

# Center of Gravity

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

Concepts:

- 1) What does the center of gravity or center of mass mean?
  
- 2) Why are there two terms for this concept?

Conceptual Questions:

- 3) Describe the motion of the center of gravity of an object that is thrown through the air on earth.
  
- 4) Describe the motion of a person doing a cartwheel down the hallway.
  
- 5) Does the moon rotate about the earth or the earth rotate about the moon?
  
- 6) What does it mean if a distant star wobbles off center?
  
- 7) Why does the Leaning Tower of Pisa not fall over?
  
- 8) How far can an object be tipped before it will fall over?
  
- 9) What is the purpose of toes?
  
- 10) Why do you spread your feet apart if your riding on a bumpy bus?
  
- 11) Why can you not successfully bend over and touch your toes?
  
- 12) Explain the difference between stable, neutrally stable, metastable and unstable equilibrium.

Exercises:

- 13) What is the equation for center of mass in the x direction?

Find the center of mass of the following:

- 14) 50 kg at 2 m  
30 kg at 3.5 m  
70 kg at 7.5 m

- 15) 2 kg at .6 m  
4.5 kg at .8 m  
1 kg at 1.23 m

- 16) .6 kg at .1 m  
1.6 kg at .6 m  
9 kg at 13 m

- 17) mass of the moon =  $7.36 \times 10^{22}$  kg at 400,000,000 meters  
mass of the earth =  $5.98 \times 10^{24}$  kg at 0 meters