

Question:

A robot probe lands on a new, uncharted planet. It has determined the diameter of the planet to be 8×10^6 m. It weighs a standard 1 kg mass and determines that 1 kg weighs only 5 newtons on this new planet.

- (a) What must the mass of the planet be?
- (b) What is the acceleration due to gravity on this planet?

Solution:

If the weight of 1 kg mass $W = 5$ N, then this planet g is equal to 5 m/s^2 , as far as $W = mg$. According to the law of gravity $mg = \frac{GmM}{R^2}$, what means $M = \frac{R^2 g}{G} = \frac{64 \cdot 10^{12} \cdot 5}{4 \cdot 6.67 \cdot 10^{-11}} = 1.2 \cdot 10^{24}$ (kg).

The answer:

- a) the mass of the planet equals to $1.2 \cdot 10^{24}$ kg;
- b) the acceleration due to gravity equals to 5 m/s^2 .

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