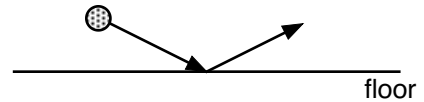


Momentum & Impulse

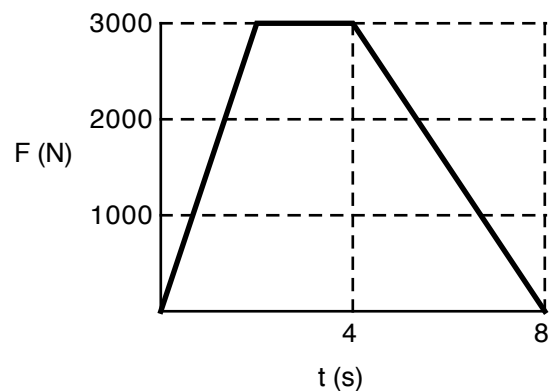
1. A 5.0 kg object with a speed of 30 m/s hits the floor at an angle of 45° and rebounds with the same speed and angle. What is the change (magnitude and direction) of momentum of the ball (relative to the floor.)



2. A 3 kg ball with an initial velocity of $15\mathbf{i}$ m/s experiences an impulse of $-20\mathbf{i} + 30\mathbf{j}$ Ns over a time interval of 0.04 seconds. What is the final velocity of the ball?

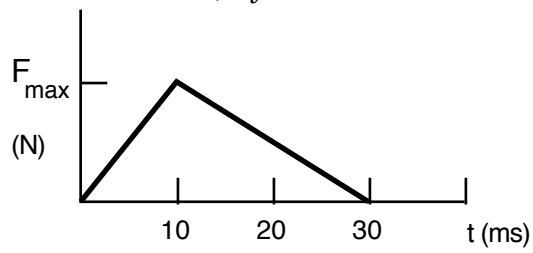
3. A super ball (mass = 0.035 kg) is thrown with a velocity of 15 m/s into a wall. It bounces back with a speed of 10 m/s. The ball and wall were in contact for only 0.02 seconds. What was the magnitude of the average force of the wall on the ball?

4. A 1500 kg car traveling at 10 m/s somehow experiences a net force as shown in the diagram. (The force is in the direction that the car was moving.) What is the final speed of the car?



Momentum & Impulse

5. A tennis ball of mass 0.1 kg bounces off a wall. It had an original speed of 30 m/s and bounces straight backwards with a speed of 20 m/s. The magnitude of the force versus time graph showing the impulse of the wall on the tennis ball is shown. What was the maximum force on the tennis ball? (*Pay attention to the units on the graph.*)



Answers:

- | | |
|--|---------------------------------------|
| 1) 212 kg•m/s, $\perp$ and away from surface | 2) $8.3\mathbf{i} + 10\mathbf{j}$ m/s |
| 3) 43.75 N | 4) 20 m/s 5) 333 N |