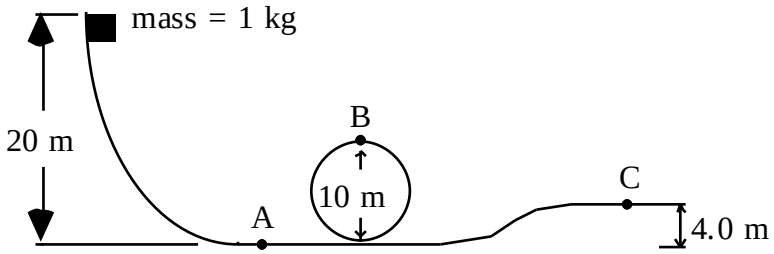
PHYSICS 11 WORK ETC. WORKSHEET 2

1. A 0.750 kg physics book is dropped from a position 2.00 m above the floor.
   a) What is the potential energy of the book before it is dropped?
   b) What is the kinetic energy of the book when it is 1.50 m from the floor? Hint: what potential energy does it have at this height?
   c) What is the speed of the book when it reaches the floor?

2. A ball of mass 0.50 kg is rolling across the table top with a speed of 5.0 m/s. When the ball reaches the edge of the table, it rolls down a frictionless incline onto the floor 1.0 m below (without bouncing). What is the speed of the ball when it reaches the floor?

3. The diagram below shows a 1.00 kg object ready to start sliding downward on a frictionless track, around a loop, and up to a small platform. Calculate the speed of the object at points A, B and C.



4. A hot-wheels car of mass 0.025 kg is travelling on a horizontal frictionless track with a velocity of 5.0 m/s. If the track suddenly turns upward, how high up the track can the car travel?

5. A 65 kg girl is running with a speed of 2.5 m/s.
   a) How much kinetic energy does she have?
   b) She then grabs onto a rope that is hanging from the ceiling, and swings from the end of the rope. How high off the ground will she swing? Ignore any friction.

6. A 950 kg vehicle moving at 25.0 m/s loses its brakes but the driver sees a runaway lane alongside the road. By steering into the lane, how far up the hill (vertically) will the vehicle travel before it comes to a stop? Assume no friction on the hill.

The following questions involve systems that include friction.

7. A 4.00 kg rubber ball drops from a height of 5.00 m to the ground and bounces back to a height of 3.00 m.
   a) How much potential energy does the ball lose on the trip down?
   b) How much energy does the ball regain on the trip back up?
   c) What is the efficiency of the system?

8. A pendulum of mass 2.0 kg drops a distance of 1.5 m when it reaches the lowest point in its swing.
   a) What potential energy did the bob have before it began its drop?
   b) What is the bob's speed at the lowest point in its swing?
   c) The bob continues its swing up to a height of 1.4 m. What is the efficiency of the system?

9. A 2.0 kg puck hits a stationary 6.0 kg puck head-on at 6.0 m/s. The 2.0 kg puck bounces straight back at 3.0 m/s and the 6.0 kg puck goes forward. The collision is elastic.
   a) Find the speed of the 6.0 kg puck.
   b) The answer to (a) can be found using cons. of momentum as well. Explain why it works in this case (2 reasons).
   c) What energy does the 6.0 kg puck receive?

10. A 6.00 kg ball of putty moving at 10.0 m/s runs head-on into another 6.00 kg ball of putty. They stick together and move ahead at 5.00 m/s.
   a) Calculate the total kinetic energy before...
   b) ...and after the collision.
   c) Was the collision elastic?
   d) What is the efficiency of the system?

1.a) 14.7 J b) 3.68 J c) 6.26 m/s 2. 6.7 m/s 3. A: 20 m/s B: 14 m/s C: 18 m/s 4.1.3 m 5. a) 203 J b) 0.32 m 6. 32 m 7. a)196 J b) 118 J c) 60% 8. a) 29 J b) 5.4 m/s c) 93% 9. a) 3.0 m/s b) reason 1: collision is elastic, so no loss in energy to heat. reason 2: motion is in a straight line c) 27 J 10. a) 300 J b) 150 J c) 50%