

Question #78331, Physics / Mechanics | Relativity

The earth is suddenly condensed so that its radius becomes $\frac{1}{\sqrt{6}}$ of its original value but its mass remains unchanged. How will its period of daily rotation change? State the underlying principle.

Solution

Kepler's third law:

$$T^2 \sim R^3$$

$$\frac{T'}{T} = \left(\frac{1}{\sqrt{6}}\right)^{\frac{3}{2}} \approx 0.26.$$

$$\frac{T}{T'} = \frac{1}{\left(\frac{1}{\sqrt{6}}\right)^{\frac{3}{2}}} \approx 3.8$$

Thus, its period of daily rotation decreases by 3.8 times.

Answer provided by <https://www.AssignmentExpert.com>