

Equations of Motion and Acceleration

Chapter 7: Motion · Topic 2

Key Concept

Acceleration is defined as the rate of change of velocity over time, calculated as $a = (v-u)/t$, and can be positive (speeding up), negative/deceleration (slowing down), or zero (constant velocity). These equations of motion are widely used in physics problems involving falling objects, vehicles, and projectile motion, and assume acceleration remains constant throughout the motion being analysed — they do not directly apply to motion with continuously changing acceleration.

Quick Revision Notes

- Three equations of motion: $v=u+at$, $s=ut+\frac{1}{2}at^2$, $v^2=u^2+2as$.
- Acceleration = change in velocity ÷ time = $(v-u)/t$.
- Acceleration can be positive (speeding up), negative (slowing down), or zero (constant velocity).
- Equations of motion assume constant (uniform) acceleration.

Practice Questions

- 1 A car accelerates from 0 to 20 m/s in 5 seconds. Find its acceleration.
- 2 Using the first equation of motion, find the final velocity of an object with $u=5$ m/s, $a=2$ m/s², after $t=4$ s.
- 3 Why do the standard equations of motion not apply when acceleration is continuously changing?