Angular Momentum of Satellite.

Angular momentum of satellite $L = mvr$

$\Rightarrow$ $L = m\sqrt{\frac{GM}{r}}\, r$ [As $v = \sqrt{\frac{GM}{r}}$]

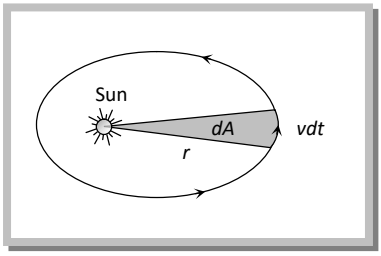
$\therefore$ $L = \sqrt{m^2 GMr}$

i.e., Angular momentum of satellite depend on both the mass of orbiting and central body as well as the radius of orbit.

Important points

(i) In case of satellite motion, force is central so torque = 0 and hence angular momentum of satellite is conserved i.e., $L =$ constant

(ii) In case of satellite motion as areal velocity



$$\frac{dA}{dt} = \frac{1}{2}\frac{(r)(vdt)}{dt} = \frac{1}{2}rv$$

$\Rightarrow$ $\frac{dA}{dt} = \frac{L}{2m}$ [As $L = mvr$]

But as $L =$ constant, $\therefore$ areal velocity (dA/dt) = constant which is Kepler's II law

i.e., Kepler's II law or constancy of areal velocity is a consequence of conservation of angular momentum.