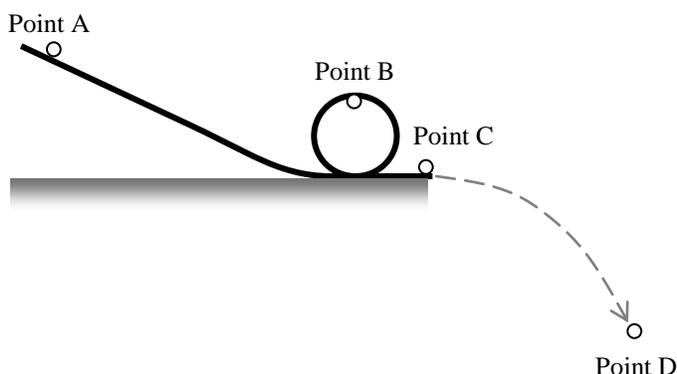


AP Physics Lab

Lab 7-B: Velocity & Energy in Vertical Circles

Equipment:

- Hot Wheels track loop
- Hot Wheels track (2 pieces)
- Hot Wheels track connectors
- marble
- meter stick
- books and wood ramps for supports



Purpose:

- Calculate the tangential velocity of a marble on a vertical circle.
- Calculate the starting height of a marble on a track.
- Determine the energy lost to outside sources by a marble on a track.

Procedures:

- Attach 2 pieces of Hot Wheels track to one side of a vertical track loop.
- Construct a track that follows the model shown above and meets the specific requirements for Points A and B listed below.

Report:

1. Calculate the velocity of the marble at Point B, v_B , in order for it to experience a normal force that is equal to its weight. Include a free body diagram in your answer.
2. Calculate the required starting height of the marble at Point A, h_A , in order for it to attain the necessary velocity v_B at Point B.
3. Release the marble from its starting height at Point A on the track. Mark the horizontal distance, d_D , of the marble at Point D. Use projectile equations to calculate the velocity, v_C , of the marble at Point C.
4. In terms of m , determine the energy of the marble at its starting position at Point A. In terms of m , determine the energy of the marble at its final position on the track at Point C. How much energy (if any) was lost or gained by the marble as it traveled through the track. What factors could explain any loss or gain?
5. Is the mass m of the marble required to calculate values for its velocity at Point B or its height at Point A? Why or why not? Is the mass m of the marble required to calculate values for its centripetal force at Point B or its potential energy at Point A? Why or why not?