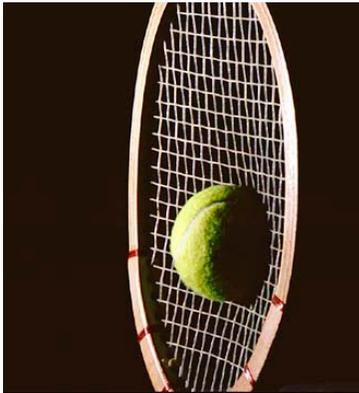


# Egg Drop Challenge!

Impulse is the change in momentum caused by a force in an interaction.

$$\text{Impulse} = \text{Force} * \text{time}$$

The impulse is determined by the force acting on an object times the time it is in contact.



The impulse of a racket on a tennis ball is what rapidly changes the ball's direction in the span of a fraction of a second. Since the energy change is very large - remember large velocities means large energies - this change has to be done with either a very large force over a very short time (such as a ball hitting the racket) or a small force over a very long time - such as air resistance slowly stopping the motion of the ball. The force comes from the motion of the racket pushing against the ball. The time is determined by how long the ball remains in contact with the racket. As can be seen in this picture the large forces over a short time severely compresses the ball.

need some impulse things with conceptual questions (why does a ball hit by a broken bat not go as far?)

To get an idea of how much stopping distance an egg needs to not break - we need to find out how well it responds under pressure. To this end will be finding how much force it takes to break an egg. You will do this by stacking weights on a board supported by the egg until it breaks. (Keep the egg in a plastic bag while you do this)

- Force required to break an egg :

- Why is it so easy to break an egg?

Unlike the tennis ball, the egg cannot easily deform itself to increase the time it is in contact with a surface. This is why a dropped egg will shatter when it hits a hard surface. Remember its not the fall that kills you, its the sudden stop.

## Dropping Eggs Safely

The challenge itself is to find a way to keep an egg from breaking when dropped from a height. To that end you will be given some limited materials.

### Materials

- Half of a cardboard box
- 4 paper plates
- 20 Rubber bands
- 3 Styrofoam cups
- Tape
- 12 Wooden Skewers
- Paper clips
- A partridge in a pear tree (not really)



Contraptions will be dropped from a height of 10 feet from the bottom of the container. The groups with the lightest, smallest, and most innovative containers in which the egg does not break will be awarded prizes.

For some inspiration here are some things that are used to protect things from sudden stops.

