

KINEMATICS

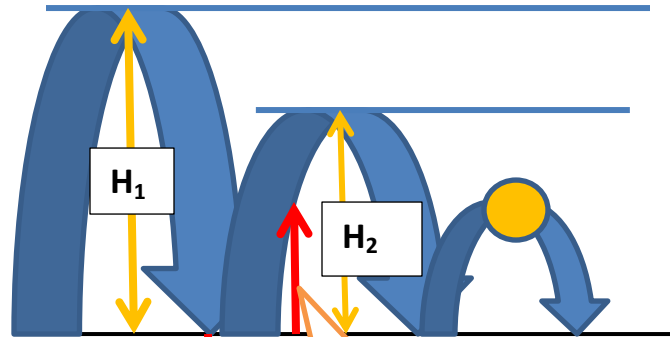
Unit 4 & 5 Dr John P. Cise , Professor of Physics, Austin Community College,

1212 Rio Grande St., Austin Tx 78701 jpcise@austincc.edu & NYTimes June 19,2011 by Pat Borrzi

Making Metal Bats Play Like Wood



Texas A&M's Matt Juengel homering June 11. In the N.C.A.A., home runs have fallen drastically.



$V_1 = \text{initial } V$

$V_2 = \text{final } V$

The College World Series has a new home in Omaha, but the stadium is not the only major difference this year. The N.C.A.A.'s new [testing standard](#) that requires metal bats to perform more like wood — meant to protect pitchers and reduce the proliferation of offense — has [altered the game](#) as drastically as the introduction of aluminum bats in 1974. In 2009, in part because of lobbying by Minnesota Coach John Anderson, the N.C.A.A. adopted the testing standard known as **BBCOR, for Ball-Bat Coefficient of Restitution**, to replace Ball Exit Speed Ratio, or BESR, starting with the 2011 season. **BBCOR measures the bounciness or give of an aluminum bat at the moment of contact with a ball. The more bounciness, the faster the ball flies off the bat.**

Players say the new bats have smaller sweet spots. The ball still jumps if you hit it right, they say. But jam shots and balls off the end of the bat no longer carry beyond outfielders' heads or out of the park.

INTRODUCTION: The coefficient of restitution(C) for a surface is defined as the ratio of the recoil velocity(V_2) off a surface divided by initial velocity (V_1) of approach to the same surface.

$C = V_2/V_1$ The graphic example above is for a bouncing ball.

QUESTION: Show that $C = V_2/V_1$ can be written as $(\text{sq root}) H_2/(\text{sq root}) H_1$?

HINT: $V_f^2 = V_i^2 + 2ax$