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| **UNIT 19: Congruence, similarity and vectors** |

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**SPECIFICATION REFERENCES**

R6 express a multiplicative relationship between two quantities as a ratio or a fraction

R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors

G5 use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)

G6 apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides … and use known results to obtain simple proofs

G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)

G19 apply the concepts of congruence and similarity, including the relationships between lengths in similar figures

G24 describe translations as 2D vectors

G25 apply addition and subtraction of vectors, multiplication by vectors by a scalar, and diagrammatic and column representations of vectors

**PRIOR KNOWLEDGE**

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.

**KEYWORDS**

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,

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| **19b. Vectors**(G24, G25) | **Teaching time**6–8 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* 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.

**POSSIBLE SUCCESS CRITERIA**

Know that if one vector is a multiple of the other, they are parallel.

Add and subtract vectors using column vectors.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Investigations involving vectors around 2D shapes such as a square can be extended to include considering the area enclosed in the same shapes.

**COMMON MISCONCEPTIONS**

Students find it difficult to understand that two vectors can be parallel and equal as they can be in different locations in the plane.

**NOTES**

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.