611-0125 (40-195) Coefficient of Restitution Apparatus

Description:
The Coefficient of Restitution is a ratio between the velocities of two objects before and after a collision. It is always a value between 0 and 1. For example, if the coefficient of restitution is zero, the collision is perfectly inelastic, meaning all the energy is absorbed, or no 'bounce occurs'. If it is 1, the collision is perfectly elastic, meaning that all the energy is conserved. Note: it is possible in theory to have a collision with a coefficient of restitution greater than 1 or less than zero. Examples include two land mines being thrown together and exploding, or two magnets colliding and sticking together. However, for classroom purposes, these phenomena can be ignored.

Our set includes an acrylic tube, a steel base, and a collection of balls.

Operation: First, unwrap your set. You may wish to save the box for storage. You will find a hardened steel base, a clear acrylic tube, and a bag containing various balls of different types. The tube has a handy metric scale running vertically along the side, and fits snugly onto the base.

To use, choose a height on the scale and release one of the balls. Monitor it carefully and note the height of the rebound. Knowing the drop height and the rebound height, it is easy to calculate the coefficient of restitution.

Assuming negligible air resistance, under the pull of gravity an object accelerates at 9.81 m/sec^2. Knowing the drop height, you know that initial velocity, $V_i = \sqrt{(2*d*g)}$. In this example, g=acceleration due to gravity, d= the drop height.

Once you have determined the rebound height, use it in the following formula $V_f = \sqrt{(2*r*g)}$. In this case, "r" is the rebound height. The rebound velocity (V_f) is similar to the drop velocity for a given height, though with an opposite sign.

To determine the coefficient of restitution, simply divide the rebound velocity (V_f) by the drop velocity (V_i). Remember, your result must always be fractional or a decimal between 0 and 1.

Warranty and Parts:
We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.