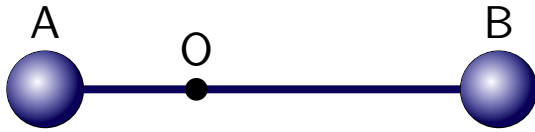


# Question 1

A rigid barbell rotates about point  $O$ . The distance from  $O$  to  $B$  is twice that from  $O$  to  $A$ .

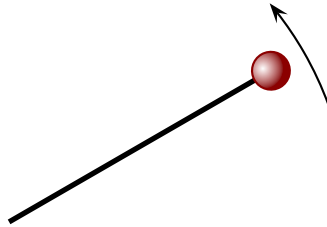


The magnitude of the acceleration of B is

1. the same as that of A and both are zero.
2. the same as that of A and both are non-zero.
3. half of that of A.
4. twice of that of A.
5. four times that of A.

## Question 2

A ball attached to a string swings in a horizontal circle.

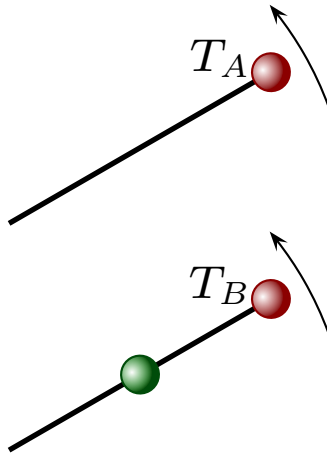


Suppose that the length of the string is decreased while the tension remains constant. Which of the following is true?

1. The angular velocity remains constant.
2. The angular velocity increases.
3. The angular velocity decreases.

## Question 3

Two arrangements of identical balls swing in horizontal circles with the same angular velocities. The distance from the “pivot” point to the outer ball is the same in each case.



Which of the following is true regarding the tensions in the strings connected to the outermost balls?

1.  $T_A > T_B$
2.  $T_A < T_B$
3.  $T_A = T_B$

# Warm Up Question 1

A turntable (horizontal disk that rotates about its center) rotates at a constant rate. A coin sits on the disk and moves along with the turntable without slipping. Is there a friction force acting on the coin and, if so, which way does it point? Explain your answer.

1. Yes. Same as direction of motion.
2. Yes. Opposite to direction of motion.
3. Yes. Toward center otherwise it would slip.
4. Yes. Net force is toward center.

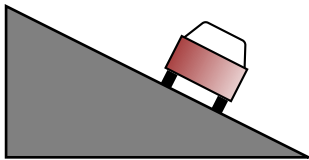
## Warm Up Question 2

A car follows a curved road. Viewed from above the curve appears as a section of circle. If the road is flat, is it possible for the car to turn without any friction? Explain your answer.

1. No. With no friction it would continue in a straight line.
2. No. With no friction there would be no centripetal force.

## Question 4

A car rounds a banked corner, maintaining its distance from the edge of the road. A cross section of the road is illustrated. There is no rolling friction that opposes the car's forward motion. The car is moving faster than the critical speed at which it can turn without the assistance of friction.



Which of the following is true?

1. There is a sideways static friction force that points down the slope.
2. There is a sideways static friction force that points up the slope.
3. There is a sideways kinetic friction force that points down the slope.
4. There is a sideways kinetic friction force that points up the slope.