Supplementary Problem VI for Physics 6

A professor of physics is going ice skating for the first time. He has gotten himself into the middle of an ice rink and cannot figure out how to make the skates work. Every motion he makes simply slips on the ice and leaves him in the same place he started. He decides that he can get off the ice by throwing his gloves in the opposite direction.

a) Suppose the professor has a mass M and his gloves have a mass m. He throws them as hard as he can away from him, and they leave his hand with a velocity v. Explain why he will move, in terms of momentum and in terms of the forces acting on him.

b) Calculate the professor's velocity, V, after he throws the gloves. Your answer should be in terms of the given quantities, M, m, and v. Do not put in any numbers at this point.

c) If the ice rink is 10 m in diameter and the professor starts in the center, **estimate** how long it will take him to reach the edge, assuming there is no friction at all. (This time, your answer should be a numerical value. Clearly show how you made the estimate and what you assumed.)