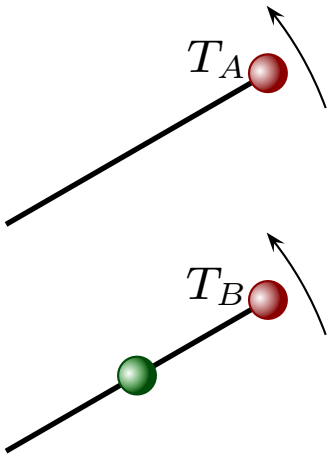
Question 1

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. Opposite to the direction of motion.
2. Yes. Toward the center; same as acceleration.
3. Yes. Toward the center; otherwise the coin would slip off the edge.
4. Yes. Away from the center; opposite to the centripetal acceleration.
5. No. There is no acceleration.

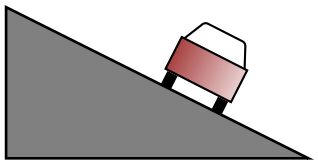
Warm Up Question 2

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, otherwise it would go straight.
2. No, there must be a force to provide the inward centripetal acceleration.
3. No, the direction of motion changes and that requires a force.
4. Yes, turning the wheels can make the car turn.

Question 2

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.

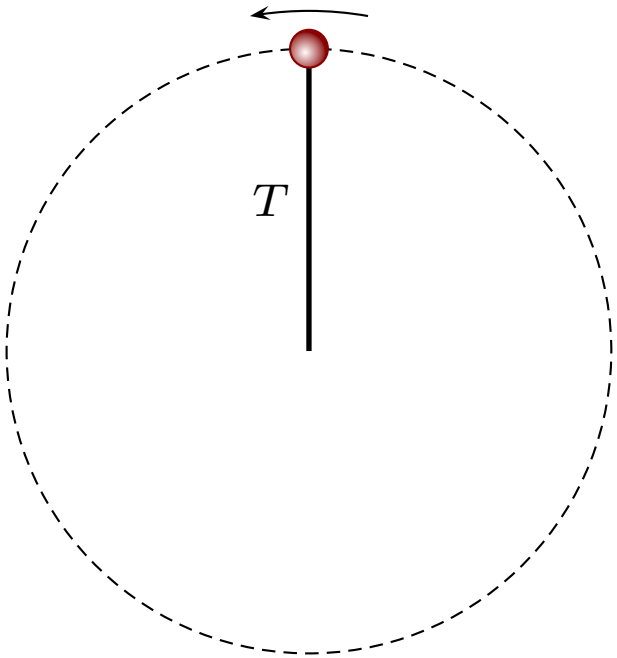


Which of the following is true?

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.

Question 3

A ball swings in a vertical circle with a constant speed. Earth's gravity acts on the ball throughout.



How does the tension in string when the ball is at the high point compare to that when it is at the low point?

1. Same.
2. Larger T at high point than low point.
3. Smaller T at high point than low point.