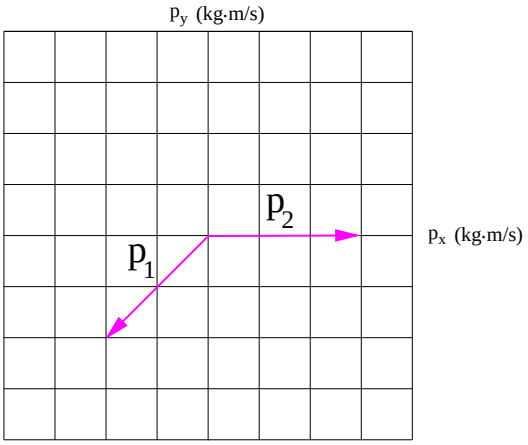
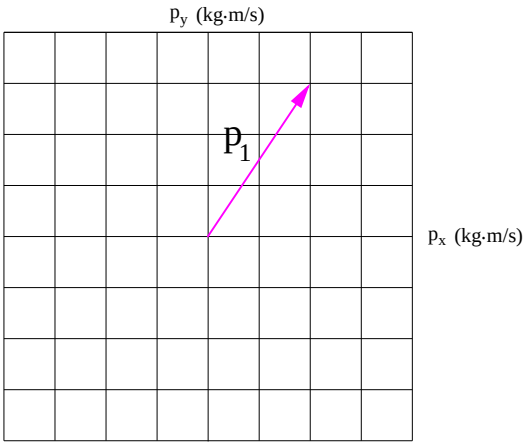
In 1-3, the sum of external forces is small enough to ignore.

1. An object initially at rest explodes into three fragments. The momentum vectors of two of the fragments are shown. (a) Draw $\vec{p}_3$, the momentum of the third fragment. Explain your drawing.



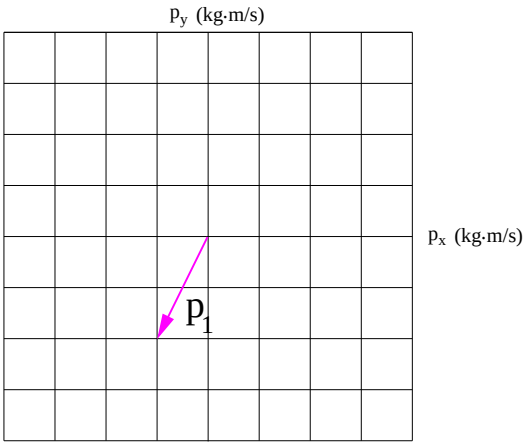
(b) If each of the three fragments has a mass of 2.0 kg, then how much mechanical energy was added to the three-fragment system by the explosion? One unit on the graph is 1.0 kg·m/s.

2. A 500-g ball traveling to the right at 8.0 m/s collides with and bounces off another ball, which was at rest. The figure shows the momentum vector $\vec{p}_1$ of the first ball after the collision. (a) Draw $\vec{p}_2$, the momentum of the second ball. One unit = 1.0 kg·m/s. Explain your drawing.



(b) If the collision is elastic (*i.e.* no mechanical energy lost), find the mass of the second ball.

3. A 500-g puck traveling to the right at 4.0 m/s collides with a second puck, initially at rest. The collision detonates one of a series of percussion caps taped around the moving puck. The figure shows the momentum vector $\vec{p}_1$ of the first puck after the little explosion. (a) Draw $\vec{p}_2$, the momentum of the second puck. One unit = 1.0 kg·m/s. Explain.



(b) If the mass of the second puck is 2.0 kg, how much mechanical energy did the little explosion add to the two-puck system?