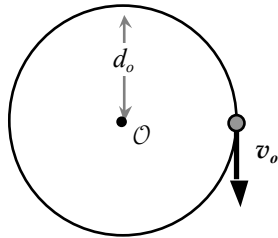


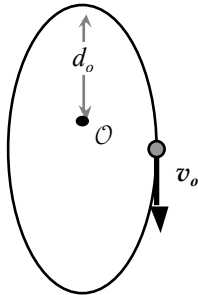
1. In each top view diagram shown below, an object of mass m moves with *constant speed* v_o along a flat, horizontal path. In each case, the origin \mathcal{O} of a coordinate system is located at a distance d_o from at least one point along the path.

For each case, does the angular momentum of the particle (relative to \mathcal{O}) remain constant as the particle moves? Explain your reasoning in each case.

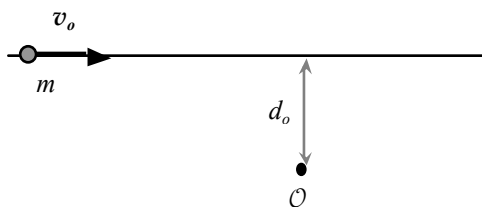
Case 1



Case 2



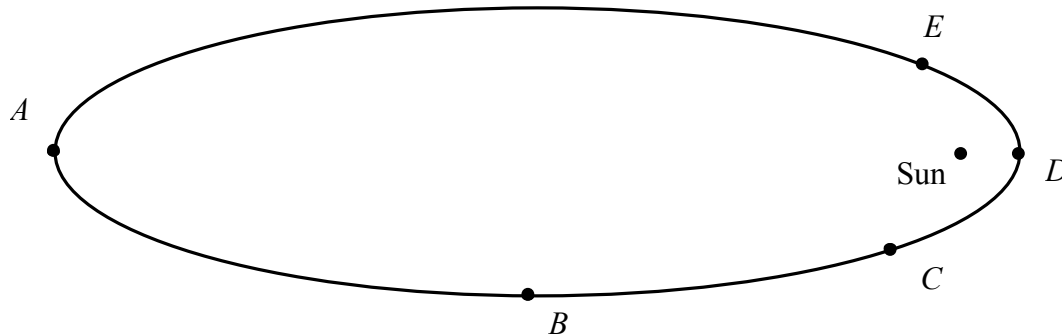
Case 3



(continued on other side)

Pretest: Angular momentum and Kepler's second law

2. Consider a comet that orbits the sun in the orbit shown below. Several points ($A-E$) are labeled along the orbit. (*Note: This is not a strobe photograph of the motion.*)



Top view diagram

- a. For each of the labeled points, is the comet moving with *increasing speed*, *decreasing speed*, or *constant speed* at that point? Explain the reasoning in each case.
- b. Rank the points $A - D$ according to the *angular momentum* of the comet (as measured relative to the center of the Sun) as it passes those points. Explain the reasoning you used to determine your ranking.