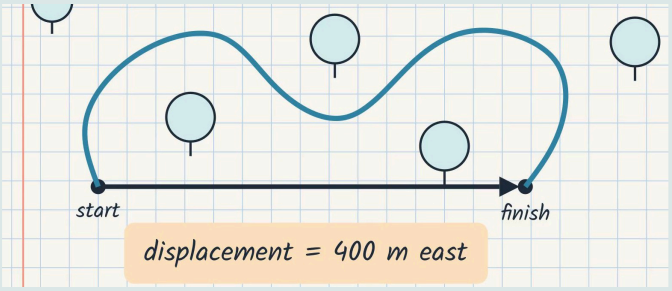
Speed and velocity

Distance and displacement, speed, s = v t, velocity, and moving in circles

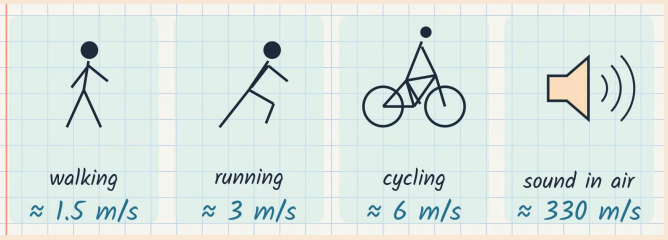
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Summary sheet

1 Distance and displacement



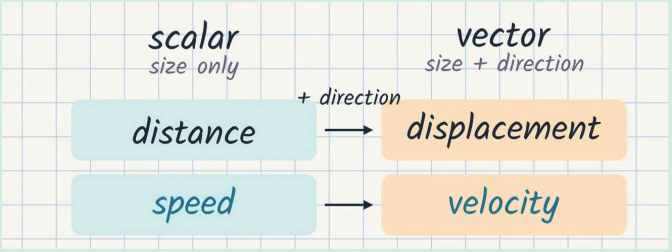
- **Distance** is how far you travel along your path. It has no direction: a **scalar**.
- **Displacement** is the straight line from start to finish, **plus the direction**: a **vector**. One lap of a 400 m track: distance 400 m, displacement **0**.

2 Speed



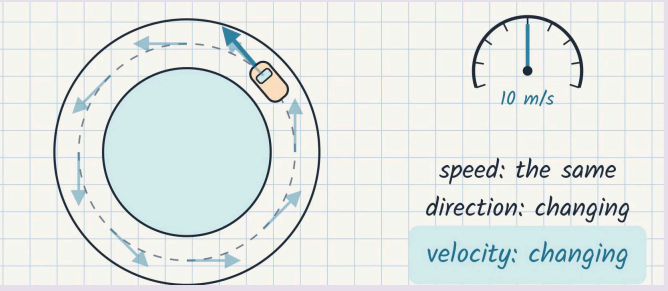
- Speed is how fast: a scalar, and rarely steady. Typical speeds: walking **1.5 m/s**, running **3 m/s**, cycling **6 m/s**, sound in air **330 m/s**; 70 mph ≈ 30 m/s.
- **s = v t** (m = m/s × s). 6 m/s for 5 min: 5 min = **300 s**, so s = 6 × 300 = **1800 m**. Average speed = total distance ÷ total time: 2400 m in 400 s = **6 m/s**.

3 Velocity



- **Velocity** is speed in a given direction, so it's a **vector**: 20 m/s north is a velocity; 20 m/s on its own is a speed.
- Scalars: distance, speed. Vectors: displacement, velocity.

4 Moving in a circle (Higher)



- A car going round a roundabout at a steady speed: its **speed stays the same**, but its **direction changes** all the time.
- So its **velocity is changing**: constant speed, changing velocity.

$$s = v\,t$$

distance travelled = speed × time

Exam tip

If a question asks how velocity changes, mention direction: answers about speed only miss the mark.

Check yourself

1. Someone walks for 10 minutes at a typical walking speed. Roughly how far do they go?
2. Is displacement a scalar or a vector?

Answers: 1. 10 min = 600 s; 1.5 × 600 ≈ 900 m 2. A vector (size and direction)