

Name: \_\_\_\_\_

Peer Leader: \_\_\_\_\_

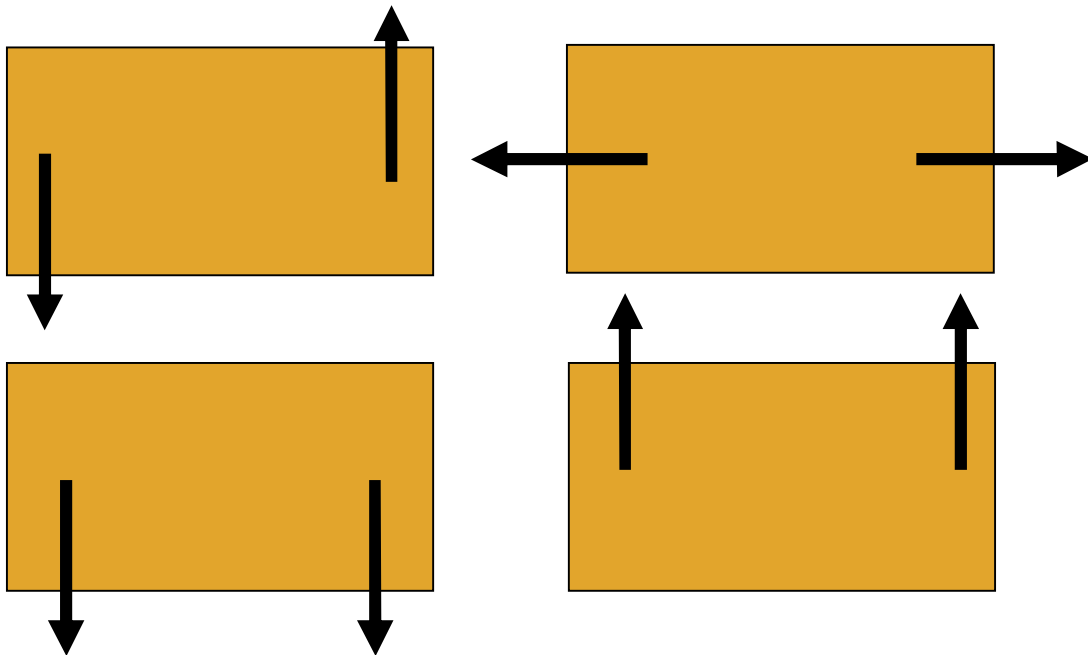
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## Static Equilibrium

This workshop focuses on the understanding of the conditions of static equilibrium and solving problems with static equilibrium situations.

### I. Conditions of Static Equilibrium

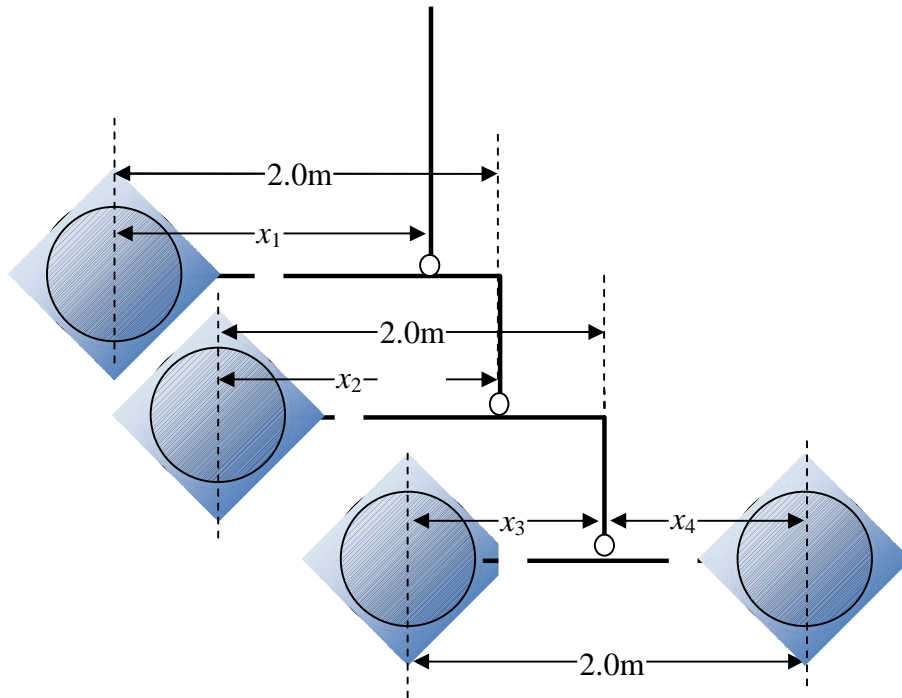
Your teacher decides to illustrate the conditions of equilibrium by allowing pairs of students to apply identical horizontal forces on 4 tables on wheels. The figure below shows each table with the respective applied forces.



Identify which table(s) is(are) in equilibrium and for each case explain why or why not.

2. Below is a sketch of a mobile similar to the one in the NEIU student union.

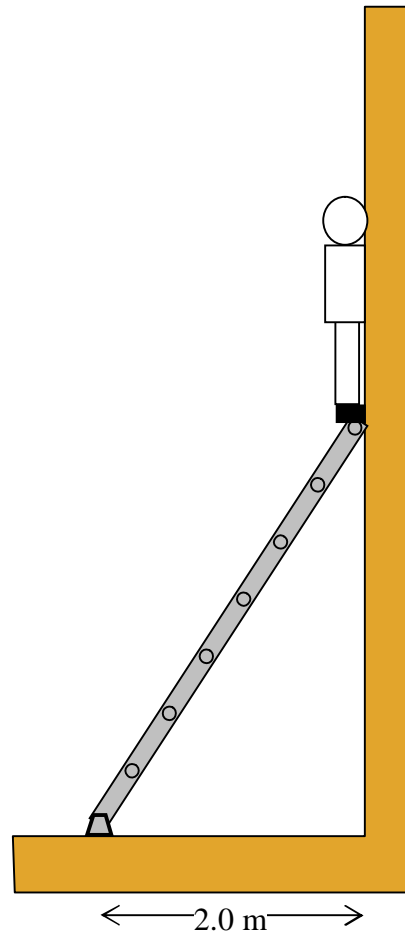
- a) Assuming that each disc has equal mass of 10kg and the mobile is in static equilibrium determine the distances from the center of the disc to the supporting cable for each of the elements of the mobile. (neglect the weight of the crossbars)



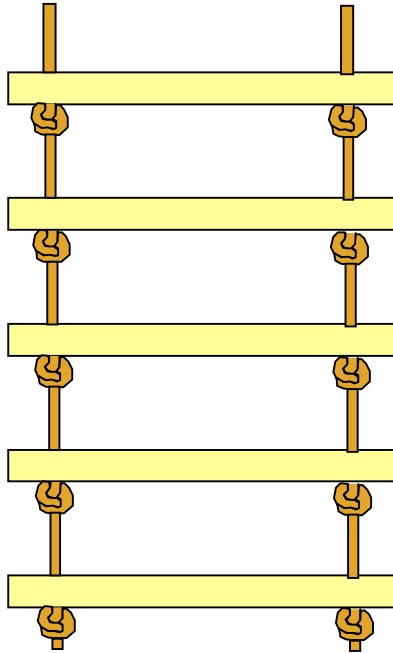
- b) Would the distances change if you double the mass of each disc? (**explain your answer**)

Phys 211 – Physics 1 Seminar  
Module 8 – v1

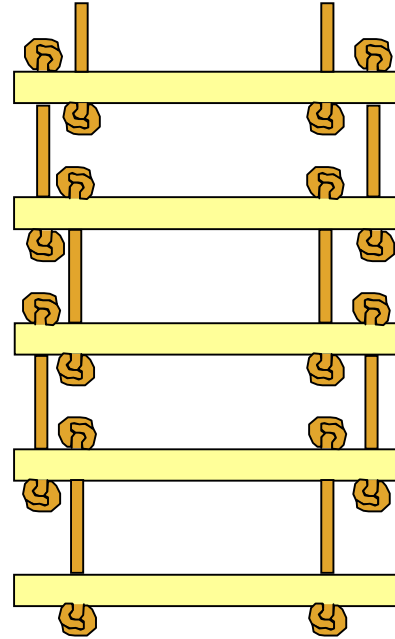
3) Consider a 5.0 m long ladder propped against the wall as in the figure below. The ladder has a mass of 12.0 kg and the coefficient of friction between the ladder and the floor is 0.35. Is it safe for a 75.0 kg painter to stand on the top rung of the ladder? **Justify your answer.**



4) You are designing hanging shelves using heavy boards and ropes. The shelves will be supported by knots on the rope. You have two choices of design. The first one you have a single rope and the knots are at the bottom of the shelf (Fig.1). In the second one each pair of shelves is supported by ropes with knots at the top and the bottom (Fig. 2).



**Fig.1- Shelf design 1**



**Fig.2 – Shelf design 2**

a) Assuming that each shelf weighs 10 kg and should support 50 kg of additional weight. What is the force in each of the knots in designs 1 and 2?

b) Which is a safer shelf design? **Explain your answer.**