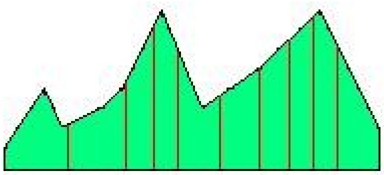
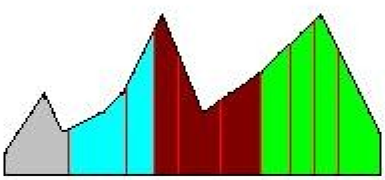
heritage - solution

Author : Adrian Panaete
"A.T. Laurian" National College, Botoşani.

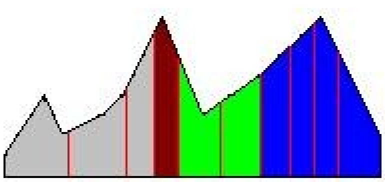
First step. If S is the sum of the **n** sons` age, we will parcel the polygon with S-1 vertical fences in S equal areas. For example if the son has 4 sons of 1,2,3, respectively 4 years old, we have S=10 so we parcel the polygon in 10 equal areas using 9 fences



Second step. Now we can observe that each son will take ***v[i]*** consecutive areas. For example the sons could occupy the areas in the order [1 year, 2 years, 3 years and 4 years]. We will use the fences ***1,3*** and ***6***.



Another example: the sons could occupy the areas in the order [3 years, 1 year, 2 years and 4 years]. We will use the fences ***3 ,4*** and ***6***.



It doesn't matter the order in which the sons will occupy the areas from left to right, we will use **n-1** from the S-1 fences we have already determined. Using all the possible orders we will have ***n! =1*2*...*n*** cases. For each case we can determine the sum of the fences' length. We choose the smallest one.

The algorithm's complexity

First step can be solved linearly (in ***O(m+S)***) if we pass from left to right through initial rectangular trapezoids and we use geometrical formulae in fixing the S-1 fences. We can also use binary search in this step.

Second step (backtracking) can have a ***O (n !)*** complexity enough to respect the time limit because for ***n = 8*** we have ***n!=40320***.