

Key points to learn

1. Distance-time (d-t) graph	A graph showing how distance changes with time Gradient represents speed
2. Speed, v [m/s]	Scalar. Distance travelled in one second Speed = $\frac{\text{distance travelled, } s \text{ [m]}}{\text{time taken, } t \text{ [s]}}$
3. Average speed [m/s]	Considers the total distance travelled and the total time taken
4. Velocity, v [m/s]	Vector. Speed in a given direction. Uses the same formula as speed
5. Displacement	Vector. Distance travelled in a certain direction
6. Acceleration, a [m/s ²]	Any change in velocity. Can be either speed or direction
	Change in velocity per second. eg 10m/s ² means velocity changes by 10m/s every second Acceleration = $\frac{\text{change in velocity}}{\text{time taken for change}}$ $a = \frac{\Delta v}{t} = \frac{v - u}{t}$ [m/s ²] [s]
7 Deceleration a [m/s ²]	When acceleration is negative. Object slows down
10. Scalar	Magnitude only eg speed
11. Vector	Magnitude and direction eg velocity
12. Velocity-time (v-t) graph	A graph showing how velocity changes with time
	Gradient represents acceleration
	Area under a v-t graph line represents distance travelled

Key points to learn

13. Typical speeds	Walking ~1.5m/s Cycling ~6m/s	Running ~1.5m/s Sound ~330m/s
14. Slopes of d-t graphs	Stationary 	Accelerating
	Constant low speed 	Constant high speed
15. Slopes of v-t graphs	Low constant velocity 	High constant velocity
	Low constant acceleration 	High constant acceleration
	Low constant deceleration 	Low constant acceleration. Big distance
16 Gravitational acceleration	Acceleration due to gravity on Earth is ~9.8m/s ²	
17. Equation of motion	<p>You need to be able to use this equation. It is given in the exam.</p> $v^2 - u^2 = 2as$ <p>v = final velocity in m/s u = start velocity in m/s a = acceleration in m/s² s = distance travelled in m</p>	

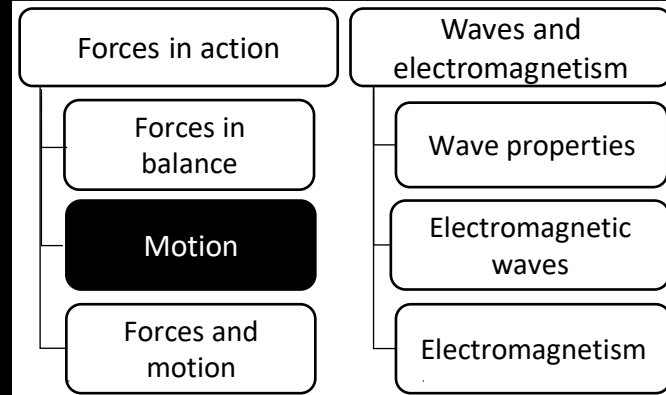
Trilogy P9: Motion

Part of: Forces

Knowledge Organiser



Big picture (Physics Paper 2)



Background

We all know about acceleration and speed, but how are they really related. The ideas on this page are essential in the use of vehicle design and tectonic movement. They can be used to describe any journey by any object.

Maths skills

Graph skills:

- Finding the steepness (gradient) of a curved line at a point using a tangent.

Gradient = rise ÷ run

- Find the area under a straight line graph. Using areas of triangles and rectangle

Rearrange the speed equation $v = s \div t$

