# A mathematical model

We would like to be able to do some mathematics to compute a few things about the ladder. A mathematical model is a description of the situation which allows us to do some mathematics.

Looking at the ladder from the side, we can depict the situation by a right triangle where the floor, the wall and the ladder each are represented by a side of the triangle. We will need some variables to describe the triangle, let us define the following three variables:

- b = distance from the wall to the bottom of the ladder
- h = distance from the ground to the top of the ladder
- ℓ = length of the ladder

Please label the following diagram using the above variables.
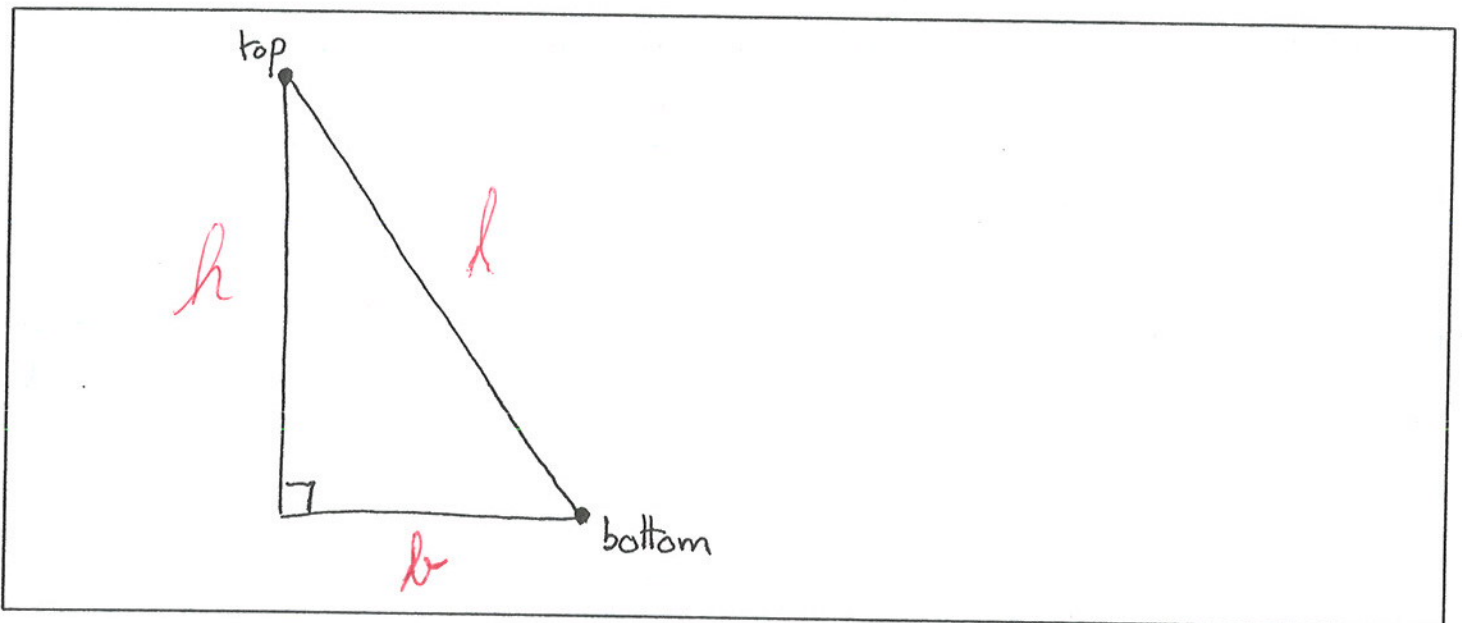
What can we say about the three variables b, h and ℓ? What similarities and/or differences do they have?

- all are measures of length.
- ℓ is constant (length of ladder is fixed)
- h and b can change, but in a related way.

Using this model, how do we represent the function describing the speed of the top of the ladder?

$$\frac{dh}{dt} \qquad OR \qquad h'(t)$$

↗ the derivative function

(h' by itself is not clear).

CQ

And what about representing the speed of the top of the ladder at the precise moment at which we took the picture? Call that specific time t_0.

$$\left. \frac{dh}{dt} \right|_{t_0} \qquad OR \qquad h'(t_0)$$

↗ derivative function evaluated at t_0.

CQ

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Do the online assignment!