Hanley Castle High School curriculum outline for parents: **Maths**

		Autumn Term		Spring Term		Summer Term	
Year 10 **Stage 10**	**Topic** **Big question / Overview**	**Calculating** *How accurate are our calculations?* Use powers and roots, negative and fractional indices, bounds and error intervals; simplify surds and solve calculations involving upper and lower bounds. **Algebraic proficiency: visualising 2** *What can we learn from graphs?* Analyse gradients, intercepts and rates of change; sketch linear, quadratic, cubic and reciprocal graphs and estimate solutions graphically. **Presentation of data** *Does a relationship imply a cause?* Draw histograms and scatter graphs; describe correlation, use lines of best fit to estimate values and distinguish correlation from causation.	**Presentation of data** *Which display best communicates data?* Construct and interpret time series, compound bar charts, frequency polygons and stem-and-leaf diagrams; calculate averages from data displays. **Proportional reasoning** *How can we model connected quantities?* Solve complex problems with speed, density and pressure, ratio and similarity; create and interpret equations for direct and inverse proportion.	**Solving equations and inequalities** *How can algebraic expressions be transformed?* Expand and factorise quadratic expressions; manipulate algebraic fractions, use the difference of two squares and rearrange more complex formulae. **Mathematical movement** *How can several transformations be combined?* Describe and perform sequences of transformations, including enlargements with fractional and negative scale factors; explain which properties remain unchanged.	**Algebraic proficiency: tinkering** *How can different equations be solved?* Solve quadratics by factorising, formula and graph; solve simultaneous equations by substitution or elimination and use iteration to approximate roots.	**Calculating space** *How do we measure complex solids?* Apply Pythagoras' theorem and calculate surface area and volume of cones, pyramids and spheres; explore the effect of scale factors on area and volume. **Understanding risk** *How can we organise complex probability problems?* Use Venn diagrams, two-way tables and frequency trees to organise information; apply counting rules and calculate conditional probabilities.	**Pattern sniffing** *How can we find rules for harder sequences?* Recognise quadratic and geometric sequences; use differences to find quadratic nth-term rules and describe geometric progressions. **Mathematical movement** *How can vectors explain geometry?* Add, subtract and scale vectors; represent movement and use vector relationships, ratios and parallel lines to justify geometrical arguments.
	Disciplinary knowledge/skills	Calculate precisely using bounds and indices, and interpret the behaviour of mathematical graphs.	Evaluate statistical relationships and apply proportional reasoning to real-life situations.	Manipulate complex algebraic expressions and explain geometric transformations.	Solve quadratic and simultaneous equations using appropriate methods.	Choose formulae for three-dimensional measures and organise complex probability information.	Generalise sequences and use vectors to reason and prove geometrical statements.
	New vocabulary	Indices Root Surd Rationalise Upper bound Lower bound Error interval Gradient Intercept Linear Quadratic Cubic Reciprocal Turning point Histogram Scatter graph Correlation Causation Line of best fit Extrapolation	Time series Compound bar chart Frequency polygon Stem-and-leaf Frequency Average Compound measure Density Pressure Speed Direct proportion Inverse proportion Constant	Quadratic Factorise Expand Algebraic fraction Difference of two squares Subject Reflection Rotation Translation Enlargement Centre Scale factor Invariant	Quadratic formula Factorise Root Iteration Substitution Elimination Simultaneous	Pythagoras Sphere Cone Pyramid Surface area Volume Similarity Scale factor Venn diagram Two-way table Frequency tree Conditional probability Intersection Product rule	Quadratic sequence Geometric sequence First difference Second difference Nth term Progression Vector Scalar Magnitude Direction Parallel Ratio Vector proof