9.16. **Model:** Choose skydiver + glider to be the system in the impulse approximation.

**Visualize:**

Note that there are no external forces along the \( x \)-direction (ignoring friction in the impulse approximation), implying conservation of momentum along the \( x \)-direction.

**Solve:** The momentum conservation equation \( p_i = p_f \) is

\[
(680 \text{ kg} - 60 \text{ kg})(v_{\text{g}x})_i + (60 \text{ kg})(v_{\text{D}x})_i = (680 \text{ kg})(30 \text{ m/s})
\]

Immediately after release, the skydiver’s horizontal velocity is still \((v_{\text{D}x})_i = 30 \text{ m/s}\). Thus

\[
(620 \text{ kg})(v_{\text{D}x})_i + (60 \text{ kg})(30 \text{ m/s}) = (680 \text{ kg})(30 \text{ m/s}) \Rightarrow (v_{\text{D}x})_i = 30 \text{ m/s}
\]

**Assess:** The skydiver’s motion in the vertical direction has no influence on the glider’s horizontal motion.