	Y11 Foundation	Chapter 19 (R6, R12, G5, G6, G7, G19, G24, G25)	**The Bigger Picture: Congruence, similarity and vectors**	**Lessons 20**
Mathematics THE ACADEMY OF ST NICHOLAS				

Essential Knowledge	**Teaching Points**
• Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS); • Solve angle problems involving congruence; • Identify shapes which are similar; including all circles or all regular polygons with equal number of sides; • Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and solve angle problems using similarity; • Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides; • Understand the effect of enlargement on perimeter of shapes; • Solve problems to find missing lengths in similar shapes; • Know that scale diagrams, including bearings and maps are 'similar' to the real-life examples. • Understand and use column notation in relation to vectors; • Be able to represent information graphically given column vectors; • Identify two column vectors which are parallel; • Calculate using column vectors, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector.	• Students need to understand similarity as one shape being an enlargement of the other. • Students should recognise that all corresponding angles in similar shapes are equal in size when the corresponding lengths of sides are not equal in size. • Use AB notation for describing lengths and $\angle ABC$ notation for describing angles. • Use simple scale factors that are easily calculated mentally to introduce similar shapes. • Reinforce the fact that the sizes of angles are maintained when a shape is enlarged. • Make links between similarity and trigonometric ratios. • Students must know that if one vector is a multiple of the other, they are parallel. • Add and subtract vectors using column vectors. • Students find manipulation of column vectors relatively easy compared to the pictorial and algebraic manipulation methods – encourage them to draw any vectors that they calculate on the picture.

Assumed Prior Knowledge/ Links / Interleaving	
• Students will have used column vectors when dealing with translations. • Students can recall and apply Pythagoras' Theorem on a coordinate grid. • Students should be able to recognise and enlarge shapes and calculate scale factors. • Students know how to calculate area and volume in various metric measures. • Students should be able to measure lines and angles and using compasses, ruler and protractor, and construct standard constructions.	

Potential Barriers to Access /Misconceptions	**Opportunities for Reasoning/Problem Solving/Proofs**
• Students may incorrectly believe that all polygons are regular or that all triangles have a rotational symmetry of order 3. • Often students think that when a shape is enlarged the angles also get bigger. • Students find it difficult to understand that two vectors can be parallel and equal as they can be in different locations in the plane	• Using scale diagrams, including bearings and maps, provides a rich source of real-life examples and links to other areas of mathematics. • Investigations involving vectors around 2D shapes such as a square can be extended to include considering the area enclosed in the same shapes.

Key Mathematical Vocabulary	Vector, direction, magnitude, scalar, multiple, parallel, collinear, ratio, column vector, congruence, side, angle, compass, construction, shape, volume, length, area, volume, scale factor, enlargement, similar, perimeter