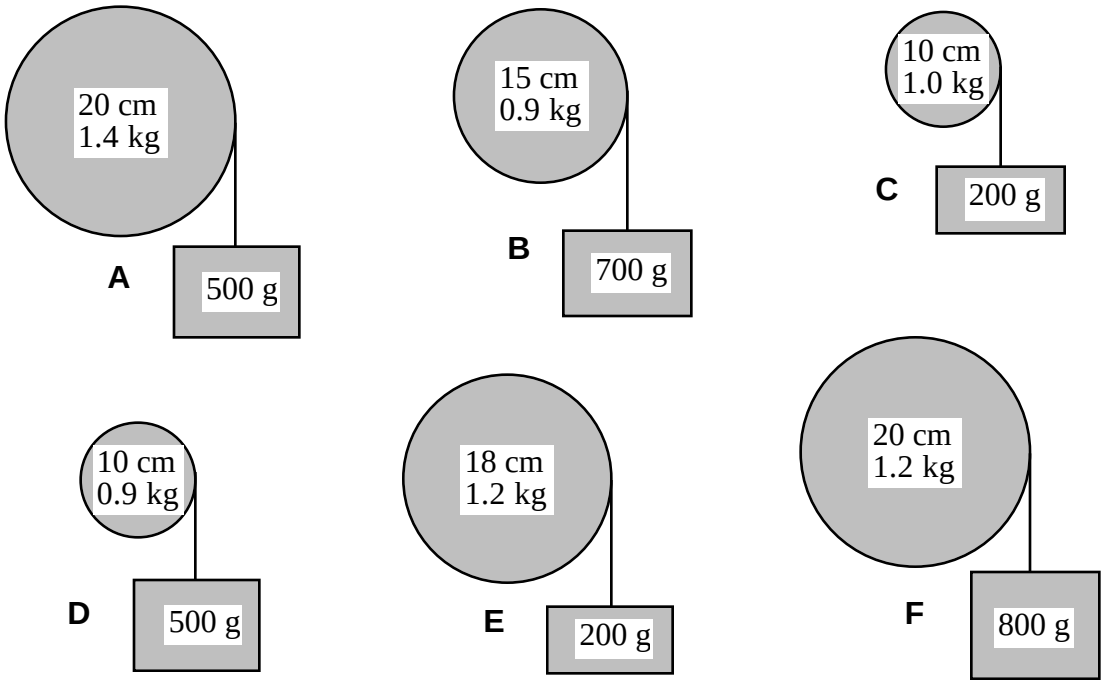
Hanging Weights and Fixed Disks—Torque[90]

Shown below are six situations where vertically oriented circular disks have strings wrapped around them. The other ends of the strings are attached to hanging masses. The radii of the disks, the masses of the disks, and the masses of the hanging masses all vary. The disks are fixed and are *not* free to rotate. Specific values of the variables are given in the figures.

Rank these situations, from greatest to least, on the basis of the magnitude of the torque on the disks. That is, put first the situation where the disk has the greatest torque acting on it and put last the situation where the disk has the least torque acting on it.



Greatest 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ Least

Or, all of these disks have the same torque acting on them. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

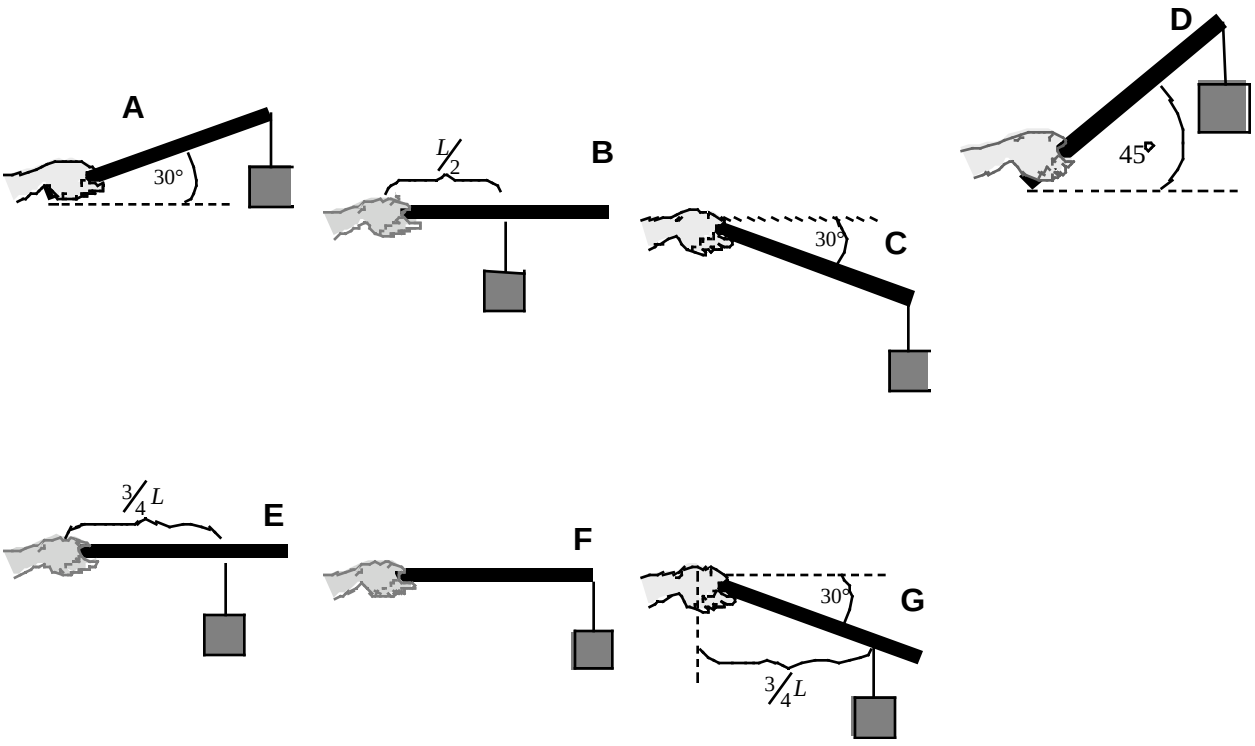
Basically Guessed				Sure				Very Sure	
1	2	3	4	5	6	7	8	9	10

[90] C. Hieggelke, D. Maloney, T. O'Kuma

Statics—Difficult to Hold I [95]

Shown below are seven situations where a student is holding a meter stick at the left end at various angles. A 1000 g mass is hung on the meter sticks at different locations. All of the meter sticks are identical, but the distance along the meter stick at which the 1000 g mass is hung and the angles at which the student holds the meter stick vary. Specific values are given in each figure. (Ignore the mass of the meter stick.)

Rank these situations, from greatest to least, on the basis of how difficult it would be for the student to hold the meter stick from the left end in the position shown. That is, put first the situation where it would be hardest to hold the meter stick at the angle shown and put last the situation where it would be easiest to hold it at the angle shown.



Hardest 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ Easiest

Or, it would be equally difficult to hold all seven of these meter sticks as shown. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

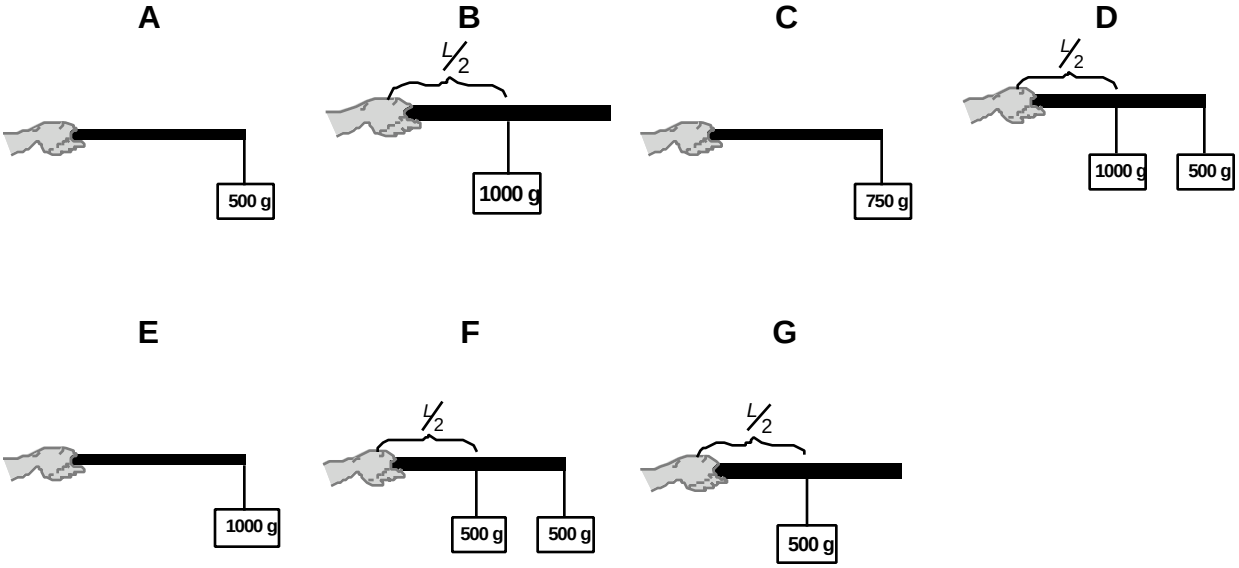
Basically Guessed				Sure				Very Sure	
1	2	3	4	5	6	7	8	9	10

[95] C. Hieggelke, D. Maloney, T. O'Kuma

Statics—Difficult to Hold II [96]

Shown below are seven situations where a student is holding a meter stick straight out horizontally. All of the meter sticks are identical, but the number, mass, and locations (either at the 50 cm mark or at the other end of the meter stick from the student) of the objects hung on the sticks vary. The specific values and locations are given in each figure.

Rank these situations, from greatest to least, on the basis of how difficult it would be for the student to keep the meter stick from rotating. That is, put first the situation where it would be hardest to hold the meter stick horizontal and put last the situation where it would be easiest to hold it horizontal.



Hardest 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ Easiest

Or, it would be equally difficult to hold all seven of these meter sticks as shown. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

Basically Guessed				Sure				Very Sure	
1	2	3	4	5	6	7	8	9	10

[96] C. Hieggelke, D. Maloney, T. O'Kuma