HLTA (secondary mathematics)
Subject knowledge and skills review

It is envisaged that candidates will make use of this subject knowledge and skills review (SKSR) at the point of deciding to pursue HLTA status where subject specialism in mathematics is being claimed for standard 10. Candidates are advised to work with a colleague in the mathematics department during or following the completion of this tool, as this will not only serve to ensure an accurate self-evaluation but also support the verification of their knowledge at the point of assessment.

In completing this SKSR candidates should refer to www.qca.org.uk where the programmes of study covered within its content are fully illustrated.

The completed SKSR may provide evidence to the HLTA assessor that the candidate has acquired sufficient knowledge of mathematics to adequately support teaching and learning within the department. This document can therefore also identify what action the candidate should take next to acquire further knowledge. As such it could provide helpful evidence for standard 7.

This tool is intended to identify where there are strengths in knowledge, and where there are areas that require development, either through in-school activity or through a delivered training programme.

Key:

0: No knowledge Candidate is unable to offer any support to pupils in this area
1: Very limited knowledge Candidate is unable to offer reliable support to pupils in this area
2: Developing knowledge Candidate with guidance would be able to offer a degree of initial support for pupils
3: Secure knowledge Candidate is able to develop pupils' understanding of this concept with accuracy, confidence and autonomy

Core knowledge	**Initial level of understanding (0–3)**	**Candidate's notes on how knowledge was acquired** (eg. you might note personal study, dates of coverage during training programme or in-school CPD)	**Final level of understanding (0–3)**
Key skills and processes			
1. Representing: • identify the mathematical aspects of a problem • **KS3:** choose between representations • **KS4**: compare and evaluate representations of a situation before making a choice • simplify the problem using appropriate variables, symbols, diagrams and models • select mathematical information, methods and tools			
2. Analysing: **Use mathematical reasoning:** • make connections within mathematics • use knowledge of related problems • visualise and work with dynamic images • look for and examine patterns and classify • make and (**KS3**:begin to)			

justify conjectures and generalisations, considering special cases and counter examples • explore the effects of varying values and look for invariance • take account of feedback and learn from mistakes • work logically towards results and solutions, recognising the impact of constraints and assumptions • **KS3:** appreciate that there are a number of different techniques that can be used to analyse a situation • **KS4:** identify a range of techniques that could be used to tackle a problem, appreciating that more than one approach may be necessary • reason inductively and deduce **Use appropriate mathematical procedures:** • make accurate mathematical diagrams, graphs and constructions on paper and on screen • calculate accurately, using a calculator when appropriate • manipulate numbers,			

algebraic expressions and equations and apply routine algorithms • use accurate notation, including correct syntax when using ICT • record methods, solutions and conclusions • estimate, approximate and check working			

3. Interpreting and evaluating: • form convincing arguments based on findings and make general statements • consider the assumptions made and the appropriateness and accuracy of results and conclusions • **KS3:** be aware of strength of empirical evidence and appreciate the difference between evidence and proof • **KS4:** appreciate the strength of empirical evidence and distinguish between evidence and proof • look at data to find patterns and exceptions • **KS3:** relate findings to the original context, identifying whether they support or refute conjectures • **KS4:** relate their findings to original question or conjecture, and indicate reliability • **KS3:** engage with someone else's mathematical reasoning in the context of a problem or particular situation • **KS4:** make sense of someone else's findings and judge their value in the light of the evidence they present • **KS3:** consider whether alternative strategies may have helped or been better. • **KS4:** critically examine strategies adopted			

4. Communicating and reflecting • **KS3**: communicate findings in a range of forms • **KS4:** use a range of forms to communicate findings to different audiences • engage in mathematical discussion of results • consider the elegance and efficiency of alternative solutions • look for equivalence in relation to both the different approaches to the problem and different problems with similar structures • **KS3:** make connections between the current situation and outcomes, and ones they have met before • **KS4:** give examples of similar contexts met previously and identify how they differed from or were similar to the current situation and how and why the same, or different, strategies were used			

Core knowledge	**Initial level of understanding (0–3)**	**Candidate's notes on how knowledge was acquired** (eg. you might note personal study, dates of coverage during training programme or in-school CPD)	**Final level of understanding (0–3)**
Number and algebra			
KS3: rational numbers and their different representations			
KS4: real numbers and their different representations			
KS3: rules of arithmetic applied to calculations and manipulations with rational numbers			
KS4: rules of arithmetic applied to calculations and manipulations with real numbers including standard index form and surds			

KS3: applications of ratio and proportion			
KS4: proportional reasoning, direct and inverse proportion, proportional change and exponential growth			
KS3: accuracy and rounding			
KS4: upper and lower bounds			
KS3: algebraic expressions, formulae, equations, inequalities and identities including index notation and the use of brackets to indicate precedence			
KS4: linear and quadratic equations in one unknown			

KS3: simultaneous linear equations in algebraic and graphical forms			
KS4: simultaneous equations			
KS3: sequences, including those arising from rules, in a variety of contexts			
KS3: graphs of polynomial functions and their properties			
KS4: graphs of exponential and trigonometric functions			
KS4: transformation of functions			

KS4: graphs of simple loci			

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Geometry and measures			
KS3: properties of 2-D and 3-D shapes and their applications, including constructions, loci and bearings, deductive reasoning and Pythagoras' theorem			
KS4: properties of 2-D and 3-D shapes, and their applications including constructions, loci, geometric proof, Pythagoras' theorem, circle theorems and trigonometrical relationships			
KS3: transformations, similarity and congruence including the use of scale			
KS4: properties and combinations of transformations including enlargements with negative scale factors			

KS3: points, lines and shapes in 2-D coordinate systems			
KS4: 3-D coordinate systems			
KS4: vectors in 2 dimensions			
KS3: units, compound measures and conversions			
KS4: conversions between measures and compound measures			

KS3: perimeters, areas, surface areas and volumes			
KS4: perimeters, areas, surface areas and volumes including those associated with parts of a circle			

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Statistics			
KS3: presentation and analysis of grouped and ungrouped data including time series and lines of best fit			
KS4: presentation and analysis of large sets of grouped and ungrouped data including box plots and histograms, lines of best fit and their interpretation			
KS3: measures of central tendency and spread			
KS4: measures of central tendency and spread			

KS3: experimental and theoretical probabilities including those based on equally likely outcomes			
KS4: experimental and theoretical probabilities of single and combined events			
KS3: applying statistics to enable comparisons.			
KS4: applying statistics to enable comparisons and give evidence for associations and relationships			