Answer on Question # 70913, Physics / Othe

Question   Mars has a mass of $6.42 \cdot 10^{23}$ kilograms and a radius of 3397 kilometers. An astronaut standing on the surface of mars drops a hammer from a height of 1.55 meters. How long does it take the hammer to reach the ground?

Solution   Let us find acceleration of free fall at Mars at its surface.

$$F = G\frac{M_m m}{R^2}$$

$$g = G\frac{M_m}{R^2} = 6.67 \cdot 10^{-11}\frac{6.24 \cdot 10^{23}}{(3397 \cdot 10^3)^2} \approx 3.8m/s^2$$

Now we can find time of free fall from $s = 1.55$ m:

$$s = gt^2/2$$

$$t = \sqrt{\frac{2s}{g}}$$