

**Activity 2.1.5 Calculating Moments**

Introduction

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| Why would the Leaning Tower of Pisa be more likely to fall over with a group ofpeople on the top floor rather than the bottom floor? The people weigh no more or less on one floor than the other. This is because the tower is anchored at the bottom. If the towerfell, the top would rotate around the base where it is pivoted. As more weight gathers at the top of the tower,a greater tendency to rotate exists because the weight has shifted further from the base. Suchforce is referred to as a moment. Engineers must be able to understand and calculate moments. Sometimes they need large moments to performwork, but they also must account for all moments inherent in any system in order to be sure that the design is safe and functions as intended. | j0428499[1] |

Equipment

* Calculator
* Meter stick
* Scientific mass or known weight
* Digital scale

Procedure

You will explore firsthand the relationship between forces and distances as they are applied to a rigid object. In this activity you will be required to keep a meter stick level as varying moments are applied to the meter stick. For the purpose of this activity, the weight of the meter stick is not considered. You can either balance the mass on the stick or hang the mass from a string.

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| 1. Locate an appropriate scientific or known mass. Verify and recordthe value of the mass. \_\_\_2 lbs= N\_\_\_\_\_\_ 2. Position a team member with their elbows bent downward and arms positioned upward. The team member’s hands should be positioned at chest level. 3. Have the team member secure the ruler in their hands so that it is pointing straight away from their chest and level. The 0 cm mark should be positioned in the team member’s hands. |  |

1. With the team member supporting the meter stick and acting as a fixed support, position the mass at the 7.5cm mark on the ruler.
   1. Is the team member able to keep the ruler level?
   2. Calculate the moment experienced by the team member.
2. With the team member supporting the ruler and acting as a fixed support, position the mass at the 15cm mark on the ruler. Calculate the moment experienced by the team member.
   1. Is the team member able to keep the ruler level?
   2. Calculate the moment experienced by the team member.
3. With the team member supporting the ruler and acting as a fixed support, position the mass at the 20cm mark on the meter stick. Calculate the moment experienced by the team member.
   1. Is the team member able to keep the ruler level?
   2. Calculate the moment experienced by the team member.
4. With the team member supporting the ruler and acting as a fixed support, position the mass at the 25cm mark on the ruler. Calculate the moment experienced by the team member.
   1. Is the team member able to keep the ruler level?
   2. Calculate the moment experienced by the team member.

Conclusion

1. Calculate the moment if you were to hold a 15 lb bowling ball with your arm straight out and your forearm perpendicular to your body. What is the pinned connection?
2. Why are clockwise moments considered negative when they are summed with counterclockwise moments?