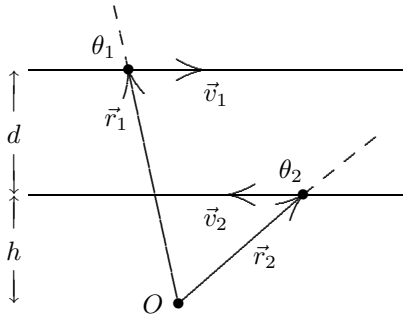
27. (a) The diagram below shows the particles and their lines of motion. The origin is marked O and may be anywhere. The angular momentum of particle 1 has magnitude $\ell_1 = mvr_1 \sin\theta_1 = mv(d+h)$ and it is into the page. The angular momentum of particle 2 has magnitude $\ell_2 = mvr_2 \sin\theta_2 = mvh$ and it is out of the page. The net angular momentum has magnitude $L = mv(d+h) - mvh = mvd$ and is into the page. This result is independent of the location of the origin.



(b) As indicated above, the expression does not change.

(c) Suppose particle 2 is traveling to the right. Then $L = mv(d+h) + mvh = mv(d+2h)$. This result depends on h, the distance from the origin to one of the lines of motion. If the origin is midway between the lines of motion, then $h = -d/2$ and $L = 0$.