QUESTION:

In 1954 the English runner Roger Bannister broke the four-minute barrier for the mile with a time of 3:59.4 s (3 min and 59.4s; **t_1=239.4 s**). In 1999 the Moroccan runner Hicham el-Guerrouj set a record of 3:43.13 s (**t_2=223.13 s**) for the mile. If these two runners had run in the same race, each running the entire race at the average speed that earned him a place in the record books, el-Guerrouj would have won by how many meters?

SOLUTION:

When Hicham el-Guerrouj finish, Roger Bannister runs 3 minutes and 43.13 seconds. The Bannister's speed is (1 mile is equall to 1609.344 meters)

$$\upsilon_b = \frac{1609.344}{239.4} = 6.72 \text{ m/s}$$

Hence, when el-Guerrouj finish, Roger Bannister covers the distance of a

$$s = \upsilon_b \cdot t_2 = 6.72 \cdot 223.13 = 1499.434 \; meters$$

So, el-Guerrouj would have won by 1609.344-1499.434=109.91 meters

ANSWER:
109.91 meters