Name:

Physics 11
M. Lam

Energy Cooperative Group Review

Block:

In groups of 3, solve the following problems on a separate sheet of paper. The paper used to solve the problems will be handed in at the end of the class.

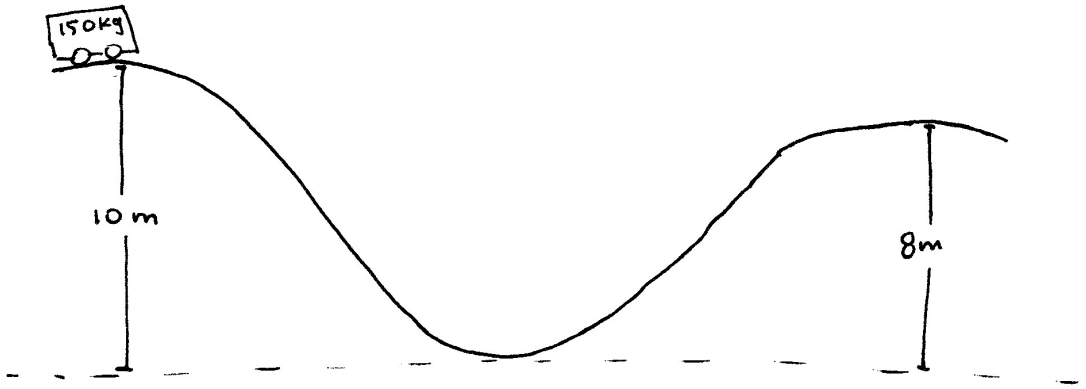
For each question, each team member should take one of the following roles:

1. **The Problem Solver**: Their job is to read the question aloud. Following this, they attempt to solve the problem while verbalizing their thoughts.
2. **The Motivator**: their job is to motivate the problem solver by giving positive and constructive feedback. They are not to solve the problem for the problem solver nor are they to give big hints but they may say things that can help the problem solver find the right path.
3. **The Scribe**: Their job is to write down **everything** the problem solver says. When the problem solver has solved the problem, the scribe should have all the steps the problem solver took to determine the answer. **The scribe does not talk.**

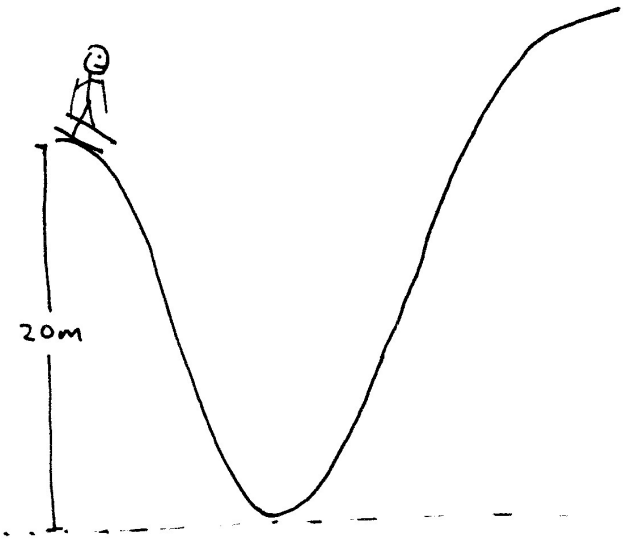
Following each question, rotate roles.

1. A 150kg roller coaster is going down a 10m hill as shown. At the top of the first hill, the velocity of the roller coaster is zero. Assuming there is no friction, determine the potential energy and kinetic energy at

a) Determine the speed at the bottom of the hill.
b) Determine the speed at the top of the second hill.
c) How would the speed change if the hills were steeper (but still the same height)?

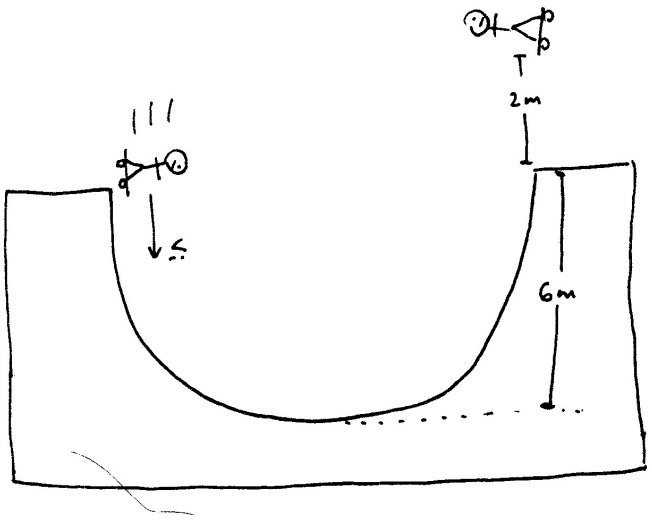


2. A 70kg skier, from rest, skis down a 20m hill and up a second hill as shown.

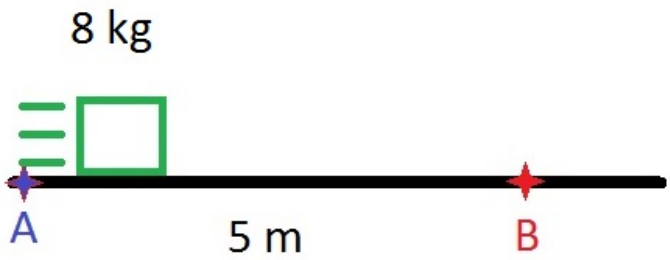


a) How high up the second hill does the skier get if there is no friction?
b) If the skier reaches a maximum height of 18m on the second hill, how much mechanical energy was lost due to friction?

3. A skateboarder pushes himself downward along a half pipe. After travelling across the half pipe, he goes up a distance of 2m into the air (as shown in the diagram). What was the initial velocity of the skateboarder?



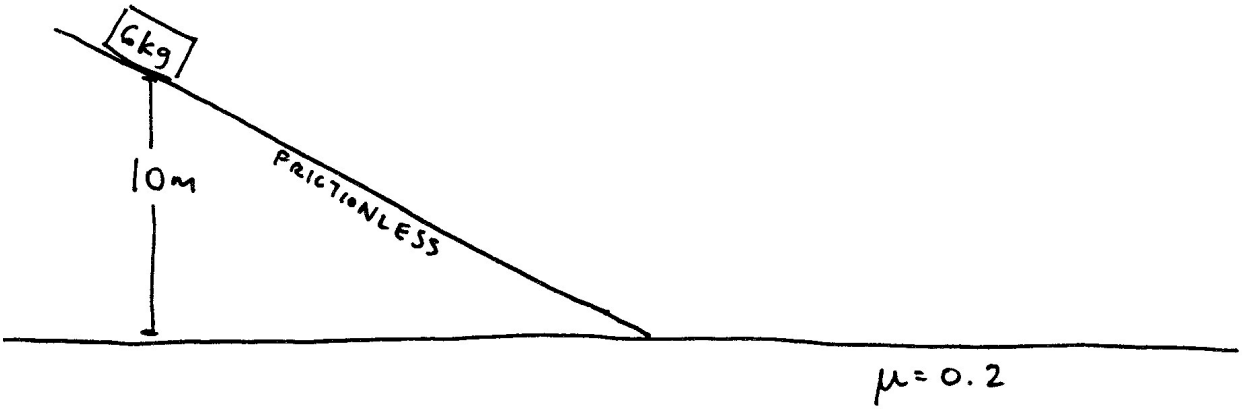
4. An 8.0 kg block is launched from point A to point B over a rough surface. As the block passes point B, it has slowed down to a velocity of 4.0 m/s and it has generated 36 J of heat energy. What is the speed when it was launched from point A?



5. A 60kg circus performer falls 10m from rest onto a trampoline and bounces back up to a height of 8m.

a) How much mechanical energy has been lost in this process?
b) List two forms of energy which the mechanical energy may have been transformed in to.

6. A 6kg block slides down a frictionless ramp with a height 10m. The block then slides along a horizontal surface with a coefficient of friction, μ=0.2.



a) What is speed of the block when it reaches the base of the ramp?
b) After sliding for 3m, what is the speed of the block?
c) How far does the block slide from the base of the ramp before it stops?

