## Physics 30 Worksheet \# 4: Conservation of Momentum (2)

1. A 1000 kg car traveling South at $20.0 \mathrm{~m} / \mathrm{s}$ collides with a 1200 kg car traveling East at $20.0 \mathrm{~m} / \mathrm{s}$. The two vehicles entangle after the collision and head off as one. What is the velocity of the combined wreckage immediately after the collision?
2. A 1500 kg car traveling West at $90.0 \mathrm{~km} / \mathrm{h}$ collides with a 1400 kg truck traveling North at $72.0 \mathrm{~km} / \mathrm{h}$. The two vehicles entangle after the collision and head off as one. What is the velocity of the wreckage immediately after the collision?
3. A 4.00 kg ball traveling North with a momentum of $11.2 \mathrm{~kg} . \mathrm{m} / \mathrm{s}$ collides with a 6.0 kg ball traveling West with a momentum of $18 \mathrm{~kg} . \mathrm{m} / \mathrm{s}$. The two balls stick together and head off as one. What is the momentum of the combined masses? What is the velocity of the combined masses?
4. A 400 kg bomb sitting at rest on a table explodes into three pieces. A 150 kg piece moves off to the East with a velocity of $150 \mathrm{~m} / \mathrm{s}$. A 100 kg piece moves off with a velocity of $200 \mathrm{~m} / \mathrm{s}$ [ $30.0^{\circ} \mathrm{S}$ of W ]. What is the velocity of the third piece?
5. A bomb sitting at rest on a table explodes into four pieces of equal mass. The first piece travels to the South at a velocity of $55.0 \mathrm{~m} / \mathrm{s}$. The second piece travels to the West at a velocity of $80.0 \mathrm{~m} / \mathrm{s}$. The third piece travels at a velocity of $40.0 \mathrm{~m} / \mathrm{s}\left[30.0^{\circ} \mathrm{W}\right.$ of N$]$. What is the velocity of the fourth piece?
6. A 200 kg bomb moving at a velocity of $10.0 \mathrm{~m} / \mathrm{s}$ to the West explode into three pieces. The first piece has a mass of 100 kg and moves to the West with a velocity of $90.0 \mathrm{~m} / \mathrm{s}$. The second piece has a mass of 55.0 kg and moves at an angle of $30.0^{\circ} \mathrm{N}$ of $E$ with a velocity of $55.0 \mathrm{~m} / \mathrm{s}$. What is the velocity of the third piece?
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7. A stationary 300 kg puck is struck by a 200 g puck moving with a velocity of $2.00 \mathrm{~m} / \mathrm{s}$ West. After the collision, the 200 g puck has a velocity of $1.00 \mathrm{~m} / \mathrm{s}$ [ $53.0^{\circ} \mathrm{N}$ of W]. Calculate the velocity of the 300 g puck.
8. Two balls of equal mass are involved in a glancing collision. Before the collision, the first ball is moving at a velocity of $1.00 \mathrm{~m} / \mathrm{s}$ East and the second ball is at rest. After the collision, the first ball is moving at a speed of $5.50 \times 10^{-1} \mathrm{~m} / \mathrm{s}\left[24.0^{\circ} \mathrm{S}\right.$ of E$]$. The second ball heads off at an angle of $24.2^{0} \mathrm{~N}$ of $E$. What is the speed of the second ball after the collision?
