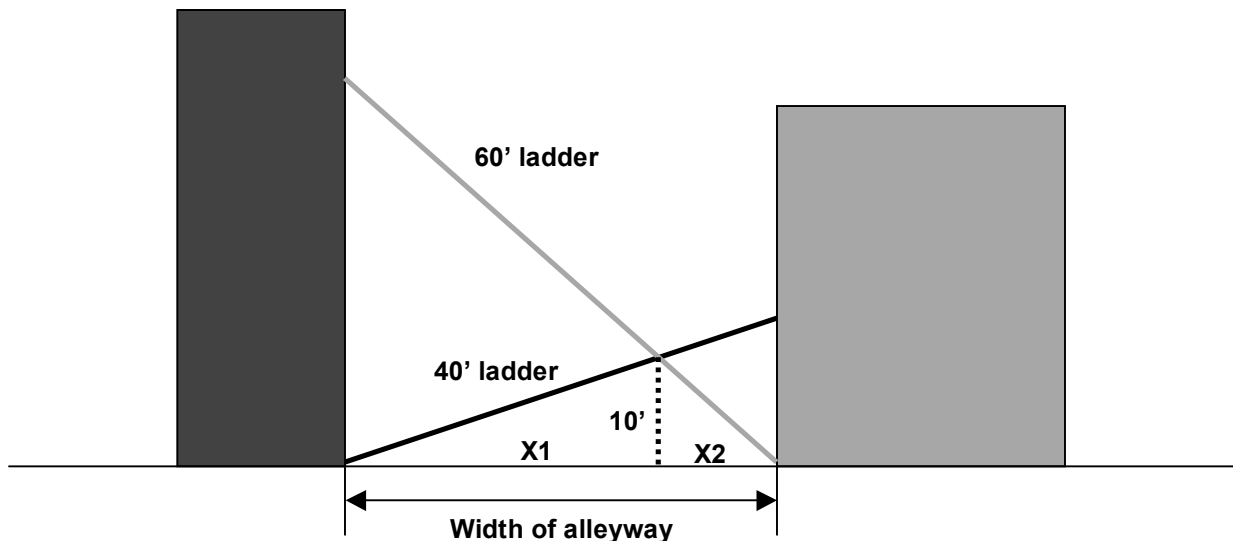


ME345 Modeling and Simulation
Professor Frank Fisher
Department of Mechanical Engineering, Stevens Inst. of Technology

The 'Ladder Problem'

Two ladders are placed in an alleyway. One is 40 feet in length, the other ladder is 60 feet in length. Both are placed on the ground at the foot of their respective building and lean against the opposite building. The buildings are tall enough that the ladders do not reach the top of the buildings. The intersection of the two ladders between the buildings is 10 feet off the ground (note: this does not necessarily need to be at the midpoint between the buildings). What is the width of the alleyway?



Hint: There are several different approaches to solve this problem (all of which are equally valid, including graphically).

Perhaps the easiest approach is to use the geometry of the problem to establish 4 independent equations with 4 unknowns (for example, X_1 , X_2 , and the two angles of the ladders with respect to the ground). This can be solved directly although the solution is complicated somewhat by the presence of the trigonometric functions. However, this can be done using Matlab by adapting the solution shown at <http://www.mathworks.com/support/solutions/en/data/1-15NRJ/index.html>.