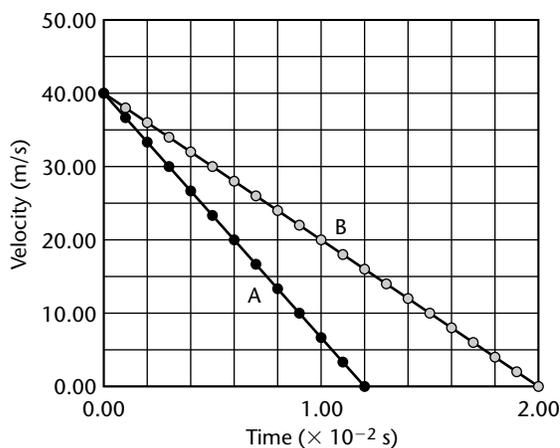


9 Momentum and Its Conservation

- A 26.0-g arrow leaves a bowstring at a velocity of +46 m/s.
 - What is the impulse on the arrow?
 - What is the average force that the string exerts on the arrow if the string is in contact with the arrow for 6.0×10^{-3} s?
 - What average force does the arrow exert on the string during this interval?
- The v - t graph below shows the velocity changes of a 0.145-kg baseball as it is caught by player A and then by player B.

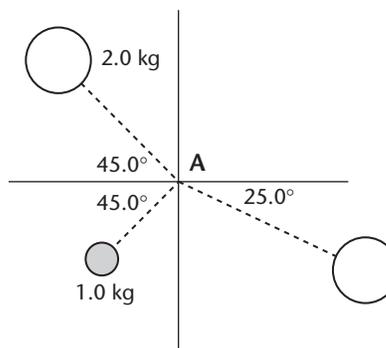


- Plot an F - t graph showing the impulse each player exerts on the ball.
- Explain which player more likely pulled back (moved in the direction of the ball) his glove while catching the ball.

- After dropping from a height 1.50 m onto a concrete floor, a 50.0-g ball rebounds to a height of 0.90 m.
 - Find the impulse acting on the ball as it dropped.
 - Find the impulse acting on the ball on its rebound.
 - Find the impulse on the ball while it was in contact with the floor.
- A 180-kg crate is sitting on the flatbed of a moving truck. The coefficient of sliding friction between the crate and the truck bed is 0.30. Two taut cables are attached to either side of the crate. Each cable can exert a maximum horizontal force of 650 N either forward or backward if the crate begins to slide. If the truck stops in 1.8 s, what is the maximum speed the truck could have been moving without breaking the cables?
- A single uranium atom has a mass of 3.97×10^{-25} kg. It decays into the nucleus of a thorium atom by emitting an alpha particle at a speed of 2.10×10^7 m/s. The mass of an alpha particle is 6.68×10^{-27} kg. What is the recoil speed of the thorium nucleus?
- A 62-kg boy on a 1.50-kg skateboard moving at +1.2 m/s steps off and lands on the sidewalk with a velocity of +1.1 m/s. How fast is the skateboard moving?

9 Momentum and Its Conservation

7. A 60.0-kg girl with two 4.0-kg bricks is sitting on frictionless ice. She throws both bricks at the same time forward at a velocity of 6.00 m/s relative to her. What is the velocity of the girl?
8. The girl in Problem 7 throws one brick and then the other each with a velocity of 6.00 m/s relative to her. What is the velocity of the girl after she throws the second brick?
9. A boy and a dog are standing on a 110-kg diving raft in the middle of a lake. Just as the 55-kg boy dives off the raft with a horizontal velocity of 4.0 m/s due east, the 22-kg dog leaps off the raft horizontally with a velocity of 5.0 m/s due north. What is the resulting velocity of the raft?
10. A 2.00-kg puck moving to the right at a velocity of 6.00 m/s at an angle of 45.0° below the horizontal collides at point A with a 1.00-kg puck traveling to the right at a velocity of 3.00 m/s at an angle of 45.0° above the horizontal as shown below.



After the collision the 2.0-kg puck moves toward the right a velocity of 4.50 m/s at an angle of 25.0° below the horizontal. What is the velocity of the 1.0-kg puck immediately after the collision?