

## 10.5: Thinking about the material .

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### Reflect and research

1. Explain how Newton's Cradle illustrates the conservation of momentum. Are the collisions in Newton's Cradle elastic? Explain!
2. Gymnasts have specially engineered "crash mats" for landing after doing spins and flips in the air. Why do these crash mats have to be specially engineered, and why can't the gymnast just use a big pile of blankets?
3. Give 2 examples where the center of mass of an object is not located inside of the object.
4. The Volvo XC60 is supposedly the safest car in the world that money can buy. Why is this?
5. In the boxing world, boxers try to "ride the punch". Research and explain how this method helps boxers to reduce injuries.

### To try at home

1. Grab two or three of your friends and ask them to hold a bed sheet. Throw an egg at full speed onto the bed sheet. What happens to the egg, and why?
2. Verify that in a 1 one-dimensional elastic collision between two objects of the same mass, if one object starts at rest, the other object will end at rest after the collision (look up Newton's Cradle to get an idea).

### To try in the lab

1. Propose an experiment to test whether a collision is elastic.
2. Propose an experiment to test whether momentum is conserved in a two dimensional collision.
3. Design a technique which measures the center of mass of an arbitrary 3D object.

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