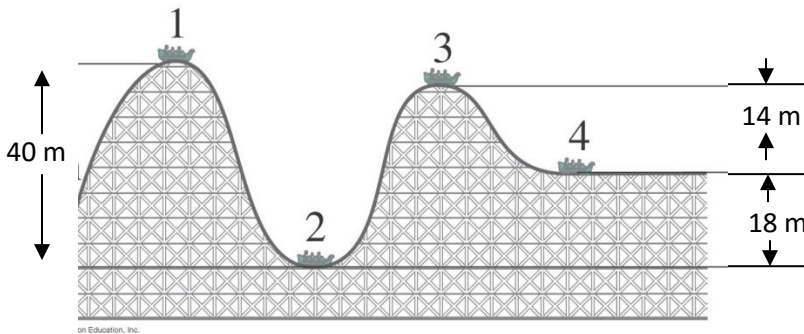


Chapter 8 Homework

1. A block of mass 0.25 kg is placed on top of a light, vertical spring whose spring constant is 5000 N/m , and is pushed downward so that the spring is compressed by 0.1 m . After the block is released from rest, it travels upward and then leaves the spring.

- What upward speed does the spring give the block the instant it leaves the spring?
- To what maximum height above the point of release does it rise?

2. A roller coaster car shown below is pulled up to point 1 where it is released from rest. Assuming no friction, calculate the speed at points 3 and 4.



3. What should be the spring constant k of a spring designed to bring a 1400 kg car to rest from a speed of 28 m/sec so that the occupants undergo a maximum acceleration of $5g$'s?

- A 145 g baseball is dropped from a tree 20 m above the ground.
 - With what speed would it hit the ground if air resistance is ignored?
 - If it actually hits the ground with a speed of 8.5 m/sec , what is the average force of air resistance exerted on it?

5. Sewage at a certain pumping station is raised vertically by 5.49 m at the rate of $1,890,000\text{ L}$ each day. The sewage, of density 1050 kg/m^3 , enters and leaves the pump at atmospheric pressure and through pipes of equal diameter. Find the minimum output rating (watts) of a pump required to lift the sewage at this rate.

6. A 62 kg skier starts from rest at the top of a ski jump, point A, and travels down the ramp. Neglecting friction and air resistance, determine the distance s to where she strikes the ground at C. The skier leaves the ramp horizontally at B.

