

6. Let the distance from Earth to the spaceship be r . $R_{em} = 3.82 \times 10^8$ m is the distance from Earth to the moon. Thus,

$$F_m = \frac{GM_m m}{(R_{em} - r)^2} = F_E = \frac{GM_e m}{r^2},$$

where m is the mass of the spaceship. Solving for r , we obtain

$$\begin{aligned} r &= \frac{R_{em}}{\sqrt{M_m/M_e} + 1} \\ &= \frac{3.82 \times 10^8 \text{ m}}{\sqrt{(7.36 \times 10^{22} \text{ kg})/(5.98 \times 10^{24} \text{ kg})} + 1} = 3.44 \times 10^8 \text{ m} . \end{aligned}$$