Assume that the particle under the influence of an attractive force$ F(r)$, where $r $is the distance from a fixed point$ O$, then it moves in a plane through $O$ and the equation of motion is
$$\frac{d^{2}u}{dθ^{2}}+u=\frac{F\left({1}/{u}\right)}{h^{2}u^{2}},$$

where $h$ is a constant, $u={1}/{r} $and $θ $is the angle the line from $O$ to the particle makes with some fixed direction in the plane.

A particle of mass 2 moves along the $x$-axis and is attracted towards the origin $O $by a force$ F=-8xi$. If initially the particle is at$x=20$, and is moving to the right with speed 30 find
(a) the position of the particle at time$ t$,
(b) the speed and the velocity of the particle at time$ t$,
(c) the amplitude, period and frequency of the oscillations.