



Essential Knowledge		Teaching Points	
<ul style="list-style-type: none"> Understand and use vector notation, including column notation, and understand and interpret vectors as displacement in the plane with an associated direction. Understand that $2\mathbf{a}$ is parallel to \mathbf{a} and twice its length, and that \mathbf{a} is parallel to $-\mathbf{a}$ in the opposite direction. Represent vectors, combinations of vectors and scalar multiples in the plane pictorially. Calculate the sum of two vectors, the difference of two vectors and a scalar multiple of a vector using column vectors (including algebraic terms). Find the length of a vector using Pythagoras' Theorem. Calculate the resultant of two vectors. Solve geometric problems in 2D where vectors are divided in a given ratio. Produce geometrical proofs to prove points are collinear and vectors/lines are parallel. 		<ul style="list-style-type: none"> Students find manipulation of column vectors relatively easy compared to pictorial and algebraic manipulation methods – encourage them to draw any vectors they calculate on the picture. Geometry of a hexagon provides a good source of parallel, reverse and multiples of vectors. Remind students to underline vectors or use an arrow above them, or they will be regarded as just lengths. Extend geometric proofs by showing that the medians of a triangle intersect at a single point. 3D vectors or \mathbf{i}, \mathbf{j} and \mathbf{k} notation can be introduced and further extension work can be found in GCE Mechanics 1 textbooks. 	
Assumed Prior Knowledge/ Links / Interleaving			
<ul style="list-style-type: none"> Students will have used vectors to describe translations and will have knowledge of Pythagoras' Theorem and the properties of triangles and quadrilaterals. 			
Potential Barriers to Access /Misconceptions		Opportunities for Reasoning/Problem Solving/Proofs	
<ul style="list-style-type: none"> Students find it difficult to understand that parallel vectors are equal as they are in different locations in the plane. 		<ul style="list-style-type: none"> "Show that"-type questions are an ideal opportunity for students to provide a clear logical chain of reasoning providing links with other areas of mathematics, in particular algebra. Find the area of a parallelogram defined by given vectors. 	
Key Mathematical Vocabulary	Vector, direction, magnitude, scalar, multiple, parallel, collinear, proof, ratio, column vector		