

63. We choose coordinates with $+x$ East and $+y$ North, with the standard conventions for measuring the angles. With SI units understood, we write the initial magnitude of the man's momentum as $(60)(6.0) = 360$ and the final momentum of the two of them together as $(98)(3.0) = 294$. Using magnitude-angle notation (quickly implemented using a vector capable calculator in polar mode), momentum conservation becomes

$$\begin{aligned}\vec{p}_{\text{man}} + \vec{p}_{\text{child}} &= \vec{p}_{\text{together}} \\ (360 \angle 90^\circ) + \vec{p} &= (294 \angle 35^\circ)\end{aligned}$$

Therefore, the momentum of the 38 kg child before the collision is $\vec{p} = (308 \angle -38^\circ)$. Thus, the child's velocity has magnitude equal to $308/38 = 8.1$ m/s and direction of 38° south of east.