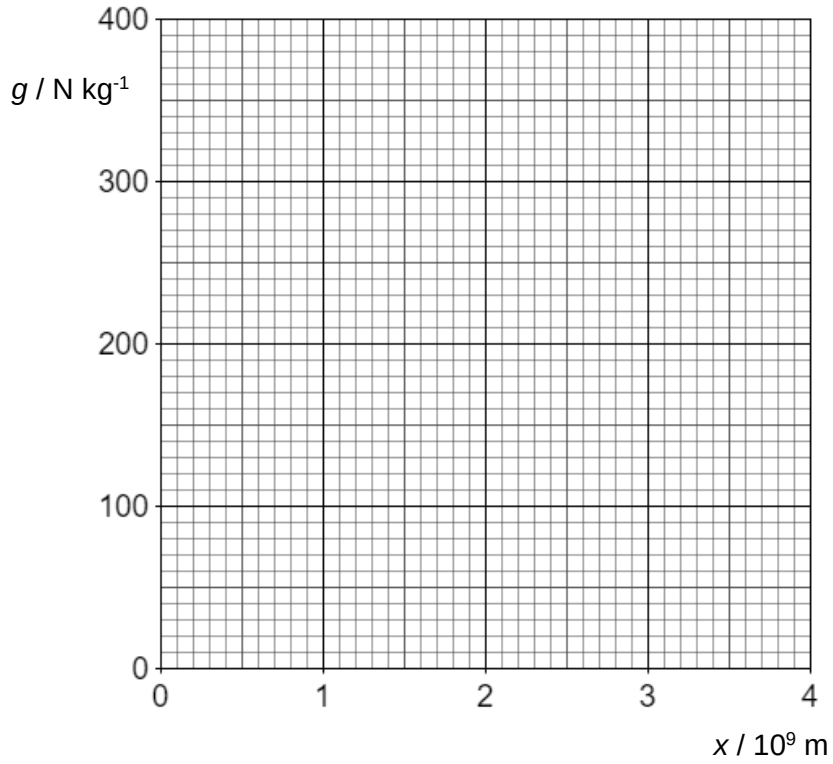

Fig. 3.1

[3]

(c) State what the area under the graph in Fig. 3.1 represents.

……..

…… [1]

[Total: 5]