SP2: **Motion and Forces** (Paper 1)

Lesson	Objectives Tracker Sheet	Date covered	I know this well	I need to do more work on this
SP2a Resultant forces	P2.14 Recall Newton's first law and use it in the following situations: (a) Where the resultant force on a body is zero, i.e. the body is moving at a constant velocity or is at rest (b) Where the resultant force is not zero, i.e. the speed and/or direction of the body changes.			
SP2b Newton's First Law	P2.14 Recall Newton's first law and use it in the following situations: (a) Where the resultant force on a body is zero, i.e. the body is moving at a constant velocity or is at rest (b) Where the resultant force is not zero, i.e. the speed and/or direction of the body change(s)			
	P2.20 **H** Explain that an object moving in a circular orbit at constant speed has a changing velocity (qualitative only).			
	P2.21 **H** Explain that for motion in a circle there must be a resultant force known as a centripetal force that acts towards the centre of the circle			
SP2c Mass and weight	P2.16 Define weight, recall and use the equation: weight (newton, N) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg), W = m × g.			
	P2.17 Describe how weight is measured.			
	P2.18 Describe the relationship between the weight of a body and the gravitational field strength.			
SP2d Newton's Second Law	P2.15 Recall and use Newton's Second Law as: force (newton, N) = mass (kilogram, kg) × acceleration (metre per second squared, m/s2), F = m × a			
	P2.22 **H** Explain that inertial mass is a measure of how difficult it is to change the			

	velocity of an object (including from rest) and know that it is defined as the ratio of force over acceleration..			
SP2d Investigating acceleration – Core practical	P2.19 Investigate the relationship between force, mass and acceleration by varying the masses added to trolleys.			
SP2e Newton's Third Law	P2.23 Recall and apply Newton's Third Law to equilibrium situations			
	P2.23 **H** Recall and apply Newton's Third Law both to equilibrium situations and to collision interactions and relate it to the conservation of momentum in collisions.			
SP2f Momentum	P2.23 **H** Recall and apply Newton's Third Law both to equilibrium situations and to collision interactions and relate it to the conservation of momentum in collisions.			
	P2.24 **H** Define momentum, recall and use the equation: momentum (kilogram metre per second, kg m/s) = mass (kilogram, kg) × velocity (metre per second, m/s) p = m × v.			
	P2.25 **H** Describe examples of momentum in collisions.			
	P2.26 **H** Use Newton's Second Law as: force (newton, N) = change in momentum (kilogram meter per second, kg m/s) / time (second, s) F = (mv – mu) / t			
SP2g Stopping distances	P2.27 Explain methods of measuring human reaction times and recall typical results.			
	P2.28 Recall that the stopping distance of a vehicle is made up of the sum of the thinking distance and the braking distance.			
	P2.29 Explain that the stopping distance of a vehicle is affected by a range of factors including: (a) the mass of the vehicle (b) the speed of the vehicle (c) the driver's reaction time			

	(d) the state of the vehicle's brakes (e) the state of the road (f) the amount of friction between the tyre and the road surface.			
	P2.30 Describe the factors affecting a driver's reaction time including drugs and distractions			
SP2h Braking distance and energy	P2.32P Estimate how the distance required for a road vehicle to stop in an emergency varies over a range of typical speeds.			
	P2.33P Carry out calculations on work done to show the dependence of braking distance for a vehicle on initial velocity squared (work done to bring a vehicle to rest equals its initial kinetic energy).			
SP2i Crash hazards	P2.26 **H** Use Newton's Second Law as: force (newton, N) = change in momentum (kilogram meter per second, kg m/s) / time (second, s) F = (mv – mu) / t.			
	P2.31 **H** Explain the dangers caused by large decelerations and estimate the forces involved in typical situations on a public road.			