

Impulse Problems

Level 3 Physics

January 2013

1. The fastest recorded baseball pitch was thrown by Nolan Ryan in 1974 with a speed of 45.0 m/s. Determine the impulse required to give a 0.145 kg baseball such a momentum.
2. Tom lost his balance after trying to make a lay-up when playing basketball and collided with the padded wall behind the basket. His 74-kg body went from 7.6 m/s to 0 m/s in 0.16 seconds.
 - (a) What was the average force acting on Tom's body?
 - (b) If Tom had hit a concrete wall instead, the time of the collision would have been 0.0080 seconds. What would have been the average force acting on Tom's body in that case?
3. Caroline, who has a mass of 48.5 kg is jumping on a trampoline and her vertical momentum is reduced (but does not change direction) by three resistive impulses with the trampoline. Prior to the series of impulses, her body is moving downward at 8.20 m/s. On the first impulse, Caroline experiences an average upward force of 230 N for 0.65 seconds. The second impulse of 112 N*s lasts for 0.41 seconds. The last impulse involves an average upward force of 116 N which causes an 84 kg*m/s momentum change. What vertical velocity does Caroline have after these three impulses?