Bungee Jumping

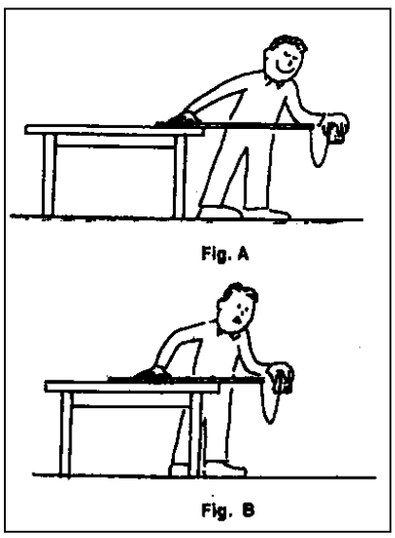
What's the deal?

In bungee jumping the cords that support the jumper must stretch. If the cord doesn't stretch when fully extended, it either brings the jumper to a sudden stop and body parts break or the cord breaks. In either case, the jumper is not likely to be thrilled with the result. Whenever a falling object is brought to a halt, the force that slows the fall depends on the time the force acts. You will see evidence of this in this activity.

What do you need?

Table, yardstick, ~20 inches of string, 1 200 g mass, 1 100 g mass, paper plate

What do you do?



Preparation: Tie the piece of string to the hole at the end of the yard stick. Tie the 200 g mass to the other end of the string. Be sure the string is tight to the mass. Be sure you have the landing pad in place (paper plate upside down).
Get the jumper in position: Place the stick flat on the table with the mass hanging over the edge of the table. Slide the stick so that 20 inches of the stick extends over the edge of the table. Raise the mass up even with the end of the stick.
Jump: While holding the stick firm at the edge of the table drop the mass from the end of the stick. WATCH YOUR TOES!!
Write down what happens.
Do it again with only 5 inches of the stick extended beyond the table edge. *Write down what happens.*
One more time…now with only 1 inch past the edge of the table. *Write down what happens.*
Describe the different forces you think the "jumper" would experience each jump. (large, small, etc.) ***Have this approved by your teacher***

Part 2: Hook the 100 g mass to the 200 g mass and repeat the activity.

Observations

200 g jumper	300 g jumper

What does it all mean?

1. Which factor in the impulse equation, $F_{net} \cdot t = \Delta(m \cdot v)$, is directly related to the "give" in the yardstick?

2. Why did the string break when there was less "give" in the stick?

3. Why is it important that a bungee jumper be brought to a halt gradually?

4. The breaking strength of the string plays a role in this activity. Do you think the length of the string plays a role? Explain.

5. How does the falling mass play a role? Will twice the mass require twice the stopping force if it is stopped in the same amount of time? Explain.

6. What could you have done differently with the heavy jumper at one inch of stick extended to prevent the string from breaking?

7. How does this relate to fishing rods bending when a fisher tries to bring in a fish?