
Speed vs. Velocity (SwiftStudy Printable)

Key Formulas

$$v = \frac{\Delta x}{\Delta t}$$

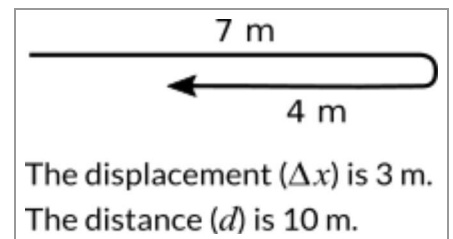
v	velocity	m/s
Δx	displacement	m
Δt	elapsed time	s

$$s = \frac{d}{\Delta t}$$

s	speed	m/s
d	distance	m
Δt	elapsed time	s

Tips to Remember

- ▶ Velocity is a **vector** quantity. That means it has both magnitude (how fast) and direction. Sometimes the direction isn't obviously given, but it's buried in the sign of the velocity. For example, a velocity of 6 m/s doesn't have an obvious direction like up or east, but it is in the **positive** direction, as opposed to -6 m/s, which would be in the opposite direction.
- ▶ Speed is a **scalar** quantity. That means that it has only magnitude; the direction is not included. Speed will always be positive, since a negative speed would imply a direction.
- ▶ Since velocity is a vector, it depends on displacement, which is also a vector. Similarly, speed depends on distance, which is a scalar like itself. Displacement takes direction into account, but distance does not. That means that if someone walks 7 m east, then 4 m west, her displacement is $7 + (-4)$, or 3 m. The distance she covers is $7 + 3$, or 10 m. The direction change in the 4 m leg caused a negative displacement, but not a negative distance, since distance is **always** positive.
- ▶ The displacement is the difference between the object's starting and ending positions. That means that if someone walks around a track and returns to her starting point, her displacement is zero.



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