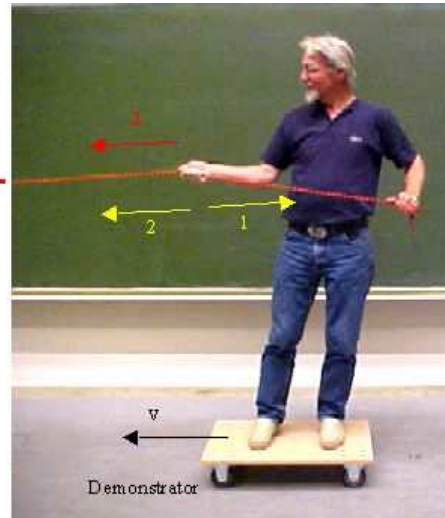
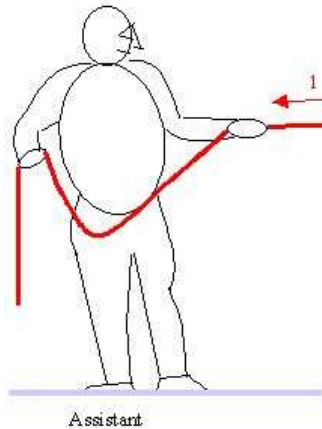


Who is pulling?

Aim: To show the reality of Action=-Reaction.

Subjects: 1H10 (Action and Reaction)

Diagram:



- Equipment:
- Light cart, easy rolling.
 - Rope, $l=10\text{m}$.
 - An assistant to the demonstrator.

Presentation: The demonstrator and his assistant are standing each at one side of the lecture hall. Each of them holds the end of the rope. The demonstrator steps on the cart. His assistant hauls in the rope and the cart with demonstrator is approaching the assistant. The point of departure is retaken by the demonstrator and his cart. But now the demonstrator on his cart hauls in the rope. Again the cart with demonstrator is approaching the assistant. (A variation to the last demonstration can be shown when instead of the assistant holding the rope, it is tied to the wall.)

Explanation: The demonstration shows that the effect of pulling by either the assistant or demonstrator is the same: the cart + demonstrator moves towards the assistant: The resultant force has in both situations to be directed towards the assistant. So in both cases the rope pulls the demonstrator towards the assistant (see Diagram; red arrows: first demonstration; yellow arrows: second demonstration). The yellow arrows show Newton's third law. (And all arrows apply in both demonstrations!)

Sources:

- [Mansfield, M and O'Sullivan, C., Understanding physics](#), pag. 119