The speed of light is assumed to be $c = 1 \text{ ft per nanosecond}$ here.

A pole vaulter desires to put an 18 ft pole into a 10 ft garage by running at $\sqrt{3}c/2 \approx 0.866c$, making $\gamma = 2$ and the pole only 9 ft long in the garage frame. A friend closes the door immediately after the rear of the pole passes by the door, thereby enclosing the pole within the garage. The back of the garage is a massive stainless steel wall which cannot be penetrated, or even moved, by the collision of the pole. See the figure below.

The origins of $K$ and $K'$ coincide when $t = t' = 0$ as usual.

$K'$ is moving toward $+x$ at $v = \frac{\sqrt{3}c}{2} = \frac{\sqrt{3}}{2} \text{ ft ns}^{-1}$.

$K'$ continues to move at the same $v$ throughout the problem, even after the front of the pole collides with the wall: $K'$ is not attached to the pole.

The pole is at rest in $K'$ before the collision. After the collision, the front of the pole is at rest in $K$ at the wall, hence both the front of the pole and the wall are moving toward negative $x'$ in $K'$ after the collision.

(a) In $K$. What is the equation of motion of the front of the pole (in terms of unprimed quantities, of course)? And of the rear of the pole?

(b) When the door closes, where is the front of the pole?

(c) When the front of the pole hits the wall, where is the rear?

(d) If the news of the collision travels at $c$, when does the rear of the pole learn of the collision, and where is the rear of the pole at that time?

(e) In $K'$. What is the equation of motion of the wall? And of the door?

(f) When the front hits the wall, where is the wall, where is the door, and where is the rear of the pole?

(g) When does the door close, and where is the wall at that time?

(h) When does the rear of the pole first learn of the collision, assuming again that the news travels at $c$?

(i) At that time, where is the rear of the pole, and where is the door?