

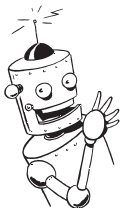
Chapter 9 Circular Motion

# Centripetal Force

## Pre-Test - Post-Test

- Which has greater linear speed, a horse near the outside rail of a merry-go-round or a horse near the inside rail?
  - The outside horse.
  - The inside horse.
  - Both have the same linear speed.
- If the Earth rotated slower about it's axis, your apparent weight would \_\_\_\_\_.
  - increase.
  - decrease.
  - stay the same.
- A person weighs less at the equator than at the poles. The reason for this has to do with the \_\_\_\_\_.
  - higher temperature at the equator, and expansion of matter.
  - tidal bulges.
  - influence of the sun, moon, and all the planets.
  - spin of the earth.
- What direction is the force acting on clothes during the spin cycle of a washing machine?
  - Upward.
  - Outward.
  - Downward.
  - Inward.
- A car travels in a circle with constant speed. The net force on the car \_\_\_\_\_.
  - is zero because the car is not accelerating.
  - is directed forward, in the direction of travel.
  - is directed toward the center of the curve.
  - is directed away from the center of the turn.
- A tin can whirled on the end of a string moves in a circle because \_\_\_\_\_.
  - the can continually pulls on the string.
  - there is an inward force acting on the can.
  - there is a force on the can pulling it outward.
  - once the can starts moving, that is its natural tendency.
- If you whirl a tennis ball on the end of a string and the string suddenly breaks, the tennis ball will \_\_\_\_\_.
  - spiral in toward your hand.
  - fly directly away from you.
  - fly directly toward you.
  - spiral away from your hand.
  - fly off, tangent to its circular path.

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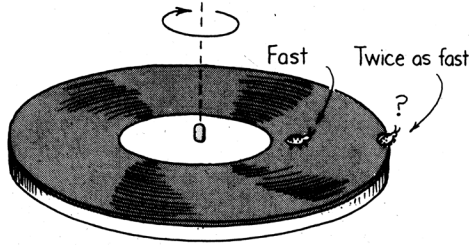


**Chapter 9 Circular Motion**

**Centripetal Force**

**Linear and Rotation Speed**

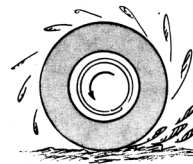
1. Which moves faster, a horse near the outside of a merry-go-round or a horse near the inside?



2. Distinguish between linear speed and rotational speed.
3. Explain tangential velocity.
4. Write the formula for calculating the tangential velocity of an object.
5. Would it be easier stand on the outer edge of a rotating merry-go-around or closer to the center?
6. If you lose your grip on a rapidly spinning merry-go-round and fall off, in which direction will you fly?
7. Do you weigh less at the north pole or at the equator?

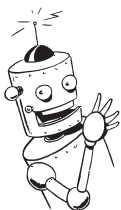
8. If the earth rotated more slowly about its axis how would that effect your weight at your current location?
9. If you should buy a quantity of gold in Mexico and weigh it carefully on a spring balance, would the same quantity of gold weigh more, less, or the same if weighed on the same spring balance in Alaska? Explain

10. Does a phonograph needle ride faster or slower over the groove at the beginning or end of a record?
11. Does a laser read more information at the start or end of a CD?
12. If fidelity increases with speed, what part of a phonograph record produces the highest fidelity? How about a CD?
13. In what direction does the loosely held mud fly off a spinning tire?



14. When a long-range cannonball is fired toward the equator from a northern (or southern) latitude, it lands west of its "intended" longitude. Why?

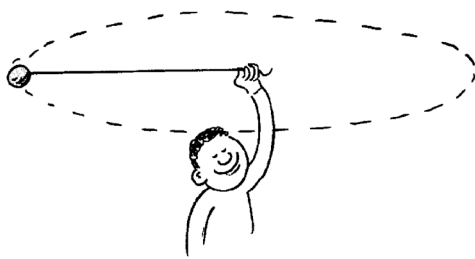
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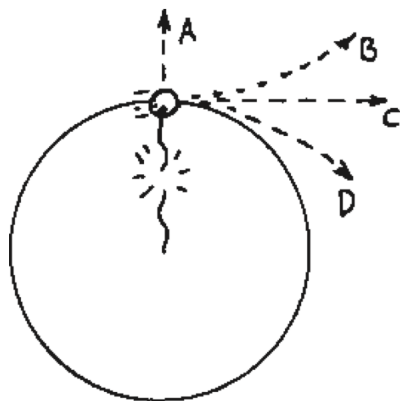
**Chapter 9 Circular Motion**

**Centripetal Force**

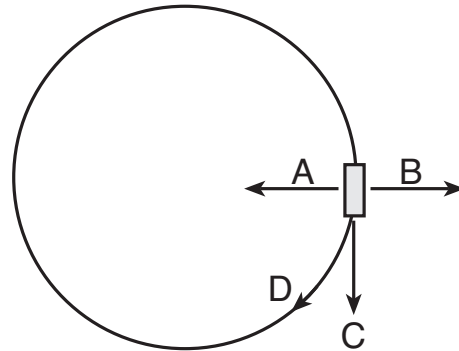
15. Give an example of an object that can move in a circular path without a force acting on it.
  
16. What is a centripetal force?
  
17. Write the formula for centripetal force and for centripetal acceleration.
  
18. What is the direction of the force that is exerted on a tennis ball as you spin it around in a circular path?



19. A tennis ball is whirled around in a circular path, what direction does the tennis ball travel if the string breaks?

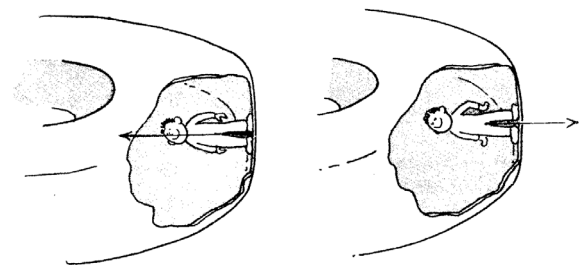


20. In the diagram below, which letter(s) represent the centripetal acceleration, the centripetal force, and the instantaneous velocity.



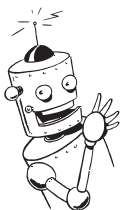
**Centrifugal Force**

21. What is a centrifugal force?
  
22. You are a passenger in a car and your friend makes a left turn. You feel like you are being thrown into the door. Explain
  
23. Why does a person on a spinning ride feel like they are being thrown outward?



24. Why is centrifugal force not considered a true force?

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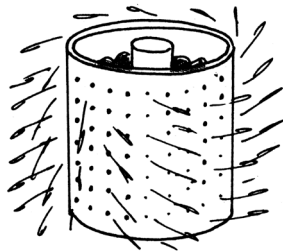


**Chapter 9 Circular Motion**

25. Swing a pail of water around rapidly in a circle at arm's length and the water will not spill. Is the water being pulled inward or thrown outward?

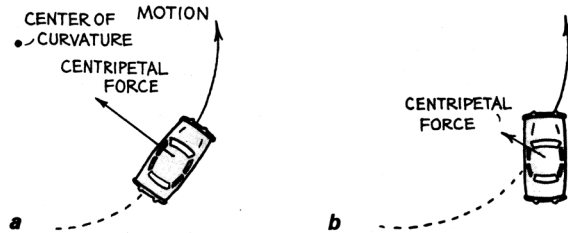
26. What is the minimum centripetal acceleration that is required for the water to stay in a spinning bucket?

27. Explain how a washing machine removes water from the clothes?



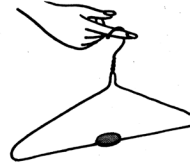
28. Is it an inward force or an outward force that is exerted on the clothes by the washing drum during the spin cycle of an automatic washer?

29. What is/are the variable(s) responsible for assuring that a car can make it through a turn?



30. Why is it unwise to do any significant braking when you think your car is going too fast in a turn?

31. Place a coin on a coat hanger and then spin the hanger on your finger. What holds the coin on the hanger, a centripetal or a centrifugal force?

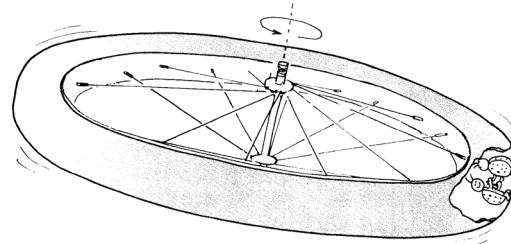


32. A common ride at most amusement parks has an individual stand against the wall of a ride and as it begins to spin faster and faster the floor drops and the person is stuck to the wall. Explain what holds the person to the wall preventing the person from falling. Draw a picture of this setup

33. From problem above, what would happen if a person was wearing a slippery wind breaker?

**Simulated Gravity**

34. How can you design a space station with a simulated gravity?



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