

BACCALAURÉAT-Session 2017

Epreuve de Discipline Non Linguistique

Mathématiques/Anglais

Topic: functions

A car drive

It was a beautiful sunny morning, so the Zingerman family decided to go on a day trip to Brighton. Unfortunately lots of other people had had the same idea, and with the odd hold-up and slow road, the Zingermans' drive to Brighton worked out at an average speed of 30mph. On the return journey that evening the traffic was much worse and the Zingermans only managed an average of 20mph.

What was their average speed over the whole journey?

Adding the two speeds and dividing by 2 gives the answer of 25mph. Unfortunately it is wrong.

Speeds cannot be averaged by adding two numbers and dividing by two. This can be demonstrated with an extreme example.

Suppose the Zingerman family travelled to Brighton at 30mph and that their overall average speed there and back was 15mph. What was their speed on the return journey?

It is tempting to say it must have been 0mph, since $(30 + 0) / 2 = 15$. But if they travelled at 0mph they would never have left Brighton!

From 'Why Do Buses Come in Threes?' Eastaway and Wyndham.

Questions

1. Make a short presentation of the text.
2. The distance one-way is 60 miles.
Joan calculated and found $V(x) = \frac{60x}{x+30}$ where x is the return average speed.
 - a) Calculate the Zingermans average speed over the whole journey for $x = 20$.
 - b) Solve the following equation : $V(x) = 15$. Comment on that result.
 - c) Is it possible to have an average speed over the whole journey of 50mph?
 - d) How did Joan find the formula $V(x) = \frac{60x}{x+30}$?
3. What are the advantages or disadvantages of travelling by train rather than by car?