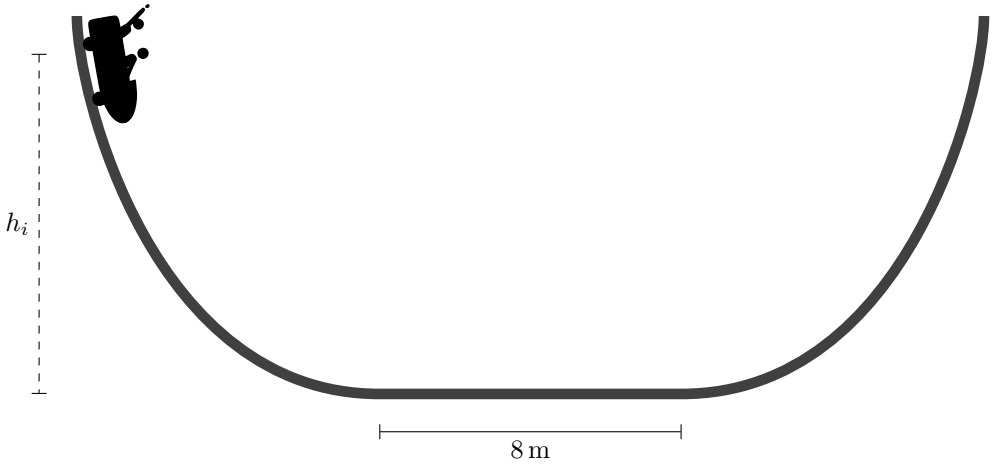
Please answer the questions below to the best of your ability either in the space provided. Everything should be scanned or photographed and submitted through gradescope.com.

Objective: *I can use ideas about kinetic energy, potential energy, and work to solve a problem which would be difficult using the momentum principle.*

1. At your local discount theme park there is an exciting ride that involves a cart that rolls back and forth across a canyon, as shown below:



(1) (a) In the past, the flat 8 m stretch in the middle was perfectly smooth, and so the entire track was frictionless. If the cart started from rest at height $h_i = 30$ m on the left, what height would it reach on the right?

(2) (b) Unfortunately, over time that 8 m stretch has become broken and rough, such that it now has a coefficient of kinetic friction equal to 0.65. If the combined mass of the cart and rider is equal to 130 kg, how high up the rightside ramp will the cart travel now?

(3) (c) How many times will the cart *completely* cross the rough patch before it stops?

(3) (d) On that last pass, the cart will become stuck as friction brings it to a stop. Assuming the left side of the flat stretch is $x = 0$ and the right side is $x = 8$, at what position does the cart come to a stop?