L03 – Linearizing Gravitational Forces & Fields

Sample Data:

$G = 6.67 \times 10^{-11}\ Nm^2/kg^2$

$m_1 = 1.60 \times 10^4\ kg$

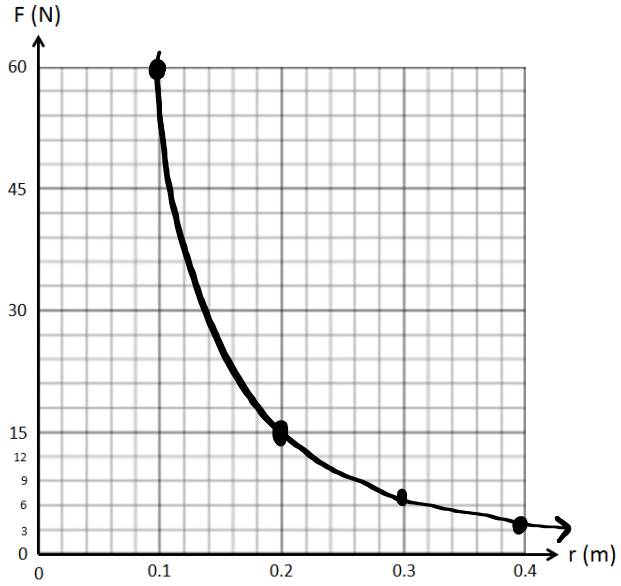
$m_2 = ?$

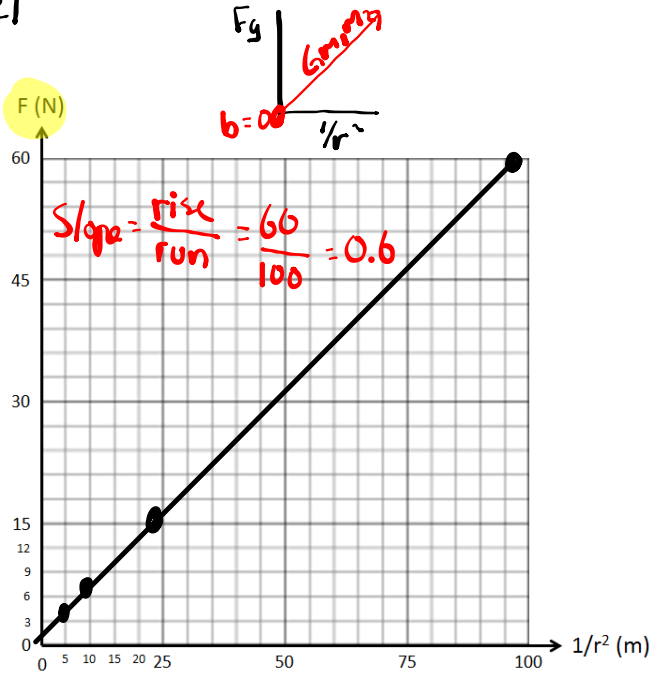
r (m)	Fg (N)	$1/r^2$
0.1	60	100
0.2	15	25
0.3	7	11.1
0.4	4	6.25

$$F_g = \frac{Gm_1m_2}{r^2}$$

$$F_g = (Gm_1m_2)\frac{1}{r^2} + 0$$

$$y = (\text{slope})\,x + b$$





$$F_g = (Gm_1m_2)\,1/r^2 + 0$$

$$y = (\text{slope})\,x + b$$

$$\text{Slope} = Gm_1m_2$$

$$0.6 = (6.67 \times 10^{-11})(1.6 \times 10^4)\,m_2$$

$$m_2 = 562{,}218.89\ kg$$

$$\approx 5.62 \times 10^5\ kg$$

Sample Data:

$G = 6.67 \times 10^{-11}\ Nm^2/kg^2$

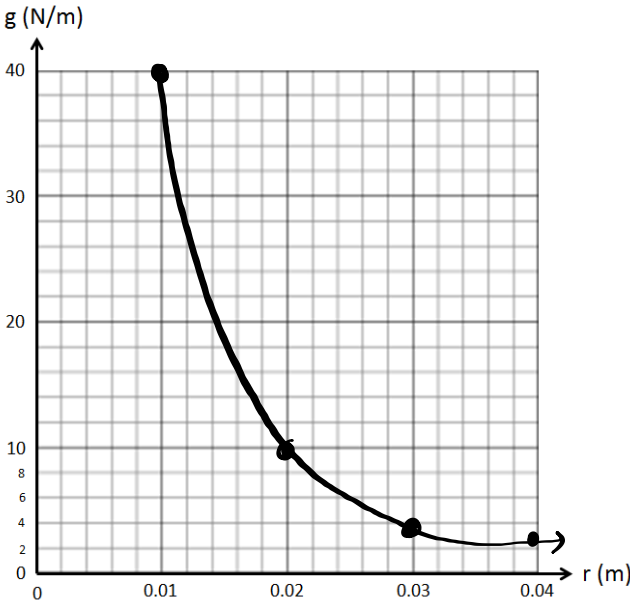
$m_1 = ?$

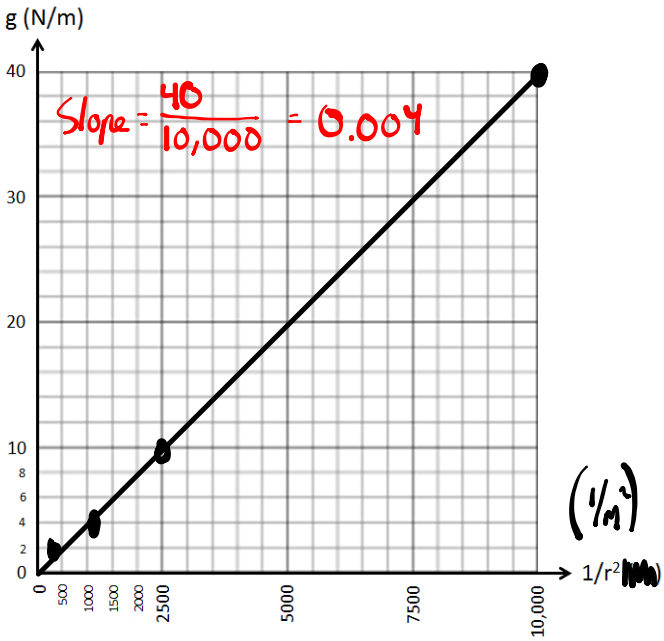
r(m)	g (N/m)	$1/r^2$
0.01	40	10,000
0.02	10	2500
0.03	4	1111
0.04	3	625

$g = \frac{Gm_s}{r^2}$

$g = (Gm_s)\frac{1}{r^2} + 0$

$y = (slope)x + b$





$Slope = Gm_s$

$0.004 = (6.67 \times 10^{-11})m_s$

$m_s = 59,970,014.992\ kg$

$\approx 6.00 \times 10^7\ kg$

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