

Motion in one dimension

Distinguish distance from displacement and calculate average speed, velocity and acceleration.

Scalars and vectors

Distance is the total path length and has no direction. Displacement is the change in position and includes direction. Choose a positive direction before calculating velocity.

Use consistent units

Convert kilometres to metres and minutes to seconds. Average speed uses total distance; average velocity uses displacement. Acceleration is the change in velocity divided by the time interval.

Formula sheet

Average speed = total distance / time

Average velocity = displacement / time

Average acceleration = (final velocity - initial velocity) / time

Worked example

A learner walks 60 m east and then 20 m west in 40 s. Find average speed and average velocity.

1. Total distance = $60 + 20 = 80$ m.
2. Choose east as positive. Displacement = $+60 - 20 = +40$ m.
3. Average speed = $80 / 40 = 2$ m/s.
4. Average velocity = $+40 / 40 = +1$ m/s, or 1 m/s east.

Try it yourself

1. A car changes velocity from 5 m/s east to 17 m/s east in 4 s. Find average acceleration.
2. A runner returns to the starting point after one lap. What is displacement?

Check your answers

1. Take east as positive: $(17 - 5) / 4 = 3$ m/s² east.
2. Zero, although the distance travelled is the full length of the lap.

Common mistake

Average velocity is not always equal to average speed. A return trip can have zero average velocity.

Source and scope

Original Pass Papers ZA revision notes; curriculum reference linked below.

Updated 2026-10-28. Selected revision topics, not an official examination paper. Check your teacher's scope.

Official DBE curriculum / textbook reference

Read online: <https://passpapers.co.za/study/revision/grade-10-physical-sciences-motion>