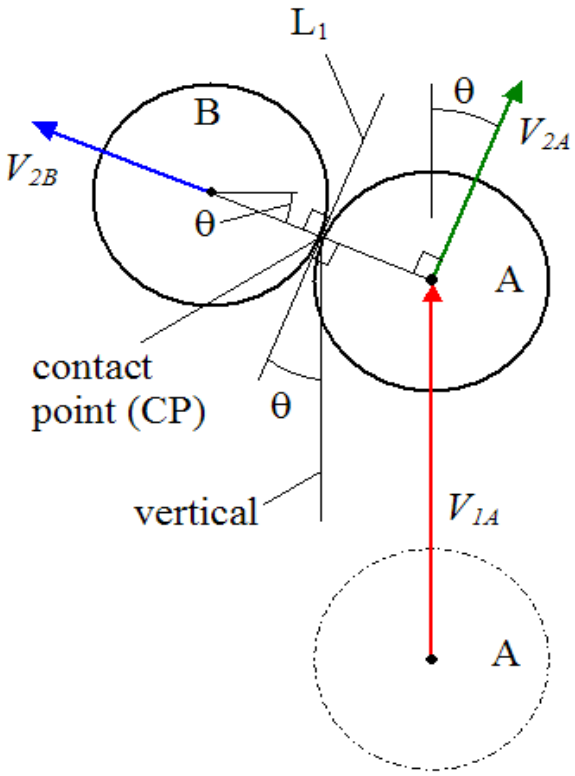
Extensions

There is more than just angles that goes into playing the games of billiards. There is a lot of physics involved when a ball hitting another ball happens. This is typically called ball collision. The figure below shows a ball collision from the side.



For the two colliding balls, the general vector equation for conservation of linear momentum is derived as follows:

Since the masses m_A and m_B are assumed equal, this equation simplifies to:

$$\vec{V}_{1A} = \vec{V}_{2A} + \vec{V}_{2B}$$

For an elastic collision kinetic energy is conserved, and the equation is:

$$\frac{1}{2}m_A(V_{1A})^2 = \frac{1}{2}m_A(V_{2A})^2 + \frac{1}{2}m_B(V_{2B})^2$$

Since the masses m_A and m_B are equal, this equation simplifies to:

$$(V_{1A})^2 = (V_{2A})^2 + (V_{2B})^2$$ (this is an example of the Pythagorean Theorem and therefore shows there exists a right triangle) Therefore, the vector equation for conservation of momentum is shown. And thus showing ball A will move in a perpendicular direction to the direction of ball B. Of course this is all in the assumption that the environment is frictionless between the balls.