

**Early Career Framework**

**Connections to the work of the Maths Hubs**

**Secondary version (v1)**

This document has been compiled by members of the Cambridge Maths Hub, with support from colleagues from other Hubs.

The first two columns are the ECF. Highlighted sections indicate ideas that we think are closely related to the work of the Maths Hubs, often with a strong connection to Mastery. The third column provides links that explain those connections. The links are to the NCETM and their mastery materials, to other Hubs that have mastery materials or to websites that help to exemplify the connections.

We have deliberately provided starting points, rather than trying to be comprehensive (which would be impossible but would also result in an unusably large document). The links we have given here will often contain other links that could be followed up.

(Cambridge Maths Hub, Summer 2021)

*The phrase ‘teaching for mastery’ describes the elements of classroom practice and school organisation that combine to give pupils the best chances of mastering maths. Mastering maths means pupils acquiring a deep, long-term, secure and adaptable understanding of the subject. Achieving mastery means acquiring a solid enough understanding of the maths that’s been taught to enable pupils to move on to more advanced material.*

*NCETM have written* [*Teaching for Mastery Professional Development materials*](https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/secondary-mastery-professional-development/)*. There are 6 themes; we have linked them to the Teaching Standards.*

**High Expectations (Standard 1 – Set high expectations)**

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| **Learn that…**1. Teachers have the ability to affect and improve the wellbeing, motivation and behaviour of their pupils.

 1. Teachers are key role models, who can influence the attitudes, values and behaviours of their pupils.

 1. Teacher expectations can affect pupil outcomes; setting goals that challenge and stretch pupils is essential.

 1. Setting clear expectations can help communicate shared values that improve classroom and school culture.

 1. A culture of mutual trust and respect supports effective relationships.

 1. High-quality teaching has a long-term positive effect on pupils’ life chances, particularly for children from disadvantaged backgrounds.
 | **Learn how to…****Communicate a belief in the academic potential of all pupils, by:** * *Using intentional and consistent language that promotes challenge and aspiration.*
* *Setting tasks that stretch pupils, but which are achievable, within a challenging curriculum.*
* *Creating a positive environment where making mistakes and learning from them and the need for effort and perseverance are part of the daily routine.*
* *Seeking opportunities to engage parents and carers in the education of their children (e.g. proactively highlighting successes).*

 | **Mastery links (where available/ appropriate)**“Mathematics teaching for **mastery** rejects the idea that a large proportion of people ‘just can’t do maths’. All students are encouraged by the belief that by working hard at mathematics they can succeed and that making mistakes is to be seen not as a failure but as a valuable opportunity for new learning”* [Secondary Teaching for Mastery](https://www.ncetm.org.uk/media/q0ykgtje/secondary-teaching-for-mastery-march-2021.pdf) – key principles
* [EEF Improving Mathematics In Key Stages Two and Three](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)

*Try: Section 5: Develop pupils’ independence and motivation (p20-23)**Section 6: Use tasks and resources to challenge and support pupils’ mathematics (p24-27)* “Without the necessary mathematical language and vocabulary skills to access mathematics, students can be faced with barriers preventing their understanding”* <https://www.cambridgemaths.org/blogs/the-language-of-mathematics/>
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| **Demonstrate consistently high behavioural expectations, by:** * *Creating a culture of respect and trust in the classroom that supports all pupils to succeed (e.g. by modelling the types of courteous behaviour expected of pupils).*
* *Teaching and rigorously maintaining clear behavioural expectations (e.g. for contributions, volume level and concentration).*
* *Applying rules, sanctions and rewards in line with school policy, escalating behaviour incidents as appropriate.*
* *Acknowledging and praising pupil effort and emphasising progress being made.*
 | “Mastery is characterised by a belief that, by working hard, all children are capable of succeeding at mathematics.Carefully structured teaching is planned in small steps. This provides both the necessary scaffold for all to achieve, and the necessary detail and rigour of all aspects of the maths to facilitate deep thinking.”* Teaching for Mastery: [Supporting research, evidence and argument](https://www.ncetm.org.uk/teaching-for-mastery/mastery-explained/supporting-research-evidence-and-argument/)

Liam Colclough, a headteacher in Sheffield, is convinced that to introduce teaching for mastery effectively, a shift in mindset is required* [Mindset: Why is it so important in Teaching for Mastery?](https://www.ncetm.org.uk/classroom-resources/cs-mindset-why-is-it-so-important-in-teaching-for-mastery/)

“We need to overcome the idea that ‘you’re either good at maths or you are not’, and that you are somehow born with a fixed ability to do maths.”* An article from the NCETM Director, Charlie Stripp: [Maths, Mindsets and Mastery](https://www.ncetm.org.uk/features/maths-mindsets-and-mastery/)

*See TS4 for practical advice on providing challenge for students* |

**How Pupils Learn (Standard 2 – Promote good progress)**

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| **Learn that…**1. Learning involves a lasting change in pupils’ capabilities or understanding.
2. Prior knowledge plays an important role in how pupils learn; committing some key facts to their long-term memory is likely to help pupils learn more complex ideas.
3. An important factor in learning is memory, which can be thought of as comprising two elements: working memory and long-term memory.
4. Working memory is where information that is being actively processed is held, but its capacity is limited and can be overloaded.
5. Long-term memory can be considered as a store of knowledge that changes as pupils learn by integrating new ideas with existing knowledge.
6. Where prior knowledge is weak, pupils are more likely to develop misconceptions, particularly if new ideas are introduced too quickly.
7. Regular purposeful practice of what has previously been taught can help consolidate material and help pupils remember what they have learned.
8. Requiring pupils to retrieve information from memory, and spacing practice so that pupils revisit ideas after a gap are also likely to strengthen recall.
9. Worked examples that take pupils through each step of a new process are also likely to support pupils to learn.
 | **Learn how to…****Avoid overloading working memory, by:** * *Taking into account pupils’ prior knowledge when planning how much new information to introduce.*
* *Breaking complex material into smaller steps (e.g. using partially completed examples to focus pupils on the specific steps).*
* *Reducing distractions that take attention away from what is being taught (e.g. keeping the complexity of a task to a minimum, so that attention is focused on the content).*

 | **Mastery links (where available/ appropriate)**The **BIG IDEA** of Coherence “Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.”This requires strong subject knowledge and an understanding of how students learn.* <https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/> (Section 2 - Coherence)
* <https://www.ncetm.org.uk/media/ludm4s3g/ncetm_secondary_mastery_pd_materials_structure.pdf>

The **BIG IDEA** of Representation and StructureOne way to reduce the cognitive load is to use visual representations to expose the structure of the concept being taught. This can include physical manipulatives, or pictorial representations:* <https://www.ncetm.org.uk/classroom-resources/cs-don-t-abandon-counters-just-because-it-s-secondary-school/>
* <https://www.youcubed.org/resources/visual-math-improves-math-performance/>
* [EEF Improving Mathematics In Key Stages Two and Three (Section 2 Use manipulatives and representations (p10-13)](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)
* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 2: Representation and Structure

Further Reading:“If a child is struggling with mathematics, particularly arithmetic, they may have difficulties with working memory. Strategies such as repetition, using manipulatives, memory aids and breaking down multi-step tasks can be used for all students.”* [Cambridge Mathematics Espresso 10](https://www.cambridgemaths.org/Images/espresso_10_working_memory_for_mathematics_learning.pdf): Why is working memory important for mathematics learning?

Daniel Willingham writes and explores the evidence from cognitive science of cognitive overload. He argues that that learning facts so they can be recalled automatically frees up working memory, so avoids cognitive overload. The paper also argues that procedural fluency and conceptual understanding should be taught in tandem. * [Daniel Willingham: "Is it true that some people just can’t do math?"](https://www.aft.org/sites/default/files/periodicals/willingham.pdf) American Educator 33.4 (2009): 14-19.

[Cambridge Mathematics Espresso 6:](https://www.cambridgemaths.org/images/espresso_6_maths_anxiety.pdf) How Does Maths Anxiety Affect Mathematics Learning? |
| **Build on pupils’ prior knowledge, by:** * *Identifying possible misconceptions and planning how to prevent these forming.*
* *Linking what pupils already know to what is being taught (e.g. explaining how new content builds on what is already known).*
* *Sequencing lessons so that pupils secure foundational knowledge before encountering more complex content.*
* *Encouraging pupils to share emerging understanding and points of confusion so that misconceptions can be addressed.*

 | Building on prior knowledge:* [EEF Improving Mathematics In Key Stages Two and Three](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)

Try Section 1: Use Assessment to Build on Pupils’ Existing Knowledge and Understanding (p8-9) For resources to assist in establishing the depth of prior knowledge NCETM has produced materials to support [assessment of mastery](https://www.ncetm.org.uk/classroom-resources/assessment-materials-secondary/) of different areas of the curriculum. |
| **Increase likelihood of material being retained, by:** * *Balancing exposition, repetition, practice and retrieval of critical knowledge and skills.*
* *Planning regular review and practice of key ideas and concepts over time.*
* *Designing practice, generation and retrieval tasks that provide just enough support so that pupils experience a high success rate when attempting challenging work.*
* *Increasing challenge with practice and retrieval as knowledge becomes more secure (e.g. by removing scaffolding, lengthening spacing or introducing interacting elements).*
 | The **BIG IDEA** of FluencyStudents retain mathematics they understand deeply and fully, so really all the big ideas of mastery apply when we talk about retention. Fluency focuses on specifically enabling students to have the facts and procedures at their fingertips that they will need to complete unfamiliar application problems.* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 4: Fluency
* <https://www.tes.com/teaching-resources/blog/tes-maths-pedagogy-place-fluency>
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**Subject and Curriculum (Standard 3 – Demonstrate good subject and curriculum knowledge)**

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| **Learn that…**1. A school’s curriculum enables it to set out its vision for the knowledge, skills and values that its pupils will learn, encompassing the national curriculum within a coherent wider vision for successful learning.
2. Secure subject knowledge helps teachers to motivate pupils and teach effectively.
3. Ensuring pupils master foundational concepts and knowledge before moving on is likely to build pupils’ confidence and help them succeed.
4. Anticipating common misconceptions within particular subjects is also an important aspect of curricular knowledge; working closely with colleagues to develop an understanding of likely misconceptions is valuable.
5. Explicitly teaching pupils the knowledge and skills they need to succeed within particular subject areas is beneficial.
6. In order for pupils to think critically, they must have a secure understanding of knowledge within the subject area they are being asked to think critically about.
 | **Learn how to…****Deliver a carefully sequenced and coherent curriculum, by:** * *Identifying essential concepts, knowledge, skills and principles of the subject and providing opportunity for all pupils to learn and master these critical components.*
* *Ensuring pupils’ thinking is focused on key ideas within the subject.*
* *Working with experienced colleagues to accumulate and refine a collection of powerful analogies, illustrations, examples, explanations and demonstrations.*
* *Using resources and materials aligned with the school curriculum (e.g.*

*textbooks or shared resources designed by experienced colleagues that carefully sequence content).* * *Being aware of common misconceptions and discussing with experienced colleagues how to help pupils master important concepts.*

  | **Mastery links (where available/** **appropriate)**The **BIG IDEA** of Coherence “Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.”This requires strong subject knowledge and an understanding of how students learn.* <https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/> (Section 2 - Coherence)

Expanding this idea to the curriculum, the NCETM has broken down areas of the KS3 curriculum into smaller steps:* <https://www.ncetm.org.uk/media/ludm4s3g/ncetm_secondary_mastery_pd_materials_structure.pdf>

Exploring a topic in depth: professional conversations: * <https://www.ncetm.org.uk/classroom-resources/insights-from-experienced-teachers/>

Identifying misconceptions with multiple choice questions – a podcast with Craig Barton and AQA:* <http://www.mrbartonmaths.com/blog/multiple-choice-questions-on-trial-with-aqas-zeek-sweiry/>

[EEF Improving Mathematics In Key Stages Two and Three](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)Section 4: Enable pupils to develop a rich network of mathematical knowledge (p16-19) |
| **Support pupils to build increasingly complex mental models, by:** * *Discussing curriculum design with experienced colleagues and balancing exposition, repetition, practice of critical skills and knowledge.*
* *Revisiting the big ideas of the subject over time and teaching key concepts through a range of examples.*
* *Drawing explicit links between new content and the core concepts and principles in the subject.*
 | The **BIG IDEA** of mathematical ThinkingEnable deep learning using rich tasks that enable all students to explore the concept. Seek challenge within the same topic rather than move on to a new topic area.* <https://www.ncetm.org.uk/classroom-resources/secmm-mathematical-prompts-for-deeper-thinking-videos/>
* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 3: Mathematical Thinking

Further Reading[Enigma Maths Hub have gathered links](https://enigmamathshub.co.uk/secondary-curriculum/) to some useful resources. |

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| 1. In all subject areas, pupils learn new ideas by linking those ideas to existing knowledge, organising this knowledge into increasingly complex mental models (or “schemata”); carefully sequencing teaching to facilitate this process is important.
2. Pupils are likely to struggle to transfer what has been learnt in one discipline to a new or unfamiliar context.
3. To access the curriculum, early literacy provides fundamental knowledge; reading comprises two elements: word reading and language comprehension; systematic synthetic phonics is the most effective approach for teaching pupils to decode.
4. Every teacher can improve pupils’ literacy, including by explicitly teaching reading, writing and oral language skills specific to individual disciplines.
 | **Develop fluency, by:** * *Providing tasks that support pupils to learn key ideas securely (e.g. quizzing pupils so they develop fluency with times tables).*
* *Using retrieval and spaced practice to build automatic recall of key knowledge.*
 | The **BIG IDEA** of FluencyStudents retain mathematics they understand deeply and fully, so really all the big ideas of mastery apply when we talk about retention. Fluency focuses on specifically enabling students to have the facts and procedures at their fingertips that they will need to complete unfamiliar application problems.* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 4: Fluency
* <https://www.tes.com/teaching-resources/blog/tes-maths-pedagogy-place-fluency>
* [Cambridge Mathematics Espresso 10](https://www.cambridgemaths.org/Images/espresso_10_working_memory_for_mathematics_learning.pdf): Why is working memory important for mathematics learning?
 |
| **Help pupils apply knowledge and skills to other contexts, by:** * *Ensuring pupils have relevant domain-specific knowledge, especially when being asked to think critically within a subject.*
* *Interleaving concrete and abstract examples, slowly withdrawing concrete examples and drawing attention to the underlying structure of problems.*
 | While applying the ideas behind the **BIG IDEA** of Mathematical thinking, we can provide our students with rich tasks to explore and apply their knowledge:* <http://www.mrbartonmaths.com/teachers/rich-tasks/>
* <https://nrich.maths.org/>
* <https://donsteward.blogspot.com/p/don-stewards-maths-education-resources.html>
* <https://www.resourceaholic.com/>

Further Reading[EEF Improving Mathematics In Key Stages Two and Three](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)Section 3: Teach strategies for problem solving (p14-15)NRICH article: [what is problem solving?](https://nrich.maths.org/6073)NRICH article: [a problem is a problem for all that](https://nrich.maths.org/6588) |
| **Develop pupils’ literacy, by:** * *Demonstrating a clear understanding of systematic synthetic phonics, particularly if teaching early reading and spelling.*
* *Supporting younger pupils to become fluent readers and to write fluently and legibly.*
* *Teaching unfamiliar vocabulary explicitly and planning for pupils to be repeatedly exposed to high-utility and high-frequency vocabulary in what is taught.*
* *Modelling reading comprehension by asking questions, making predictions, and summarising when reading.*
* *Promoting reading for pleasure (e.g. by using a range of whole class reading approaches and regularly reading high-quality texts to children).*
* *Modelling and requiring high-quality oral language, recognising that spoken language underpins the development of reading and writing (e.g. requiring pupils to respond to questions in full sentences, making use of relevant technical vocabulary).*
* *Teaching different forms of writing by modelling planning, drafting and editing.*
 | [NRICH article](https://nrich.maths.org/2473) about using questions.“Without the necessary mathematical language and vocabulary skills to access mathematics, students can be faced with barriers preventing their understanding”<https://www.cambridgemaths.org/blogs/the-language-of-mathematics/> |

**Classroom Practice (Standard 4 – Plan and teach well structured lessons)**

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| **Learn that…**1. Effective teaching can transform pupils’ knowledge, capabilities and beliefs about learning.
2. Effective teachers introduce new material in steps, explicitly linking new ideas to what has been previously studied and learned.
3. Modelling helps pupils understand new processes and ideas; good models make abstract ideas concrete and accessible.
4. Guides, scaffolds and worked examples can help pupils apply new ideas, but should be gradually removed as pupil expertise increases.
5. Explicitly teaching pupils metacognitive strategies linked to subject knowledge, including how to plan, monitor and evaluate, supports independence and academic success.
6. Questioning is an essential tool for teachers; questions can be used for many purposes, including to check pupils’ prior knowledge, assess understanding and break down problems.
7. High-quality classroom talk can support pupils to articulate key ideas, consolidate understanding and extend their vocabulary.
8. Practice is an integral part of effective teaching; ensuring pupils have repeated opportunities to practise, with appropriate guidance and support, increases success.
9. Paired and group activities can increase pupil success, but to work together effectively pupils need guidance, support and practice.
10. How pupils are grouped is also important; care should be taken to monitor the impact of groupings on pupil attainment, behaviour and motivation.
11. Homework can improve pupil outcomes,

particularly for older pupils, but it is likely that the quality of homework and its relevance to main class teaching is more important than the amount set.  | **Learn how to…****Plan effective lessons, by:** * *Using modelling, explanations and scaffolds, acknowledging that novices need more structure early in a domain.*
* *Enabling critical thinking and problem solving by first teaching the necessary foundational content knowledge.*
* *Removing scaffolding only when pupils are achieving a high degree of success in applying previously taught material.*
* *Providing sufficient opportunity for pupils to consolidate and practise applying new knowledge and skills.*
* *Breaking tasks down into constituent components when first setting up independent practice (e.g. using tasks that scaffold pupils through meta-cognitive and procedural processes).*

 | **Mastery links (where available/** **appropriate)**The **BIG IDEA** of mathematical ThinkingEnable deep learning using rich tasks that enable all students to explore the concept. Seek challenge within the same topic rather than move on to a new topic area.* <https://www.ncetm.org.uk/classroom-resources/secmm-mathematical-prompts-for-deeper-thinking-videos/>
* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 3: Mathematical Thinking
* <http://www.mrbartonmaths.com/teachers/rich-tasks/>

The **BIG IDEA** of VariationVariation helps students to build a rich and complex understanding of the concept through examples that show what the concept is, and what it is not, and including peculiar or boundary examples. The essential features are exposed by varying the non-essential features. Questions are chosen carefully to expose the structure further.* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 5: Variation

Planning materials: <https://www.ncetm.org.uk/classroom-resources/planning-to-teach-secondary-maths/> The Shanghai approach: a podcast: <https://www.ncetm.org.uk/podcasts/secondary-maths-teaching-in-shanghai-two-teachers-reflect/> The Mr Barton Maths Podcast – a conversation about lesson planning with Dylan Wiliam <http://www.mrbartonmaths.com/blog/dylan-wiliam-author-researcher-trainer-and-assessment-for-learning-expert/> NCETM have written [Teaching for Mastery Professional Development materials](https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/secondary-mastery-professional-development/). There are 6 themes which we have explored across TS1 to 4, see all here for an overview. |
| **Make good use of expositions, by:** * *Starting expositions at the point of current pupil understanding.*
* *Combining a verbal explanation with a relevant graphical representation of the same concept or process, where appropriate.*
* *Using concrete representation of abstract ideas (e.g. making use of analogies, metaphors, examples and non-examples).*
 | The **BIG IDEA** of Representation and StructureOne way to reduce the cognitive load is to use visual representations to expose the structure of the concept being taught. This can include physical manipulatives, or pictorial representations:* <https://www.ncetm.org.uk/classroom-resources/cs-don-t-abandon-counters-just-because-it-s-secondary-school/>
* <https://www.youcubed.org/resources/visual-math-improves-math-performance/>
* [EEF Improving Mathematics In Key Stages Two and Three (Section 2 Use manipulatives and representations (p10-13)](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)
* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 2: Representation and Structure
 |
| **Model effectively, by:*** *Narrating thought processes when modelling to make explicit how experts think (e.g. asking questions aloud that pupils should consider*

*when working independently and drawing pupils’ attention to links with prior knowledge).* * *Making the steps in a process memorable and ensuring pupils can recall them (e.g. naming them, developing mnemonics, or linking to memorable stories).*
* *Exposing potential pitfalls and explaining how to avoid them.*

 | Jennifer Webb explores the idea of metacognition in the mathematics classroom, “If students are regularly practising metacognitive skills, such as making explicit connections between new and prior learning, and independently selecting strategies to succeed in tasks, these skills will eventually become second nature to them.” * <https://funkypedagogy.com/what-does-teaching-metacognitively-look-like/>
 |
| **Stimulate pupil thinking and check for understanding, by:** * *Planning activities around what you want pupils to think hard about.*
* *Including a range of types of questions in class discussions to extend and challenge pupils (e.g. by modelling new vocabulary or asking pupils to justify answers).*
* *Providing appropriate wait time between question and response where more developed responses are required.*
* *Considering the factors that will support effective collaborative or paired work (e.g. familiarity with routines, whether pupils have the necessary prior knowledge and how pupils are grouped).*
* *Providing scaffolds for pupil talk to increase the focus and rigour of dialogue.*

  | The **BIG IDEA** of mathematical ThinkingEnable deep learning using rich tasks that enable all students to explore the concept. Seek challenge within the same topic rather than move on to a new topic area.* <https://www.ncetm.org.uk/classroom-resources/secmm-mathematical-prompts-for-deeper-thinking-videos/>
* NCETM. [Secondary ITE professional development materials](https://www.ncetm.org.uk/classroom-resources/secondary-ite-professional-development-materials/) – part 3: Mathematical Thinking
* <http://www.mrbartonmaths.com/teachers/rich-tasks/>

[NRICH article](https://nrich.maths.org/2473) about using questions.“Without the necessary mathematical language and vocabulary skills to access mathematics, students can be faced with barriers preventing their understanding”<https://www.cambridgemaths.org/blogs/the-language-of-mathematics/> |

**Adaptive Teaching (Standard 5 – Adapt teaching)**

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| **Learn that…**1. Pupils are likely to learn at different rates and to require different levels and types of support from teachers to succeed.
2. Seeking to understand pupils’ differences, including their different levels of prior knowledge and potential barriers to learning, is an essential part of teaching.
3. Adapting teaching in a responsive way, including by providing targeted support to pupils who are struggling, is likely to increase pupil success.
4. Adaptive teaching is less likely to be valuable if it causes the teacher to artificially create distinct tasks for different groups of pupils or to set lower expectations for particular pupils.
5. Flexibly grouping pupils within a class to provide more tailored support can be effective, but care should be taken to monitor its impact on engagement and motivation, particularly for low attaining pupils.

There is a common misconception that pupils have distinct and identifiable learning styles. This is not supported by evidence and attempting to tailor lessons to learning styles is unlikely to be beneficial. 1. 7. Pupils with special educational needs or disabilities are likely to require additional or adapted support; working closely with colleagues, families and pupils to understand barriers and identify effective strategies is essential.
 | **Learn how to…****Develop an understanding of different pupil needs, by:** * *Identifying pupils who need new content further broken down.*
* *Making use of formative assessment.*
* *Working closely with the Special Educational Needs Co-ordinator (SENCO) and special education professionals and the Designated Safeguarding Lead.*
* *Using the SEND Code of Practice, which provides additional guidance on supporting pupils with SEND effectively.*

**Provide opportunity for all pupils to experience success, by:*** *Adapting lessons, whilst maintaining high expectations for all, so that all pupils have the opportunity to meet expectations.*
* *Balancing input of new content so that pupils master important concepts.*
* *Making effective use of teaching assistants.*

**Meet individual needs without creating unnecessary workload, by:** * *Making use of well-designed resources (e.g. textbooks).*
* *Planning to connect new content with pupils' existing knowledge or providing additional pre-teaching if pupils lack critical knowledge.*
* *Building in additional practice or removing unnecessary expositions.*
* *Reframing questions to provide greater scaffolding or greater stretch.*
* *Considering carefully whether intervening within lessons with individuals and small groups would be more efficient and effective than planning different lessons for different groups of pupils.*

**Group pupils effectively, by:** * *Applying high expectations to all groups, and ensuring all pupils have access to a rich curriculum.*
* *Changing groups regularly, avoiding the perception that groups are fixed.*
* *Ensuring that any groups based on attainment are subject specific.*
 | **Mastery links (where available/** **appropriate)**One of the key aspects of **mastery** is small steps of progress, and this is an approach that can work well for children with **SEND** too. A good **maths** progression will break down complicated concepts into manageable steps, enabling children to focus on one new aspect at a time and build on this understanding as their lessons progress.[EEF Improving Mathematics In Key Stages Two and Three](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)Section 7: Use structured Interventions to Provide Additional Support (p28-29)Section 6: Use tasks and resources to challenge and support pupils’ mathematics (p24-27)Section 2: Use manipulatives and representations (p10-13)EEF Report:[Making Best Use of Teaching Assistants](https://educationendowmentfoundation.org.uk/tools/guidance-reports/making-best-use-of-teaching-assistants/)Providing enrichment and “extended” materials, without moving on to new concepts: <https://www.ncetm.org.uk/classroom-resources/secmm-mathematical-prompts-for-deeper-thinking-videos/>  |

**Assessment (Standard 6 – Make accurate and productive use of assessment)**

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| **Learn that…**1. Effective assessment is critical to teaching because it provides teachers with information about pupils’ understanding and needs.

 1. Good assessment helps teachers avoid being over-influenced by potentially misleading factors, such as how busy pupils appear.

 1. Before using any assessment, teachers should be clear about the decision it will be used to support and be able to justify its use.

 1. To be of value, teachers use information from assessments to inform the decisions they make; in turn, pupils must be able to act on feedback for it to have an effect.

 1. High-quality feedback can be written or verbal; it is likely to be accurate and clear, encourage further effort, and provide specific guidance on how to improve.

 1. Over time, feedback should support pupils to monitor and regulate their own learning.
2. Working with colleagues to identify efficient approaches to assessment is important; assessment can become onerous and have a disproportionate impact on workload.
 | **Learn how to…****Avoid common assessment pitfalls, by:** * *Planning formative assessment tasks linked to lesson objectives and thinking ahead about what would indicate understanding (e.g. by using hinge questions to pinpoint knowledge gaps).*
* *Drawing conclusions about what pupils have learned by looking at patterns of performance over a number of assessments (e.g. appreciating that assessments draw inferences about learning from performance).*
* *Choosing, where possible, externally validated materials, used in controlled conditions when required to make summative assessments.*
 | **Mastery links (where available/** **appropriate)**[EEF Improving Mathematics in Key Stages Two and Three](https://educationendowmentfoundation.org.uk/public/files/Publications/Maths/KS2_KS3_Maths_Guidance_2017.pdf)Section 1: Use Assessment to Build on Pupils’ Existing Knowledge and Understanding (p8-9) Checkpoints: <https://www.ncetm.org.uk/classroom-resources/checkpoints/> The mastery approach to marking and feedback: <https://www.ncetm.org.uk/media/gkaldkso/secondary-marking-guidance-october-2016-v2.pdf> Assessment at KS3 guidance<https://www.ncetm.org.uk/media/qgjdx5fo/secondary_assessment_materials_november_2017.pdf> |
| **Check prior knowledge and understanding during lessons, by:** * *Using assessments to check for prior knowledge and pre-existing misconceptions.*
* *Structuring tasks and questions to enable the identification of knowledge gaps and misconceptions (e.g. by using common misconceptions within multiple-choice questions).*
* *Prompting pupils to elaborate when responding to questioning to check that a correct answer stems from secure understanding.*
* *Monitoring pupil work during lessons, including checking for misconceptions.*

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| **Provide high-quality feedback, by:** * *Focusing on specific actions for pupils and providing time for pupils to respond to feedback.*
* *Appreciating that pupils’ responses to feedback can vary depending on a range of social factors (e.g. the message the feedback contains or the age of the child).*
* *Scaffolding self-assessment by sharing model work with pupils, highlighting key details.*
* *Thinking carefully about how to ensure feedback is specific and helpful when using peer- or self-assessment.*

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| **Make marking manageable and effective, by:** * *Recording data only when it is useful for improving pupil outcomes.*

* *Working with colleagues to identify efficient approaches to marking and alternative approaches to providing feedback (e.g. using whole class feedback or well supported peer- and self-assessment).*
* *Using verbal feedback during lessons in place of written feedback after lessons where possible.*
* *Understanding that written marking is only one form of feedback.*
* *Reducing the opportunity cost of marking (e.g. by using abbreviations and codes in written feedback).*
* *Prioritising the highlighting of errors related to misunderstandings, rather than careless mistakes when marking.*
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**Managing Behaviour (Standard 7 – Manage behaviour effectively)**

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| **Learn that…**1. Establishing and reinforcing routines, including through positive reinforcement, can help create an effective learning environment.
2. A predictable and secure environment benefits all pupils, but is particularly valuable for pupils with special educational needs.
3. The ability to self-regulate one’s emotions affects pupils’ ability to learn, success in school and future lives.
4. Teachers can influence pupils’ resilience and beliefs about their ability to succeed, by ensuring all pupils have the opportunity to experience meaningful success.
5. Building effective relationships is easier when pupils believe that their feelings will be considered and understood.
6. Pupils are motivated by intrinsic factors (related to their identity and values) and extrinsic factors (related to reward).
7. Pupils’ investment in learning is also driven by their prior experiences and perceptions of success and failure.
 | **Learn how to…****Develop a positive, predictable and safe environment for pupils, by:** * *Establishing a supportive and inclusive environment with a predictable system of reward and sanction in the classroom.*
* *Working alongside colleagues as part of a wider system of behaviour management (e.g. recognising responsibilities and understanding the right to assistance and training from senior colleagues).*
* *Giving manageable, specific and sequential instructions.*
* *Checking pupils’ understanding of instructions before a task begins.*
* *Using consistent language and non-verbal signals for common classroom directions.*
* *Using early and least-intrusive interventions as an initial response to low level disruption.*
* *Responding quickly to any behaviour or bullying that threatens emotional safety.*
 | **Mastery links (where available/** **appropriate)**Breaking down expectations into smaller parts also works for behaviour management: [**http://www.mrbartonmaths.com/blog/doug-lemov-tips-for-the-return-to-classrooms/**](http://www.mrbartonmaths.com/blog/doug-lemov-tips-for-the-return-to-classrooms/) |
| **Establish effective routines and expectations, by:** * *Creating and explicitly teaching routines in line with the school ethos that maximise time for learning (e.g. setting and reinforcing expectations about key transition points).*
* *Practising routines at the beginning of the school year.*
* *Reinforcing routines (e.g. by articulating the link between time on task and success).*
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| **Build trusting relationships, by:** * *Liaising with parents, carers and colleagues to better understand pupils’ individual circumstances and how they can be supported to meet high academic and behavioural expectations.*
* *Responding consistently to pupil behaviour.*

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| **Motivate pupils, by:** * *Supporting pupils to master challenging content, which builds towards long-term goals.*
* *Providing opportunities for pupils to articulate their long-term goals and helping them to see how these are related to their success in school.*
* *Helping pupils to journey from needing extrinsic motivation to being motivated to work intrinsically.*
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**Professional Behaviours (Standard 8 – Fulfil wider professional responsibilities)**

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| **Learn that…**1. Effective professional development is likely to be sustained over time, involve expert support or coaching and opportunities for collaboration.

 1. Reflective practice, supported by feedback from and observation of experienced colleagues, professional debate, and learning from educational research, is also likely to support improvement.

 1. Teachers can make valuable contributions to the wider life of the school in a broad range of ways, including by supporting and developing effective professional relationships with colleagues.

 1. Building effective relationships with parents, carers and families can improve pupils’ motivation, behaviour and academic success.

 1. Teaching assistants (TAs) can support pupils more effectively when they are prepared for lessons by teachers, and when TAs supplement rather than replace support from teachers.
2. SENCOs, pastoral leaders, careers advisors and other specialist colleagues also have valuable expertise and can ensure that appropriate support is in place for pupils.

 7. Engaging in high-quality professional development can help teachers improve.  | **Learn how to…****Develop as a professional, by:** * *Engaging in professional development focused on developing an area of practice with clear intentions for impact on pupil outcomes, sustained over time with built-in opportunities for practice.*
* *Strengthening pedagogical and subject knowledge by participating in wider networks.*
* *Seeking challenge, feedback and critique from mentors and other colleagues in an open and trusting working environment.*
* *Engaging critically with research and discussing evidence with colleagues.*
* *Reflecting on progress made, recognising strengths and weaknesses and identifying next steps for further improvement.*

**Build effective working relationships, by:** * *Contributing positively to the wider school culture and developing a feeling of shared responsibility for improving the lives of all pupils within the school.*
* *Seeking ways to support individual colleagues and working as part of a team.*
* *Communicating with parents and carers proactively and making effective use of parents’ evenings to engage parents and carers in their children’s schooling.*
* *Working closely with the SENCO and other professionals supporting pupils with additional needs, making explicit links between interventions delivered outside of lessons with classroom teaching.*
* *Sharing the intended lesson outcomes with teaching assistants ahead of lessons.*
* *Ensuring that support provided by teaching assistants in lessons is additional to, rather than a replacement for, support from the teacher.*
* *Knowing who to contact with any safeguarding concerns.*
 | **Mastery links (where available/** **appropriate)**Go to [your local Maths Hub](https://ncetm.org.uk/maths-hubs/find-your-hub/) website to see what training opportunities there are linked to Maths Education. There are 40 Maths Hubs across England and they support teachers from Early Years Foundation Stage to Post-16 education.[The [Cambridge Maths Hub](https://cambridgemathshub.org/)is one of them and works across Cambridgeshire including Peterborough, West Suffolk, King's Lynn and West Norfolk.]Engaging with the Maths teacher community nationally: a podcast [**https://www.ncetm.org.uk/podcasts/our-tuesday-twitter-based-chats/**](https://www.ncetm.org.uk/podcasts/our-tuesday-twitter-based-chats/)Discussing mastery with your secondary headteacher: a podcast [**https://www.ncetm.org.uk/podcasts/two-london-heads-on-engaging-with-teaching-for-mastery/**](https://www.ncetm.org.uk/podcasts/two-london-heads-on-engaging-with-teaching-for-mastery/) |
| **Manage workload and wellbeing, by:** * *Using and personalising systems and routines to support efficient time and task management.*
* *Understanding the right to support (e.g. to deal with misbehaviour).*
* *Collaborating with colleagues to share the load of planning and preparation and making use of shared resources (e.g. textbooks).*
* *Protecting time for rest and recovery.*
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