

The Thrill of an Inanimate Object's Lifetime

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Background

Bungee jumping is an activity enjoyed by some daring individuals. It consists of a person hurling him or her from a platform such as bridges, balloons, or towers with only an elastic cord to impede the otherwise messy impact with the ground. (Remember the rate at which the ground decelerates you would kill you!). The jumper must use elastic material to absorb the energy of the fall before he or she reaches the ground.

To maximize the thrill, designers of bungee jumps attempt to have the jumper come as close to ground as possible without actually touching the ground. Their designs involve calculating the amount of gravitational potential energy converted to other forms of energy during the jumper's fall and setting this value equal to the amount of elastic potential energy (similar to a spring) gained by the elastic cord.



The Challenge

You will be the bungee engineer. Create a bungee cord using elastic material (i.e. rubber bands attached together, a single elastic, any combination of elastic materials) that will allow a 0.1 kg mass to fall from a height in the range of 15ft - 20ft and come to rest as close to the ground without touching it as possible. Your bungee design should be able to adjust to accommodate heights in this range, just like bungee engineers have to do for different drops. The height of the mass by itself is approximately 0.08 m.

The Scoring

This will be scored as a competition. Each group will build and test their bungees before the competition. The height will be chosen at the meet, and groups will have 5 minutes to calculate and adjust their bungees before they will be impounded.

Closest drop to the ground without touching will receive 50 points, 2nd closest 49 and so on. Ties will split the points. If a mass hits the ground the team will receive 15 points. If they do not have a bungee, they will receive 0 points. Teams get one drop, but if a cord gets tangled on the way down, the team will be allowed *one and only one* redrop without modification to the cord. It may be untangled, but its length or attachment point for example cannot be changed. And the original drop will not count.

Design Considerations

The cord **MUST** be made out of elastic material so that the cord, transforming the energy of the falling mass into stored elastic potential energy, gradually decelerates the mass. You cannot simply use a steel wire that is the exact length of the drop so that the mass is jerked to a stop above the ground. The three North Shore Science League advisors administering the event will determine if any cords are to be deemed non-elastic.