# Curriculum: PGCE Mathematics (11-16) with QTS\*

# AY 21/22



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In line with the Secondary PGCE approach, all teaching in the mathematics schemes of learning is mapped against and underpinned by both the Core Content Framework and the Faculty of Education ITE Pillars.

The content contained in early sessions provides trainees with an understanding of the importance of mathematics in the curriculum including the current debates and key issues related to the subject; for example, in the way in which the teaching of mathematics for mastery programme influences much of the current thinking in mathematics education and is fundamental to curriculum design.  This knowledge of mastery for mathematics is strongly aligned to the Subject and Curriculum strand of the CCF regarding how children master foundational concepts and knowledge before moving on whilst, at the same time, this aspect of the module aligns with the key ideas from How Pupils Learn as teaching for mastery reflects the importance of understanding how memory works.  Prioritising the ideas centred on teaching mathematics for mastery provides a sound base of knowledge for the trainees in readiness for appreciating the implications for the key themes of the mathematics national curriculum programmes of study; for example, an understanding of mathematical fluency and coherence directly supports and prepares trainees for the way in which mathematical thinking underpins the structure of the curriculum.  These aspects are underpinned by Hodgen et al. (2018). This broad discussion on the principles of mathematics education supports the trainees in considering the finer details of subject knowledge, specific pedagogical approaches and an understanding of how mathematical misconceptions impact on learning and how this is linked to the curriculum (Ofsted, 2021).  A constant and recurring theme evident in all sessions related to this module is the requirement for trainees to engage with mathematical problems; this enables the trainees to apply previously taught content and to revisit their knowledge of key concepts.  In addition to providing the minimal requirement of the core content related to the subject knowledge, content and principles of mathematics education, enrichment experiences allow trainees to further develop their skills and knowledge. For example, trainees contribute to the delivery of a Finance and Mathematics Day at a local school which reinforces and builds upon the previously taught knowledge and enhances their understanding of how mathematical learning can be developed through a rich and engaging curriculum.

Trainees consider their own identity as mathematics teachers and gain a knowledge of some key educational philosophies and before considering finer and specific content such as educational policy and inclusion in the context of mathematics education.  Content on safeguarding, professional behaviours and well-being are delivered as a priority before trainees start their first placement.  The following content then builds upon the trainees’ knowledge and understanding of educational philosophies and how they may inform key issues in education; for example, by considering SEND, EAL and PP and the implications for learning in mathematics.

Trainees build on the earlier work on the curriculum to consider how pupils learn mathematics.  They gain a knowledge of a range of learning theories by being asked to consider the ways in which the teaching and learning of mathematics is influenced by key theorists.  There are strong and coherent links between this work and the subject-specific content in the earlier module; for example, trainees are required to practice and apply their knowledge of mathematical pedagogical approaches to the content on assessment, adaptive teaching and planning in relation to their understanding of the mathematics curriculum.  As such, trainees are required to build upon previously taught knowledge and appreciate the associations between the content of the sessions.  Although there is an emphasis on the way in which, for example, Cognitive Load Theory relates to effective mathematics teachers, trainees are also encouraged to consider and critique approaches teaching mathematical content through enquiry-based rich tasks.  As with the other modules, this work is further developed through the engagement with weekly tasks which provide trainees with the opportunity to reinforce, revisit and further develop key concepts such as progression in mathematics in the context of their placement experience.

Hodgen, J., Foster, C., Marks, R., & Brown, M. (2018). Evidence for Review of Mathematics Teaching: Improving Mathematics in Key Stages Two and Three: Evidence Review. London: Education Endowment Foundation. Available from: <https://educationendowmentfoundation.org.uk/evidence-summaries/evidencereviews/improving-mathematics-in-key-stages-two-and-three>

Ofsted (2021) Research Review Series: Mathematics. Available from:

<https://www.gov.uk/government/publications/research-review-series-mathematics/research-review-series-mathematics>

|  |  | Trainees should… | Prior to PP | End of Introductory PP | End of Developmental PP | Interim on Consolidation PP | End of Consolidation/Course |
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| PILLAR 1 | Personal & Professional values, attitudes and beliefs | *Learn that:* | Teachers have a responsibility for the care and progress of their pupils in terms of mathematical achievement and numerical competency in life/work.  Safeguarding is the responsibility of every professional.  Mathematics teachers should hold strong beliefs about the value of their subject and are able to inspire and create a sense of mathematical curiosity in learners. | Teaching is a profession that has certain standards of conduct and behaviour such as the promotion of FBV.  Reflective practice is an essential element of professional development. | Teachers of mathematics can contribute the wider life of the school, for example, through the provision of whole school numeracy or financial awareness.  Protecting their own time contributes to the creation of a healthy work/life balance. | The teaching of mathematics should be supported by educational research and through engagement with the Association of Teachers of Mathematics. | Ongoing CPD is important for professional development through the engagement with the National Centre for Excellence in the Teaching Mathematics, the Teaching for Mastery programme and local Maths HUB. |
| *Learn how to:* | Recognise and report safeguarding concerns. | Reflect on their own practice to set effective targets for improvement. | Manage their time effectively. | Reflect on progress made, recognising strengths and weaknesses and identify next steps for improvement. | Set targets and identify next steps for career/ECT development via support from, and engagement with, National Centre for Excellence in the Teaching Mathematics.  Contribute to the local mathematics community, such as their regional Maths HUB. |
| PILLAR 2 (Subject & Curriculum knowledge) | How learning occurs & progression | *Learn that:* | Prior knowledge plays an important role in how pupils learn mathematics.  Memory is an important factor in learning mathematics; for example, in knowing key number facts. | Teaching one key mathematical concept at a time leads to most effective learning.  Worked mathematical examples through a cycle such as ‘My turn/your turn’ guides children with new learning. | Teaching key mathematical concepts through modelling and intelligent practice should usually precede problem-solving and real-life mathematical application. | Carefully planned classroom talk can support pupils to articulate their mathematical reasoning. | Embedding metacognition into teaching enables pupils to take greater ownership of their learning so that they can evaluate the most effective methods of calculation or procedures. |
| *Learn how to:* | Model mathematical processes to ensure pupils develop their level of fluency. | Design intelligent practice that allows pupils to become more secure in their conceptual understanding.  Design lessons which include opportunities for teaching, practice and assessment. | Plan and deliver a carefully sequenced curriculum allowing for mathematical fluency, reasoning and problem-solving to be embedded into the learning journey.  Engage with schemes of learning to plan a coherent sequence of lessons. | Carefully design and manage group work in a structured way to ensure mathematical understanding is developed. | Contribute to curriculum design within their mathematics department and the local community via Maths HUBS. |
| Curriculum & subject knowledge | *Learn that:* | The mathematics curriculum includes a coherent programme of content and opportunities for pupils to develop their reasoning, problem-solving and fluency.  Mastery in mathematics is based on the 5 ‘big ideas’ that promote conceptual understanding. | Promoting literacy within mathematics can contribute to the way in which pupils develop and demonstrate their reasoning skills.  Collaborating with colleagues can contribute to the effective use of shared resources. | Continuing to development subject knowledge allows for more secure understanding of alternative mathematical methods. | Developing skills in problem-solving in mathematics is complex and there should be opportunities to use a range of approaches to allow to transfer their skills to different situations. | The development of subject knowledge is an ongoing and long-term process and can be supported by mathematics workshops from the National Centre for Excellence in the Teaching Mathematics. |
| *Learn how to:* | Audit their own mathematics subject knowledge and devise an action to address gaps. | Identify essential concepts, knowledge and skills within a coherent curriculum.  Anticipate and address mathematical misconceptions. | Assess work in line with the requirements of the Key Stage 4 specifications. | Take greater responsibility for designing of medium -term plans that demonstrate an appropriate coherence of mathematical ideas and concepts. | Enhance their subject and pedagogical knowledge in preparation for teaching a range of key stages and levels. |
| PILLAR 3 (The craft of teaching & pedagogy) | Assessment | *Learn that:* | Assessment of learning in mathematics is a critical part of the teaching and learning cycle by allowing mathematical misconceptions to be identified and addressed. | The planning of assessment tasks should be linked to learning outcomes and support the assessment of mathematical understanding as well as correctness. | Asking open questions enables checks to be made on mathematical understanding and for pupils to demonstrate secure reasoning. | The use of data must be used carefully to inform future planning.  Quality feedback can take a variety of forms and may be verbal as well as written. | Providing feedback which takes into account the range of factors which can impact on pupils’ understanding of the feedback. |
| *Learn how to* | Build assessment tasks into lesson plans to help inform future learning by being able to respond to mathematical misconceptions. | Structure assessment tasks to check for prior knowledge, gaps and mathematical misconceptions. | Provide specific and helpful feedback.  Use self and peer assessment in a structured manner. | Provide accurate assessment and feedback to pupils in line with the mathematics department policy, and examination specifications. | Identify effective approaches to marking and alternative approaches to providing feedback. |
| Adaptive Teaching | *Learn that:* | Adaptive teaching in mathematics is based on the idea that pupil learn at different rates.  Ensuring additional challenge by providing contextual mathematical problems does not equate to effective adaptive teaching. | Adaptive teaching is does not mean designing different tasks; for example, additional challenge can be provided through an amended mathematical task which promotes deeper thinking and reasoning or supports pupils in considering the most efficient mathematical method. | Some pupils need new content which adapted by being broken down further and/or through a different teaching approach (such as via a mathematical mastery model of CPA) to enable all pupils to reach the same learning goal. | The design of practice and retrieval tasks can provide the appropriate level of support to allow access to challenging work. | Intervention work with small groups within a lesson is more effective than planning different lessons for different groups of pupils. |
| *Learn how to* | Use faded worked examples to provide a scaffold of mathematical methods. | Guide pupils by breaking down new mathematics into smaller steps. | Support pupils with a range of educational needs such as being able to alleviate mathematics anxiety. | Reframe questions to provide greater scaffolding or greater challenge; for example, by designing reverse mathematical questions. | Use TAs effectively to support pupils by planning for their contribution and addition to the teaching. |
| Behaviour | *Learn that:* | Attitudes to mathematics can impact on the behaviour of pupils. | The creation of a positive and respectful learning environment, including the promotion of a ‘can do’ attitude to learning mathematics where making mistakes is a natural part of the learning process, can impact positively on behaviour. | Pupils can be motivated through the level of challenge of mathematics and their success against outcomes, as well as through the engagement and contextualisation of the of the mathematical content. | Responding consistently and decisively to pupil behaviour can impact on the conduct and progress in the classroom. | The pastoral system at a whole school level plays a critical part in supporting pupils, including the roles of form tutors, pastoral support staff and the members of the leadership team. |
| *Learn how to:* | Set high expectations in relation to pupil outcomes by designing engaging and challenging mathematical learning experiences. | Set clear behavioural expectations and routines which establish a consistent and inclusive learning environment.  Apply rules, sanctions, rewards, and praise in line with the school policy.  Establish and build positive and professional relationships which assist with managing behaviour. | Give clear, manageable, specific and sequential instructions for tasks and behaviour.  Reinforce established school and classroom routines which maximise time for learning and link any justification of these to the value of mathematics. | Engage with parents/carers and colleagues in helping to support and manage pupil behaviours. | Reflect on the effectiveness of different approaches to managing behaviour in relation to a particular setting. |
| SFE PRIORITIES AY 21/22 | English as an Additional Language (EAL) | *Learn that:* | * Jim Cummins framework is essential for pupils with EAL esp. with a focus on context embedded, cognitively demanding * CALP and BIC skills are important for language acquisition and teachers need to plan for them in helping pupils understand mathematical vocabulary * That it is important to include context embedded and cognitively demanding work for all pupils but especially those with EAL, for example by placing mathematics into real-life problems. | * That it is important to address misconceptions such as learners with EAL have an additional need not a special need * EAL learners are not a homogenous group * How context embedded and cognitively demanding is simply good teaching and useful for all learners; for example, by providing appropriate practice in solving problems in worded mathematical contexts | * The Jim Cummins Iceberg model – that language 1 and language 2 are interdependent * That children with EAL need extra support with colliquations, vocabulary depth and vocabulary breadth and so the teacher needs to consider this at the planning stage * There are stages of progression to language development and relate to Hilary Hester’s BEL stages * Group work and discussion is essential for language acquisition in all subject disciplines and learners with EAL may require support in using language to demonstrate their mathematical reasoning | * There are various approaches within mathematics that support all children with context embedded and cognitively demanding work * Opportunities to enhance pupils’ mathematical confidence can be captured through pure or abstract mathematics whereas real contextual problems may require greater support * It is important to understand how to manage children’s behaviour and recognise whether the behaviour is related to feelings of isolation and/or language barriers | * Pupils with EAL may have additional barriers to their learning such as experiences of being a refugee or external pressures such as the need to be the translator for their family * It is important to use the BEL stages for assessment but that there are other models * The importance of avoiding cultural appropriation |
| *Learn how to* | * Adapt teaching to include dual language cards or text to support language acquisition in mathematics * Identify key vocabulary that will be needed in mathematics | * Ask the teacher questions about their practice. * To ask questions about the rationale for grouping children with EAL esp. if they observe a pupil with EAL in a lower competency group * Adapt their teaching and standard schemes of work so that they can offer mathematical problem-solving embedded and cognitively demanding activities that support language acquisition | * Use dual language books, flashcards, and visual aids to support reading comprehension to access mathematical resources and worded number problems * Evaluate resources and activities related to their discipline that may be suitable for pupils with EAL including visits to museums and outdoor learning spaces * Recognise the 4 BEL stages of development and identify some of the approaches that may be suitable for specific stages of language acquisition | * Use the BEL stages for assessment * How to celebrate culture, languages and difference in all classes and throughout a school * Be sympathetic to the needs of pupils with EAL and those who are refugees * Address ways of supporting families who have EAL | * Assess the stage of language development through assessment stages and consider support strategies * Evaluate (and if necessary, challenge) any poor EAL practices in school |
| Relationship & Sex Education (RSE) | *Learn that:* | * The goals/aims for RSE are very different to the aims or goals of other curriculum subjects and these should be recognised and foregrounded when teaching it * There are 4 core areas to the statutory secondary RSE curriculum: Identity, gender and sexuality, Consent and healthy relationships, Anatomy, sexual health and fertility, and RSE in a digital context * Ground rules in RSE teaching are important. | * In the RSE classroom, consciously ensuring pupil safety is paramount given the often-sensitive nature of the subject matter and the goals of the curriculum * Awareness and the use of language in RSE is important e.g., heteronormative, cis-normative etc. * The RSE classroom is not the place to debate their morality but to provide non-judgemental information about how to access services etc | * SRE should Provide information which is realistic and relevant, and which reinforces positive social norms * Lessons should start where students are: find out what they already know, understand, are able to do and are able to say | * Importance of avoiding making any assumptions about pupils, taking a measured, rather than value-laden approach * RSE dovetails with foundational knowledge for understanding other compulsory topics such as fertility, sexual health, FGM and menstruation (which is technically part of health education). | * RSE includes planning to teach explicit life skills (e.g., planning, decision-making skills), specific skills (e.g., communication, sexual negotiation skills) and promote resilience. * Distancing techniques which will enable learners to depersonalise the topic being discussed, should be incorporated |
| *Learn how to* | * Reflect what the new guidance means for their own teaching practice * Appreciate the role, purpose and value of RSE in the curriculum * Create a classroom environment which encourages explorative learning, questioning and development while ensuring safety | * Gently challenge misconceptions and misuse of language which emerge * Model acceptance and celebration of differences in sexual orientation, sex preference and decisions (while always championing consensual relationships) | * Ensure that any bi/homophobia, bullying, offensive language is challenged in the classroom, whatever the basis of the viewpoint   Take a positive approach which does not attempt to induce shock or guilt but focuses on what students can do to keep themselves and others healthy and safe and to have positive, healthy relationships | * Respond to challenges that they might encounter in the RSE classroom * Avoid pedagogy that may be misleading and contribute to shame and stigma * Apply a wide variety of approaches to teaching and learning, with an emphasis on interactive learning and the teacher as facilitator. | * Ensure that students are informed, empowered and safe as they develop and grow through secondary school and beyond * Develop strategies and resources for teaching RSE, relating specifically to Identity, gender and sexuality, Consent and healthy relationships, Anatomy, sexual health, and fertility, and RSE in a digital context |
| Safeguarding | *Learn that:* | * Safeguarding and Digital Wellbeing is an essential part of ITE and looking after pupils, colleagues and themselves. Inclusive of their conduct when learning and teaching online. * All professionals have a responsibility and duty of care for the pupils, colleagues and themselves in relation to the Recognise, Respond and Report (3R’s) * Keeping Children Safe in Education (2021) and Working together to safeguard children (2018) are of fundamental importance and a valuable source of guidance for all educational professionals. * Settings have their own Safeguarding Policies which must be followed by all in that setting. * Every setting should have a Designated Safeguarding Lead (DSL) who is the first point of contact for any safeguarding concerns. * Safeguarding pupils involves not promising confidentiality, sharing pertinent information and reassuring the pupil of their disclosure. | * Every setting has their own safeguarding policy and all professionals in that setting should uphold its content and ethos. * Pupils are not a homogenous group and therefore support for safeguarding needs to be individualised whilst also still following all safeguarding procedures * Peer on Peer abuse and sexual harassment are current priorities for all settings. * The following are requirements to know and implement as a teacher: * 1) they are essential part of the safeguarding system for children. * 2) To identify concerns early, provide help, promote welfare and prevent concerns from escalating. * 3) Providing a safe learning environment for all pupils and young adults. * 4) Be prepared to identify children / young adults who may benefit from early help * 5) Safeguard children’s and young people wellbeing and maintain public trust in the teaching profession as part of their professional duties | * Safeguarding relies on a wider network of support and intelligence sharing, such as across a school or LEA setting. * Bullying, including Cyberbulling is wrong and can take many forms. * Safeguarding involves promoting the welfare of children and colleagues within the school and wider community. | * The adverse experiences of pupils can have an affect upon learning and progress * The wider impact of safeguarding of pupils, vulnerable young people in relation is linked to Child Criminal Exploitation (CCE) and Child Sexual Exploitation (CSE). * A high quality RSE curriculum can assist n safeguarding pupils by embedding knowledge and understanding and empowering teachers to provide/recognise safeguarding concerns. | * Safeguarding is everyone’s responsibility and that a child centred approach will ensure this is as essential. * Consistent awareness and professional development will ensure the protection and care in a proactive way for all pupils, colleague and themselves.   . |
| *Learn how to:* | * Undertake an Audit of safeguarding knowledge and understanding underpinned by KCSIE (2021) online resource to identify their readiness for professional practice. * Engage with further CPD development undertaken through Prevent training (Government link) * Identify the signs of possible abuse * Report disclosures to the necessary DSL including the DSL at Edge Hill * Keep themselves safe online and in settings by, for example, ensuring they do not promise confidentiality, only share information with key staff (e.g. DSL), and not prompting the pupil during their disclosure. | * Confidently and competently report safeguarding concerns in their setting and at University. * Conduct themselves in a professional and safe manner in educational Setting. * Respond to a pupil’s disclosure and act immediately adhering to the necessary steps.eg. recognising signs of abuse / knowing what County lines involves and the impact on the school / community. * Implement procedures and processes in line with an educational setting including reporting incidents/concerns to the DSL | * Identify how a safe and secure environment is established for pupils. * Identify the importance and essential approach to ensuring the welfare of pupils both in school and their community. * Seek advice and guidance for professional colleges on sensitive issues regarding welfare and safeguarding eg. Inclusive of FGM and Prevent and other essential areas of safeguarding. | * Identify symptoms and situations related to safeguarding within a school and wider context. Supporting and reinforcing focus from the RSE curriculum involving essential topics such ‘Sexual Harassment’ and ‘Peer on Peer Abuse in school’ * Recognise the impact of Adverse childhood experiences and different forms this can take upon their learning and education. | * Become a confident and competent advocate regarding safeguarding and digital wellbeing within a school and wider context. * Identity when to act upon situations and the professional manner this must uphold. * Undertake further professional awareness and understanding through continual updates provided by the DfE, Designated Safeguarding Lead (setting they are employed in), NSPCC updates and policy guidance aligned to DfE. |