Students' centre of mass

Aim: To show that the centre of mass (CM) will not move when only internal forces are acting.

Subjects: 1D40 (Motion of the Center of Mass)

Diagram:

Equipment:

- Two light carts, easy rolling.
- Rope, l=10m.
- Light student.
- Heavy student.

Presentation: The two carts are situated in front of the lecturehall, one on the right side, the other left. The two students (volunteers) stand each on their own cart; they hold the rope. Knowing the students' masses, the CM can be determined. This position is marked on the floor. Now one of the students (or both) gently hauls in the rope. The carts will hit apporximately at the CM.

Explanation: The CM of a system of particles represents the average position of those particles. So, seen from the CM $m_1r_1+m_2r_2+....=0$: The larger the mass (m), the smaller r will be. Since there are no external forces acting, the CM will not be displaced as this demonstration verifies.

Sources:

- Mansfield, M and O'Sullivan, C., Understanding physics, pag. 128