When you see “OSE” in front of a task, it means you must begin your solution with an Official Starting Equation. It should take you no more than 15 minutes each to do these problems if you (hopefully) have already sufficiently reviewed the material for the test this coming Wednesday. The problems are designed to help you verify your level of preparation.

1. A block is released from rest on a frictionless straight plane that is inclined an angle \( \theta \) with respect to the vertical. After sliding down a distance \( D \) along the incline, it flies off the end at a height \( H \) above the ground.

   a) **OSE:** Derive an expression for the angle \( \phi \) relative to the vertical at which the block strikes the ground in terms of relevant system parameters. (Hint: You will want to divide the task into two parts with two different coordinate systems.)

2. Two blocks are connected by a massless string. One block of mass \( M \) is moving up a rough inclined plane that makes angle \( \theta \) with the horizontal. The block and the plane have a coefficient of kinetic friction \( \mu \) between them. The other block, of mass \( m = \frac{1}{2} M \), hangs over a massless frictionless pulley. A constant wind is blowing horizontally, producing an effective force on the inclined block whose magnitude \( B \) is half that block’s weight magnitude. The inclined plane protects the hanging block from the wind.

   a) In the figure, superimpose a neatly drawn fully labeled free-body diagram on each block, including the coordinate system associated with each that you will use to solve the dynamics.

   b) **OSE:** Derive an algebraic expression for the tension in the string in terms of relevant system parameter