KS3 Physics – Forces & Motion – Learning Objectives

	Beginning	Developing	Secure	Embedding	Extending	Excelling
Calculating Speed	With assistance, calculate speed, and recall the unit.	Qualitatively describe the motion of a moving object using a distance-time graph and/or a speed-time graph.	Complete calculations to find speed, distance and time (without assistance), including changing units. Give detailed description of an object's motion by analysing distance-time and speed-time graphs – this should include some calculations.		Sketch distance-time and speed-time graphs, following a description of the motion. Calculate acceleration using the equation, and recall the unit.	Interpret velocity-time graphs, quantitatively and qualitatively, including negative values.
Types Of Force	Describe a force, in simple terms, and recall the unit.	Represent the forces acting on an object using a simple diagram. Find the resultant of two forces acting in the same plane.	Show how to represent the following forces on a diagram, describe an appropriate context for each, and discuss variable which may affect them: weight, reaction, upthrust, air resistance, friction, driving force, tension. Explain the difference between mass and weight, state the units, and calculate weight. Calculate the resultant force of a system with multiple forces acting on it, and explain how the motion of an object changes based on the resultant force acting on it.			Calculate the resultant of a pair of perpendicular forces. Recall and apply Newton's Laws of Motion.
Deforming Materials	Recall that forces are not always used for changing the motion of an object, but can also be used to deform the object.	Describe the mechanical properties of a material, and discuss how they would behave when a force is applied.	Recall Hooke's Law, and complete an experiment to show how a spring behaves when an increasing force is added to it. Define the term 'elastic limit', and explain how it can be identified from a graph.		Understand the term 'spring constant'; determine the spring constant of a spring using a force-extension graph and explain how the constant would change as stiffness varies.	
Work and Power	-	Explain the difference between work and energy, and define power, and recall the units for each.	Complete calculations involving mechanical work and power (without assistance), including changing units.		Solve complex problems involving work and power, including calculations with multiple stages, and calculations involving reference to other areas of the topic (eg. speed, resultant force).	
Terminal Speed	-	Recall that the air resistance acting on an object increases as its speed increases. Recall that the forces acting on an object travelling with constants speed are balanced, and the direction of the resultant force acting on an object with changing speed.		Describe, in terms of changing forces, how a moving object achieves its terminal speed (eg. skydiver, racing car); explain how an object may accelerate or decelerate to different extents, depending on the size of the resultant force acting on it. Link the streamlined design of an object to its terminal speed.		Compare the differences in the motion of a falling object on the Earth and the Moon or another planet.
Pressure	-	Recall the definition of pressure, and state an appropriate unit.	Calculate the pressure of a system, using force and area, including the use of appropriate units. Qualitatively discuss situations where it is useful to have a high or low pressure. Describe the principle of operation of a hydraulic system.		Solve complex pressure calculations, including changing units and calculating the object's surface area. Complete calculations to determine the size of the output force from a hydraulic system.	
Moments	-	Recall the definition of moment, and state an appropriate unit.	Calculate moment, using force and distance, including the use of appropriate units. Recall the principle of moments, and apply it to simple situations. Define the term 'force multiplier', and explain how a lever uses the principle of moments.		Solve problems using the principle of moments, where more than one force is applied either side of the pivot.	Discuss the usage of other force multipliers – where they are used and how the force is magnified (eg. pulleys, gears).

** Objectives covering more than one grade are assessed based on the level of scientific detail and language used by the learner.*