
They should be able to

1. be able to use the equations for uniformly accelerated motion in one dimension: $s = (u+v)t/2$, $v = u + at$, $s = ut + \frac{1}{2}at^2$, $v^2 = u^2 + 2as$
2. be able to draw and interpret displacement–time, velocity–time and acceleration–time graphs
3. know the physical quantities derived from the slopes and areas of displacement–time, velocity–time and acceleration–time graphs, including cases of non-uniform acceleration, and understand how to use the quantities
4. CORE PRACTICAL 1: Determine the acceleration of a freely-falling object
5. understand scalar and vector quantities and know examples of each type of quantity and recognise vector notation
6. be able to resolve a vector into two components at right angles to each other by drawing and by calculation
7. be able to find the resultant of two coplanar vectors at any angle to each other by drawing, and at right angles to each other by calculation
8. understand how to make use of the independence of vertical and horizontal motion of a projectile moving freely under gravity
9. be able to draw and interpret free-body force diagrams to represent forces on a particle or on an extended but rigid body using the concept of centre of gravity of an extended body
10. be able to use the equation $\Sigma F = ma$, and understand how to use this equation in situations where m is constant (Newton’s second law of motion), including Newton’s first law of motion where $a = 0$, objects at rest or travelling at constant velocity; use of the term terminal velocity is expected
11. be able to use the equations for gravitational field strength $g = F/m$ and weight $W = mg$
12. know and understand Newton’s third law of motion and know the properties of pairs of forces in an interaction between two bodies
13. understand that momentum is defined as $p = mv$
14. know the principle of conservation of linear momentum, understand how to relate this to Newton’s laws of motion and understand how to apply this to problems in one dimension
15. be able to use the equation for the moment of a force, moment of force $= Fx$, where x is the perpendicular distance between the line of action of the force and the axis of rotation
16. be able to use the concept of centre of gravity of an extended body and apply the principle of moments to an extended body in equilibrium
17. be able to use the equation for work $\Delta W = F\Delta s$, including calculations when the force is not along the line of motion
18. be able to use the equation $E_k = \frac{1}{2}mv^2$ for the kinetic energy of a body
19. be able to use the equation $\Delta E_{\text{grav}} = mg\Delta h$ for the difference in gravitational potential energy near the Earth’s surface
20. know, and understand how to apply, the principle of conservation of energy including use of work done, gravitational potential energy and kinetic energy
21. be able to use the equations relating power, time and energy transferred or work done $P = E/t$ and $P = W/t$
22. be able to use the equations efficiency = useful energy output / total energy input and efficiency = useful power output / total power input
23. be able to use the equation density $\rho = m/V$
24. understand how to use the relationship upthrust = weight of fluid displaced
25. a) be able to use the equation for viscous drag (Stokes’ law) $F = 6\pi\eta rv$; b) understand that this equation applies only to small spherical objects moving at low speeds with laminar flow (or in the absence of turbulent flow) and that viscosity is temperature dependent
26. CORE PRACTICAL 2: Use a falling-ball method to determine the viscosity of a liquid
27. be able to use the Hooke’s law equation $\Delta F = k\Delta x$, where k is the stiffness of the object

28. understand how to use the relationships (tensile or compressive) stress = force / cross-sectional area, (tensile or compressive) strain = change in length / original length, and Young modulus = stress / strain
29. a) be able to draw and interpret force–extension and force–compression graphs; b) understand the terms limit of proportionality, elastic limit, yield point, elastic deformation and plastic deformation and be able to apply them to these graphs
30. be able to draw and interpret tensile or compressive stress–strain graphs, and understand the term breaking stress
31. CORE PRACTICAL 3: Determine the Young modulus of a material
32. be able to calculate the elastic strain energy E_{el} in a deformed material sample, using the equation $\Delta E_{el} = \frac{1}{2}F\Delta x$, and from the area under the force–extension graph; the estimation of area and hence energy change for both linear and non-linear force–extension graphs is expected

Stage	Use	Your notes
Starter 10 min · retrieval practice	<i>nothing in the Library for this stage yet</i>	
Teach the new content	Handout 01 Vocabulary list 01	
Practice guided then independent	Exercise sheets 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8 Past-paper sheets 1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 1.8	
Check before they leave	<i>nothing in the Library for this stage yet</i>	
Homework set from the Library	Any unused exercise sheet above	

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No objective statements parsed for this topic — see the syllabus.

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Practice guided then independent	<i>nothing in the Library for this stage yet</i>	
Check before they leave	<i>nothing in the Library for this stage yet</i>	
Homework set from the Library	<i>nothing in the Library for this stage yet</i>	

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