

# Physics

## Quiz # 9

Date Given: June 9, 2022  
Date Due: June 16, 2022

- Q1.** (2 points) If the 2-kg block passes over the top B of the circular portion of the path with a speed of 3.5 m/s, calculate the magnitude  $N_B$  of the normal force exerted by the path on the block. Determine the maximum speed  $v$  which the block can have at A without losing contact with the path.

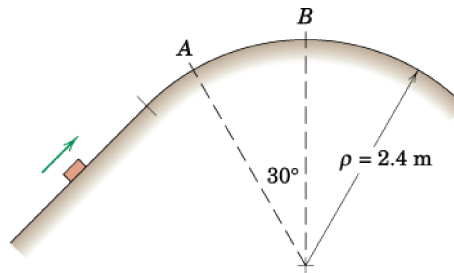


Figure 1: Illustration to Problem 1.

- Q2.** (2 points) Set up the  $n, t$  axes and write the equations of motion for the 10-kg block shown in Figure 2 along each of these axes.

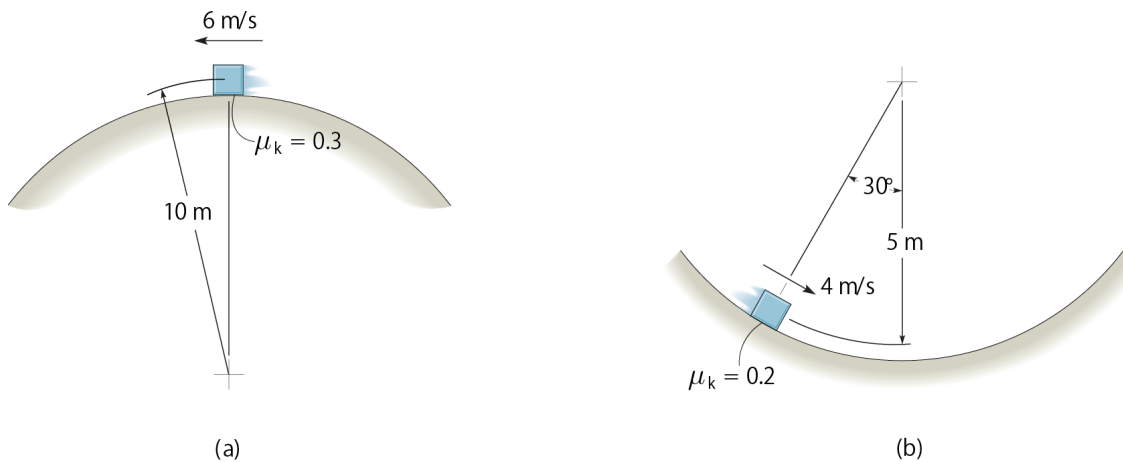


Figure 2: Illustration to Question 2.

- Q3.** (2 points) A child twirls a small 50 gram ball attached to the end of a 1m string so that the ball traces a circle in a vertical plane as shown. What is the minimum speed  $v$  which the ball must have when in position 1? If this speed is maintained throughout the circle, calculate the tension  $T$  in the string when the ball is in position 2. Neglect any small motion of the child's hand.

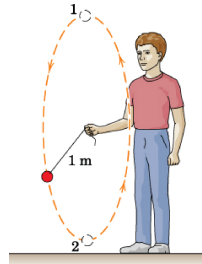


Figure 3: Illustration to Question 3.

- Q4.** (1 point) The hollow tube is pivoted about a horizontal axis through point  $O$  and is made to rotate in the vertical plane with a constant counterclockwise angular velocity  $\dot{\theta} = 3\text{rad/s}$ . If a  $0.1\text{kg}$  particle is sliding in the tube toward  $O$  with a velocity of  $1.2\text{m/s}$  relative to the tube when the position  $\theta = 30^\circ$  is passed, calculate the magnitude  $N$  of the normal force exerted by the wall of the tube on the particle at this instant.

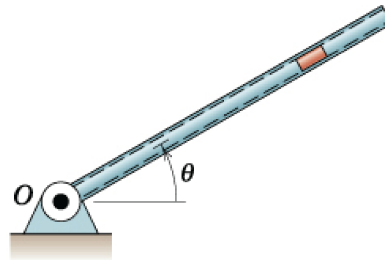


Figure 4: Illustration to Problem 4.