Motion Along a Straight Line

Checklist statement	✓
I can define displacement, speed, velocity and acceleration.	☐
I can apply $v = \frac{\Delta s}{\Delta t}$, define all terms and know their standard units.	☐
I can apply $a = \frac{\Delta v}{\Delta t}$, define all terms and know their standard units.	☐
I can distinguish between average and instantaneous speed and velocity.	☐
I can describe motion using displacement–time, velocity–time and acceleration–time graphs.	☐
I can interpret gradients of displacement–time and velocity–time graphs.	☐
I can interpret areas under velocity–time and acceleration–time graphs.	☐
I can describe motion with uniform and non-uniform acceleration, including examples such as a bouncing ball.	☐
I can apply the equations of motion for uniform acceleration.	☐
I can apply $v = u + at$, define all terms and know their standard units.	☐
I can apply $s = \frac{(u+v)t}{2}$, define all terms and know their standard units.	☐
I can apply $s = ut + \frac{at^2}{2}$, define all terms and know their standard units.	☐
I can apply $v^2 = u^2 + 2as$, define all terms and know their standard units.	☐
I can define acceleration due to gravity, g.	☐
I can describe a required practical to determine $g$using a free-fall method.	☐
I can determine $g$from a graph and identify random and systematic errors in the experiment.	☐

Projectile Motion

Checklist statement	✓
I can explain that horizontal and vertical motions are independent in a uniform gravitational field.	☐
I can solve projectile motion problems using the equations of uniform acceleration.	☐
I can describe qualitatively the effect of friction on motion.	☐
I can describe lift and drag forces qualitatively.	☐
I can define terminal speed.	☐
I know that air resistance increases with speed.	☐
I can explain qualitatively how air resistance affects the trajectory of a projectile.	☐
I can explain factors that affect the maximum speed of a vehicle.	☐

Newton's Laws of Motion

Checklist statement	✓
I can state Newton's three laws of motion.	☐
I can apply Newton's laws of motion to appropriate situations.	☐
I can apply $F = ma$ for situations where the mass is constant, define all terms and know their standard units.	☐
I can draw and use free-body diagrams to analyse forces.	☐

Momentum

Checklist statement	✓
I can define momentum as mass × velocity.	☐
I can apply conservation of linear momentum.	☐
I can apply conservation of momentum quantitatively to one-dimensional problems.	☐
I can apply $F = \frac{\Delta(mv)}{\Delta t}$, define all terms and know their standard units.	☐
I can define impulse as the change in momentum.	☐
I can apply $F\Delta t = \Delta(mv)$, define all terms and know their standard units.	☐
I can explain the significance of the area under a force–time graph.	☐
I can analyse forces that vary with time, including the effect of impact forces and contact time.	☐
I can describe elastic and inelastic collisions and explosions.	☐
I can explain the importance of momentum conservation in ethical transport design.	☐

Work, Energy and Power

Checklist statement	✓
I can apply $W = Fs\cos\ \theta$, define all terms and know their standard units.	☐
I can apply $P = \frac{\Delta W}{\Delta t}$, define all terms and know their standard units.	☐
I can apply $P = Fv$, define all terms and know their standard units.	☐
I can interpret the significance of the area under a force–displacement graph.	☐
I can define efficiency.	☐
I can apply efficiency $= \frac{\text{useful output power}}{\text{input power}}$ and express efficiency as a percentage.	☐

Conservation of Energy

Checklist statement	✓
I can state the principle of conservation of energy.	☐
I can apply $\Delta E_p = mg\Delta h$, define all terms and know their standard units.	☐
I can apply $E_k = \frac{1}{2}mv^2$, define all terms and know their standard units.	☐
I can apply conservation of energy quantitatively and qualitatively.	☐
I can analyse energy transfers involving gravitational potential energy, kinetic energy and work done against resistive forces.	☐