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| Year 11 – Higher Tier | **Topic: Unit 19 – Vectors and Geometric Proof****Period:** Autumn 1 |
| **Overview of topic:**Students will build on their knowledge from KS3 and year 10 in dealing with geometric constructs and apply vectors and vector notation to solve geometric problems* Vectors and vector notation
* Vector arithmetic
* Further vector arithmetic
* Parallel vectors and collinear points
* Solving geometric problems

In addition to continued study within the scheme of work, year 11 students will complete regular GCSE practice papers and use analysis of those results to inform revision of prior knowledge, tailored to the individual needs of different classes and students. |
| **Key** **knowledge:*** Add and subtract vectors algebraically and use column vectors.
* Solve geometric problems and produce proofs.
* “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 vocabulary:**

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| Tier 2 | Tier 3 |
| * Direction
* Magnitude
* Multiple
* Proof
* Ratio
 | * Vector
* Scalar
* Parallel
* Collinear
* Column vector
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 | **Key skills:** * Understand and use vector notation, including column notation, and understand and interpret vectors as displacement in the plane with an associated direction.
* Understand that 2a is parallel to a and twice its length, and that a is parallel to −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..
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| **Co-curricular opportunities:** Vector arithmetic underpins the advanced calculations required for complex geometrical processing such as programming of CNC or robotic machines in technology, or the physics engines used in simulations such as flight simulators and computer games | **Key reading skills taught and key texts:**Clarify – identify key vocabulary in questions and be fluent in understanding the meaningsQuestion – from a worded question, what Maths is required to be done in order to get a solution?**Wider Reading Opportunities/Links:** |
| **How can I use this information at home?*** Conversation starters with your children to discuss their learning
* Support your child in carrying out independent research around the topic
* Visit your local library (or BorrowBox), museums, or other locations to explore the topic
* Promote books/other texts that explore this topic (see reading section)
* Help your child to learn the key vocabulary
* Encourage practice and consolidation through completion of homework, TTRockStars and using other online learning platforms
* Encourage them to practice their mathematical skills in a variety of everyday situations wherever the opportunity arises.
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