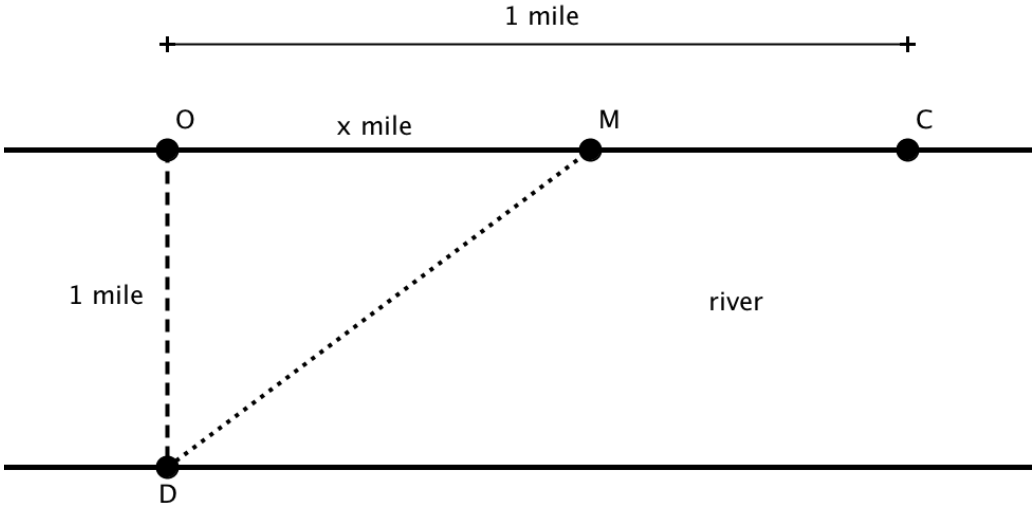
Académie de Toulouse – classes européennes mathématiques-anglais – session 2013

Sujet n°23

Please do not write on the subject paper and don't forget to give back the examination paper at the end of the test

FUNCTIONS

You are standing at the edge of a slow-moving river which is one mile wide and you wish to return to your campground on the opposite side of the river.
You can swim at 2 mph and walk at 3 mph.
You must first swim across the river to any point on the opposite bank.
From there walk to the campground, which is one mile from the point directly across the river from where you start your swim.
The aim of the problem is to find the quickest route.



D is the departure, O the opposite point, M the point where you reach the shore and C the campground

1. If we label x the OM length, what is the remaining length to walk ? How many time will you spend walking ?
2. What distance do you swin ? How many time will you spend swimming ?
3. Label the total time T(x). Prove that T(x) = $\frac{\sqrt{1+x^2}}{2}+\frac{1-x}{3}$
4. Compute the minimum time by studying the function T. For which value of x is it ?

NB : mph = mile per hour