

Answer on Question #58754-Physics-Mechanics | Relativity

Bacteria move back and forth by using their flagella (structures that look like little tails). A bacteria moves with $v_1 = -50 \frac{\mu m}{s}$ have been observed to $-X$ direction for $t_1 = 2.3 \text{ second}$, and it move forth to the $+x$ direction for $v_2 = 30 \frac{\mu m}{s}$ within $t_2 = 1 \text{ seconds}$.

- What is its total displacement?
- What is the total distance?
- Find his average velocity for his whole movement?
- Determine his average speed for his whole movement?

Solution

$$x_1 = v_1 t_1 = -50 \frac{\mu m}{s} \cdot 2.3 \text{ s} = -115 \mu m$$

$$x_2 = v_2 t_2 = 30 \frac{\mu m}{s} \cdot 1 \text{ s} = 30 \mu m$$

- a) The total displacement is

$$s = |x_1 + x_2| = |-115 + 30| = 85 \mu m$$

- b) The total distance is

$$d = |x_1| + |x_2| = |-115| + |30| = 145 \mu m$$

- c) The average velocity for his whole movement is

$$v = \frac{s}{t_1 + t_2} = \frac{85}{2.3 + 1} = 25.76 \frac{\mu m}{s}$$

- d) The average speed for his whole movement is

$$u = \frac{d}{t_1 + t_2} = \frac{145}{2.3 + 1} = 43.94 \frac{\mu m}{s}$$