

Maths - Best Practice Grid

What should we see in maths lessons as best practice?

Retrieval starters – mix of interleaving prior learning practice identified by teacher and pre-requisite skills directly relating to current learning no longer than 10 minutes, students complete work in silence in their yellow books.

KO's used to identify key facts and concepts for KS4 groups.

Answers displayed for students to self-mark, not all questions gone through by teacher. Teachers may choose one element of the starter to explore in greater depth.

Diagnostic questions – exploration of misconceptions whereby of the 4 possible answers all 3 of the incorrect answers are plausible answers given a specific misconception that a student may have. Every student participating – answers shared with mini whiteboards, no opt out. Use of whiteboards allows the teacher to ascertain if further teaching is necessary, either in the moment or in a future lesson, to address whole class misconceptions.

Student booklets – **KS3** Students are given unit booklets for elements that require use of graphs etc. These contain a variety of tasks that teachers will direct students to complete as appropriate to their learning, students do not proceed through the tasks without teacher's instruction. All other working should be completed in progress book.

KS4 Students will have the use of booklets for each unit based on tasks from Learning Journeys.

Worked Example – Carefully considered examples modelled by teacher with no student questioning or interjection during exposition. Strong focus on mathematical language and elements of exposition that require emphasis carefully considered prior to lesson. Cold call questioning will be used to

Students progressing to Your Turn – following teacher model these are completed in their progress book/mini whiteboard in silence whilst teacher circulates to identify any common errors. Students will then continue to independent task, following methods modelled in worked examples.

Intelligent practice – questions carefully considered to elicit student reflection on answers and links to previous question

High expectations – correct mathematical language used and clearly structured presentation with methods modelled clearly shown by all students

Problem solving modelled – after breaking down the composite problem into the components to isolate and develop the skills the teacher will assess these are secure before modelling how to approach the composite problem.

What does effective questioning and scaffolding look like in maths?

Looking for explanations, not simply answer, explanation method much more important than simply a final answer.

Diagnostic questions are utilised at various points in the learning cycle to explore student misconceptions. Depending on overall class responses the students may be asked to consider the incorrect options to help emphasise the mistakes commonly made. This process may be done using whiteboards/1,2, 3, 4 on hands. Mathematical language modelled in both questioning and response.

Teachers will look to highlighting possible stumbling blocks through whole class discussion to ensure students are aware of these common errors and can anticipate these in their independent practice.

Questioning will promote higher order thinking, probing students for reasoning, making links to prior learning.

<p>Teacher circulating – ensuring all students able to access task, identifying misconceptions across group to identify need for whole class feedback or individual intervention</p> <p>Answers regularly displayed – Ensures students have regular clarification of their accuracy and can seek feedback, students to mark in green pen and corrections (including method not just answer) to be completed in green pen to show student reflection</p> <p>Cold calling – Teachers use cold calling to ensure all students engaged with learning. Hands up permitted but teachers actively look to ask others unless question difficulty requires teacher to seek answers from those with hands up whose explanations will support class wide understanding.</p> <p>Stretch and challenge – Within the learning journeys there are opportunities for all students to deepen their understanding rather than progressing through the booklets and teachers will include additional material to cater for this as necessary within the scope of their own classes.</p> <p>Teachers demonstrate excellent subject knowledge - Use of higher order thinking, probing students for reasoning, making links to prior learning. Teachers will utilise the faculty produced learning journeys/student booklets, as appropriate, to meet the groups needs and plan to scaffold and extend to supplement as necessary.</p>	
<p>What does great modelling and exposition look like in maths?</p> <p>Consideration of ‘curse of the expert’ to ensure student understanding is not taken for granted.</p> <p>Prior to lessons teachers will consider key aspects of knowledge necessary to be emphasised and explicitly communicated during worked examples.</p> <p>Careful consideration of mathematical language, both in teacher exposition and in students’ responses – not accepting half answers and refining responses if explanation not accurate.</p> <p>No student participation whilst teacher completes worked example, books closed and pens down to ensure student is fully engaged and focused on new learning.</p> <p>Teacher modelling the thinking necessary, explicit to the question, not just showing the working out</p> <p>Worked examples and Your turn closely linked to help students apply new learning and build confidence through successful completion before moving onto further practise.</p> <p>Questioning from teacher to prompt mathematical thinking</p> <p>Composite skills broken down into component skills to reduce cognitive overload.</p> <p>Key language broken down to help deepen students understanding eg. per cent (out of 100)</p>	<p>What does retrieval practice look like in maths?</p> <p>Starters - KS4 using knowledge organiser faculty produced templates for top 3 questions – these should be quick recall facts, bottom two questions slightly more indepth – 1 from prior learning, 1 linking to current learning – teachers choice based on knowledge of group.</p> <ul style="list-style-type: none"> - KS3, similar format to KS4 but without use of knowledge organisers <p>Homework – 10 questions on a variety of areas, same skills each half term but increasing difficulty throughout the term (supported with links to videos on corbettmaths)</p> <p>Dr Frost teacher can set tasks based on prior learning</p> <p>End of Unit reviews – Purposely completed couple of weeks after the unit was taught. Looking at granular skills for the unit covered to highlight to both student and teacher any areas that may need further practice/teaching.</p> <p>Interleaving skills from previous units into current learning eg. Substitution fractions and decimals from Unit A into algebraic formulae in Unit C/D, or mensuration calculations in Unit F.</p>

<p>What will you see in students' workbooks?</p> <p>Yellow books – starters, paired work and possibly initial practice when new learning introduced. Extension tasks may also be completed in here if teacher feels appropriate, to allow students to explore ideas more freely.</p> <p>Progress books Your turn and exercises following modelled examples Marking and corrections completed by student in green pen End of Unit reviews – peer marked – students identifying areas of improvement Termly tracking assessments and feedback sheets glued into book (KS3), feedback sheets RAG'd so students can easily identify areas for improvement. Homework at back of book – all students following expectations of question, working and answer – following examples on weebly</p>	<p>What formative assessment and feedback will you see in maths?</p> <p>Teacher circulating and checking students' work, use of prompting questions to help guide understanding, individually or as part of whole class feedback. Teacher questioning – either using mini whiteboards or cold calling. Regular feedback to ensure all students can continue through tasks confidently or issues are addressed in the moment, either through student reflection following display of answers, individual discussions with the teacher or whole class feedback. Any feedback modelled by teacher on the board is expected to be copied by all students, using green pen who either; incorrectly answered the question, whose own method relied more on trial and improvement rather than robust method or whose method has gaps or simply have yet to complete this question. KS4 groups will receive QLA emailed to both them and parents, identifying strength and weaknesses, including targeted key skills from Dr Frost.</p>
<p>What questions are useful to ask the children about their learning to elicit understanding?</p> <p>How did you go about...? Is that answer reasonable? Did anyone use a different method? Why did you do that? How did you break it down? What should you do next? What does 'this' tell us? Can anyone refine ... answer? Can you add to answer? What do you notice about... How could you help someone if they gave the answer....? Is this always true? How can you prove ...? What's the same what's different?</p>	<p>How do teachers in maths engage with the subject community?</p> <p>Attend training events and webinars, Engagement with faculty/whole school PL, Engagement with subject specific articles, Feedback through HOF's to develop trust wide community Teachers regularly check twitter, Read maths gems blog posts.</p>
<p>How is literacy taught in maths?</p> <p><i>Reading</i> Questioning used to check students can confidently decipher mathematical representation of ideas and concepts. Teachers model thinking of 'unpicking' the information presented and recognising the necessary mathematical operation. Tier 3 mathematical vocabulary and command words is explicitly taught to ensure students have a firm understanding of the word within the mathematical context. Knowledge organisers used to encourage independence and retrieval of key terms and facts.</p>	

Oracy

Think Pair Share and Questioning used to develop students mathematical dialogue, articulating thinking and reasoning with peers.

Think Pair Share given clear parameters – which student talks first, how long, potentially sentence starters provided for students to support process.

Think Pair Share

- Stage 1:
 - Independent thinking time for students
- Stage 2:
 - Silent thinking time (30s)
 - Assign roles (listener/talker)- these roles will swap
 - Teachers ensure equal talking time for both students
 - Question the pair, not the student (we thought...)
- Stage 3
 - Probing/Bouncing question, asking a lot of “whv”.

Meeting the needs of NTE students

Identifying students on seating plans

Clear routines

Worked examples include explicit modelling of vocabulary, reading of mathematical questions and unpacking of key terms

Using choral response to support new vocabulary acquisition

Ensure consistent depth in starter questions, linked to the knowledge organiser (KS4)

Using visual representations and dual coding where appropriate to support working.

Scaffolds such as partially completed examples, structured layouts and guided steps are provided where needed to support students before moving to full independent practice

Provide with printed copies of wordier example/problem-pair questions

Prioritise checking of understanding during circulation

Ensure Rushey Rewards are given to acknowledge their effort

Provide with printed copy of homework examples

Promote homework clubs

Meeting the needs of emerging readers

Identifying students on seating plans

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Promote homework clubs

Meeting the needs of SEN students

Identifying students on seating plans

Clear routines

Worked examples include explicit modelling of vocabulary, reading of mathematical questions and unpacking of key terms

Using advice cards to support learner

Using choral response to support new vocabulary acquisition

Ensure consistent depth in starter questions, linked to the knowledge organiser (KS4)

Meeting the needs of PP students

Identifying students on seating plans

Ensuring they always have access to equipment

Using visual representations where appropriate to support working.

Worked examples include explicit modelling of vocabulary, reading of mathematical questions and unpacking of key terms

Using advice cards to support learner

Using choral response to support new vocabulary acquisition

Key vocabulary for the unit shared with examples, if relevant.

Printout of example/ non-examples

Using visual representations and dual coding where appropriate to support working.

Manipulatives/ aids printed if relevant - number lines, place value grid etc.

Scaffolds such as partially completed examples, structured layouts and guided steps are provided where needed to support students before moving to full independent practice

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