Attainment Band	**Forces** **Knowledge and Understanding**
Yellow/Yellow +	• Describe the main types of force and accurately draw force diagrams to explain the relative size (magnitude) and direction of applied forces and their effects • Provide an effective explanation of the concept of speed and independently derive the equation for speed; link their understanding of the speed equation to explain the operation of speed cameras • Explain what is represented on a more complex distance–time graph and construct a graph to represent a more complex journey • Apply the concept of relative motion to a situation with more than two objects moving at different speeds • Explain examples of balanced and unbalanced forces and correctly predict the relative motion produced by unbalanced forces; explain the concept of a reaction force using simple examples • Explain how a more complex set of opposing forces may or may not result in an object being in equilibrium • Explain how forces can cause an object to deform, link the deformation to the size of the force, and recognise that for a range of forces the amount of deformation is linear and that this can be used to design machines for measuring forces • Obtain a precise set of data by investigation, produce accurately drawn graphs to illustrate Hooke's Law, and explain the behaviour of a material at the elastic limit • Include the essential features in a plan to investigate the force of friction • Understand that frictional drag is a contact force acting in the opposite direction to movement and explain the motion of a sky diver in relation to the effects of frictional forces • Evaluate data from an investigation into streamlining and explain the findings in terms of frictional drag • Evaluate the concept of a gravitational field as a means of explaining the effects, including acceleration • Explain weight in relation to the idea of a gravitational field and apply this to deep space and different planets • Explain how the force and area can be varied to alter the pressure applied • Identify the causes and implications of pressure increase with depth in a liquid • Apply ideas of density and displacement to predict the outcome of various situations • Identify implications of differing atmospheric pressure at different heights and across the world

Blue	• State the main types of force and draw force diagrams to show the size and direction of forces; identify force pairs • Explain the concept of speed and demonstrate how the speed equation is derived using their understanding of speed • Construct a graph to represent a journey explain what it represents • Apply the concept of relative motion to a situation with two objects moving at different speeds • Apply an understanding of forces to explain simply the changes caused by forces of different magnitudes and directions • Explain how opposing forces may or may not result in an object being in equilibrium • State that applying a force can compress or stretch an object, and state that the bigger the force the larger the deformation • Carry out an investigation into springs and gather data to show simply the relationship between load and extension • Use their own data to state Hooke's Law and explain the elastic limit of a material • Describe the effects of friction and explain why friction is beneficial in a range of situations • Explain air and water resistance in terms of frictional drag, and recognise this as a contact force • Investigate streamlining and use scientific vocabulary to explain how streamlining reduces the forces of friction on an object moving through a fluid • Apply the concept of a gravitational field to describe the causes and effects of gravity • Explain the relationship between gravity and weight • Explain the term 'weightless' and apply understanding to explain why weight changes on different planets • Explain how the pressure on a solid surface may vary and the effects this has • Calculate the pressure applied from the force and the area • Explain why pressure increases with depth in a liquid • Explain why some objects float and others sink using concepts of density, displacement and upthrust • Explain why atmospheric pressure changes according to height
Green	• List some types of force and label diagrams to show the direction of forces • State that forces are needed to change the motion of an object, and draw force arrows in diagrams • Describe a method in simple terms to find the speed of an object • Label a distance–time graph and explain some of its features • Describe the effects of balanced and unbalanced forces, and know that an unbalanced force is needed for a change to take place • Predict relative motion produced by different forces on an object • Explain how forces can cancel each other out • Carry out an investigation into springs and gather data to show simply the relationship between load and extension • Identify the force of friction between two objects and list examples of situations that need friction • Know that objects are slowed down by drag forces • Recognise streamlined shapes and know that this helps them to move through air or water • Explain the effects of gravity and how they vary around the Earth • Describe the effect of an object being in a gravitational field • Know that objects have different weights on different planets and that in deep space objects are weightless • Describe the effects of varying pressure on a solid surface and suggest factors that affect this • Describe how pressure increases with depth in a liquid and some effects of this • Suggest why some objects float and others sink • Describe how atmospheric pressure changes according to height
White	• Some of the above elements have been achieved