



4/7/04

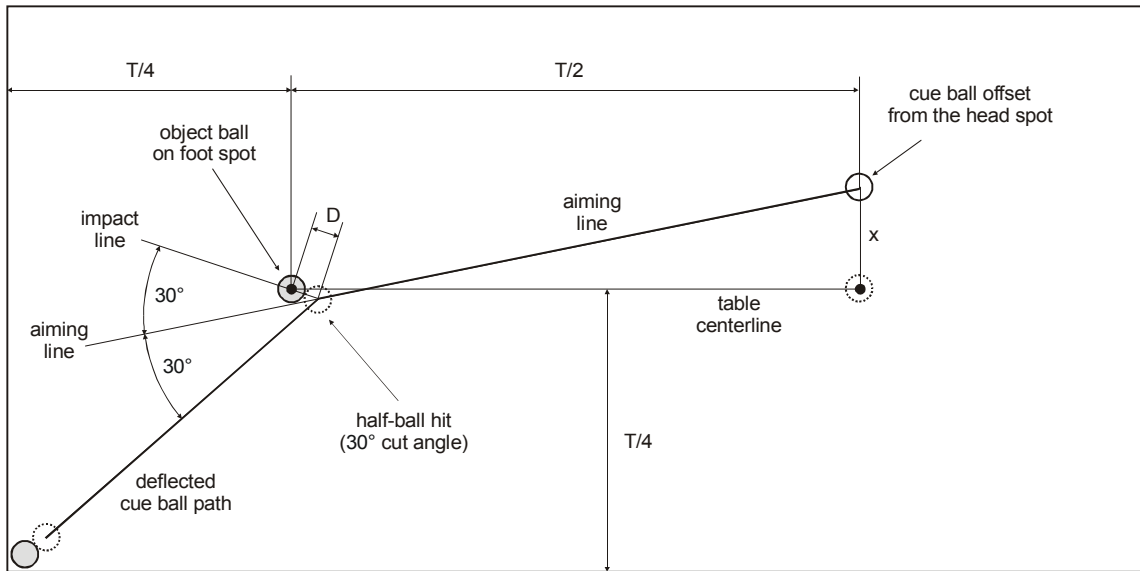


TP A.1 Half-ball hit, foot-spot carom shot

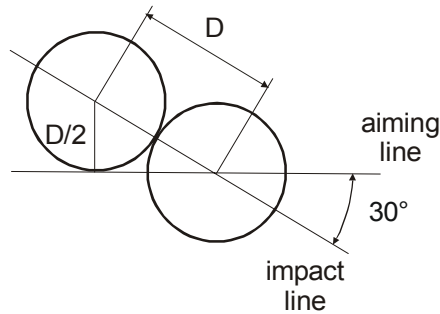
supporting:
"The Illustrated Principles of Pool and Billiards"
<http://billiards.colostate.edu>
by David G. Alciatore, PhD, PE ("Dr. Dave")

T: table size (6.5', 7', 8', 9')

D := 2.25-in ball diameter



For a half-ball hit, the cut angle is 30 degrees:



From the figure below, looking at the components of line segments perpendicular to the bold line,

$$D \cdot \sin(60 \cdot \text{deg}) = \frac{T}{4} \cdot \cos(\theta) - \frac{T}{4} \cdot \sin(\theta)$$

This equation can be written as:

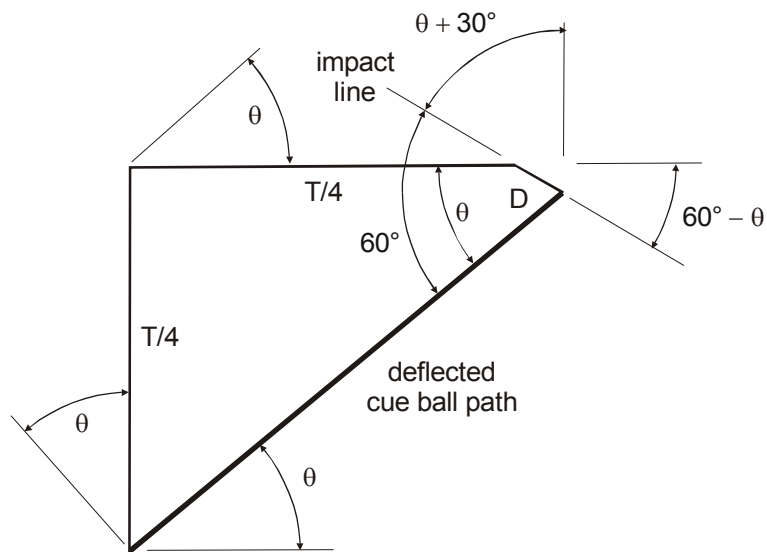
$$\cos(\theta) - \sin(\theta) = \frac{2 \cdot \sqrt{3} \cdot D}{T}$$

which can be written as:

$$\sqrt{2} \cdot \cos(\theta + 45 \cdot \text{deg}) = \frac{2 \cdot \sqrt{3} \cdot D}{T}$$

Therefore, θ , the angle of the deflected cue ball path, relative to the table centerline, can be found with:

$$\theta(T) := \arccos\left(\frac{\sqrt{6} \cdot D}{T}\right) - 45 \cdot \text{deg}$$



From the figure below, the angle to the aiming line, relative to the table centerline, is:

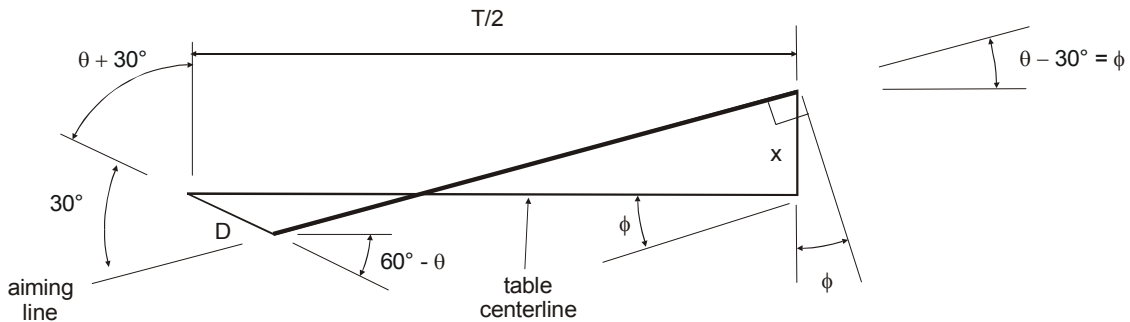
$$\phi(T) := \theta(T) - 30\text{-deg}$$

Looking at the components of line segments perpendicular to the bold line,

$$D \cdot \sin(30\text{-deg}) = \frac{T}{2} \cdot \sin(\phi) - x \cdot \cos(\phi)$$

Solving this equation for the cue ball offset x gives:

$$x(T) := \frac{1}{\cos(\phi(T))} \cdot \left(\frac{T}{2} \cdot \sin(\phi(T)) - \frac{D}{2} \right)$$



Here are some data for various table sizes:

$$\theta(8\text{-ft}) = 41.709\text{ deg} \quad \phi(8\text{-ft}) = 11.709\text{ deg}$$

$$\frac{x(6.5\text{-ft})}{D} = 2.844 \quad \frac{x(7\text{-ft})}{D} = 3.199 \quad \frac{x(8\text{-ft})}{D} = 3.911 \quad \frac{x(9\text{-ft})}{D} = 4.623$$

These numbers are expressed as the number of ball diameters the cue ball should be offset from the head spot for good shot alignment.

In practice, smaller offsets should be used to compensate for deflection from the 30 degree line due to speed. Also, for a half-ball hit, the deflected angle is more than 30 degrees (about 34 degrees). On an 8' table, an offset of 2-3 balls works fairly well for slow to medium speed hits. A larger offset is required on a larger table.