

Class 30: More collisions

Classwork

Problem 1: A 90.5 -kg ice hockey player hits a 0.16 -kg puck, giving the puck a velocity of 48.5 m/s.

Part (a) If both are initially at rest and if the ice is frictionless, how far, in centimeters, does the player recoil in the time it takes the puck to reach the goal, 16 m away?

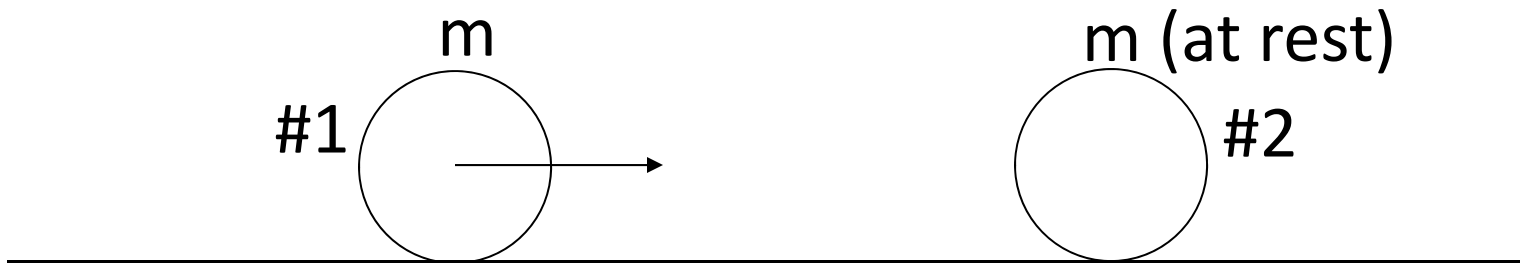
Test 3

1. Next Wednesday (April 8) 11:00-11:50 in this class room.
2. Energy and momentum.
3. No formula or cheat sheet.
4. 8 multiple choice problems (5 points each) and 2 long (30 points each) problems. Total 100 points.
5. Calculators allowed, but not the program function (though I don't think it will help).
6. Please bring photo ID.
7. No reschedule of test even though you have more than two tests that day.

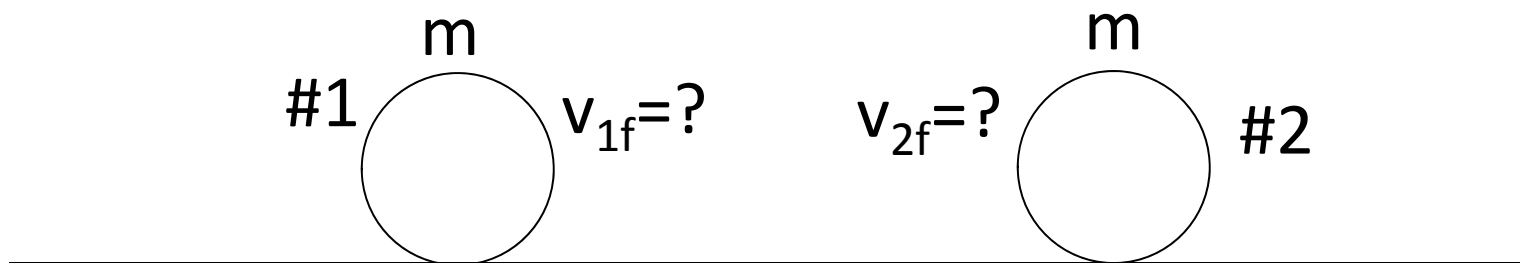
Example 4

Balls have equal mass

Before collision:



After collision:

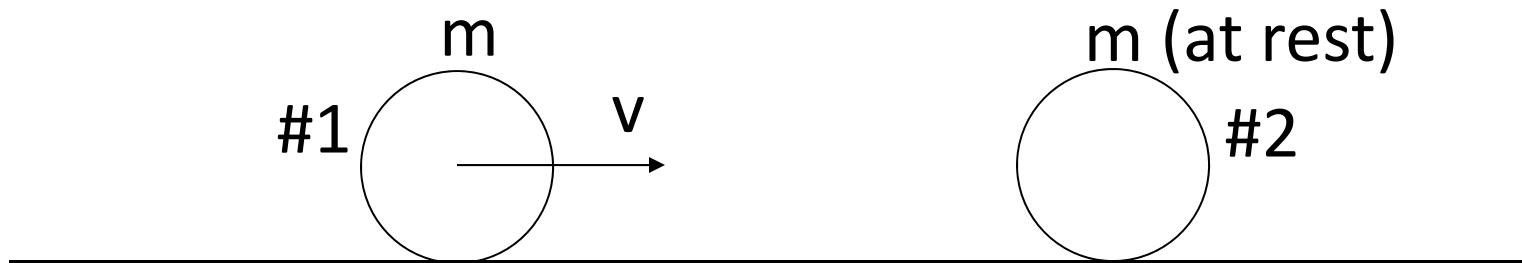


What are V_{1f} and V_{2f} if this is an elastic collision?

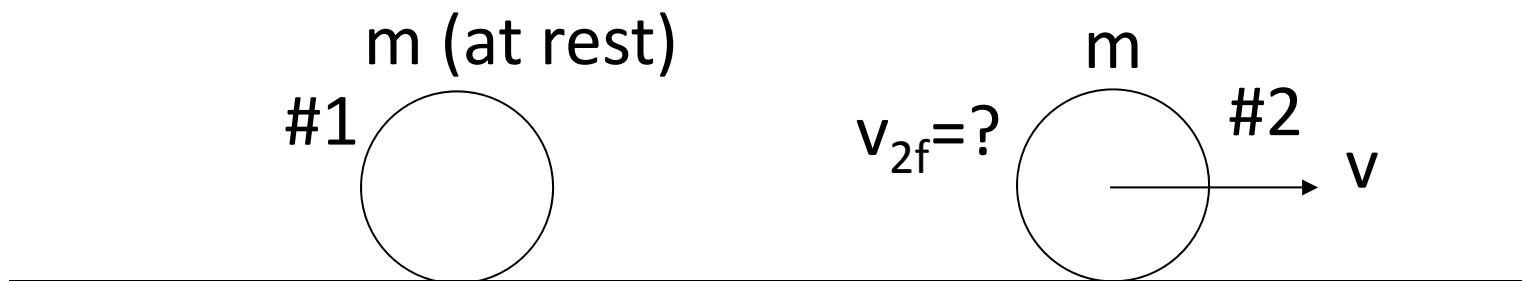
Observation 1

In an *elastic collision*, if the two object have equal mass

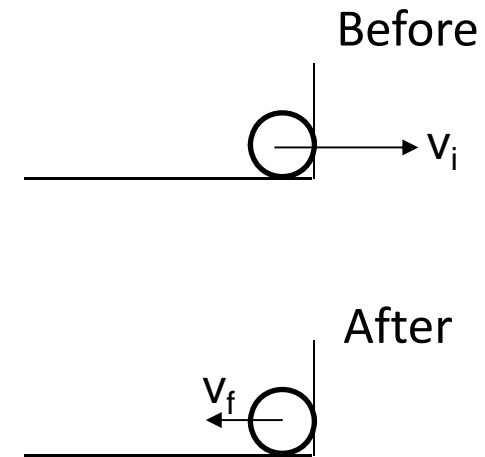
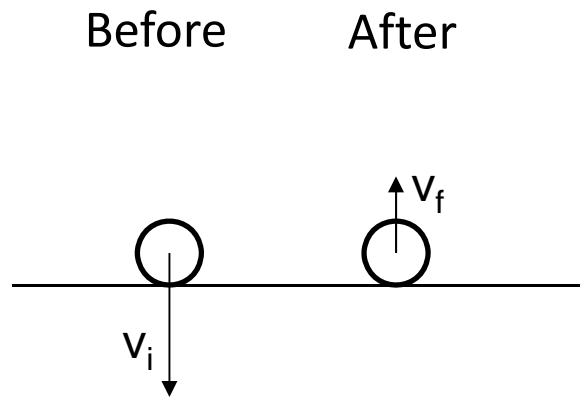
Before collision:



After collision:



Observation 2



In collisions with floor or wall (1D), the floor or the wall can be considered as a particle of infinite mass. The velocity of the floor or the wall is undetermined unless you know the value of e . This velocity cannot be ignored no matter how small it is, because $\infty \times 0 = \text{a finite number!}$

Observation 3



In collisions between a big mass M and a small mass m , the magnitude of momentum transfer between the two masses is the same ($M\Delta v_M = -m\Delta v_m$) because of conservation of momentum. As a result, $|\Delta v_m|$ is big and $|\Delta v_M|$ is small.

