Answer on Question #54691, Physics / Mechanics | Kinematics | Dynamics

What is the average velocity of the earth the instant it has traveled half of its circular orbit about the sun in m/s?

Solution:

In one-half year, the Earth moves halfway around its orbit, a circle of radius 1.50×10^{11} m centered on the Sun.

Algebraically an **average velocity** is defined as,

$$v = \frac{d}{t}$$

where, d is the displacement and t is the time taken for that displacement.

The displacement is

$$d = 2R = 2 * 1.50 * 10^{11} = 3 * 10^{11} \text{ m}$$

The average length of the year in the modern calendar is 365.2425 days

The time is a half of year

$$t = \frac{1}{2} * 365.2425 \text{ days} * 24 \text{ hours} * 3600 \text{ sec} = 15778476 \text{ s}$$

Thus, the average velocity is

$$v = \frac{3 * 10^{11} \text{ m}}{15778476 \text{ s}} = 19013.2 \frac{\text{m}}{\text{s}} \approx 19 * 10^3 \text{ m/s}$$

Answer: $19 * 10^3$ m/s