

# Maths Expectations 2021/2022

## Intent

- All pupils should become fluent in the fundamentals of mathematics, through varied and frequent practice, so that pupils develop conceptual and procedural understanding and are able to recall and apply their knowledge rapidly and accurately to problems.
- The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. When to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage.
- Pupils who grasp concepts rapidly should be challenged through rich and sophisticated problems before any acceleration through new content. Those pupils who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

## Implementation

As a school we will be continuing to follow the mastery approach of teaching Mathematics. The key principles are:

- All pupils are encouraged by the belief that by working hard at maths they can succeed.
- A detailed curriculum is mapped out across all phases and key knowledge and skills are set out, which need to be mastered before moving on to the next stage.

## Differentiation

- Pupils are taught through whole-class interactive teaching, where the focus is on **all** pupils working together on the same ARE lesson content. For year groups with specific needs these will be need to be discussed with the Maths Lead and SLT to look at possible alternatives.
- If a pupil fails to grasp a concept or procedure, this is identified quickly and early intervention ensures the pupil is ready to move forward with the whole class in the next lesson. Strengthening activities are used with small groups of pupils to consolidate learning before the next lesson. In contrast to this, deepening activities should be used to challenge the more able.

## Lesson structure

- Lessons are broken down into small connected steps that gradually unfold the concept.
- The children should be active throughout the lesson through discussions, pupils modelling on the board and partner work.
- Lesson design identifies the new mathematics that is to be taught, the key points, the difficult points and a carefully sequenced journey through the learning is mapped out.
- The questions that are provided have been carefully structured to guide the children through the learning journey. They are not simply a set of random questions to practice the same skill over and over again. Each question/task builds upon the learning of the previous one. This is known as intelligent practice.

$2 \times 3 =$	$6 \times 7 =$	$9 \times 8 =$
$2 \times 30 =$	$6 \times 70 =$	$9 \times 80 =$
$2 \times 300 =$	$6 \times 700 =$	$9 \times 800 =$
$20 \times 3 =$	$60 \times 7 =$	$90 \times 8 =$
$200 \times 3 =$	$600 \times 7 =$	$900 \times 8 =$

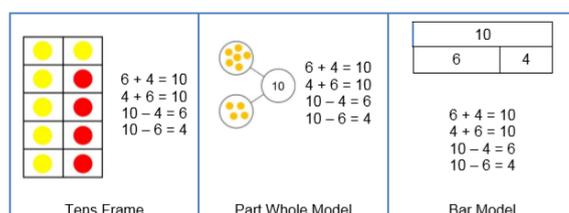
Shanghai Textbook Grade 2 (aged 7/8)

$123 + 134 =$
$234 + 149 =$
$345 + 167 =$
$305 + 149 =$

- When planning lessons, teachers need to anticipate any difficulties and make these an explicit part of the teaching sequence.
- Children need to have both conceptual and procedural understanding. Conceptual understanding is understanding the maths that is taking place and procedural is knowing how to follow a set of steps to answer a question. These need to be taught parallel to one another.
- In order to achieve deep learning the children need to make connections and reason. Key reasoning questions that should be used are:
  - *What is the same? What is different?*
  - *True or false? They are an opportunity to challenge misconceptions.*
  - *Which is the odd one out? These allow all answers to be correct provided the child can reason their choice.*
  - *Here is the answer. What could the question have been?*
  - *Which is the correct question?*

## Visual representations/concrete resources

- Visual representations and concrete equipment should be used to help children to understand the concepts and procedures: Why we do what we do.
- These visual representations need to be varied. Children need to see the same calculation presented in a range of different ways.



## Vocabulary

- Vocabulary is to be included on LOs. Vocabulary has been specified on the MTPs but staff will need to choose 2/3 key words to include on LOs which children need to use within the lesson.
- Children are expected to use the correct vocabulary and reason in full sentences. I say, you say, you say, you say, we all say. This technique enables the teacher to provide a sentence stem for children to communicate their ideas.
- Example: If the rectangle is the whole, the shaded part is one third of the whole. Having modelled the sentence, the teacher then asks individual children to repeat this, before asking the whole class to chorus chant the sentence. This provides children with a valuable sentence for talking about fractions.
- Repeated use helps to embed key conceptual knowledge.

## Questioning

- A hugely important part of a mastery classroom is questioning. More traditional 'chalk and talk' lessons can be transformed into an excited discussion by incorporating good questions
- The peer discussions that take place as a result of questions posed are invaluable as a way for teachers to assess levels of understanding, and as a platform for pupils to learn from one another
- More effective learning takes place when the teacher doesn't immediately accept or reject an answer. If the answer is confirmed correct, the rest of the class no longer need to think for themselves. An alternative approach is to ask several children what they think the answer is before asking, 'How do you know?' It is up to the whole class to justify and reason the theory correct or incorrect. Teachers avoid 'telling' the students the answers, and the pupils have to work out why it must be correct - a more powerful type of learning that helps link concepts together.
- Some generic questions to ask that are perfect to help assess learning include:

- How do you know?
- Can you prove it?
- Can you come up with a different method?
- What do you notice?
- Will it always do that, and why?
- What happens if?
- Does your answer seem reasonable? Why/why not?

### Long term plans

- The long term plan is based on the White Rose Maths LTP. It can be found in the Maths folder in subject areas.
- The mastery process is based on longer blocks which enable children to deepen their understanding before moving on to the next topic.
- There are still opportunities to revisit topics in starter activities and through links being made with other topics. For example addition and subtraction units will build on place value.
- Consolidation weeks have been planned to allow for topics to be revisited or to allow for the fact that some topics may need to be extended.

### Medium term plans

- Each unit has been divided into a series of small steps which build upon each other.
- Each step will usually take one lesson but staff have the flexibility to spend more or less time depending on the needs of the children.
- WRM have added in extra steps from the previous years' learning. These are highlighted in red on the MTP. They are designed to fill any gaps that may have arisen in the summer term and enable pupils to access the curriculum for the year group they are now in.
- Prior learning has also been included to ensure staff know what should already be in place before the unit is taught. This could be tested in SODA activities or mental starters.
- Ready to progress links have been included on the MTPs.
- MTPs are saved in the Maths folder in subject areas on Teams.

### Short term planning

- It is important that staff take the time to create high quality resources and teaching slides for each lesson. These will then form the basis of the short term planning. There is no longer an expectation that staff will screen shot teaching slides onto a planning grid.
- When planning lessons consider: what is new learning; what learning does it build upon; is the previous learning secure; when will this learning be built upon in the future.

## T&L process

### Flashback:

- The aim is to recall information without any prompts to strengthen long term memory.
- Research shows that children need to know things by heart in order to develop their reasoning skills. They should be given opportunities to practise until they can't get the answer wrong.
- Questions can be from previous topics that class have struggled with (based on assessment data) but may also be selected to link to the key learning for that lesson.
- The final question should allow endless possibilities and encourage children to play with numbers and show their understanding of a range of concepts. Children given chance to share their thinking with a partner.
- Children should be given a chance to change their answers as this is a learning opportunity rather than an assessment opportunity.
- Target children monitored and supported as necessary.

### Flashback

1) Round 456 to the nearest 10

2) Calculate  $97 - 100$

3) What number is halfway between 5500 and 6500?

4)  $5 \times 70 =$

$5 \times 700 =$

$7 \times 50 =$

$7 \times 500 =$

What other related facts can you think of?

### Prior knowledge:

- This section of the lesson provides an opportunity to revisit the learning from previous lesson.
- Children should be given an opportunity to recap on what they learnt last lesson. It allows them to build upon what they have previously learnt and make connections with the new learning for this lesson.
- Any misconceptions from marking can be addressed
- If this is the first lesson in the topic, then this will be an opportunity to assess what the children already know from previous teaching.

Lets recap

1) Which is the best estimate to use to check the answer to  $488 \times 32$ ?

$500 \times 40$        $400 \times 30$        $500 \times 30$

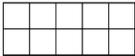
### Guided practise

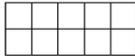
- Clear, specific learning objective.
- Learning skills that need to be mastered to achieve the LO broken down into small steps.
  1. Write tenths as a fraction using diagram
  2. Given decimal and have to show how many tenths on a diagram
  3. To write tenths as a decimal (1 or more in the ones column)
  4. Given decimal and have to show how many tenths and ones on a diagram.

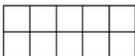
Have a think

There are      ones (wholes)  
There are      tenths

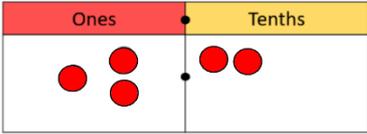
How can we represent these decimals?

0.4  

0.6  

0.8  

What do you notice?

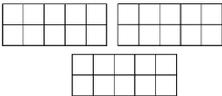


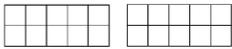
There are  ones and  tenths.

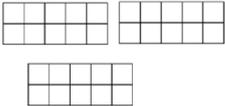
ones +  tenths =  +  =



How can we represent these decimals?

2.4  

1.6  

2.8  

- Teacher led but lots of opportunities for children to practise on whiteboards (able to change answers)
- To check that all children understand the concept behind the procedure, it is important to constantly reason where answers have come from. Can they justify the teachers, their own or their peers' answers?
- This is further strengthened when children are encouraged to look closely at the questions/images and look for similarities and differences. What do you notice?
- Visual prompts should be gradually removed to support independence.
- The teacher models example (**I do**). Teaching tools are available from WRM and saved in Subject Area; Maths; 20/21; White Rose IWB files. Sentence stems may be created during this section to generalise the rules that have been learnt. It is during this section of the lesson that the teacher needs to focus on the key vocabulary that they are expecting the children to use. **Teachers need to talk through why they are doing what they are doing.**
- This is then followed by an example that either the teacher and class do together or the children work with their learning partners to complete (**We do**). This provides teachers with an opportunity to assess if children are able to progress to the independent stage. Encourage children to challenge one another in a supportive way. Do they agree? Why? Why not?

### Independent practise

- This is then followed by examples for the children to practise on their own in their books (**You do**).
- If the teacher has noted during the 'we do' section that some children are struggling then they should support this group either through more guided practice or through the use of visual/concrete resources.
- This gives them an opportunity to process the procedure they have been shown.
- They can also consider what elements of the model they understand and check the parts they are still unsure of.
- The questions do not need to just be a list of calculations. They should be presented in a variety of ways to challenge the children's thinking (see WRM varied fluency). There should be a question thrown in that challenges the children to think about what it is that they are practising.
- Consider which activities require a sheet to be stuck in the books and which could be completed directly into maths books. Sometimes worksheets can restrict pupil's responses and structure the working out too much. This needs to be a consideration during the planning process.
- Questions should be presented to the children one or two at a time to prevent cognitive overload.
- If children finish early then they should be given a challenge/extension to look for patterns or consider the problem in a different way. For example a lesson which looks at subtracting single digits from three digit numbers ( $123 - 4 =$ ) could move on to looking at  $123 - 5 + 1$   $123 - 6 + 2 =$  . What other calculations could I find that would give me the same answer? Where possible extension tasks should be as open ended as possible.

- Pictorial models and concrete apparatus should be made available for **all** children to support.
- If children are struggling they should only require a short explanation to get back on track.
- If age appropriate, children should be marking their work before moving onto the next step. If children are not able to do this themselves then the teacher/Ta will need to do this as part of their ongoing monitoring. If less than 80% success rate, then skill/concept would need to be re-taught to all.

### **Application/Reasoning**

- Once the children have mastered the strategy/skill they should extend their thinking through solving mathematical problems. They should be able to apply their new knowledge to different concepts. They need to be able to identify what is important and unimportant in solving a problem and to explain or justify a solution.
- These problems should be as open ended as possible to allow all pupils to work on them at their level.
- Example activities include:
  - Spot the mistake / which is correct? Why / why not?
  - True or false? Always, sometimes, never?
  - Possible answers / Other possibilities
  - What do you notice?
  - Missing numbers / Missing symbols / Missing information/Connected calculations
  - What else do you know? / Use a fact / Fact families
  - Convince me / Prove it
  - Generalising rules
  - What's the same, what's different?
  - Odd one out
  - Here is the answer. What could the question have been?
  - Which is the correct question?
  - Which diagram/model matches the question?
  - This section can help provide children with a context for abstract calculations.

It is not necessary for *Guided/intelligent practise* and *application/reasoning* to be completed for every lesson. It is more important that staff are clear on the objective for the lesson and how well the children have achieved it. If they feel *application/reasoning* activities are necessary and they have not been able to fit these in, then a second lesson should be used.

This will depend on the topic and the objective. For example topics such as statistics may only need *modelling* and *practise*. This may also be the case when the objectives being taught are very similar over the course of several lessons. For example *subtracting with no exchanges*, *subtracting with one exchange*, *subtracting with two exchanges*.

## Mastery resources to support planning

### White Rose Maths:

1. This site provides examples of varied fluency, reasoning and problem solving activities within the Schemes of Learning.

<https://whiterosemaths.com/resources/schemes-of-learning/primary-sols/>

2. Additional resources can also be found in the premium subscription area

<https://resources.whiterosemaths.com/my-account/>

Username: simon.russell

Password HkGuDjft@j%p

Within each year group tab you will find:

- True or false quizzes
  - Worksheets in three different formats (powerpoint, photocopiable and display only).
  - There is also a video for each unit, a powerpoint which can be used for teaching slides and flashback activities which are questions from previous lesson and topics.
3. They also provide parent books which may be useful for homework.

<https://whiterosemaths.com/resources/primary-resources/parent-workbooks/>

### Power Maths:

- Power maths practise books have also been purchased for each year group.
- Teaching guides may be useful when planning your lessons and these have already been downloaded into the Maths folder in subject areas on Teams. They provide teachers with questions that could be asked, common misconceptions which may arise and strengthening and deepening activities which could be used as next steps if you need to revisit the lesson again.

### NCETM spine materials

These are divided into three main areas. These have been called spines.

*Spine 1: Number, Addition and Subtraction,*

*Spine 2: Multiplication and Division and*

*Spine 3: Fractions.*

The materials can support teachers to develop their subject and pedagogical knowledge and so help to improve mathematics teaching. They do not follow the order set out on the MTPs.

These can be found here:

[https://teams.microsoft.com/\\_#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=NCETM%2520spine%2520materials&rootfolder=%252Fsites%252Fapa\\_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FNCETM%2520spine%2520materials](https://teams.microsoft.com/_#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=NCETM%2520spine%2520materials&rootfolder=%252Fsites%252Fapa_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FNCETM%2520spine%2520materials)

### **Ready to progress materials**

These materials identify the most important conceptual knowledge and understanding that pupils need as they progress from year 1 to year 6. These important concepts are referred to as ready-to-progress criteria. Each year-group chapter then provides:

- teaching guidance for each ready-to-progress criterion, including core mathematical representations, language structures and discussion of connections to other criteria
- example assessment questions for each ready-to-progress criterion
- guidance on the development of calculation and fluency

These can be found here:

[https://teams.microsoft.com/\\_#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=Ready%2520to%2520progress&rootfolder=%252Fsites%252Fapa\\_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FReady%2520to%2520progress](https://teams.microsoft.com/_#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=Ready%2520to%2520progress&rootfolder=%252Fsites%252Fapa_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FReady%2520to%2520progress)

**Concrete resources:** Each year group will be given a set of resources linked to the calculation policy. These resources should be readily available to all children throughout the lessons. They are not solely for less able pupils. Staff will need to model their use for children.

**Pictorial models:** Each year group will be provided with a set of slides showing pictorial models which should be displayed on maths displays in classrooms. These will be saved in White Rose IWB files folder within the Maths subject area on Teams. They are again linked to the calculation policy. It is advised that these some of these teaching tools should be photocopied and laminated so the children can have access to these during the lesson.

Interactive resources can also be found at <https://mathsbot.com/manipulativeMenu>

**Calculation policies** can be found in Maths subject areas on teams.

[https://teams.microsoft.com/\\_#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=Calculation%2520policies&rootfolder=%252Fsites%252Fapa\\_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FCalculation%2520policies](https://teams.microsoft.com/_#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=Calculation%2520policies&rootfolder=%252Fsites%252Fapa_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FCalculation%2520policies)



- At the start of each unit, a knowledge mat needs to be introduced. This should be displayed in the classroom and will be referred back to throughout the topic. These will be saved in the Maths subject areas folder on Teams.  
[https://teams.microsoft.com/#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=Knowledge%2520organisers&rootfolder=%252Fsites%252Fapa\\_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FKnowledge%2520organisers](https://teams.microsoft.com/#/school/files/Teaching%20Staff?threadId=19%3Ada1aabf5fab84b9eb8dedf6d12459da7%40thread.skype&ctx=channel&context=Knowledge%2520organisers&rootfolder=%252Fsites%252Fapa_widerstaff-TeachingStaff%252FShared%2520Documents%252FTeaching%2520Staff%252FSubject%2520Areas%252FMaths%252F2021-2022%252FKnowledge%2520organisers)
- For each step an LO will need to be stuck in. Some steps may take more than one lesson. The LO should include vocabulary (2/3 words that the children must be able to use in their reasoning and explanations by the end of the session) and success criteria if necessary. If it will be helpful, you may also include visual images to remind children when working independently to support their learning.
- Whole worksheets should not be stuck in books.
- Where possible pupils should be encouraged to complete any written calculations directly into their books. They should also be able to write detailed written responses and draw their own representations for reasoning problems.
- If there are children with misconceptions at the end of the lesson, these should be addressed before the next lesson starts. A strengthening activity may be needed before the next lesson's LO is stuck in if a small group of children have the same misconceptions. If it is an individual who is struggling then this could be addressed through the use of teachers pink marking. While children are completing purple pen or strengthening activities, the rest of the group can be completing a deepening activity.

The link to strengthening and deepening can be found here:

[https://teams.microsoft.com/l/file/A4C4DC34-3035-44FE-907A-38B95010AD11?tenantId=c8084b96-749c-453a-ac2b-57aef3eedd7d&fileType=docx&objectUrl=https%3A%2F%2F8602141.sharepoint.com%2Fsites%2Fapa\\_widerstaff-TeachingStaff%2FShared%20Documents%2FTeaching%20Staff%2FSubject%20Areas%2FMaths%2F2021-2022%2FStrengthening%20and%20deepening.docx&baseUrl=https%3A%2F%2F8602141.sharepoint.com%2Fsites%2Fapa\\_widerstaff-TeachingStaff&serviceName=teams&threadId=19:da1aabf5fab84b9eb8dedf6d12459da7@thread.skype&groupId=3b590371-b393-40f0-8085-6d74ecb6c22b](https://teams.microsoft.com/l/file/A4C4DC34-3035-44FE-907A-38B95010AD11?tenantId=c8084b96-749c-453a-ac2b-57aef3eedd7d&fileType=docx&objectUrl=https%3A%2F%2F8602141.sharepoint.com%2Fsites%2Fapa_widerstaff-TeachingStaff%2FShared%20Documents%2FTeaching%20Staff%2FSubject%20Areas%2FMaths%2F2021-2022%2FStrengthening%20and%20deepening.docx&baseUrl=https%3A%2F%2F8602141.sharepoint.com%2Fsites%2Fapa_widerstaff-TeachingStaff&serviceName=teams&threadId=19:da1aabf5fab84b9eb8dedf6d12459da7@thread.skype&groupId=3b590371-b393-40f0-8085-6d74ecb6c22b)