

COR and Temperature

What is this about?

The COR of a baseball is supposed to be precisely 0.546. However, this value depends not only on the properties of the ball, but also on the temperature and humidity of the ball. This experiment will illustrate the effect of temperature on the COR.

What do I need?

You will need a tennis ball and a freezer. Also, from Sargent-Welch a Happy Ball (WL0709) and a Double Sided Hardwood Meter Stick (WLS44696).

What will I be doing?

You will use the square root of the ratio of the bounce height to the drop height to get the COR of a tennis ball and the happy ball just as you did in the “Coefficient of Restitution” activity. You will then put them in a freezer for a bit and repeat the experiment.

What do I think will happen?

Take a minute and write down a description of what you think will happen and why you think it.

Will the cold tennis ball have a COR that is larger, smaller, or the same as the room temperature ball? What about the happy ball? Why?

What really happened?

1. Drop the room temperature tennis ball from a height of one meter.
2. Measure the height of the bounce. Repeat this a few times and average.
3. Take the square root of the ratio of the heights to get the COR.
4. Repeat this for the happy ball.
5. Put the balls in the freezer for half an hour or so and repeat the experiment.

Write a description of your results.

What did I learn?

You probably noticed that the COR of the cold ball is much less than the COR of the room temperature ball. This is also true for baseballs, although the effect is much smaller. There have been rumors that in the old days some teams chilled the game balls before playing hard-hitting rivals.

What else should I think about?

The humidity where baseballs are stored turns out to have a bigger effect on COR than the temperature. In low humidity, the balls dry out, weigh less, and have slightly higher CORs. The Colorado Rockies play in Denver where the humidity is much lower than most other ballparks. The Rockies keep the game balls in a humidifier to maintain them at a more standard humidity.



 Catch it in the Web!

-  You can read about the Rockies humidior at
(http://colorado.rockies.mlb.com/news/article.jsp?ymd=20070208&content_id=1798476&vkey=news_col&fext=.jsp&c_id=col.)
-  An experiment that measures the effect of humidity on COR by David Kagan at
(<http://phys.csuchico.edu:16080/kagan/profdev/COR.pdf>)
-  Baseball at High Altitude by Alan Nathan at (<http://webusers.npl.uiuc.edu/~a-nathan/pob/Denver.html>)
-  Sargent-Welch at
(<http://www.sargentwelch.com/>)