

Chapter 10 Center of Gravity

# Center of Gravity

## Pre-Test - Post-Test

1. On a balanced seesaw, a boy three times as heavy as his partner sits \_\_\_\_\_.
  - A)  $1/3$  the distance from the fulcrum.
  - B) less than  $1/3$  the distance from the fulcrum.
  - C) more than  $1/3$  the distance from the fulcrum.
  
2. Two people are balanced on a seesaw. What will happen to side A if the person on side B leans toward the center?
 

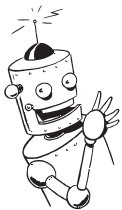
A) rise.	C) stay the same.
B) fall.	D) not enough information.
  
3. If you balance a broom horizontally on one finger, the center of gravity of the broom will be above your finger-closer to the broom end than the handle end. If you saw the broom in two pieces at that point, and weigh the two parts on a weighing scale, you'll find that the heavier part is the \_\_\_\_\_.
 

A) bristle end.	C) both weigh the same.
B) handle end.	
  
4. Toss a baseball bat into the air and it wobbles about its. \_\_\_\_\_.
 

A) light end.	C) center of mass.
B) heaviest point.	D) geometrical center.
  
5. An object will fall over if its center of gravity is \_\_\_\_\_.
 

A) too high.	C) outside the object.
B) not over its area of support.	D) too low.
  
6. The Leaning Tower of Pisa doesn't topple over because its center of gravity is
  - A) above a place of support.
  - B) relatively low for such a tall building.
  - C) stabilized by its structure.
  - D) displaced from its center.
  - E) in the same place as its center of mass.
  
7. If a box of granite stones of different size were shaken, small stones would soon migrate to the bottom. The reason this happens is that \_\_\_\_\_.
  - A) the mass of the box is lowered.
  - B) the center of gravity of the box is lowered.
  - C) small stones are heavier than larger stones.
  - D) smaller objects fall faster than larger objects.

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**Chapter 10 Center of Gravity**

**Center of Gravity**

**Torque**

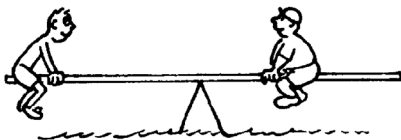
1. Why does a ball roll down a hill?
2. How do you make an object change its state of rotation?
3. Explain a Torque.
4. What is the formula for torque?

5. Why do top fuel dragsters have such long front ends?

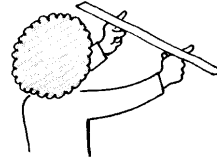


**Balanced Torque**

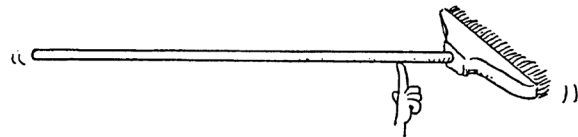
6. What does the term balanced torques mean? State mathematically.
7. Is it possible to play seesaw with someone who is lighter or heavier than you?



8. Rest a meter stick on two fingers as shown. Slowly bring your fingers slowly together. At what part of the stick do your fingers meet?



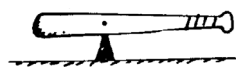
9. Which half of the broom weighs more, the bristle-end or the sawed-off handle?



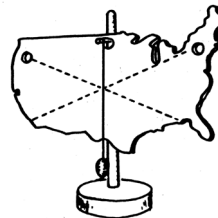
10. How do the clockwise and the counterclockwise torques compare when a system is balanced?

**Center of Mass/Gravity**

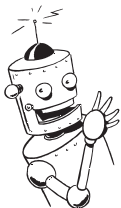
11. Where is an object's center of mass located?



12. How do you locate the center of mass?

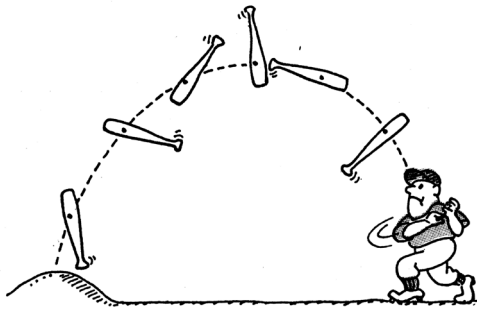


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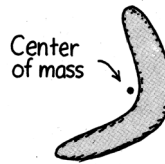


**Chapter 10 Center of Gravity**

13. Toss a baseball bat into the air and it appears to wobble all over the place. Specifically, what place?

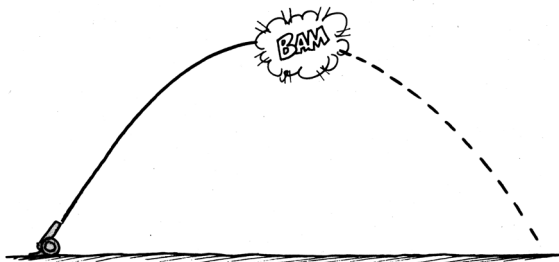


18. Give an example of an object where the center of mass is located at a point where there is no mass.



19. Why is the wobbly motion of a single star an indication that the star has a planet or system of planets?

14. A cannon ball is shot into the air and explodes. What happens to the object's center of gravity?



20. What is the objective when balancing a car tire?

21. Why do some high-jumpers arch their bodies into a U-shape when passing over the high bar (the Fosbury flop)? centrifugal force, explain.

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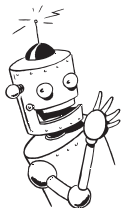
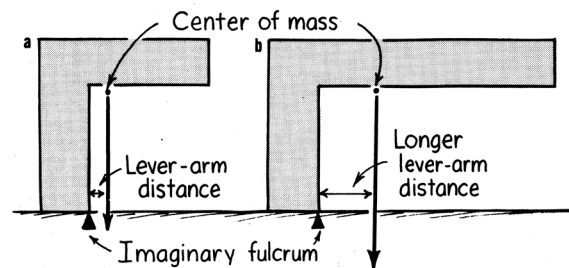
15. What is the difference between a cheap ping-pong ball and an expensive one?

16. Why was Doc Fizzix's baseball career cut short at a young age?

17. Where is the most comfortable seat to be in on a bus when traveling on a bumpy road?

**Toppling/Stability**

22. Sometimes what seems like an easy question to answer turns out to be the hardest, why do object fall over?

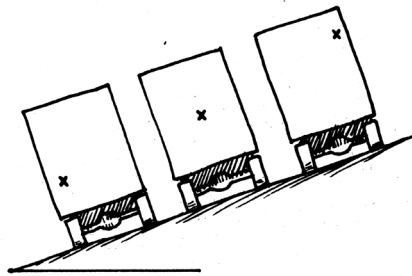


**Chapter 10 Center of Gravity**

23. Why is it dangerous to roll open the top drawers of a fully loaded file cabinet that is not secured to the floor?

28. How are today's modern sky scrapers designed in order to avoid falling?

24. Circle the truck that is most likely to topple over.

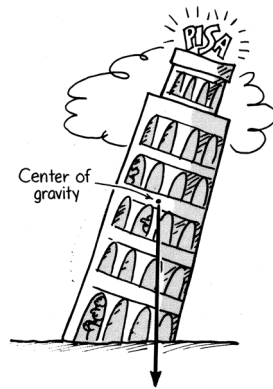


29. Why is it easier to carry two buckets of water, one in each arm, rather than one bucket with the same amount of water?

30. Explain why a long pole that sags can be beneficial to a tight rope walker.



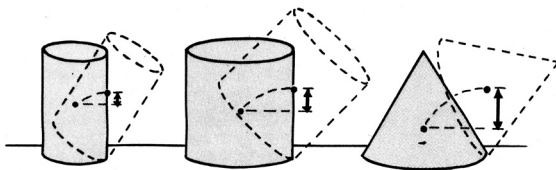
25. How far can the Leaning Tower of Pisa lean before it falls?



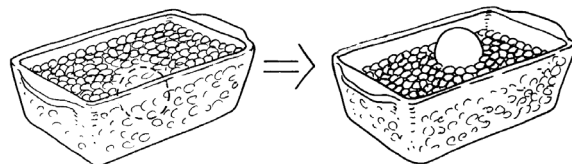
31. Mr. Balmer performs a demonstration in which a ball rolls up hill, explain.

32. You ever throw dice and they keep coming up "7's"? Where is the CG of the dice?

26. What is the most stable position of an object?



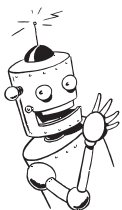
33. How would you get the prize out of a box of cereal without emptying the box?



27. Why don't Weebles fall down?

34. Explain how panning for gold works.

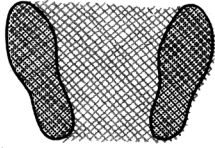
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**Chapter 10 Center of Gravity**

**CG of People**

35. Why do you stand with your feet far apart when you are standing on a bus?

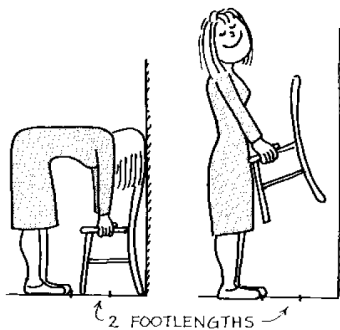


36. On what does the location of a person's center of gravity depend?

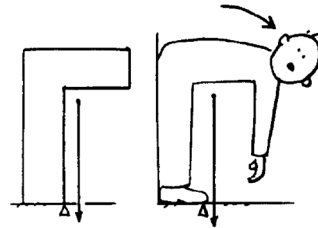
37. Compare the location of the center of mass of males and females.

38. With your toes against a wall, try to stand on your toes without toppling backward. Explain why it can't be done.

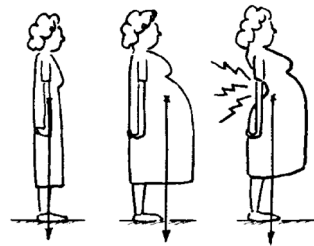
39. Try the following with a group of males and females. Stand exactly two foot lengths away from a wall. Bend over with a straight back and let your head lean against the wall. Then lift a chair that is placed beneath you while your head is still leaning against the wall. With the chair lifted, attempt to stand up. Give a reason why females can generally do this and males cannot.



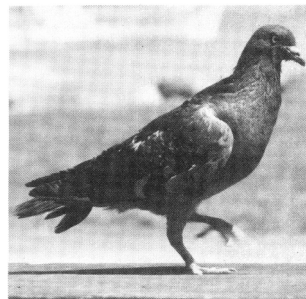
40. One year Doc Fizzix had a student do the impossible task of touching her toes while her heels were against a wall, how was she able to complete the challenge?



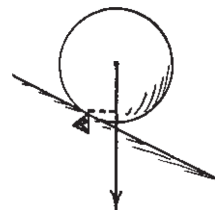
41. What two inventions did Doc Fizzix come up with to help his wife through her pregnancy?



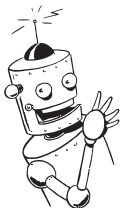
42. Why do some animals have tails?



43. Sometimes what seems like an easy question turns out to be the hardest. Why does a ball roll down a hill?



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