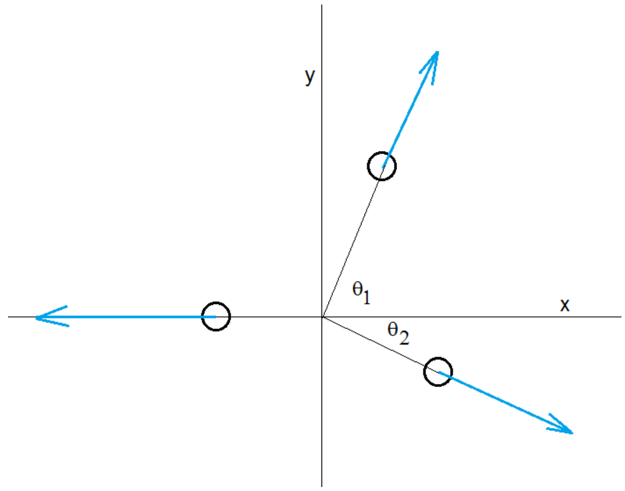
7-4

Analytical mathematical solution:

Let x be East and y be North.
Forces acting vertically do not affect the horizontal components of momentum.
No external forces in the horizontal direction. Use conservation of momentum.
Given that the masses and final speeds are all the same.
θ_1 and θ_2 are the angles that the momentum vectors of masses 1 and 2 (respectively) make with the +x axis, assuming one above and the other below.



y: $0 = mv\sin\theta_1 - mv\sin\theta_2$
$\sin\theta_1 = \sin\theta_2$
$\theta_1 = \theta_2$
(although it is conceivable that they are supplementary)
x: $0 = -mv + mv\cos\theta_1 + mv\cos\theta_2$
$1 = 2\cos\theta_2$
$\cos\theta_2 = {}^1/_2$
$\theta_2 = 60^o$ and so then does θ_1. So, one of the pucks moves 60^o north of east and the other 60^o south of east.

Graphical solution:

The initial total momentum is zero, so the final total momentum must also be zero. So, the three individual momentum vectors add to zero, which means they form a triangle when placed 'tip to tail.' Since all vs and ms are the same, the lengths of the arrows representing the momentum vectors are equal, so we have an equilateral triangle. This then tells us that the three vectors point in directions that are 120^o from each other. So, one of the pucks moves 60^o north of east and the other 60^o south of east.