

The mass of planet mars is 6.42×10^{23} kg and it orbits 2.28×10^{11} m from the sun. The time period of mars around the sun is 686.98 days. What is the angular momentum of the mars around the sun?

Given:

Mass of mars:	$M = 6.42 \times 10^{23}$ kg
Orbital distance of mars from sun:	$R = 2.28 \times 10^{11}$ m
Time period of mars around sun:	$T = 686.98$ days

Determine: Angular momentum of mars: L

Use formula:

$$L = I\omega \text{-----(1)}$$

Moment of inertia “I” of mars:

$$I = MR^2 = 6.42 \times 10^{23} \times (2.28 \times 10^{11})^2 = 3.3 \times 10^{46} \text{ kgm}^2$$

The angular velocity “ ω ” of mars:

$$\omega = 2\pi / T = (2 \times 3.14) / (686.98 \text{ d} \times 24 \text{ hrs} \times 3600 \text{ s}) \text{ rad/s}$$

Substituting for I and ω in (1):

$$L = (3.3 \times 10^{46}) \times (2 \times 3.14) / (686.98 \text{ d} \times 24 \text{ hrs} \times 3600 \text{ s})$$

$$\mathbf{L = 3.5 \times 10^{39} \text{ kgm}^2 / \text{s}}$$