

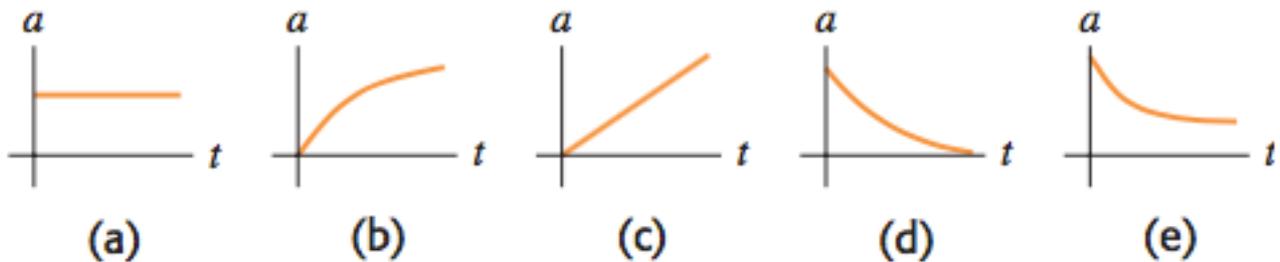
Spring-2018 Phys101
Assignment 5

Check MatingPhysics for other problems

Due date: 15 March 2018.

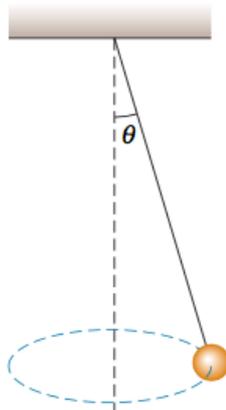
Discussion questions

- 1- Two unequal masses fall from a tower. Object one has more mass and falls first. Object one and two are connected by a string. What is the tension in the string when both objects are in free fall?
- 2- A block rests on an inclined plane with enough friction to prevent it from sliding down. To start the block moving, is it easier to push it up the plane or down the plane? Why?
- 3- A ball is dropped from rest and feels air resistance as it falls. Which of the graphs in the following figure best represents its acceleration as a function of time?



Problems

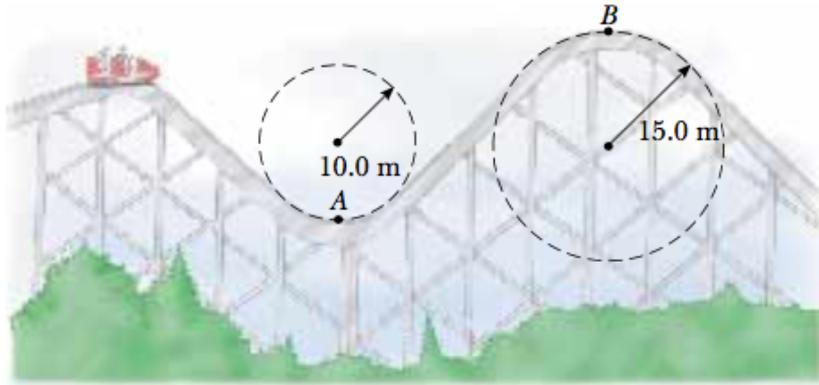
- 4- Consider a conical pendulum with an 80.0-kg bob on a 10.0-m wire making an angle of 5.00° with the vertical. Determine
 - (a) the horizontal and vertical components of the force exerted by the wire on the pendulum.
 - (b) the radial acceleration of the bob.



5- A roller-coaster car has a mass of 500 kg when fully loaded with passengers (See figure).

(a) If the car has a speed of 20.0 m/s at point *A*, what is the force exerted by the track on the car at this point?

(b) What is the maximum speed the car can have at *B* and still remain on the track?



6- Three objects are connected on a table as shown in below. The rough table has a coefficient of kinetic friction of 0.350. The objects have masses of 4.00 kg, 1.00 kg, and 2.00 kg as shown, and the pulleys are frictionless.

(a) Draw a free-body diagram for each object.

(b) Determine the acceleration of each object and each object's directions.

(c) Determine the tensions in the two cords.

(d) If the tabletop were smooth, would the tensions increase, decrease, or remain the same? Explain

