# Primary Early Years (3 – 7 phase) Initial Teacher Education Curriculum Plan – Mathematics Postgraduate Programme

| Curriculum Aim |
| --- |
| Through our Initial Teacher Education Curriculum, it is our aim that all Edge Hill Primary Early Years (3 – 7) trainees will:   * Believe that children can be successful mathematicians, regardless of social background, disadvantage, protected characteristics or other circumstances and that this is their moral purpose as educators * Develop their confidence and resilience by promoting an enthusiasm and passion for mathematics through both adult-led and child- initiated play * Understand that mathematics is the route to developing both accurate and fluent numeracy skills, the impact of working memory and cognitive overload on developing fluency and the importance of applying mathematics in everyday life skills * Understand the purpose of the three aims of the mathematics National Curriculum and how these can be addressed for all areas of the mathematics curriculum * Understand how to adapt the teaching of mathematics for children with SEND and/or additional needs * Understand that pedagogical decisions are supported by robust evidence * Promote the development of mastery throughout the mathematics curriculum * Understand that children explore many mathematical concepts in their play, some of which are challenging and may not be actively taught until a later age phase * That young children are naturally curious and will experience many opportunities for mathematical problem solving and challenge during their play |

|  | **University Based Learning** | | | **School/Practical Based Learning** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Phase | Learn that…. | Learn How | | Learn that | | | Learn How |
| Phase 1 | There are advantages of talk and language in mathematics lessons LT4.3, LT4.7  The advantages of promoting mathematical talk in both adult led and child initiated play LT2.2, LT3.10, LT4.6, LT4.7  All children are unique and bring different mathematical skills to their school experience LT1.2, LT1.4, LT1.5, LT3.7, LT4.1, LT5.2, MB7.4  It is important to develop a positive attitude to mathematics and to engage purposively in children’s mathematical play LT1.1, LT1.2, LT1.4, LT1.6, LT2.1, LT7.4, LH2.1  It is important that the environment is enabled to promote mathematical exploration, discussion and problem solving LT1.1, LT1.2, LT1.3, LT1.4, LT1.6, LT2.1, LT3.10, LT4.3, LT4.4, LT4.7, MB7.1  The term fluency in relation to early mathematical progression LT2.8  Fluency is not just rapid recall it is developing a sense of number LH2.4, LH2.5  Mastery is an approach to teaching mathematics ensuring all children are achieving LT1.1, LT1.3  The 5 big ideas to promote the teaching of Mastery (NCETM) LT1.3, LT3.3, LH8.7  Mastery was popularised after its success in East Asia, but it was explicitly based on theories from around the world. LH2.3, LT3.3  Mastery is misunderstood and not all teachers are clear about it what it actually means.LT1.6, LT3.3  It is important for children to have a strong grounding in number LT2.5, LT3.3, LT3.7, LT5.3  There are 5 counting principles  Children need to develop number sense and move from counting strategies through reasoning strategies to retrieval and application LT2.3, LT2.4, LT2.5, LT3.7, LT4.5  The progression sequence through counting and early calculation LT3.2, LT3.3, LH2.6  How subitising can support the development of counting skills **LT2.2, LT3.5**  Children’s mathematical play can encounter a range of more complex concepts including area, perimeter, congruency, similarity and translations LT1.3, LT3.2, LT3.7  How mathematical play and adult led activities can be adapted for children with differing needs LT1.3, LT1.6, LT4.4, LT5.2  Effective problem solving requires the building up of a ‘problem solving toolbelt’ LT3.6, LT4.5, LH3.13  What constitutes mathematical reasoning  The characteristics of effective learning are visible in children’s mathematical play and promote mathematical reasoning LT1.1, LT1.2, LT1.3, LT1.6, LT3.6, LT4.1, MB7.3  Assessment is integral to moving children forward in their learning and it should include high quality verbal feedback LT6.4, LT6.5, LT6.6  The 3 aims and how they relate to each other and early years pedagogy LT1.2 | To build on pre-school experiences of mathematics and how this influences their mathematical play  To promote mathematical talk in both adult led and child initiated play LH1.2  To use the specific technical vocabulary associated within counting. LH1.2  To plan for and teach the different types of problem solving, not just word problems.  To plan for and teach the number of skills required to become an efficient problem solver. LH2.3, LT3.5  To teach the different stages to the problem-solving process.  To use Polya and Dewey’s problem-solving cycles to plan for and scaffold children’s mathematical problem-solving during play LH3.13, LH3.14, LH8.7 | | Assessing reasoning skills through questioning, observation and scaffolded conversations can be a very useful form of assessment within children’s play. LT3.5, LT4.6, LH4.14, LT6.1, LT6.3, LT6.4,  It is important that the environment is enabled to promote mathematical exploration, discussion and problem solving LT1.1, LT1.2, LT1.3, LT1.4, LT1.6, LT2.1, LT3.10, LT4.3, LT4.4, LT4.7, MB7.1  It is important for children to have a strong grounding in number LT2.5, LT3.3, LT3.7, LT5.3  Mathematics specific vocabulary should be promoted across all areas of mathematics. LT4.7  Promoting higher level concepts in continuous provision planning will allow young children to have practical experience of these. For example, using a set of cutters to promote congruency and similarity when playing in the malleable area of provision LT2.1, LT3.2, LH2.1 | | | To observe children’s mathematical play and extract the knowledge, understanding and misconceptions demonstrated LT1.3, LT1.6, LT2.6, LT6.1, LT6.3, LH2.6, LH2.8, LH4.15, LH5.12. LH6.1, LH6.3, LH6.6  To promote the use of mathematics specific vocabulary across all areas of mathematics.  LT4.7, LH 3.20  To promote a mathematical mindset for pupils irrespective of background or ability. LH1.4, LH1.5, LH1.8  To promote resilience and perseverance when problem solving, whist considering the role of long term memory, working memory and cognitive learning theory- conditional knowledge.. LT2.3, LT2.4, LT2.5, LT2.7, LT7.4  To plan, teach and assess an adult led session.  LH2.8, LH3.3, LT4.9, LH4.1, LH5.8, LT6.1, LT6.3, LT6.4 , LH6.1, LH6.3  To plan for pupils to have opportunities to learn and develop reasoning skills by including a variety of teaching and learning approaches within their play.- conditional knowledge.LT2.7, LH2.8, LT3.5, LH3.3, LH4.1  To assess reasoning skills through questioning, observation and scaffolded conversations during children’s play.LH2.8, LT3.5, LT4.6, LH4.14, LH4.15, LH5.12, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3, LH6.6  To observe children’s mathematical play and extract the knowledge, understanding and misconceptions demonstrated in order to ensure progress in mathematicsLT1.3, LT1.6, LT2.6, LT6.1, LT6.3, LH2.6  To intervene sensitively in play to extend learning and mathematical vocabulary LT1.4, LT1.3, LT2.7, LT3.10, LT4.1, LT4.6  To plan a range of activities that enable children to develop number sense to 10 LT2.4, LT2.5, LT2.7, LT5.2  To plan for mathematical enhancements to areas of provision including structuring and modelling resources for a range of differing needs LT1.2, LT1.3, LT1.6, LT3.2, LT4.8, LT7.1, LH2.1, LH2.8, LH5.3  To plan enhancements to areas of provision that allow children to practice the counting principles LT2.2, LT2.7, LT3.3, LT4.8, LT5.2, LT5.6  To plan appropriate play opportunities around shape and space promoting mathematical language LT2.4, LT2.5, LT2.7, LT5.2  To plan adult led experiences that develop and secure children’s understanding of the counting principles. LT1.3, LT3.2, LT3.3, LT4.8, LT4.9, LT4.10, LT5.3, LH2.2, LH2.7LH7.4  To observe for misconceptions in counting and how these might be addressed through adult support LT2.6, LT3.4, LT5.5, LH3.1, LH2.6, LH6.1  To plan, teach, scaffold and assess children’s mathematical reasoning during both adult led and child initiated play LT2.2, LT2.4, LT2.5, LT3.10, LT5.6, LT5.1, LT6.3  To plan appropriate play opportunities around shape and space promoting mathematical language LT2.4, LT2.5, LT2.7, LT5.2  To use efficient assessment procedures that monitor achievements and feed into learning LT6.5, LT6.6, LT6.7, LH6.12, LH6.13, LH6.14 |
|  | **Assessment**   * **Completion of the Numeracy Challenge which results in a summative score and a breakdown of areas to target** * **Questioning throughout the sessions based on mathematical play and extending vocabulary** * **Students are required to set targets around their knowledge of mathematical concepts based on self-assessment of performance within the session** | | | **Assessment**  **• Weekly Development Summary – assessing progress on a weekly basis focusing on key strands of the EHU curriculum which includes discussion focus tasks**  **• Adult Led Task/ Continuous Provision observations – subject specific feedback**  **• Progress report**  **• Reflections in blue book**  **Mentors will feedback in relation to CCF content observed in lessons and to specific mathematics content taught and trainees mathematical subject knowledge. Trainees will be deemed ready to progress in this area**. | | | |
|  | **Composite knowledge/ understanding/skills**  At the end of this phase students will **know**:  A range of strategies to support children’s mathematical play LT1.6, LT2.7 | | At the end of this phase students will **understand:**  The importance of counting and place value as the foundations of number LT3.3, LH5.6 | | | At the end of this phase students will **be able to**:  Plan, teach and assess high quality mathematical opportunities for both adult led and child initiated play LT2.2, LT2.6, LT2.8, LT3.1, LT3.4, LT4.8, LT4.9, LH5.3, LH5.7, LH5.9 | |
|  | **Research, literature and resources supporting the curriculum design of Phase 1.**  DfES Early Years Foundation Stage (statutory)  Development Matters (2021) Non Statutory Guidance  Birth to 5 (2021) Non Statutory Guidance  Montague-Smith, A., Cotton, T., Hansen, A and Price, A. (2018) Mathematics in Early Years Education  Tucker, K (2014) Mathematics through play in the early years.  NCETM Six key areas of early mathematical learning  NCETM Number Blocks | | | | | | |
|  | **Phase 2** | | | | | | |
|  | **Learn That** | **Learn How** | | **Learn That** | | | **Learn How** |
| Phase 2 | There are three aims of the mathematics curriculum LT3.1  There is declarative and procedural subject knowledge required to plan, teach and assess the Key Stage 1 programme of study for mathematics. This will include varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge accurately and rapidly **LT2.2, LH2.3, LH2.7, LT3.3, LT3.5, LT3.7, LT4.2, LT6.1, LT6.3, LT6.4**  One of the key aims of the mathematics curriculum is for pupils to become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. L.T 1.3, LT3.1, LT4.8  This will specifically link to understanding of declarative and procedural knowledge. LT3.3, LT3.5, LH3.11  This will specifically link to understanding of conditional knowledge.  Shape and space play an important role in young children’s surroundings and play  There are specific areas of mathematics that do require mental recall (number bonds) LT2.2, LT2.7, LH2.7, LH2.8  There is specific technical vocabulary used within counting, early calculation and shape LT4.7, LH8.4  The declarative and procedural subject knowledge required to plan, teach and assess the Key Stage 1 programme of study for mathematics. This will include varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge accurately and rapidly **LT2.2, LH2.3, LH2.7, LT3.3, LT3.5, LT3.7, LT4.2, LT6.1, LT6.3, LT6.4**  The progression sequence though EYFS and Key Stage 1 for: counting, place value, calculation and geometry LT2.2, LT4.2, LH3.3  The concrete, pictorial, abstract approach in relation to Bruner’s principles of enactive, iconic and symbolic **LH3.12, LT4.3**  Children may transition from EYFS to Key Stage 1 with varying needs mathematically LT1.4, LT5.1, LT5.2  There is a difference between an error and a misconception. LH1.3, LT2.6  There are strategies for addressing common errors and misconceptions across all areas of the Key Stage 1 mathematics curriculum **LH1.3, LT2.6, LH2.6, LT3.4, LT6.4, LT6.5, LT6.6**  There are names and properties of common 2d and 3d shapes and the associated vocabulary – declarative knowledge and developing associated schema. LH1.2, LT3.5, LT3.7  The structures of addition, subtraction, multiplication and division LT3.2, LT4.4  Van Hiele’s levels of geometric thinking  There is specific technical vocabulary used within number and geometry, LT4.6, LT4.7  There are different forms of questioning that can elicit different responses LT4.6  There are cognitive factors leading to mathematical difficulties. LT2.4, LT4.5  Adaptive teaching supports the development of number sense, meeting the needs of SEN/D pupils, in particular dyscalculic children.. LT1.3, LT5.1, LT5.2, LT5.3, LT5.7, LH5.2 | The three aims of the mathematics curriculum relate to each other. LT3.1  The term fluency relates to mathematical progression and the declarative and procedural knowledge associated with number and calculation. LT3.1, LT3.3, LT3.5, LH3.11  Calculation and place value are linked. LT2.2, LT2.6, LH2.3, LH2.7, LT3.7  Fluency is not just rapid number recall it is developing a sense of number.LT2.5, LH3.11  Mental recall supports the learning and understanding of number bonds, times tables and how this links to working memory and long term memory.LT2.3, LT2.4, LT2.5, LH3.11  To use the specific technical vocabulary associated within place value, calculation and statistics. LH1.2  Mental strategies inform the informal and formal written strategies to calculation – procedural knowledge. LT2.6, LH2.7, LT3.5, LT3.7, LH3.8, LT4.2  To develop an understanding of a mathematical mindset in relation to the work by Carol Dweck and more recently, Jo Boaler. LT2.1  The Concrete, Pictorial, Abstract (CPA) approach, in relation to Bruner’s principles of enactive, iconic, symbolic supports adaptive teaching and the value of dual coding. LH3.12, LT4.3  Mastery is an approach to teaching mathematics ensuring all children achieve to their full potential.LT3.3  To teach the conditional knowledge required by pupils to reason mathematically and problem solve in relation to number and calculation at Key Stage 1 LT2.1, LH2.7, LT4.2  Their own mathematical schema has developed over time, particularly in relation to calculation strategies  Spaced learning can benefit cognitive load, working memory and long term memory. LT2.4, LT2.8, LH2.11, LH3.10 | | Collaborative learning and mathematical dialogue are effective approaches to developing reasoning skills and present effective assessment opportunities. LT1.5, LT4.7 (EYFS and KS1)  One of the key aims of the mathematics curriculum is for pupils to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. LT3.1 (EYFS and KS1)  One of the key aims of the mathematics curriculum is for pupils to solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. LT 1.3, LT3.1 (EYFS and KS1)  There is specific vocabulary associated with reasoning that will develop as children progress LT3.10, LT4.7  **(EYFS and KS1)**  There are a number of types of problem solving not just word problems  **(KS1)**  There are a number of skills required to become an efficient problem solver LT2.3, LT2.4, LT2.5, LT4.5, LH4.3  **(EYFS and KS1)**  There are different forms of questioning that can elicit different responses LT4.6  (EYFS and KS1)  There are cognitive factors leading to mathematical difficulties. LT2.4, LT4.5  (EYFS and KS1)  Adaptive teaching supports the development of number sense, meeting the needs of SEN/D pupils, in particular dyscalculic children.. LT1.3, LT5.1, LT5.2, LT5.3, LT5.7, LH5.2  (EYFS and KS1)  Conditional knowledge is required by pupils to reason mathematically and problem solve across all areas of the mathematics curriculum. LT2.1, LH2.3, LH2.7, LT4.2  (KS1)  Planning, teaching and assessing a sequence of lessons develops both conceptual and procedural understanding of number, including counting, place value and calculation as appropriate to EYFS and Key Stage 1. **LH2.3, LH2.7, LH2.9, LT3.1, LT3.5, LH3.3, LH3.7, LH3.8, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3, LT4.8**  Planning for pupils to have opportunities to learn and develop reasoning skills are influenced by a variety of teaching and learning approaches LT3.5, LT3.6, LH3.3  (EYFS and KS1)  Assessing reasoning skills through questioning, observation and scaffolded conversations provide evidence of progress LT6.1, LT6.3, LT6.5, LT6.6, LH2.9, LH6.12, LH6.13, LH6.14  (EYFS and KS1)  Implementing a problem solving culture into every mathematics lesson where pupils are engaged by the challenges and demonstrate resilience supports the development of a mathematical mindset LT1.3, LH3.13, LH3.14, LH4.3, LH8.4  **(EYFS and KS1)**  Adapting the teaching of mathematics to meet the needs of children with SEND (in particular dyscalculia) and those that have EAL is crucial to support progress of all learnersLT2.8, LT2.9, LT5.1, LT5.2, LT5.3, LT5.4, LT5.5, LT5.6, LT7.2, LH2.1, LH2.2, LH2.3  **(EYFS and KS1)**  Times tables and counting patterns can be taught using effective strategies without just using drill and practice LT2.1, LT2.5, LT2.7, LT2.8, LH2.9, LH3.3, LH3.11, LT4.2, LT6.1, LT6.2 LT6.3, LT6.4, LH6.1, LH6.3  (EYFS and KS1)  Appropriate concrete and visual resources support number sense and a conceptual understanding of calculation strategies when considering the CPA approach..LH2.3, LH2.9, LH3.12, LT4.3, LH4.3, LH4.8, LH5.9, LT6.1  (EYFS and KS1)  Assessing reasoning skills through questioning, observation and scaffolded conversations can be a very useful form of assessment.LH2.8, LT3.5, LT4.6, LH4.14, LH4.15, LH5.12, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3, LH6.6  (EYFS and KS1)  The National Curriculum requires implementation of a problem-solving culture into every mathematics lesson where pupils are engaged by the challenge and demonstrate resilience.- conditional knowledge. LT1.1, LT1.2, LT3.2, LT7.4  (KS1)  To promote resilience and perseverance when problem solving, whist considering the role of long term memory, working memory and CLT- conditional knowledge.. LT2.3, LT2.4, LT2.5, LT2.7, LT7.4  (EYFS and KS1) | | | To plan to utilise appropriate concrete and visual resources to support number sense and a conceptual understanding of calculation strategies considering the CPA approach. LH2.3, LH2.9, LH3.12, LT4.3, LH4.3, LH4.8, LH5.9, LT6.1  (EYFS and KS1)  To correctly use specific technical vocabulary used within fractions, geometry and measure and the role of the long term memory in storing this information.LH1.2  (KS1)  To identify their developmental needs as mathematical educators and independently address these.  (EYFS and KS1)  To plan, teach and assess a sequence of lessons developing both conceptual and procedural understanding of number, including counting, place value and both mental and written calculation. LH1.1, LH2.3, LH2.7, LH2.9, LT3.5, LH3.3, LH3.7, LH3.8, LT4.6, LT6.1, LT6.2 LT6.3, LT6.4, LH6.1, LH6.3  (KS1)  To plan to utilise appropriate concrete and visual resources to support number sense and a conceptual understanding of calculation strategies considering the CPA approach. LH2.3, LH2.9, LH3.12, LT4.3, LH4.3, LH4.8, LH5.9, LT6.1  (EYFS and KS1)  To adapt the teaching of number sense to meet the needs of SEN/D pupils, in particular dyscalculic children. LT1.3, LT5.1, LT5.2, LT5.3, LT5.7, LH5.2  (EYFS and KS1)  To plan, teach and assess a sequence of lessons following a mastery approach. LT2.7, LH2.3, LH2.9, LH3.3, LH3.4, LH3.7, LH4.1, LH5.6, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3  (KS1)  To implement a problem-solving culture into every mathematics lesson where pupils are engaged by the challenge and demonstrate resilience.- conditional knowledge. LT1.1, LT1.2, LT3.2, LT7.4  (EYFS and KS1)  To plan and assess using a mastery approach, supported by the NCETM materials..LT2.8, LH2.3, LH2.8, LH2.9, LT3.3, LH3.3, LH3.4, LH3.7, LH4.1, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3, LH8.3  (EYFS and KS1)  To observe for misconceptions in counting and how these might be addressed through adult support LT2.6, LT3.4, LT5.5, LH3.1, LH2.6, LH6.1  (EYFS)  To plan, teach, scaffold and assess children’s mathematical reasoning during both adult led and child initiated play LT2.2, LT2.4, LT2.5, LT3.10, LT5.6, LT5.1, LT6.3  (EYFS)  To plan appropriate play opportunities around shape and space promoting mathematical language LT2.4, LT2.5, LT2.7, LT5.2  (EYFS) |
|  | **Composite knowledge/ understanding/skills**  At the end of this phase students will **know**:   * Common errors and misconceptions across all areas of the Key Stage 1 mathematics curriculum (Number and calculation, geometry and measures) LT2.6, LH3.7 | | At the end of this phase students will **understand:**   * How to model mathematical concepts with the aim of addressing common errors and misconceptions LT2.6, LT2.9, LT3.4, LH3.4 | | | At the end of this phase students will **be able to**:   * Plan, teach and assess a series of lessons that build children’s understanding of mathematical concepts in a secure manner across both EYFS or KS1. LT2.2, LT3.1, LT3.5, LT3,7, LT4.8, LT4.10, LT6.1, LT6.3, LH2.1, LH2.2, LH2.3LH6.12, LH6.13, LH6.14 | |
|  | **Assessment**   * **Questioning within sessions by tutor on a formative basis** * **Completion of the Numeracy Challenge to monitor improvement in subject knowledge and continue to address targets** * **Peer discussions on mathematical concepts and informal peer assessment** | | | | **Assessment**  **• Weekly Development Summary – assessing progress on a weekly basis focusing on key strands of the EHU curriculum which includes discussion focus tasks**  **• Lesson observations – subject specific feedback**  **• Progress report**  **• Reflections in blue book**  **Mentors will feedback in relation to CCF content observed in lessons and to specific mathematics content taught and trainees mathematical subject knowledge. Trainees will be deemed ready to progress in this area**. | | |
|  | **Research, literature and resources supporting the curriculum design of Phase 2.**  Haylock, D and Manning, R (2019) Mathematics Explained for Primary Teachers (6th edition)  Cotton, T. (2020) Understanding and Teaching Primary Mathematics (4th edition)  Hansen, A. (2020) Children’s errors in mathematics (5th edition)  Research Review: Mathematics, Ofsted, 2021  Ready to Progress materials, DfE and NCETM, 2020  NCETM Progression maps, NCETM 2021  NCETM videos  NCETM Mastery materials  CPA approach as proposed by Jerome Bruner 1966  National Curriculum 2014  Nrich website | | | | | | |
|  | **Phase 3** | | | | | | |
|  | **Learn That** | **Learn How** | | **Learn That** | | | **Learn How** |
| Phase 3 | The progression sequence though EYFS and Key Stage 1 for: measures and statistics LT2.2, LT4.2, LH3.3  The difference between non standard and standard measures LT3.2  There is specific technical vocabulary used within measures and statistics LT4.6, LT4.7  The terms transitivity and conservation and how to use these concepts to assess children’s basic understanding of measures LT3.2  The concept of procedural and conceptual variation LH8.7  Being able to apply their previous knowledge to link different areas and skills of mathematics is crucial for progression in mathematics LT3.3, LT4.2, LT4.6  There is a difference between a working wall and a passive display LT3.5, LT4.3, LH2.5  There are cognitive factors leading to mathematical difficulties LT1.1, LT5.2  The importance of supporting parents and how to engage them effectively LT1.3, LT1.4, LT1.5, LT2.7, LT2.8, LT5.7  Mathematics can be taught in creative ways, including outside the classroom | To promote mathematical talk in both adult led and child initiated play LH1.2  To use the specific technical vocabulary associated within counting and early calculation. LH1.2  To plan for and teach the different types of problem solving, not just word problems.  To plan for and teach the number of skills required to become an efficient problem solver. LH2.3, LT3.5  To develop children’s understanding of fractions and statistics  LH2.3, LT3.5 | | Planning, teaching and assessing creative and engaging mathematics lessons is important to produce motivation in mathematics LT3.2, LT4.2, LT4.6, LT6.5, LT6.6, LH1.2, LH2.2, LH2.3, LH4.6  Engaging parents in their child’s mathematical development is important for promoting progress. LT1.3, LT5.7, LH1.4, LH7.11  mathematical dialogue are effective approaches to developing reasoning skills and present effective assessment opportunities. LT1.5, LT4.7 (EYFS and KS1)  One of the key aims of the mathematics curriculum is for pupils to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. LT3.1 (EYFS and KS1)  One of the key aims of the mathematics curriculum is for pupils to solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. LT 1.3, LT3.1 (EYFS and KS1)  There is specific vocabulary associated with reasoning that will develop as children progress LT3.10, LT4.7  **(EYFS and KS1)**  There are a number of types of problem solving not just word problems  **(KS1)**  There are a number of skills required to become an efficient problem solver LT2.3, LT2.4, LT2.5, LT4.5, LH4.3  **(EYFS and KS1)**  There are different forms of questioning that can elicit different responses LT4.6  (EYFS and KS1)  There are cognitive factors leading to mathematical difficulties. LT2.4, LT4.5  (EYFS and KS1)  Adaptive teaching supports the development of number sense, meeting the needs of SEN/D pupils, in particular dyscalculic children.. LT1.3, LT5.1, LT5.2, LT5.3, LT5.7, LH5.2  (EYFS and KS1)  Conditional knowledge is required by pupils to reason mathematically and problem solve across all areas of the mathematics curriculum. LT2.1, LH2.3, LH2.7, LT4.2  (KS1)  Planning, teaching and assessing a sequence of lessons develops both conceptual and procedural understanding of number, including counting, place value and calculation as appropriate to EYFS and Key Stage 1. **LH2.3, LH2.7, LH2.9, LT3.1, LT3.5, LH3.3, LH3.7, LH3.8, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3, LT4.8**  Planning for pupils to have opportunities to learn and develop reasoning skills are influenced by a variety of teaching and learning approaches LT3.5, LT3.6, LH3.3  (EYFS and KS1)  Assessing reasoning skills through questioning, observation and scaffolded conversations provide evidence of progress LT6.1, LT6.3, LT6.5, LT6.6, LH2.9, LH6.12, LH6.13, LH6.14  (EYFS and KS1)  Implementing a problem solving culture into every mathematics lesson where pupils are engaged by the challenges and demonstrate resilience supports the development of a mathematical mindset LT1.3, LH3.13, LH3.14, LH4.3, LH8.4  **(EYFS and KS1)**  Adapting the teaching of mathematics to meet the needs of children with SEND (in particular dyscalculia) and those that have EAL is crucial to support progress of all learnersLT2.8, LT2.9, LT5.1, LT5.2, LT5.3, LT5.4, LT5.5, LT5.6, LT7.2, LH2.1, LH2.2, LH2.3  **(EYFS and KS1)**  Times tables and counting patterns can be taught using effective strategies without just using drill and practice LT2.1, LT2.5, LT2.7, LT2.8, LH2.9, LH3.3, LH3.11, LT4.2, LT6.1, LT6.2 LT6.3, LT6.4, LH6.1, LH6.3  (EYFS and KS1)  Appropriate concrete and visual resources support number sense and a conceptual understanding of calculation strategies when considering the CPA approach..LH2.3, LH2.9, LH3.12, LT4.3, LH4.3, LH4.8, LH5.9, LT6.1  (EYFS and KS1)  The National Curriculum requires implementation of a problem-solving culture into every mathematics lesson where pupils are engaged by the challenge and demonstrate resilience.- conditional knowledge. LT1.1, LT1.2, LT3.2, LT7.4  (KS1)  To promote resilience and perseverance when problem solving, whist considering the role of long term memory, working memory and CLT- conditional knowledge.. LT2.3, LT2.4, LT2.5, LT2.7, LT7.4  (EYFS and KS1) | | | To plan to utilise appropriate concrete and visual resources to support number sense and a conceptual understanding of calculation strategies considering the CPA approach. LH2.3, LH2.9, LH3.12, LT4.3, LH4.3, LH4.8, LH5.9, LT6.1  (EYFS and KS1)  To correctly use specific technical vocabulary used within fractions, geometry and measure and the role of the long term memory in storing this information.LH1.2  (KS1)  To identify their developmental needs as mathematical educators and independently address these.  (EYFS and KS1)  To plan, teach and assess a sequence of lessons developing both conceptual and procedural understanding of number, including counting, place value and both mental and written calculation. LH1.1, LH2.3, LH2.7, LH2.9, LT3.5, LH3.3, LH3.7, LH3.8, LT4.6, LT6.1, LT6.2 LT6.3, LT6.4, LH6.1, LH6.3  (KS1)  To plan to utilise appropriate concrete and visual resources to support number sense and a conceptual understanding of calculation strategies considering the CPA approach. LH2.3, LH2.9, LH3.12, LT4.3, LH4.3, LH4.8, LH5.9, LT6.1  (EYFS and KS1)  To adapt the teaching of number sense to meet the needs of SEN/D pupils, in particular dyscalculic children. LT1.3, LT5.1, LT5.2, LT5.3, LT5.7, LH5.2  (EYFS and KS1)  To plan, teach and assess a sequence of lessons following a mastery approach. LT2.7, LH2.3, LH2.9, LH3.3, LH3.4, LH3.7, LH4.1, LH5.6, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3  (KS1)  To implement a problem-solving culture into every mathematics lesson where pupils are engaged by the challenge and demonstrate resilience.- conditional knowledge. LT1.1, LT1.2, LT3.2, LT7.4  (EYFS and KS1)  To plan and assess using a mastery approach, supported by the NCETM materials..LT2.8, LH2.3, LH2.8, LH2.9, LT3.3, LH3.3, LH3.4, LH3.7, LH4.1, LT6.1, LT6.3, LT6.4, LH6.1, LH6.3, LH8.3  (EYFS and KS1)  To observe for misconceptions in counting and how these might be addressed through adult support LT2.6, LT3.4, LT5.5, LH3.1, LH2.6, LH6.1  (EYFS)  To plan, teach, scaffold and assess children’s mathematical reasoning during both adult led and child initiated play LT2.2, LT2.4, LT2.5, LT3.10, LT5.6, LT5.1, LT6.3  (EYFS)  To plan appropriate play opportunities around shape and space promoting mathematical language LT2.4, LT2.5, LT2.7, LT5.2  (EYFS) |
|  | **Assessment**   * **Self-assessment of mathematical skills via their targets. These targets are monitored by LT and PATs.** * **Completion of Numeracy Challenge to identify trainees for intervention.** * **Reflective entries into their learning journeys which are shared with the PAT** | | | **Assessment**  **• Weekly Development Summary – assessing progress on a weekly basis focusing on key strands of the EHU curriculum which includes discussion focus tasks**  **• Lesson observations – subject specific feedback**  **• Progress report**  **•Reflections in blue book.**  **Mentors will feedback in relation to CCF content observed in lessons and to specific mathematics content taught and trainees mathematical subject knowledge. Trainees will be deemed ready to progress in this area**. | | | |
|  | **Composite knowledge, understanding and skills** | | | | | | |
|  | **At the end of this phase students will know:**  **How to make informed decisions about**  **mathematics planning, teaching and**  **assessing learning for the phase in**  **which they are teaching based on**  **the appropriate level of subject**  **knowledge**  **How to plan for the needs of the**  **learners within their school-based**  **placement** | | **At the end of this phase students will understand:**  **How to use a school’s medium-term sequenced plans and schemes of work as a starting point to sequence learning**  **How to plan and teach for effective learning in mathematics by carefully sequencing learning to**  **best facilitate transferal to long term memory**  **and adapting teaching to be inclusive and to**  **scaffold and stretch** | | | **At the end of this phase students will be able to:**  **Use subject and curriculum**  **knowledge to plan and teach**  **science lesson/s which use science**  **specific pedagogies and enquiry**  **skills to facilitate progress that**  **draws on children’s prior learning,**  **addresses misconceptions,**  **sequences learning and integrates**  **formative assessment** | |
|  | **Research, literature and resources supporting the curriculum design of Phase 3**  Montague-Smith, A., Cotton, T., Hansen, A and Price, A. (2018) Mathematics in Early Years Education  Tucker, K (2014) Mathematics through play in the early years.  NCETM Six key areas of early mathematical learning  NCETM Number Blocks  **Ready to Progress materials, DfE and NCETM, 2020**  **NCETM Progression maps, NCETM 2021**  **NCETM videos**  **NCETM Mastery materials** | | | | | | |