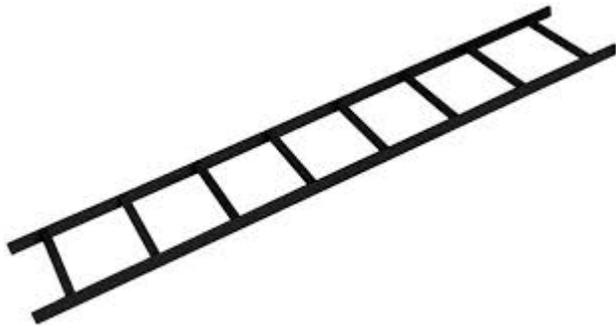


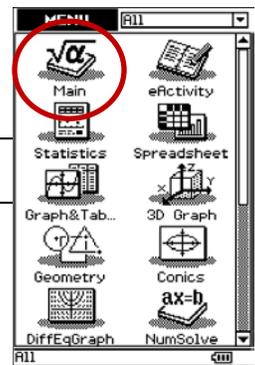
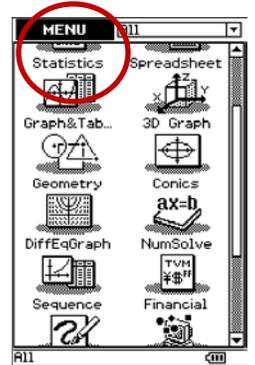
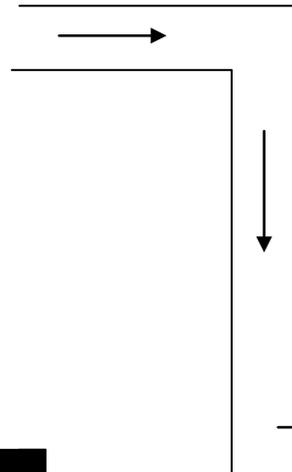
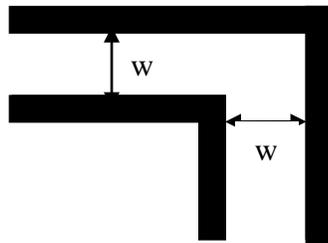
Getting the ladder around the corner!

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Carrying a ladder around the corridors of a school, workplace etc where there are corridors that meet at right angles, begs the challenge to solve this dilemma for any corridor width and height. You can also add in the dimensions for the width and thickness of the ladder.

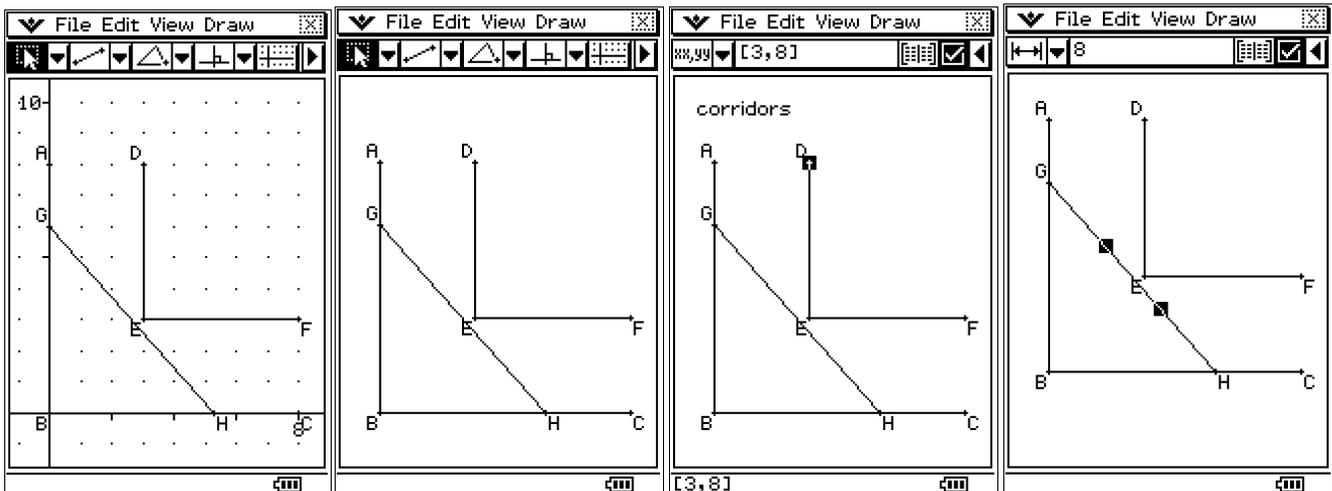


Let's first use a corridor with the same height and width.

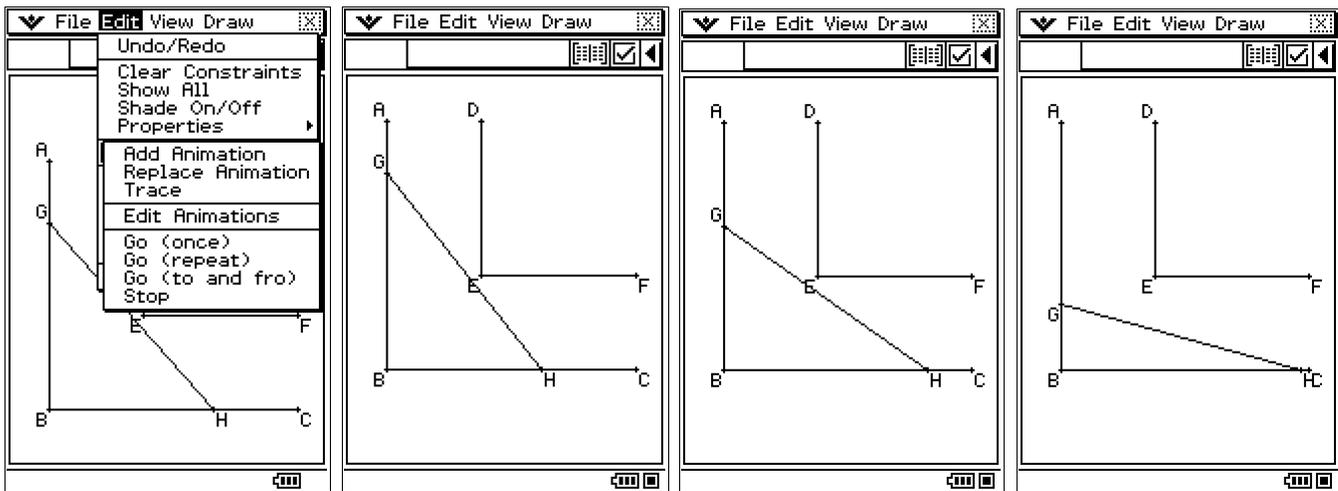


Example: With the width of the corridors being 3 metres and a ladder of length 8 metres.
Assumptions: The ladder is held horizontally in the moving through the corridor and has no thickness.

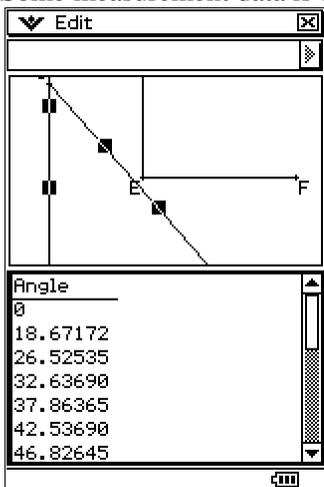
Construct the corridor with sides ABC and DEF and fix all the points as illustrated with point 'D' by placing a $\sqrt{\quad}$ in the right box and fix all the length of the ladder GH also.



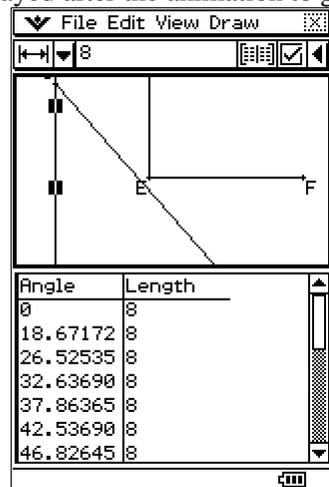
Now animate the ladder GH along the side of the corridor AB.
A number of 'screen captures' are illustrated on page 2.



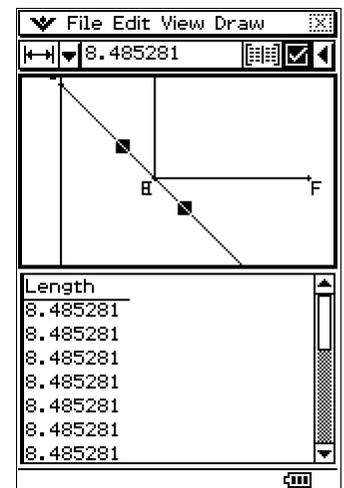
Some measurement data is displayed after the animation to gather the evidence.



Angle BGH



Length GB



It appears that a critical point is when the angle with the ladder and a corridor side is 45° , and the corner of the corridor point 'E'.

Algebra:

Let w = corridor width and ' l ' is the ladder length.

$$(2w)^2 + (2w)^2 = l^2$$

$$4w^2 + 4w^2 = l^2$$

$$8w^2 = l^2$$

$$2\sqrt{2}w = l$$

Therefore, the 3 metre corridor width the ladder length should be $6\sqrt{2}$ metres [= 8.485 (3 d.p)].

Question: What could the ladder length be in this 3 metres wide corridor with a corridor was 2.5 meters high, and the ladder width was 400 mm and has a thickness of 100 mm?

Activity: Draw some diagrams illustrating this 45° angle and the ladder touching the corner with different width corridors. Construct these on the ClassPad and animate. Collect the data and find a relationship.

Question: What could the ladder length be if the entry corridor width was ' w ', height ' h ' and the exit corridor width was ' y ' with the ladder width of ' a ' mm and a thickness of ' b ' mm if carried

- (a) horizontally?
- (b) Not horizontally?