Average speed (v(avg)) and Average Velocity (V(avg))

Average speed

- Average speed = v(avg) = total distance over the entire path/time duration
- units of m/s
- scalar, not a vector (no direction)

Average Velocity

- Average Velocity = V(avg) = total Displacement divided by the time duration

- Units of m/s

- Vector (magnitude and direction)

- Direction of Velocity is always the same as the direction of the Displacement.

Example

- A person walks 70 m east in 46 s and then 30 m west in 19 s.

- What are the average speed and average velocity?

- Average speed = (70 + 30)/(46 + 19) = 100/65

- 1.5 m/s

- Average Velocity = (70 – 30)/(46 + 19) = 40/65

- 0.62 m/s east

Example

- A person walks 8.0 m west in 6 s and then 9 m south in 7 s.

- Average speed = (8 + 9)/(6 + 7) = 17/13 = 1.3 m/s

- Average Velocity = total Displacement/time

- 12/13 = 0.92 m/s SW

- 48 degrees below x-axis

Group Activity

- Determine the average speed and average Velocity for each of the following:

- 1.   A mailman walks 50 m north in 38 s; 50 m east in 38 s; 50 m south in 38 s; and 50 m west in 38 s.

- 2.   A student walks 10.5 m north in 7 s and then 3.5 m east in 3 s.

- 3.   A student walks 6.5 m north in 4 s; 3.5 m west in 3 s; 2.0 m north in 2 s; and lastly 4 m west in 3 s.

Group Activity

- Determine the average speed and average Velocity for the following:

- 4.   A student walks 4.0 m east in 3 s, 6.0 m south in 4 s, 3.5 m east in 3 s, 1.5 m north in 1 s, and lastly 6.0 m east in 3 s.