2D Conservation of Momentum

Example Problems

Ex 1: A 9-kg sled slides across a frictionless pond at 6 m/s. A 3-kg book is dropped on top of it and lands with a speed of 4 m/s. The impact of the book is not enough to break the ice. At what speed does the sled travel with the book on board?

Ex 2: A 1700-kg car traveling north at 11 m/s collides with a 2000-kg truck traveling east at 18 m/s. Find the speed of the wreckage if the collision is perfectly inelastic.

Ex 3: A 22-kg stationary bomb explodes into four pieces: 2 kg goes west at 3 m/s, 4 kg goes east at 6 m/s, 7 kg goes north at 4 m/s.
A) What is the mass of the last piece?
B) In what general direction does the last piece travel?
C) What is the speed of the fourth piece?
D) What is the exact direction in which it travels?

Ex 4: Three cars collide at an intersection. One car has a mass of 1500 kg and is traveling 14 m/s E. The second car has a mass of 1000 kg and is traveling 18 m/s N. The third car has a mass of 1200 kg and is traveling 12 m/s S.

If the cars stick together upon impact, what is the final velocity of the wreckage?