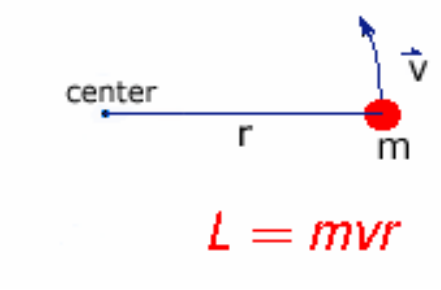
Angular Momentum

TRIKKE tech



Objects executing motion around a point possess a quantity called angular momentum. This is an important physical quantity because all experimental evidence indicates that angular momentum is rigorously conserved in our Universe: it can be transferred, but it cannot be created or destroyed. As the adjacent figure illustrates the magnitude of the angular momentum in this case is $L = mvr$, where L is the angular momentum, m is the mass of the small object, v is the magnitude of its velocity, and r is the distance to the center point.

Ice Skaters and Angular Momentum

This formula indicates one important physical consequence of angular momentum: because the above formula can be rearranged to give $v = L/(mr)$ and L is a constant for an isolated system, the velocity v and the separation r are *inversely correlated*. Thus, conservation of angular momentum demands that a decrease in the separation r be accompanied by an increase in the velocity v, and vice versa. This important concept carries over to more complicated systems: generally, for rotating bodies, if their radii decrease they must spin faster in order to conserve angular momentum. This concept is familiar intuitively to the ice skater who spins faster when the arms are drawn in, and slower when the arms are extended; although most ice skaters don't think about it explicitly, this method of spin control is nothing but an invocation of the law of angular momentum conservation.

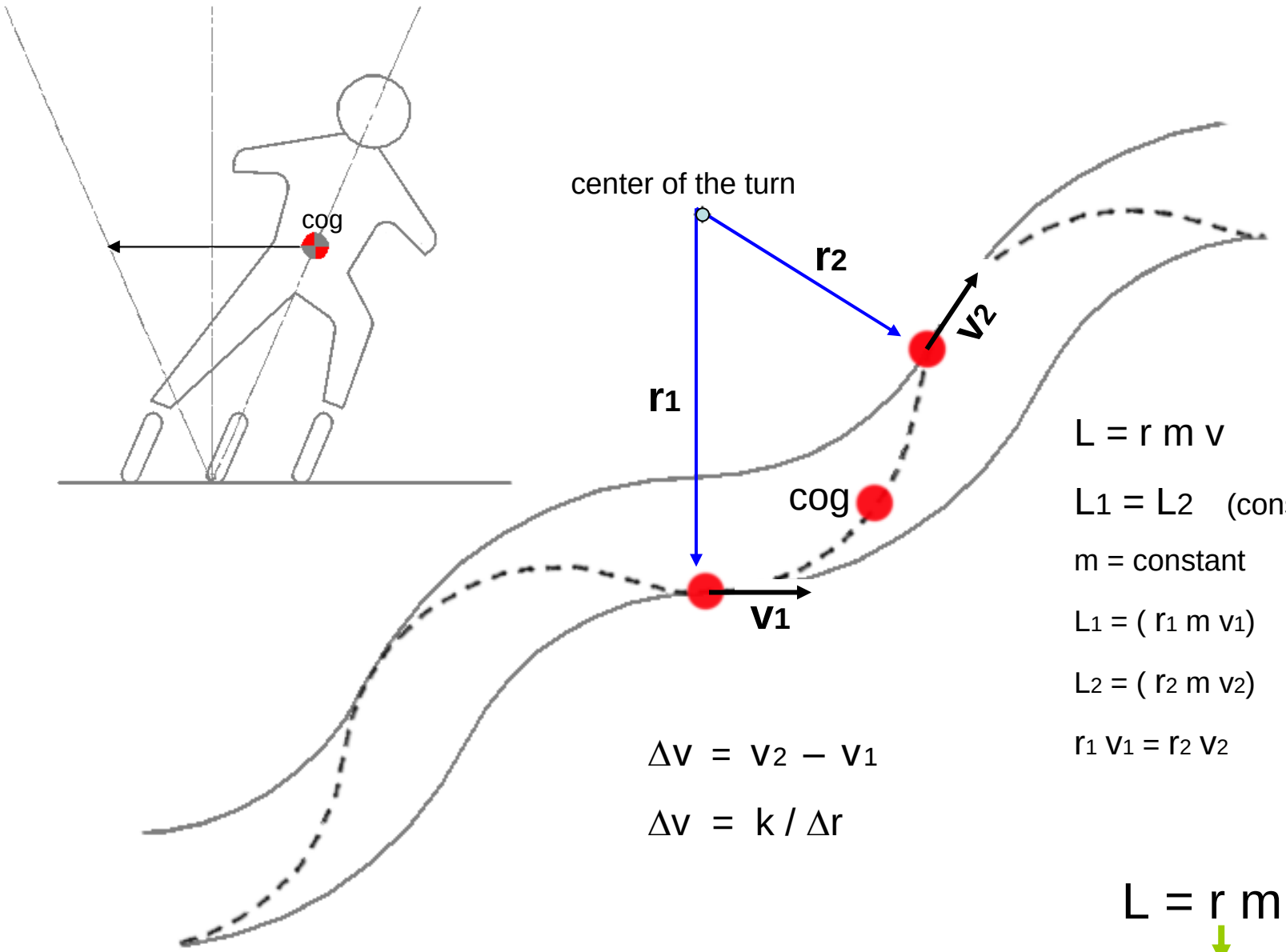
TRIKKE Physics

With <u>trikke</u> there are two ways to speed up:

a) Moving the center of gravity (cog) towards the center of the turn (legs work).

b) Shortening the radius through the handlebar action (arms work).

Because of the friction with the surface, tires, bearings and air resistance, the rider must keep working – transfer energy to overcome the drag. Without energy loss (drag), the speed would increase infinitely with each stroke ($\Sigma\Delta v$).
The energy input from the rider may be accumulated in form of altitude gain (uphill).



$\Delta v = v_2 - v_1$

$\Delta v = k / \Delta r$

$L = r\ m\ v$

$L_1 = L_2$ (conservation)

m = constant

$L_1 = (r_1\ m\ v_1)$

$L_2 = (r_2\ m\ v_2)$

$r_1\ v_1 = r_2\ v_2$

$L = r\ m\ v$

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