Worksheet momentum solutions

**1.** A car with a mass of 1Mg is at rest at a stoplight. When the light turns green, the car's engine applies a force resulting in a net force of 2kN acting on the car to the east for 10s.

**a)** Calculate the acceleration that the car experiences.

**b)** Calculate the impulse on the car.

**c)** Calculate the final velocity of the car at the end of the 10 seconds.

**d)** Calculate the initial momentum of the car.

**e)** Calculate the final momentum of the car.

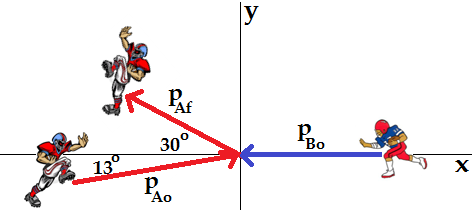
**f)** Calculate the change in momentum and compare this value to the value you got in part **b)**.

Notice that the change in momentum is equal to the impulse. This is always the case.

Also notice that the units .

**2.** Football player A is running due east when he jumps into the air at a 13o angle slamming into football player B's head with his lower torso. Football player B was running due west. After the collision, football player B comes to a halt while player A flies north west at a 30o angle from the horizontal.

**a)** Draw this situation. Label the angles and the momentum vectors.



**b)** Is this collision elastic or inelastic, and how do you know?

This is an elastic collision due to the football players bouncing off each other.

**c)** Describe this situation algebraically using these two equations: ∑pox = ∑pfx ∑poy = ∑pfy