

Challenge 84: Mathematical Training

Here are two problems on trains,

To help you to train up your brain.

Using mathematical skill,

(Oh! What a thrill!)

You surely won't find them a pain.

Problem One:

A train crosses the countryside at a constant speed. I want to calculate its speed, so I send out two observers.

One stands next to the train tracks and calculates how long the train takes to pass her. She reports that it takes t_1 seconds for the train to pass her.

The other watches a bridge of length a metres. She reports that it takes t_2 seconds for the train to pass over the bridge.

How fast is the train going? And how long is it?

Problem Two:

Every station on my railroad sells tickets to every other station. The tickets are all pre-printed and distributed to every station. I add some stations (more than one), and have to print 46 new kinds of ticket.

How many stations did I add? How many stations were there before?