

LAB 06 QUESTIONS

QUESTION 1

Open the Ladder geometry web page. Two workmen want to carry a ladder around a corner where one corridor meets another. Whether or not the ladder fits depends on the length of the ladder and the widths of the two corridors. Open the interactive figure that lets you experiment with different combinations of these distances. It gives a view looking down on the intersection, with the ladder represented by a red line segment.

You can drag points C and D to change the widths of the corridors. The picture is scaled so that the numbers reported are the widths of the corridors in feet. Drag point A to change the length of the ladder. After the distances are set, move point B to see if the ladder fits around the corner. When the ladder gouges the wall, it disappears. The goal is to make the ladder as long as possible and have it go around the corner without disappearing.

Press the refresh button to restore the initial picture, which shows corridor widths of 4 and 6. With these corridor widths, what is the longest that the ladder can be to fit around the corner? Answer as a number, without specifying units.

1 points

QUESTION 2

Drag D to reset the side corridor width to be 4, and make the top corridor width 8. Now what is the longest that the ladder can be?

0.5 points

QUESTION 3

How about making the side corridor 2. and the top corridor 4?

0.5 points

QUESTION 4

How can you use geometry to account for the relationship between the answer to question 2 and question 3? (It is approximate due to round off in the lengths.)

- The area of a triangle is one half the base of the triangle times the height of the triangle.
- The top corridor and the side corridor are congruent in question 2 and in question 3
- The corridor figure for question 3 is similar to the figure for question 2, but scaled down by a factor of $1/2$.
- The corridor figure for question 3 is similar to the figure for question 2, but scaled up by a factor of 2.

0.5 points

QUESTION 5

There is a guide line to give some auxiliary information about how the ladder moves. The guide line is the thin gray line that tracks the ladder. It makes an angle with its vertex at point B. How do the ladder length and the guide line length compare when the ladder has disappeared?

- The ladder length is exactly half the length of the guide line
- The ladder length is shorter than the guide line
- The ladder length is the same as the length of the guide line
- The ladder length is longer than the length of the guide line

0.5 points

QUESTION 6

What happens to the reported angle as point B moves further and further to the left?

- The angle gets smaller, eventually approaching zero.
- The angle gets smaller, but never gets smaller than 10° .
- The angle stays the same.
- The angle gets larger, approaching 90° as B approaches C
- The angle gets larger, but never bigger than 85°

0.5 points

QUESTION 7

What is the furthest to the right that B can move while still showing the red ladder line, and what happens to the reported angle there?

- The angle gets smaller, eventually approaching zero.
- The angle gets smaller, but never gets smaller than 10° .
- The angle stays the same.
- The angle gets larger, approaching 90° as B approaches C
- The angle gets larger, but never bigger than 85°

0.5 points

QUESTION 8

Set the corridor widths to both be 6 feet. What angle makes the guide line length the shortest? (Answer to the nearest degree.)

1 points

QUESTION 9

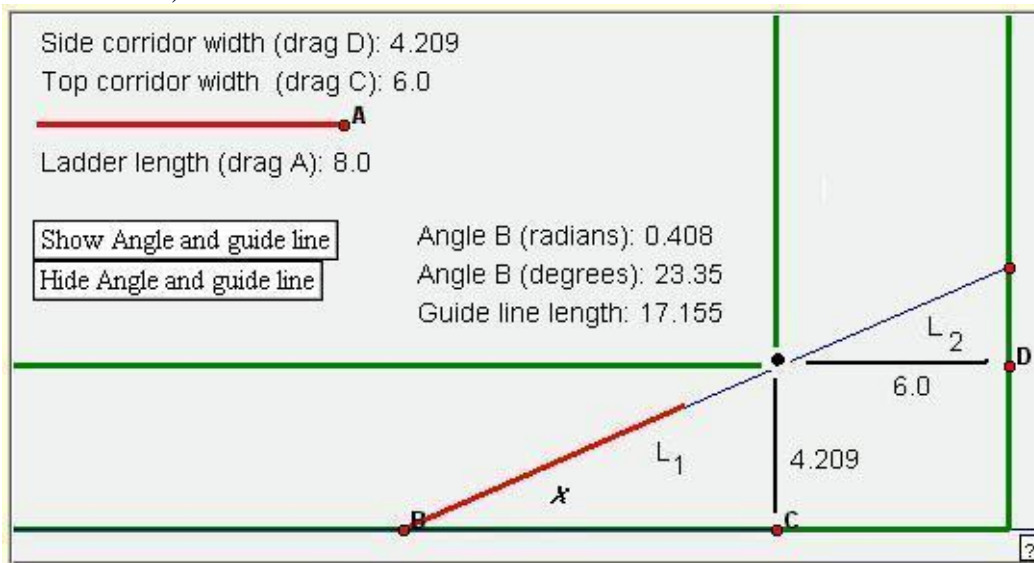
What is the relation between the ladder length and the guide line length?

- The maximum ladder length is the maximum guide line length
- The maximum ladder length is the minimum guide line length.
- The minimum ladder length is the maximum guide line length.
- The minimum ladder length is the minimum guide line length.

1 points

QUESTION 10

Consider the picture as augmented below. The guide line has two parts, labeled L1 and L2, for the part of the guide line in each corridor. The angle is labeled x . Identify a right triangle and use it to write an equation giving L1 as a function of x . (Note that L1 is not in general the same as the length of the ladder.)

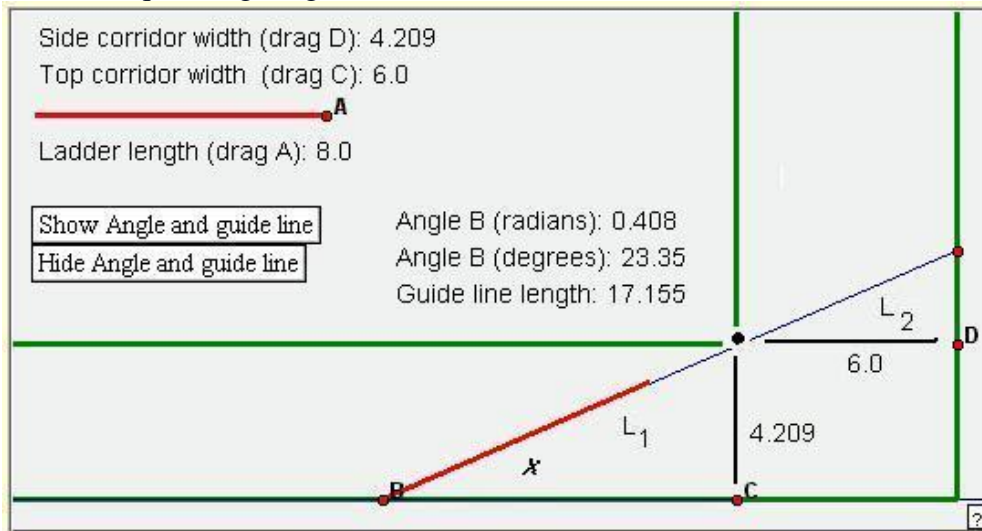


- $L1 = 4.209 \sin x$
- $L1 = 4.209 \cos x$
- $L1 = 4.209 / \sin x$
- $L1 = 4.209 / \cos x$
- $L1 = 6 \sin x$
- $L1 = 6 \cos x$
- $L1 = 6 / \sin x$
- $L1 = 6 / \cos x$

1 points

QUESTION 11

Write an equation giving L_2 as a function of x .



- $L_2 = 4.209 \sin x$
- $L_2 = 4.209 \cos x$
- $L_2 = 4.209 / \sin x$
- $L_2 = 4.209 / \cos x$
- $L_2 = 6 \sin x$
- $L_2 = 6 \cos x$
- $L_2 = 6 / \sin x$
- $L_2 = 6 / \cos x$

1 points

QUESTION 12

The guide line length L is $L_1 + L_2$. Use the Exam_grapher to plot L as a function of x . Examine the graph to find the minimum value of L , and compare the answer to the experimental value for the longest ladder obtained in problem 1. Be careful: make sure that the answer you find is consistent with the smallest and largest values of the angle at B from questions 6 and 7. Give your answer to the nearest hundredth.

1 points

QUESTION 13

The function that you graphed in the previous question is periodic, so the extreme value is achieved over and over. What is the appropriate restricted domain to use so that the function values make sense relative to the model? (Hint: look at questions 6 and 7.)

- $0 < x < 180$
- $45 < x < 90$

- $0 < x < 45$
- $0 < x < 90$
- $90 < x < 180$

1 points