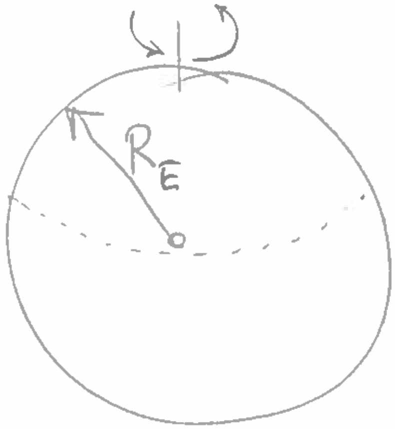


To a good approximation, the Earth is a solid sphere of uniform density, with

$$M_E = 5.98 \times 10^{24} \text{ kg}$$

$$R_E = 6.37 \times 10^{6} \text{ m}$$

It has a moment of inertia one can find in our table of basic shapes:

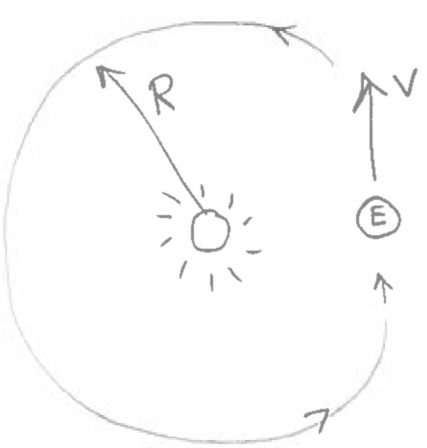
$$I = \frac{2}{5} M_E R_E^2 = 9.71 \times 10^{37} \text{ kg} \cdot \text{m}^2$$

The Earth rotates on its axis with an angular velocity

$$\omega = \frac{2\pi \text{ rad}}{24 \text{ hours}} = \frac{2\pi}{86{,}400 \text{ s}} = 7.27 \times 10^{-5} \ \frac{\text{rad}}{\text{s}}$$

So the Earth's rotational Kinetic energy is

$$\text{Rot KE} = \frac{1}{2} I \omega^2 = \underline{2.57 \times 10^{29} \text{ J}}$$



The Earth also has linear Kinetic energy due to its orbit around the Sun:

$$V = \frac{2\pi R}{\text{period}} = \frac{2\pi \left(1.496 \times 10^{11} \text{ m}\right)}{3.15 \times 10^{7} \text{ s}} = 29{,}790 \ \frac{\text{m}}{\text{s}}$$

Thus the linear KE is

$$\text{Linear KE} = \frac{1}{2} M_E V^2 = 2.65 \times 10^{33} \text{ J}$$

This is much larger than the rotational KE.