Problem of the Week
Problem B and Solution
Take It In Stride

Problem

Donovan and his friend Usain each think they're faster than the other. Donovan has been practicing his running, and is hoping to beat Usain in a 0.75 km race. When Usain runs, his stride length is 120 cm.

(a) If the span of Donovan's running stride length is $\frac{2}{3}$ that of Usain's, how many more strides than Usain will he have to take in order to run the 0.75 km distance?

(b) It takes both Donovan and Usain exactly 255 seconds to run 0.75 km. Who takes more strides per second? Explain your reasoning.

(c) How many strides per second did Donovan take? Round your answer to one decimal place.

Solution

(a) Since Usain's stride length is $120\,\text{cm}$, Donovan's stride length is

$$\frac{2}{3} \times 120 = \frac{2 \times 120}{3} = \frac{240}{3} = 80\,\text{cm}$$

So to run 0.75 km, or $75\,000$ cm, Donovan will take $75\,000 \div 80 = 937.5$ strides. Since he cannot take partial strides, this means he will take 938 strides.
For Usain, he will take $75\,000 \div 120 = 625$ strides.
Thus, Donovan will take $938 - 625 = 313$ more strides than Usain.

(b) Since Donovan has the smaller stride length, to run the same distance in the same time he must take more strides per second.

(c) The actual number of strides per second for Donovan was $938 \div 255 \approx 3.7$ strides per second.

Note: The actual number of strides per second for Usain was $625 \div 255 \approx 2.5$ strides per second.