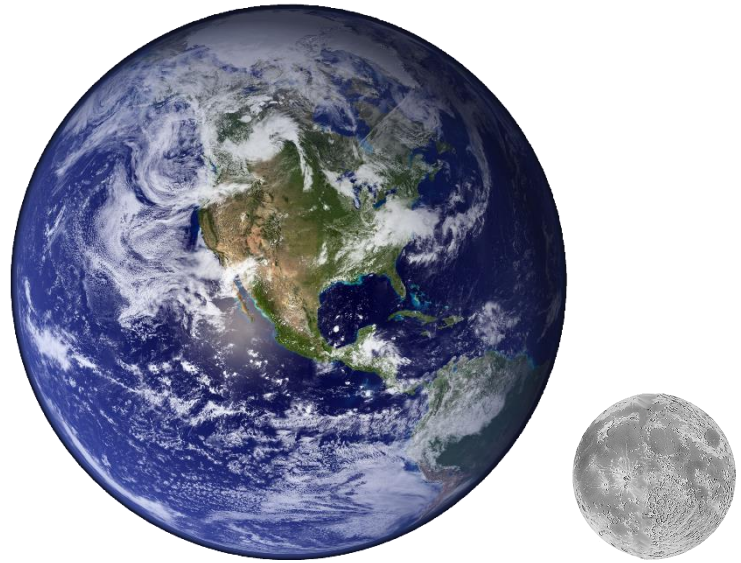


## Going Round

The Earth orbits the Sun in a roughly circular path at an average distance of  $150,000,000\text{km}$  from the Sun, taking around 365 days.

The Moon orbits the Earth in a roughly circular path at an average distance of  $390,000\text{km}$  from the Earth, taking around 27 days.



Which is greater:

- The speed of the Earth around the Sun?
- The speed of the Moon around the Earth?

Justify your answer.

## Going Round SOLUTIONS

*Option 1:*

The Moon takes just 27 days to orbit the Earth, while the Earth takes 365 days to orbit the sun. This means the Moon completes roughly 13.5 orbits in the time it takes the Earth to complete one.

$$\text{Moon: } \frac{1}{27 \times 24 \times 60} = 0.00002572\text{rpm}$$

$$\text{Earth: } \frac{1}{365 \times 24 \times 60} = 0.000001902\text{rpm}$$

$$\Rightarrow \text{Moon} = 13.5 \text{ times faster}$$

*Option 2:*

The Moon travels  $2\pi \times 390,000 \approx 2450442\text{km}$  in 27 days.

The Earth travels  $2\pi \times 150,000,000 \approx 942477796\text{km}$  in 365 days.

$$\text{Moon: } \frac{2450442}{27 \times 24} \approx 3800\text{kmph} \quad \text{Earth: } \frac{942477796}{365 \times 24} \approx 108,000\text{kmph}$$

$$\Rightarrow \text{Earth} = 28.5 \text{ times faster}$$