

Answer on Question #43412, Physics, Mechanics — Kinematics — Dynamics

If the gravitational force exerted by the planet Saturn on a 560 kg lunar vehicle is $5.83 \cdot 10^3$ N, the radius of Saturn is?

Solution

Gravitational force is equal to weight:

$$F = \frac{GM_{saturn}m_{vehicle}}{R_{saturn}^2}$$

Hence, radius of Saturn is

$$R_{saturn} = \sqrt{\frac{GM_{saturn}m_{vehicle}}{F}} = \sqrt{\frac{6.67 \cdot 10^{-11} \cdot 5.68 \cdot 10^{26} \cdot 560}{5.83 \cdot 10^3}} \approx 60.2 \cdot 10^6 \text{ m} = 60200 \text{ km}$$