ANSWER

SPH 4U

Name: ~~WINTER~~ 2019.

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GRAVITATONAL FIELDS QUIZ

1. A satellite, with a mass of 1000.0 kg, orbits a faraway planet, at a height of 4.5 x 10^6 m above the surface. The satellite experiences a force of gravity equal to 525 N. If the planet has a mass of 7.56 x 10^{30} kg, determine the radius of the planet.

$m_s = 1000.0\,kg$

$h = 4.5\times10^6\,m$

$F_g = 525\,N$

$M = 7.56\times10^{30}\,kg$

$r_p = ?$ } (1)

$F_g = \frac{GMm}{r^2}$ (1)

$F_g = \frac{GMm}{(r_p+h)^2}$ (1)

$(r_p+h)^2 = \frac{GMm}{F_g}$

$\sqrt{(r_p+h)^2} = \sqrt{\frac{GMm}{F_g}}$

$r_p = \sqrt{\frac{GMm}{F_g}} - h$ (1)

$$r_p = \sqrt{\frac{(6.67\times10^{-11}\ Nm^2/kg^2)(7.56\times10^{30}kg)(1000.0kg)}{525N}} - 4.5\times10^6\,m$$

$r_p = 3.09871111\,77\times10^{10}\,m$

$r_p = 3.1\times10^{10}\,m$ (1)