

32. Denoting the new speed of the car as v , then the new speed of the man relative to the ground is $v - v_{\text{rel}}$. Conservation of momentum requires

$$\left(\frac{W}{g} + \frac{w}{g}\right) v_0 = \left(\frac{W}{g}\right) v + \left(\frac{w}{g}\right) (v - v_{\text{rel}}) .$$

Consequently, the change of velocity is

$$\Delta \vec{v} = v - v_0 = \frac{w v_{\text{rel}}}{W + w} .$$