

# Train Length Puzzle

(12 October 2018)

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Here is another Talwalkar problem that seems insoluble at first glance.

(<https://mindyourdecisions.com/blog/2018/10/11/can-you-solve-the-train-length-puzzle/#more-31185>, retrieved 10/11/2018)

## Can You Solve The Train Length Puzzle?

Presh Talwalkar, October 11, 2018

Thanks to Pedro for suggesting this problem!

Every day, a train passes a train station along a straight line track, and the train moves at a constant speed. Two friends, *A* and *B*, want to determine how long the train is. Lacking proper equipment, they devise the following method. They first synchronize their walking. Both *A* and *B* walk at the same constant speed, and each step they take is the same length.

One day they line up back to back at the train station. When the front of the train reaches them, they both start walking in opposite directions. Each person stops exactly as the back of the train passes by. If person *A* takes 30 steps, and person *B* takes 45 steps, how long is the train, in terms of steps?

Watch the video for a solution. *Can You Solve The Train Length Puzzle?*<sup>1</sup>

## Solution

Figure 1 captures all the information in the problem, where  $L$  = length of the train,  $v$  = its constant speed in steps/min,  $r$  = the constant speed of the walkers *A* and *B* in steps/min,  $t_1$  = time for the end of the train to reach walker *A*, and  $t_2$  = time after  $t_1$  for the end of the train to reach walker *B*.

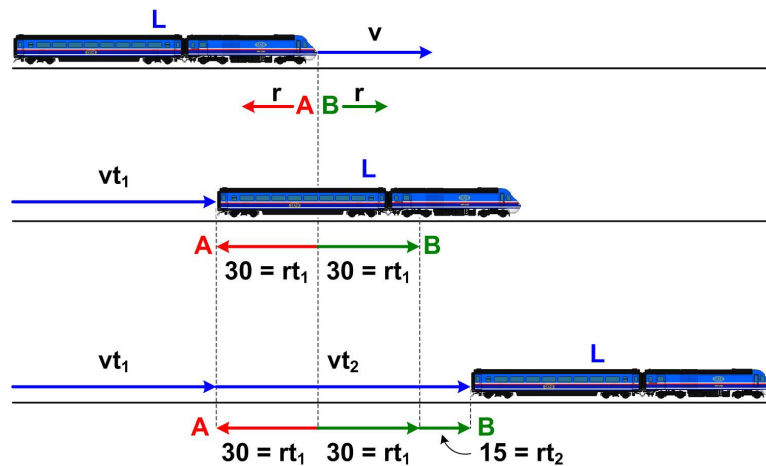


Figure 1 Problem Statement

<sup>1</sup> <https://youtu.be/VU9KenfPgo8>

Therefore, we have

$$v(t_1 + t_2) = L + 45$$

$$(v/r)(30 + 15) = L + 45$$

$$L = 45(v/r - 1)$$

and

$$vt_2 = 75 \text{ and } rt_2 = 15$$

$$(v/r)15 = 75$$

$$v/r = 5.$$

Therefore,

$$L = 45 \times 4 = 180 \text{ steps}$$

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