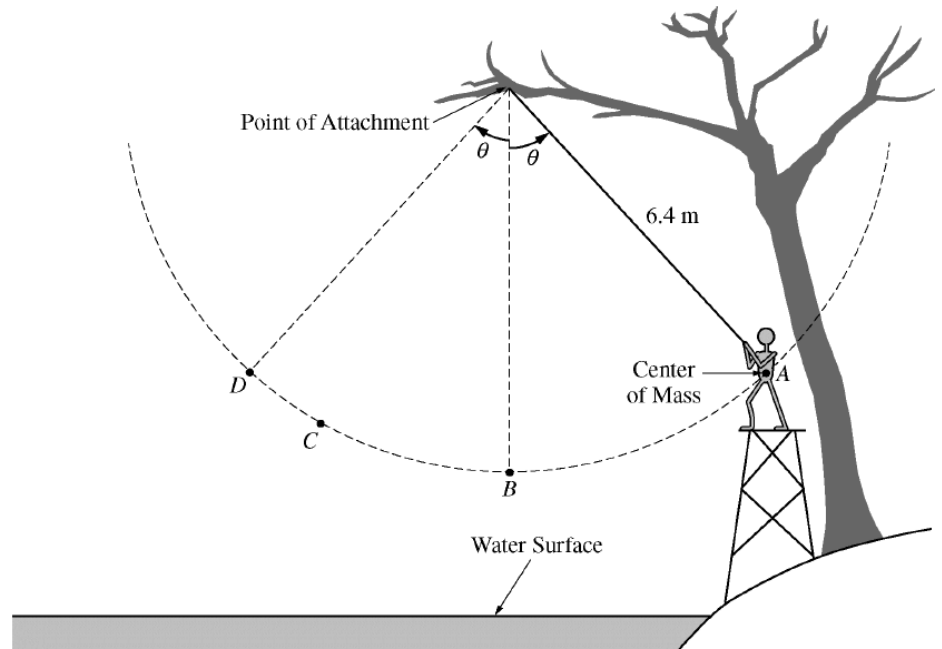


THE ROPE SWING

Complete all your work on a blank sheet of paper, but feel free to make up the diagram on this sheet of paper.

Starting from rest at Point A, a 50 kg person swings along a circular arc from a rope attached to a tree branch over a lake, as shown in the figure to the right. Point D is at the same height as Point A. The distance from the point of attachment to the center of mass of the person is 6.4 m with. Ignore *silly* things like air resistance and the elasticity of the rope...



- 1) The person jumps off the platform three times, each time letting go at a different point.
 - a) On the first swing, the person lets go at Point B. Draw a line to represent the trajectory of the center of mass after the person lets go of the rope until the person hits the water.
 - b) On the first swing, the person lets go at Point C. Draw a line to represent the trajectory of the center of mass after the person lets go of the rope until the person hits the water.
 - c) On the first swing, the person lets go at Point D. Draw a line to represent the trajectory of the center of mass after the person lets go of the rope until the person hits the water.
- 2) The center of mass of the person standing on the platform is at Point A, 4.1m above the surface of the water, and point B is 3.5m above the water. Calculate the velocity of the person at Point B.
- 3) Suppose that the person lets go of the rope at Point B. Calculate R, the horizontal distance moved from where the person releases the rope at Point C to where the person hits the water.
- 4) Two students make the following claims

Student A: If the person is released from Point B, they will travel farther horizontally because their initial horizontal velocity is larger at that point

Student B: If the person releases from Point C, they will travel farther horizontally because they will have an upward initial y-component of their velocity, and also a larger vertical distance to the water both of which cause them to stay in the air longer.

- a) What part(s) of student A's response is correct? (If Any)
- b) What part(s) of student B's response is correct? (If Any)
- c) Choose one student's response and identify a logical error in their argument due to incorrect or missing physics.
- d) At what release point will the person travel the furthest horizontally after letting go of the rope? At B ____ Before the angle is 45° ____ Where the angle is 45° ____ After the angle is 45° ____ Justify your answer.