

B.1.2 String Breaker

Key Concepts: Inertia
Impulse
Materials: Large mass
Suspension frame
Padded box to catch mass
Cotton string
Set Up Time:
Time Estimate:

Set Up And Display

The suspension frame is set across a corner of the lecture bench so that the padded box may be placed beneath it. The cross piece should have a collar with a hook from which a piece of string is hung. The large mass should hang from this string and a second string should hang from the mass. Make sure the string is easy to break.

Ask the class which string will break if the bottom string is pulled. The answer depends on how the bottom string is pulled. A quick jerk will break the lower string, while a slow, steady pull will break the top string.

Explanation

The large mass has a lot of inertia, which essentially means it is more difficult to accelerate. The sharp tug on the lower string is not able to get the mass moving in the short time it is applied. All the force has to be absorbed by the lower string, so it breaks. The steady force has time to get the mass moving, so the force is imparted to the top string. The top string is already strained by the force weight of the large mass, so the slow, steady force is enough to break it in this case.

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