

## Recoil Problems

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1. A 500 kg cannon fires a 5 kg ball forward at 80 m/s. What was the final velocity of the cannon?
2. John is sitting in a boat and throws a rock north at 30 m/s. John and the boat (total mass 130 kg) move south at 2 m/s. What is the mass of the rock?
3. Mary (40 kg) and Larry (60 kg) are competing in the Ice Dancing Championship. They begin their routine with Mary pushing off on Larry. If Larry travels at 0.85 m/s, what is Mary's velocity?
4. A 50 g bullet is fired from a 1.2 kg gun with a speed of 150 m/s.
  - a. What is the recoil velocity of the gun?
  - b. Which experiences a greater force, the gun or the bullet?
  - c. Which experiences a greater change in velocity?
  - d. Which experiences a greater acceleration?
  - e. Which experiences a greater impulse?
5. Bonnie (60 kg) and Ronnie (45 kg) are on a row boat (25 kg) in the middle of a lake. For some unknown reason, Bonnie jumps off the front of the boat with a speed of 2 m/s and Ronnie jumps off the back with a speed of 1.5 m/s. What is the resultant speed of the boat?

Answers:

- 1) 0.8 m/s, backwards    2) 8.67 kg    3) 1.28 m/s, opposite direction    4. a) 6.25 m/s    b) same  
c) bullet    d) bullet    e) same    5) -2.1 m/s