

**Physics Web Quest: Torque**

Name \_\_\_\_\_  
Period \_\_\_\_\_

Open the Physics Animations Folder

Open **torque** ( <http://phet.colorado.edu/simulations/sims.php?sim=Torque> )

Part I: Torque

1. Click the tab at the top that says torque
2. Set the force equal to 1 N.
3. Click Go let this run for at least 10 seconds
4. What is the torque on the wheel (include direction).
  
5. What eventually happens to the lady bug? \_\_\_\_\_
6. From Newton's second law, a force will cause an \_\_\_\_\_
7. When considering angular motion, a torque will cause an \_\_\_\_\_  
\_\_\_\_\_ (consider both torque equations)
8. What must be the centripetal force that keeps the lady bug moving in a circle?  
\_\_\_\_\_
9. Why does this force eventually fail? \_\_\_\_\_  
\_\_\_\_\_
10. Reset all, and set the force back to 1 N.
11. Observe the acceleration vector as you start. Describe how it changes. \_\_\_\_\_  
\_\_\_\_\_
12. Will the acceleration vector ever point directly to the center? \_\_\_\_\_ Why /  
Why not? (the next steps might help you answer this question) \_\_\_\_\_  
\_\_\_\_\_
13. Reset all. Set the force back to 1 N.
14. Hit start, wait about 2 seconds, and set the brake force to 1 N. Hit enter and observe.
15. Describe the motion of the wheel: \_\_\_\_\_
16. What happened to the acceleration vector? \_\_\_\_\_ Why?  
\_\_\_\_\_  
\_\_\_\_\_
17. What is the net torque? \_\_\_\_\_
18. Reset all. Set the Force back to 1 N. Hit Start.
19. After a few seconds, set the brake force equal to 3N and hit enter.
20. Right after you set the break force, calculate the net torque (check with the graph):
  
21. Eventually the disc stops and the net torque is zero. This is because the breaking torque changed as you can see in the graph. Why did it change?



### Part III

1. Click the Angular Momentum tab at the top.
  2. Set the scale of the moment of inertia and angular momentum graphs to show a range of 2 to -2.
  3. Set the angular speed to be 45 degrees / s.
  4. What is the SI unit for angular momentum? \_\_\_\_\_
  5. Calculate the angular momentum in SI units (you should have already calculated the moment of inertia in part II).
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6. While the disk is moving, change the inner radius to 2.
  7. Observe the graphs.
  8. Changing the inner radius automatically changes the angular velocity to 36 degrees / s. Why? (mention moment of inertia and angular momentum in your answer).