TP A.11

Analysis of a common fractional-ball aiming system

supporting:
“The Illustrated Principles of Pool and Billiards”
http://billiards.colostate.edu
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A common aiming system based on fractional-ball aiming claims there are only three different aims for all cut shots: a "15 degree cut," a "30 degree cut," and a "45 degree cut." Here, I show that these aims are equivalent to 3/4-, 1/2-, and 3/4-ball-hits, and I show the 15 and 45 degree angles are not exact. Also, I show an example shot "in between" two of the aim references to show a deficiency of the method. The method provides easy visual aiming, and it helps a player establish good reference aims for different ranges of cut shots; but for "in-between" cut angles, one must adjust or compensate between the aim references.

\[
\phi = \sin^{-1}\left(\frac{R/2}{2R}\right) = 14.48^\circ
\]

Note - the cut angle is not exactly 15 degrees.
1/2-ball hit:
aim the center of the CB at the edge of the OB

\[ \phi = 30^\circ \]

"30° cut:"
aim the edge of the CB at the center of the OB

\[ \phi = \sin^{-1}\left(\frac{R}{2R}\right) = 30^\circ \]

Note - the cut angle is exactly 30 degrees.

1/4-ball hit:
aim the right 1/4 of the CB at the left edge of the OB

\[ \phi = 48.59^\circ \]

"45° cut:"
aim the right edge of the CB at the left 1/4 of the OB

\[ \phi = \sin^{-1}\left(\frac{3/2 R}{2R}\right) = 48.59^\circ \]

Note - the cut angle is not exactly 45 degrees.
Example "in-between" shot:

- The OB is on the foot spot.
- The CB is inside the 1st diamond on the end rail and the 2nd diamond on the side rail.

The optimal cut angle for this shot is 39.3 degrees, which is "in between" the 1/2-ball and 1/4-ball aiming references.