

5. If the golf ball moves in the direction opposite to its initial direction but with the same speed, its momentum will be of the same magnitude but of the opposite sign. Therefore the final momentum will be

$$p_f = - 1.8 \text{ kg m / s}$$

The change in momentum is defined as the difference between the final momentum and the initial momentum or

$$\Delta p = p_f - p_i$$

$$\Delta p = - 1.8 \text{ kg m / s} - 1.8 \text{ kg m / s} = - 3.6 \text{ kg m / s}$$

Note that the magnitude of the change in momentum is exactly twice the initial momentum, but that it has a sign opposite to that of the initial momentum. In a sense the tree had to "take away" the initial momentum and then had to "add" an equal amount of momentum in the opposite direction.