EXCELLENCE TYPE QUESTION.

A boy goes in a race but finds he is not fit enough to run all the way.

He jogs for a while at a constant speed then he walks at a constant speed for ¼ of the distance that he jogged. Finally he sprints for the last bit which is $1/10^{th}$ of the distance that he jogged.

The total distance was 1.08 km.

He walked at ½ of the speed that he jogged and he sprinted at twice the speed that he jogged.

His total time for the race was 5 min 10 sec.

Find how far he jogged, walked and sprinted.

Find at what speeds he jogged, walked and sprinted.

Hints only if necessary!

Distance: if he jogged d metres

How far did he walk?

How far did he sprint?

Make an equation for the total distance.

Solve it to find the distances for jogging, walking and sprinting.

Speeds: if you let his walking speed be v then you don't have to deal with fractions!

How fast did he jog?

How fast did he sprint?

Times:

Find the time taken to jog

Find the time taken to walk

Find the time taken to sprint

Make an equation for the total time.

Solve it to find the speeds for jogging, walking and sprinting.

SOLUTION.
Distance: if he jogged *d* metres
How far did he walk? *d/4*
How far did he sprint? *d/10*
Make an equation for the total distance. *$d + \dfrac{d}{4} + \dfrac{d}{10} = 1080\ m$*

$$20\left(d + \frac{d}{4} + \frac{d}{10}\right) = 20 \times 1080\ m$$

$$20d + 5d + 2d = 21600$$

$$27d = 21600$$

$$d = 800$$

∴ he jogged for 800 m
Walked for 200 m
Sprinted for 80 m

Speeds: if you let his walking speed be *v* then you don't have to deal with fractions!

How fast did he jog? *2v*
How fast did he sprint? *4v*

Times: vel = $\dfrac{\text{dist}}{\text{time}}$ so time = $\dfrac{\text{dist}}{\text{vel}}$

Find the time taken to jog *800 / 2v*
Find the time taken to walk *200 / v*
Find the time taken to sprint *80 / 4v*

Make an equation for the total time.

$\dfrac{400}{v} + \dfrac{200}{v} + \dfrac{20}{v} = 310\ sec$

$\dfrac{620}{v} = 310$

so $v = \dfrac{620}{310} = 2\ m/s$

the speed for jogging = 4 m/s, walking = 2 m/s and sprinting = 8 m/s.