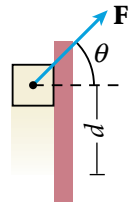
50. A 5.0 kg block is pushed 3.0 m at a constant velocity up a vertical wall by a constant force applied at an angle of 30.0° with the horizontal, as shown at right. If the coefficient of kinetic friction between the block and the wall is 0.30, determine the following:



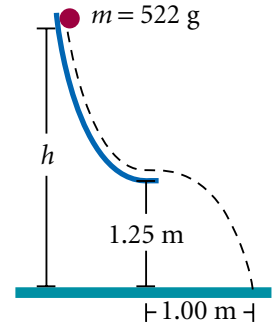
- **a.** the work done by the force on the block
- **b.** the work done by gravity on the block
- **c.** the magnitude of the normal force between the block and the wall

51. A 25 kg child on a 2.0 m long swing is released from rest when the swing supports make an angle of 30.0° with the vertical.

- **a.** What is the maximum potential energy associated with the child?
- **b.** Disregarding friction, find the child's speed at the lowest position.
- **c.** What is the child's total mechanical energy?
- **d.** If the speed of the child at the lowest position is 2.00 m/s, what is the change in mechanical energy due to friction?

52. A ball of mass 522 g starts at rest and slides down a frictionless track, as shown in the diagram. It leaves the track horizontally, striking the ground.

- **a.** At what height above the ground does the ball start to move?
- **b.** What is the speed of the ball when it leaves the track?
- **c.** What is the speed of the ball when it hits the ground?



Graphing Calculator Practice

Work of Displacement

Work done, as you learned earlier in this chapter, is a result of the net applied force, the distance of the displacement, and the angle of the applied force relative to the direction of displacement. Work done is described by in the following equation:

$$W_{net} = F_{net} d \cos \theta$$

The equation for work done can be represented on a graphing calculator as follows:

$$Y_1 = \text{FXCOS}(\theta)$$

In this activity, you will use this equation and your graphing calculator to produce a table of results for various values of θ. Column one of the table will be the displacement (X) in meters, and column two will be the work done (Y_1) in joules.

Visit go.hrw.com and enter the keyword **HF6WRKX** to find this graphing calculator activity. Refer to **Appendix B** for instructions on downloading the program for this activity.