Answer on Question #42075, Physics, Other

In a long distance race, the athletes were expected to take four rounds of the track such that the line of the finish was same as the line of start. Suppose the length of the track is 200m.

a) What is the total distance to be covered?

b) What is the displacement?

c) It is uniform or non- uniform?

d) Is the displacement and the distance equal?

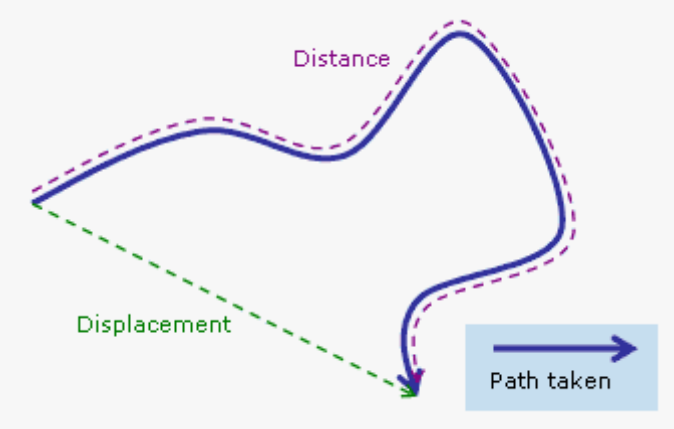
Solution:

Given:

$L = 200\ \text{m}$

$N = 4$

Distance and displacement are two quantities that may seem to mean the same thing yet have distinctly different definitions and meanings.



- Distance is a scalar quantity that refers to "how much ground an object has covered" during its motion.
- Displacement is a vector quantity that refers to "how far out of place an object is"; it is the object's overall change in position.

a) the total distance is

$$D = 4L = 4 \cdot 200 = 800\ \text{m}$$

b) Displacement = final position-initial positive = $r_0 - r_0 = 0$

Thus, the displacement is equal to zero, because finish was same as the line of start.

c) The types of motion are:

- Uniform motion
- Non uniform motion

1) Uniform motion: When equal distance is covered in equal interval of time, the motion is said to be in uniform motion.

The bodies moving with constant speed or velocity have uniform motion or increase at the uniform rate.

2) Non Uniform motion: When unequal distances are covered in equal interval of time, the motion is said to be in non uniform motion. The bodies executing non uniform motion have varying speed or velocity.

Motion is non-uniform as the direction of motion of the athlete is changing while running on the track.

d) From a) and b) we have that, *displacement and distance moved are not equal*.

Answer. a) 800 m; b) 0 m; c) non-uniform; d) not equal.

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