

PHYSICS 11 MOMENTUM ETC. WORKSHEET 1

1. A 75 g mouse runs across the floor with a speed of 2.6 m/s. What is its momentum?
2. What is the impulse of a 55 N force exerted over a time interval of 1.0 ms (= 0.001 s)?
3. a) What impulse is needed to change the speed of a 10.0 kg object from 12.6 m/s to 25.5 m/s?
b) If the impulse takes place in a time interval of 5.00 s, what force acts on this object?
4. a) What impulse must act on a 100 g baseball to change its velocity from 40.0 m/s to -50.0 m/s?
b) If the impulse takes place in 1.20 ms, what force has acted on the baseball?
5. An unbalanced force of 25 N acts for 5.0 s on an object originally at rest. If the object has a mass of 0.150 kg,
a) what impulse is delivered to the object?
b) what speed does the object obtain at the end of the 5 seconds?
6. When Roger Federer serves a tennis ball, it leaves his racket with a velocity of 65.0 m/s. If the ball's mass is 60.0 g and is in contact with the racket for 0.030 s,
a) what is the average force on the ball?
b) what is the impulse of this force?
7. A mass of 6.3 kg, traveling at 6 m/s, is given an impulse of -31.5 N·s. What is the velocity of the mass after the impulse?
8. A 90.0 kg fullback is running at a speed of 5.0 m/s and is stopped by a tackler in 0.5 s. Calculate:
a) the original momentum of the fullback.
b) the impulse imparted to the tackler.
c) the average force exerted on the tackler.
9. a) Calculate the impulse "suffered" by a 70.0 kg man who lands on firm ground after jumping from a height of 5.0 m. (hint: first find the speed at which the man hits the ground by using kinematics)
b) What average force would be exerted on the man in the collision if he bent his knees and absorbed the fall over 0.15 s?
c) What average force would be exerted on the man in the collision if he locked his knees and absorbed the fall over 0.0002 s?

1. 0.195 kg·m/s 2. 0.055 N·s 3. a) 129 N·s b) 25.8 N 4. a) -9.0 N·s b) -7500 N 5. a) 125 Ns b) 833 m/s
6. a) 130 N b) 3.9 N·s 7. 1.0 m/s 8. a) 450 kg·m/s b) -450 N·s c) -900 N 9. a) -693 N·s b) -4620 N
c) -3.465×10^6 N