

Kinematics · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; full Physics guide acquired (84 PDF pages). Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Motion · 1.1

Reasoning

A speedometer gives a reading at one moment. A journey average can hide stops and rapid changes in speed. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Motion · 2.1

Reasoning

Displacement includes direction; distance counts total path length. Velocity is change in displacement per time. Acceleration is change in velocity per time.
velocity: Rate of change of displacement; acceleration: Rate of change of velocity.

Motion · 3.1

Reasoning

The gradient of a displacement-time graph is velocity. The area under a velocity-time graph gives displacement. A constant-acceleration formula is valid only when its assumption is justified. Choose a positive direction and state it. Use a light gate or video with a known scale and frame interval for repeatable motion measurements. Avoid assuming hand timing is exact over very short intervals.

Motion · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: velocity rises uniformly from 2 to 10 metres per second in 4 s. $a = (v-u)/t$. $a = (10-2)/4 = 2$ metres per second squared. Displacement is trapezium area: $s = (u+v)t/2 = (2+10) \times 4/2 = 24$ m.

Motion · 4.2

Reasoning

Velocity changes from 3 to 15 metres per second in 6 s. Find acceleration. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Motion · 5.1

Reasoning

Negative velocity indicates direction under the chosen sign convention; it does not necessarily mean slowing down. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Motion · 5.2

Reasoning

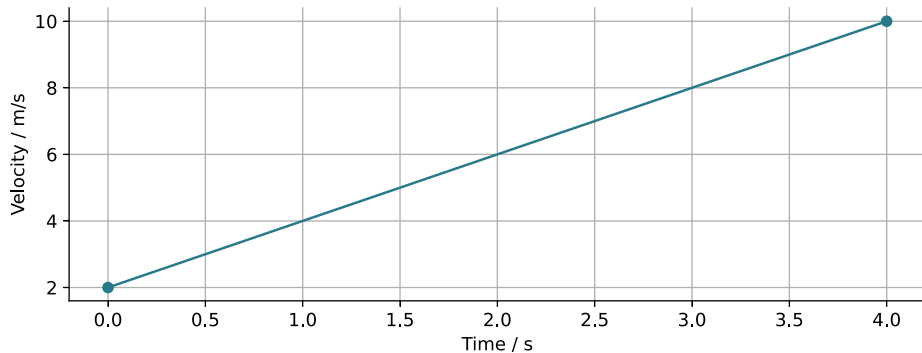
A negative velocity always means the object is slowing down. This claim is false: Negative velocity indicates direction under the chosen sign convention; it does not necessarily mean slowing down.

Motion · 5.3

Reasoning

Motion graphs and acceleration: The gradient of a displacement-time graph is velocity. The area under a velocity-time graph gives displacement. A constant-acceleration formula is valid only when its assumption is justified.

Motion · diagram



- Original teaching diagram: Motion graphs and acceleration
- Use the labels and the stated model together.

Motion · original transfer

Your turn

Velocity falls uniformly from $+6$ to -2 m/s in 4 s. Find acceleration, displacement and distance. Explain why the last two differ.

Motion · transfer reasoning

Method and interpretation

$a = -2 \text{ m/s}^2$; displacement $= (6 - 2) \times 4 / 2 = 8 \text{ m}$. Velocity crosses zero at 3 s; triangle areas give distance $9 + 1 = 10 \text{ m}$. Distance adds path lengths despite reversal.

Check yourself

- Explain velocity using the stated model.
- Explain acceleration using the stated model.
- Change one value in the original transfer; explain which assumption still matters.