

# Astronomy Picture of the Day (2007 Oct. 1)

**The Small Cloud of Magellan**

# Advanced Question

## Chap. 4, Q43 in P93

Suppose that you travelled to a planet with 4 times the mass and 4 times the diameter of the Earth. Would you weigh more or less on that planet than on Earth? By what factor?

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## Chap. 4, Q43 in P93

**Answer:**  $\frac{1}{4}$  as much.

Using the Newton's law of universal gravitation

$$F = G \frac{m_1 m_2}{r^2}$$

Weight on Earth of your mass  $m$ :  $F_E = G \frac{mm_E}{r_E^2}$

Weight on the planet of your mass  $m$ :  $F_P = G \frac{mm_P}{r_P^2}$

$$\frac{F_P}{F_E} = \frac{m_P}{m_E} \frac{r_E^2}{r_P^2} = \frac{4}{1} \frac{1^2}{4^2} = \frac{1}{4}$$