

### Answer on Question #77286 Physics / Classical Mechanics

Find the length of the major axis of earth orbit Kepler's third law and fact that earth's orbital period is  $T = 365.256$  days.

Use:  $G = 6.6726 \times 10^{-11} \frac{\text{Nm}^2}{\text{kg}^2}$ .  $M = 1.99 \times 10^{30}$  kg.  $\pi = 3.14$ . Recall that  $1N = \frac{1kg}{m^2}$ . The length of the major axis of earth orbit is \_\_\_ km.

#### Solution:

The Kepler's third law states

$$T^2 = \frac{4\pi^2}{GM} a^3$$

Thus the major axis

$$a = \sqrt[3]{\frac{GMT^2}{4\pi^2}} = \sqrt[3]{\frac{6.6726 \times 10^{-11} \times 1.99 \times 10^{30} \times (365.256 \times 24 \times 3600)^2}{4 \times 3.14^2}} = 1.497 \times 10^{11} \text{ m}$$

**Answer:**  $1.497 \times 10^{11}$  m

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