

5. Plot a graph of gravitational field strength ( $g$ ) against inverse of the radius squared ( $1/r^2$ ).  
 Plot Graph Paper  
 • Units  
 • Labels      • All points plotted correctly / accurately  
 • LOBF  
 • Reasonable size / scales (3 marks)

6. It is known that gravitational field strength due to the Earth can be calculated using the formula

$$g = GM_e / r^2$$

Use your graph, determine the mass of the Earth.

$$y = mx$$

$$\text{Slope} = GM_e \quad (1)$$

$$g = GM_e \cdot \frac{1}{r^2}$$

$$\text{Slope} = \frac{7.3 - 0}{170 \times 10^6 - 0} = 4.3 \times 10^{-14}$$

I haven't graphed  
accurately yet  
so this is only  
rough - must  
graph accurately!  
(if marks)

① Slope / Points used marked on graph  
(ie not data points)

**6 marks**

① Value of slope close to  $4.3 \times 10^{-14}$

$$4.3 \times 10^{-14} = 6.67 \times 10^{-11} M_e$$

$$M_e = 6.45 \times 10^{24} \text{ kg}$$

①

①

Ans: \_\_\_\_\_ Units \_\_\_\_\_