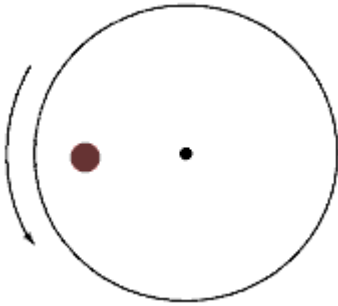
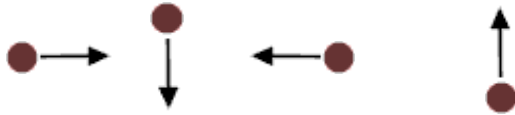




5. A coin of mass 25 grams is placed 20 cm from the center of a rotating turntable as shown below. The coin does not slip while the platform rotates at a constant angular speed of 40 rpm.



- a. What is the magnitude of the coin's linear velocity in m/sec?
- b. Which of the following answer correctly illustrates the direction of the coin's linear velocity at the instant it is at the position shown in the diagram above?

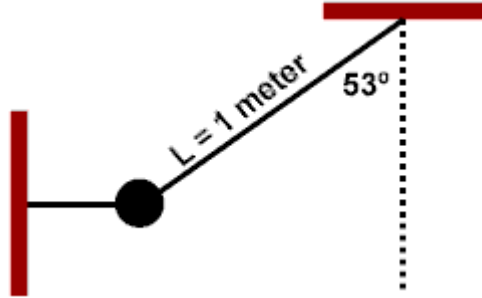


- c. What would be the magnitude of the acceleration experienced by the coin?
- d. Which of the following answer correctly illustrates the direction of the coin's acceleration at the instant it is at the position shown in the diagram above?



- e. If the coefficient of static friction between the coin and the surface is 0.65, what would the greatest linear speed the coin could acquire and still have the coin stay in place?
- f. If the first coin were to be replaced with a larger coin made of the same material, how would your answer to part (e) change? Justify your response.

6. A 250-gram pendulum bob is initially constrained at a  $53^\circ$  angle by two strings as shown below.

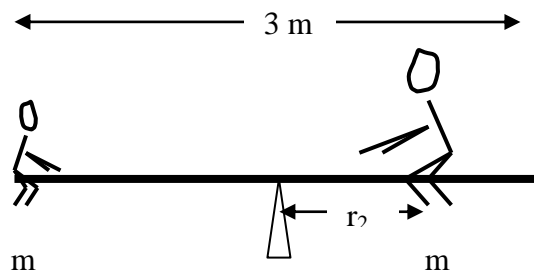


- a. What is the tension in the diagonal string?
- b. The horizontal string is now cut close to the pendulum bob allowing it to swing. What will the speed of the bob as it passes through the lowest position?
- c. What will be the tension in the supporting string when the bob is at its lowest position?

7. Tarzan (mass = 78.0 kg) swings from rest on a 30.0 m long vine of negligible mass which is initially inclined at an angle of  $37.0^\circ$  with the vertical. Calculate Tarzan's speed and the tension in the vine at the bottom of the swing.

8. If the torque required to loosen a nut on the wheel of a car has a magnitude of  $40.0 \text{ N m}$ , what minimum force must be exerted by a mechanic at the end of a  $30.0 \text{ cm}$  wrench to loosen the nut?

9. Two children sit on a see-saw which is  $3 \text{ m}$  long and pivoted on an axis at its center. The first child has a mass  $m_1$  of  $25 \text{ kg}$  and sits at the left end of the see-saw, while the second child has a mass  $m_2$  of  $50 \text{ kg}$  and sits somewhere on the see-saw to the right of the axis. At what distance  $r_2$  from the axis should the second child sit to keep the see-saw horizontal?



10. A  $700.0 \text{ N}$  window washer is standing on a uniform scaffold supported by a vertical rope at each end. The scaffold weighs  $200.0 \text{ N}$  and is  $3.00 \text{ m}$  long. What is the tension in each rope when the window washer stands  $1.00 \text{ m}$  from one end?