

Answer on Question #67608, Physics/ Mechanics Relativity

Question:

By using Newton's law of gravitation, calculate mass of sun.

Answer:

$F_{Earth-Sun} = \frac{GM_{Earth}M_{Sun}}{r^2}$. due to this force, Earth rotates around the Sun

$$F_{Earth-Sun} = M_{Earth}a = M_{Earth}\omega^2r = \frac{4M_{Earth}\pi^2r}{T^2}; T = 1 \text{ year}$$

$$\frac{4M_{Earth}\pi^2r}{T^2} = \frac{GM_{Earth}M_{Sun}}{r^2}$$

$$M_{Sun} = \frac{4\pi^2r^3}{GT^2} = \frac{4 * 3.14^2 * 150^3 * 10^{27}}{6.67 * 10^{-11} * 365^2 * 24^2 * 3600^2} = 2 * 10^{30} \text{ kg}$$

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