Two particles with identical mass \( m \) are moving in 2 dimensions. There is no friction, gravity, or any external forces. The particles have different speeds \( v_1 \) and \( v_2 \) and their velocities make the same angle \( \theta \) from the x-axis as shown.

After the collision, the particle stick together, and move with velocity \( v \) at an angle \( \phi \) from the x-axis.

Calculate the initial velocities \( v_1 \) and \( v_2 \) in terms of \( v \) and the angles \( \theta \) and \( \phi \).

\[
v_1 = \ldots
\]

\[
v_2 = \ldots
\]