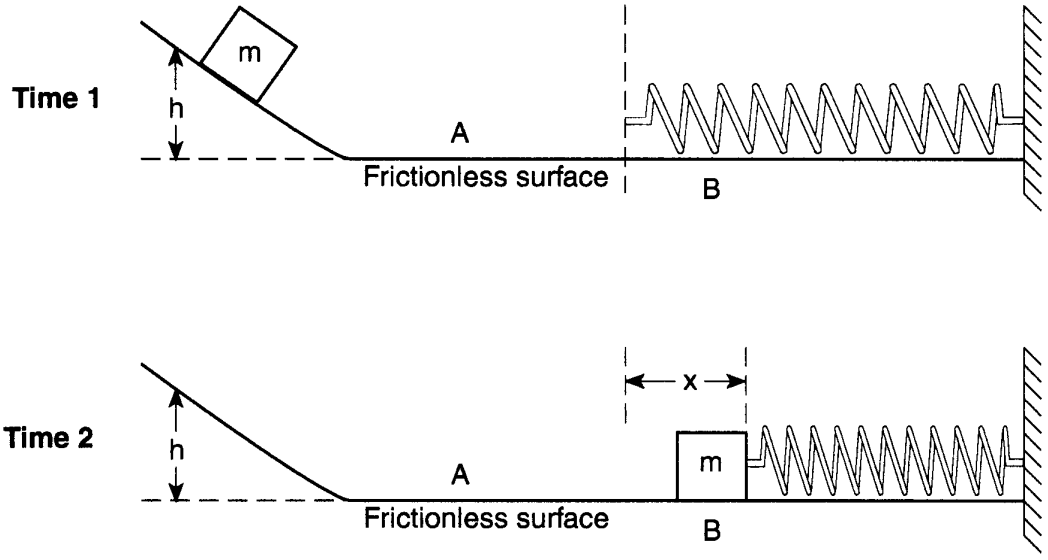
Name **Part 2 Review R**

1. Base your answer to the following question on the information and diagram below.

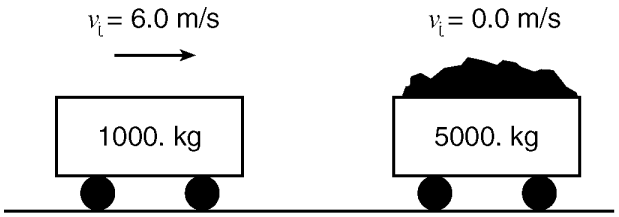
   A block of mass *m* starts from rest at height *h* on a frictionless incline. The block slides down the incline across a frictionless level surface and comes to rest by compressing a spring through distance *x*, as shown in the diagram below.



Determine the spring constant, *k*, in terms of *g*, *h*, *m*, and *x*. [Show all work including formulas and an algebraic solution for *k*.]

2. Base your answer to the following question on the information and diagram below.

A 1000.-kilogram empty cart moving with a speed of 6.0 meters per second is about to collide with a stationary loaded cart having a total mass of 5000. kilograms, as shown. After the collision, the carts lock and move together. [Assume friction is negligible.]



Calculate the speed of the combined carts after the collision.

3. The coefficient of kinetic friction between a 780.-newton crate and a level warehouse floor is 0.200. Calculate the magnitude of the horizontal force required to move the crate across the floor at constant speed.

Base your answers to questions **4** through **6** on the information below.

The driver of a car made an emergency stop on a straight horizontal road. The wheels locked and the car skidded to a stop. The marks made by the rubber tires on the dry asphalt are 16 meters long, and the car's mass is 1200 kilograms.

4. Assuming that energy is conserved, calculate the speed of the car before the brakes were applied.

5. Calculate the work done by the frictional force in stopping the car.

6. Calculate the magnitude of the frictional force the road applied to the car in stopping it.

7. Base your answer to the following question on the information below.

A 50.-kilogram child running at 6.0 meters per second jumps onto a stationary 10.-kilogram sled. The sled is on a level frictionless surface.

a Calculate the speed of the sled with the child after she jumps onto the sled. [Show all work, including the equation and substitution with units.]

b Calculate the kinetic energy of the sled with the child after she jumps onto the sled.[Show all work, including the equation and substitution with units.]