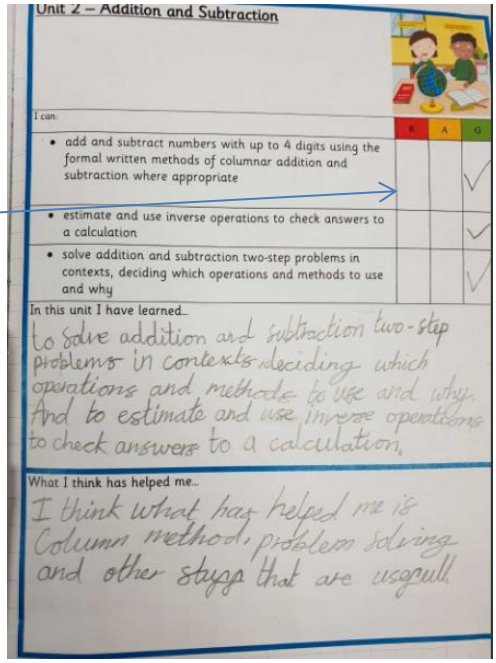
# Mathematics - Teaching and learning expectations: a journey through a unit.

## Unit covers

Cover sheets are to be stuck in at the beginning of each topic. These inform the children of the skills they will learn throughout the unit and ensure that teachers have covered all objectives by the end of the year. The children then revisit this document at the end of the unit and have the opportunity to RAG the objectives, showing how confident they feel at applying these skills. They discuss what they have learnt and what they used to support them.


Unit 2 – Addition and Subtraction

I can:

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

In this unit I have learned...

to solve addition and subtraction two-step problems in contexts deciding which operations and methods to use and why. And to estimate and use inverse operations to check answers to a calculation.

What I think has helped me...

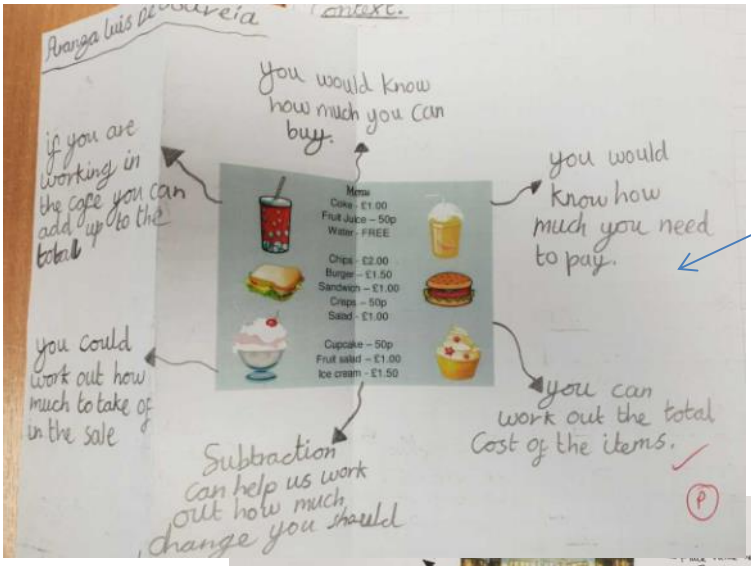
I think what has helped me is Column method, problem solving and other steps that are useful.

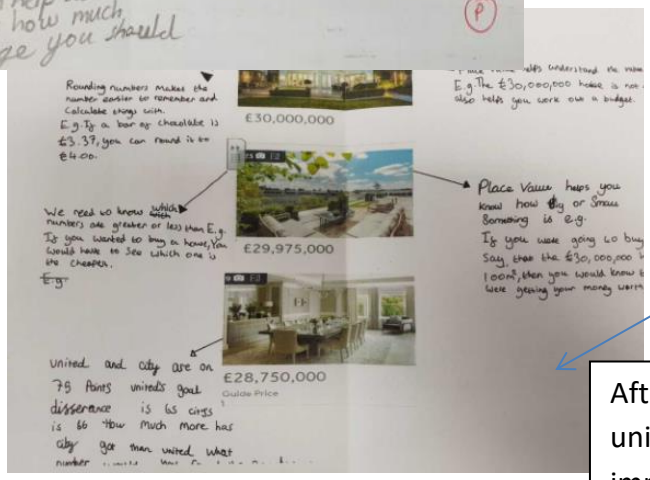
## Daily Starters

The first ten minutes of your lesson should be an engaging 'warm up' for the children and a chance to practice basic skills mentally and number knowledge. **Firstly,** the children must participate in daily counting starting from any given number, in different increments, forwards and backwards. You could use a counting stick, hoop or a ball to support this e.g. 10 more than 75 is…..throw the ball to any child to answer and they carry this on. For younger children they could stamp their feet or clap whilst counting to get every child involved. Just 5-10 minutes a day will support children's knowledge of numbers and secure foundations.

**Secondly**, a basic revision of key mental calculation strategies that have already been taught should be quickly revised at the beginning of every lesson **e.g. half of 20 is.., 20 x 18 is.., 10 less than 1001 is.., ¼ of 100 is…** Children have become reliant on using written calculations to reach answers and often use fingers or objects to support. However, we need to support children in working these calculations out "in their head" instead of just on paper. This requires and encourages students to quickly and efficiently recall a range of strategies and then select the best one for the problem at hand. Every new strategy learned and problem solved encourages brain plasticity – that is, increased brain-cell activity and the creation of new pathways.

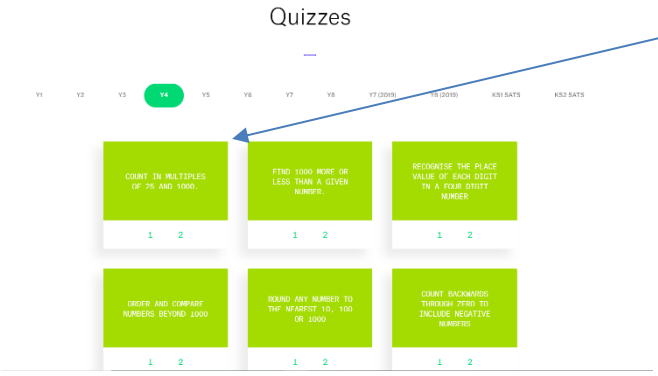
## Day 1: Discussion day and Diagnostic tests

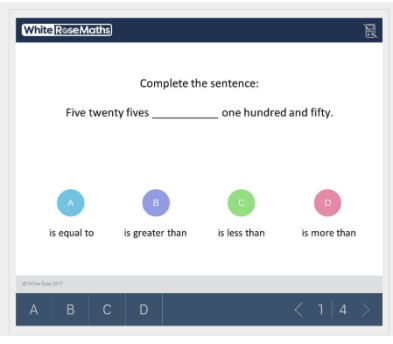


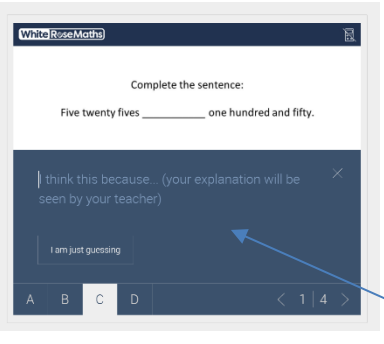




On the first day of the new topic we have a discussion day. This is where the teacher links the new learning to real life, putting the children's learning into context. This is done through picture cues and then the children discuss why they would need to use this particular skill in day to day life. This gives meaning behind the learning and helps engage the children as they feel it is purposeful and will help them in the future.

## Day 1- end of lesson -Diagnostic tests – White rose



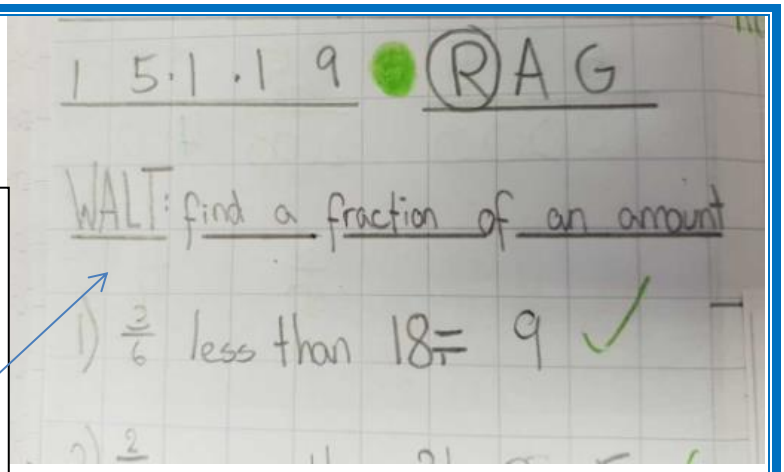



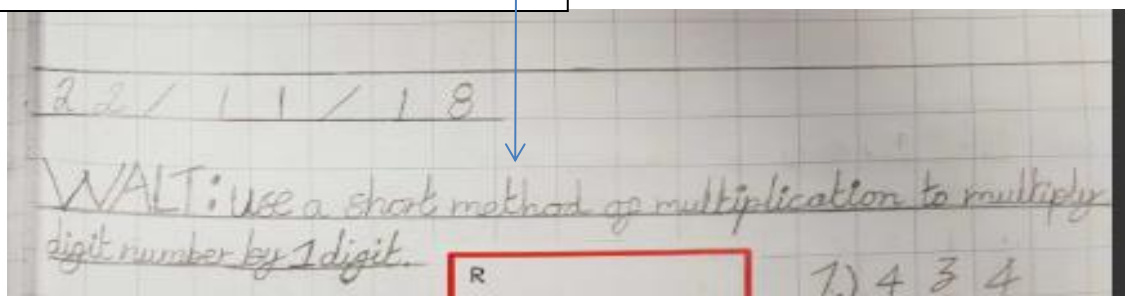




After introducing the unit using the RAG unit cover and discussion day, it is important to support your planning and teaching by ensuring that you are aware of children's prior knowledge and areas that need revisiting. These white rose diagnostic tests for each year group and unit will give teachers and support staff a clear indication of any misconceptions and will help identify strengths and weaknesses in key skills. This will also ensure you are challenging the children and not re teaching skills that they are already confident with. It is a great way to start the unit and opens many opportunities for discussions to have an accurate insight of children's gaps in learning. These questions can be discussed and answered as a class or in small groups. There is also an opportunity for the children to explain their thinking and document how they reached their answer.

## WALTs

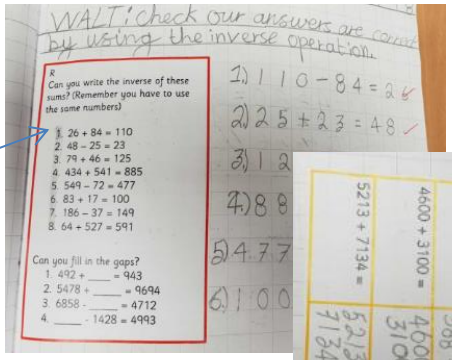
The WALT (we are learning to..) is written at the top of every piece of work. This is skills specific and shows the method supporting the children to achieve this objective e.g. counting on, using a number line, column addition etc

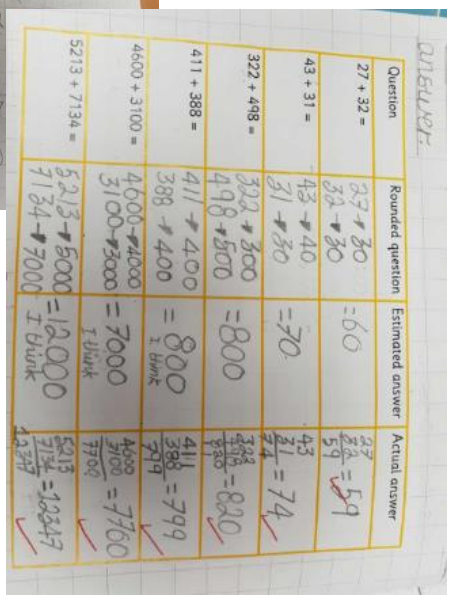



## Differentiation

When differentiating work, to ensure it matches the needs of all learners we use our RAG system (red being the most challenging activity). This allows the children to progress throughout the lesson and move to the more difficult challenge. It also supports children who are finding this particular challenge difficult as they can start on the green challenge. Children record which activity they completed by writing 'RAG' underneath their WALT and circling the activity they chose. The children are then given the opportunity to 'traffic light' their walt, showing the teacher how they found todays learning.



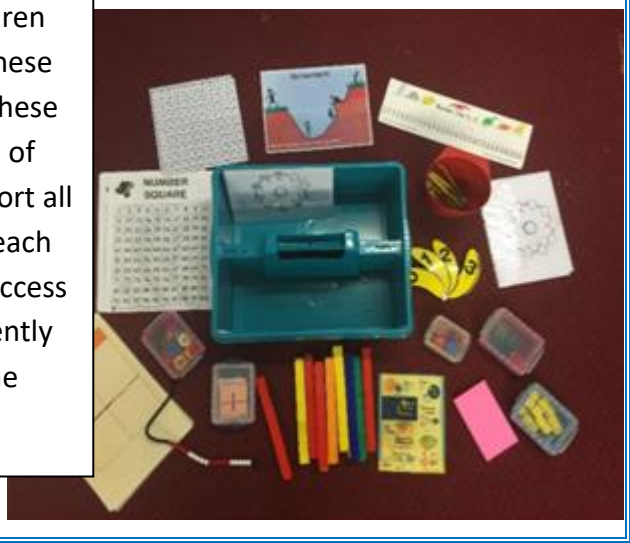




**Use resources from classroom secrets, White Rose or test base to support your daily teaching.**

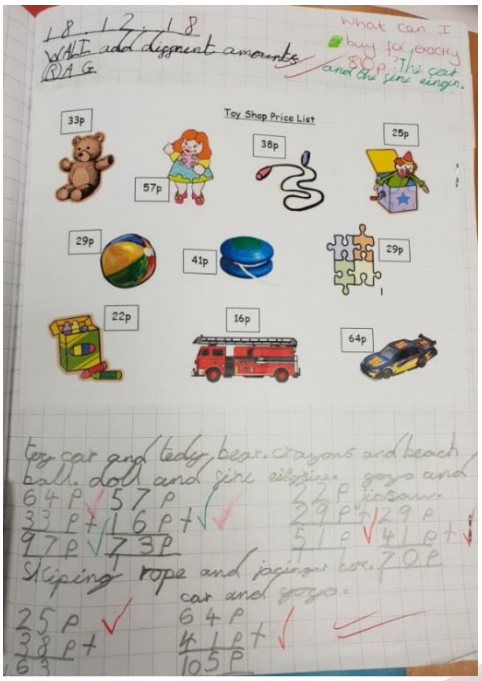
## Maths Baskets

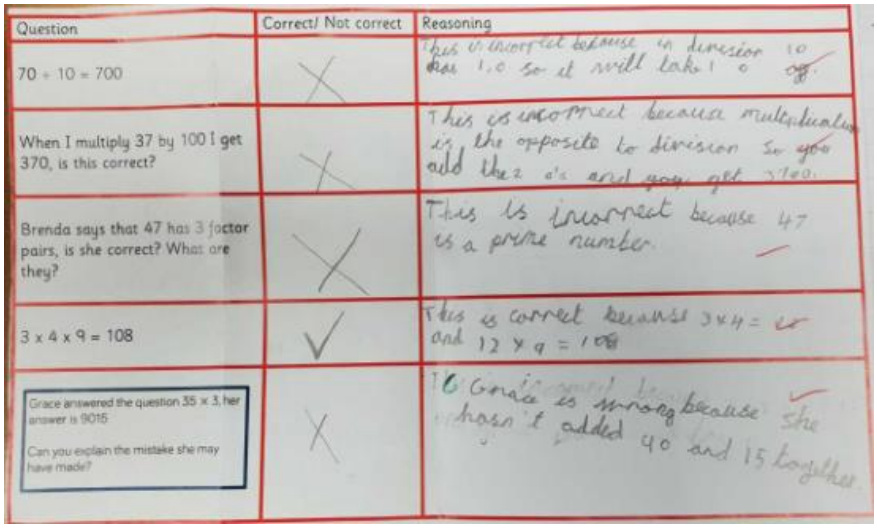
Throughout each lesson, the children have access to these maths baskets. These include a range of resources to support all learners during each lesson. Children access these independently throughout the session.



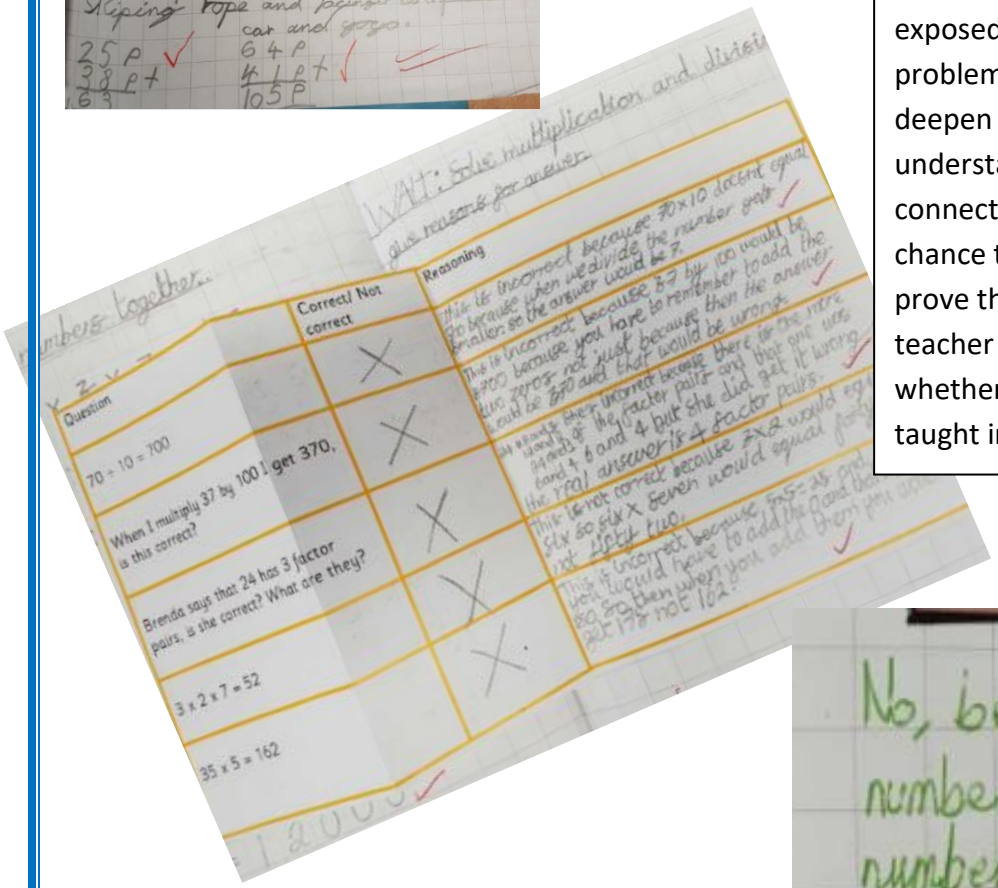
## Opportunities for reasoning and problem solving



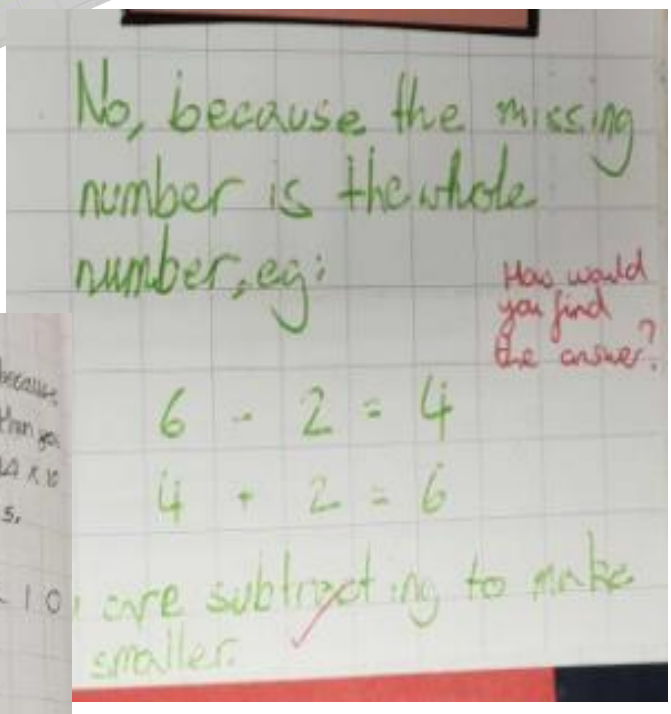



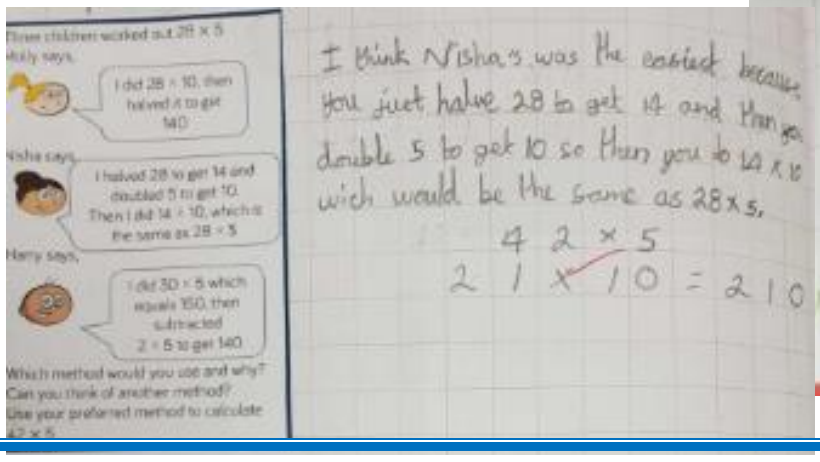
| Question | Correct/ Not correct | Reasoning |
|---|---|---|
| 70 ÷ 10 = 700 | X | This is incorrect because in division 10 does 1, 0 so it will take 1 0 off. |
| When I multiply 37 by 100 I get 370, is this correct? | X | This is incorrect because multiplication is the opposite to division so you add the 2 0's and you get 3700. |
| Brenda says that 47 has 3 factor pairs, is she correct? What are they? | X | This is incorrect because 47 is a prime number. |
| 3 x 4 x 9 = 108 | ✓ | This is correct because 3 x 4 = 12 and 12 x 9 = 108 |
| Grace answered the question 35 x 3, her answer is 9015. Can you explain the mistake she may have made? | X | Grace is wrong because she hasn't added 40 and 15 together |

Throughout the unit the children will be exposed to a range of reasoning and problem solving activities, in order to deepen their knowledge and understanding. This helps children make connections and links and gives them the chance to explain their thinking and prove their answers. This supports teacher assessment and evidences whether children can apply the skills taught independently.



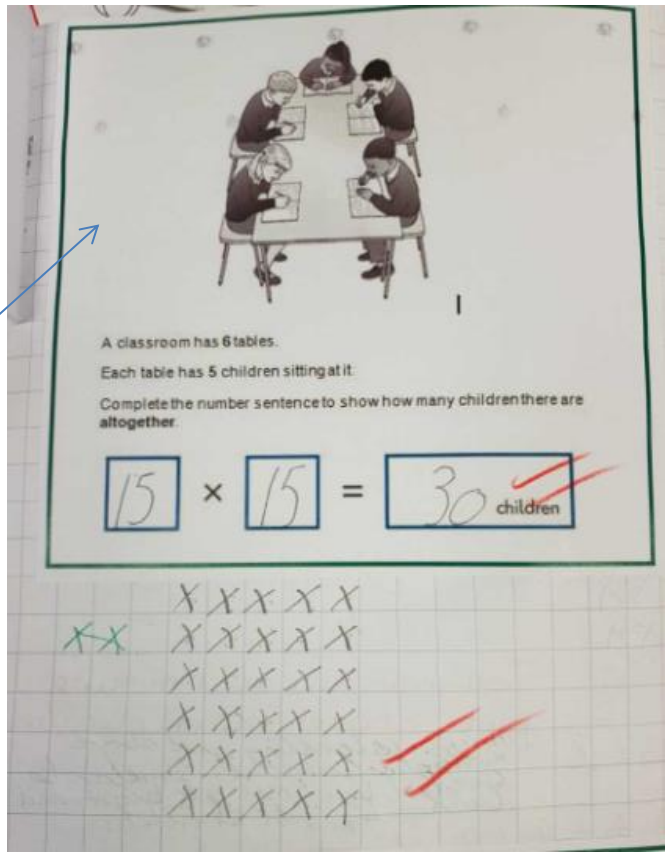
| Question | Correct/ Not correct | Reasoning |
|---|---|---|
| 70 ÷ 10 = 700 | X | This is incorrect because 70 x 10 doesn't equal 70 because when we divide the number gets smaller so the answer would be 7. |
| When I multiply 37 by 100 I get 370, is this correct? | X | This is incorrect because 37 by 100 would be 3700 because you have to remember to add the two zeros, not just because then the answer would be 370 and that would be wrong. |
| Brenda says that 24 has 3 factor pairs, is she correct? What are they? | X | Brenda is wrong because there is one more factor pairs and that one was 6 and 4 but she did get it wrong. The real answer is 4 factor pairs. |
| 3 x 2 x 7 = 52 | X | This is not correct because 2 x 2 would equal 4 not six so six x seven would equal forty two. |
| 35 x 5 = 162 | X | This is incorrect because 5 x 5 = 25 and you would have to add the 2 and the 5 together so 7 then when you add them you get 25 + 7 = 32 not 162. |



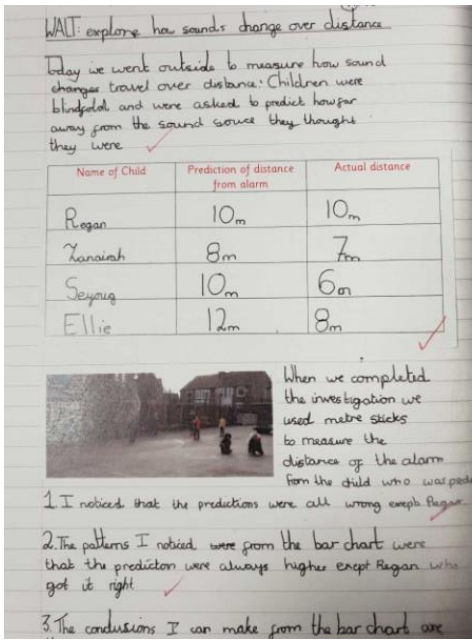



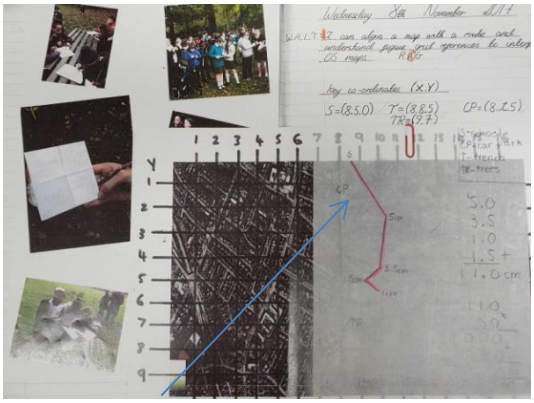
**Testbase to support assessment of Children's knowledge**

This is used regularly throughout each unit. These activities are colour coded (red = wt, Green = Exp, Purple = GD). These are used to assess the children's application of previously taught skills during or at the end of a unit. It is sometimes used to access prior knowledge and children's starting points in order to inform future planning.

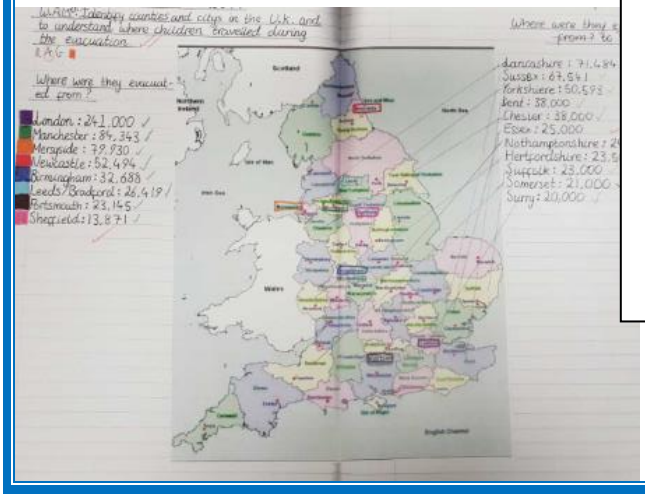


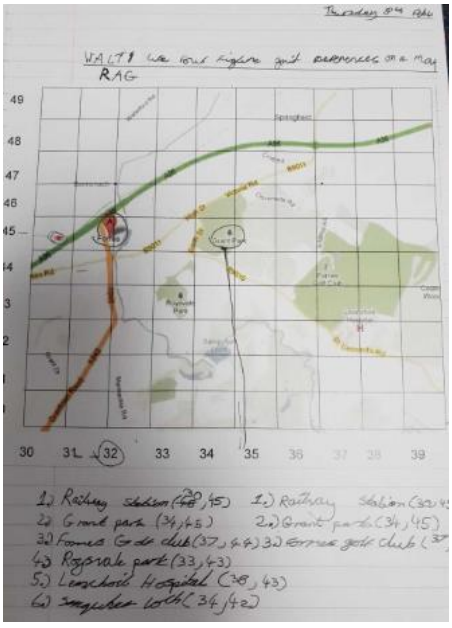

**Cross curricular links**



Skills are then transferred to other curriculum areas such as Topic and Science. This gives children the opportunity to independently apply previously taught skills to a different context, deepening their understanding.



## Outdoor Learning








At the beginning of your unit, when looking through the white rose scheme of work, remember to plan opportunities for outdoor learning. This gives meaning and context to the learning, makes it exciting and it will be something the children will always remember. This can be recorded in books by taking a photograph and the children adding a simple commentary. By planning regular outdoor learning tasks the children will also get to practice key life skills such as turn taking, resilience, problem solving, communicating, critical thinking, creative thinking and working collaboratively. Growth mindset stickers will be used to award these skills.











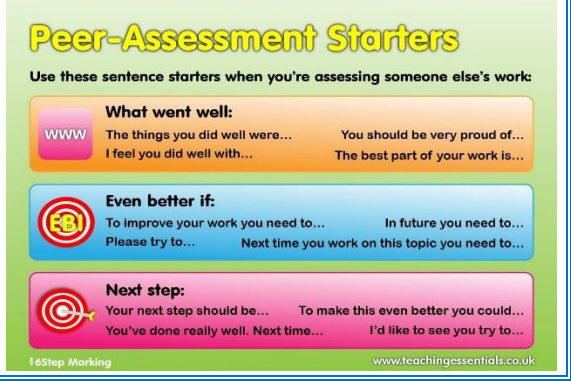




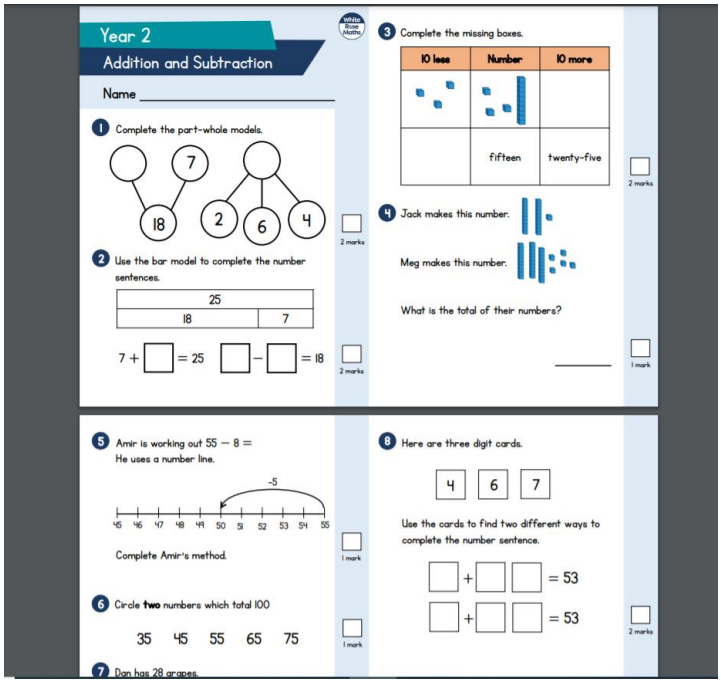


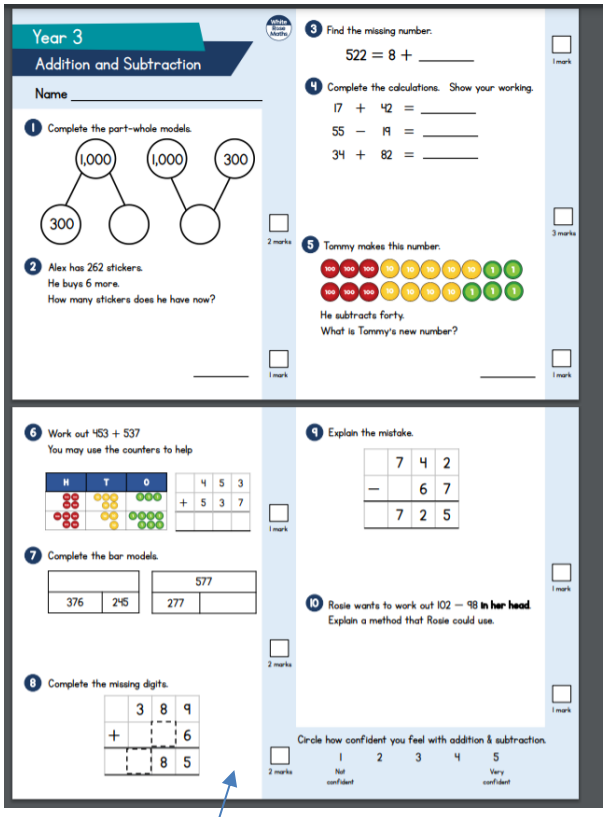
Children will self-assess by using the traffic light system at the end of each piece of work. However, it is essential to also plan opportunities for peer assessment wherever possible. Use success criteria's for their partners to check, get them marking each other's work, suggesting next steps and asking questions. Train the children in being 'Maths Mentors' so they can help correct any misconceptions they find when marking their partners work.

## Self-assessment / Peer assessment / Growth Mindset



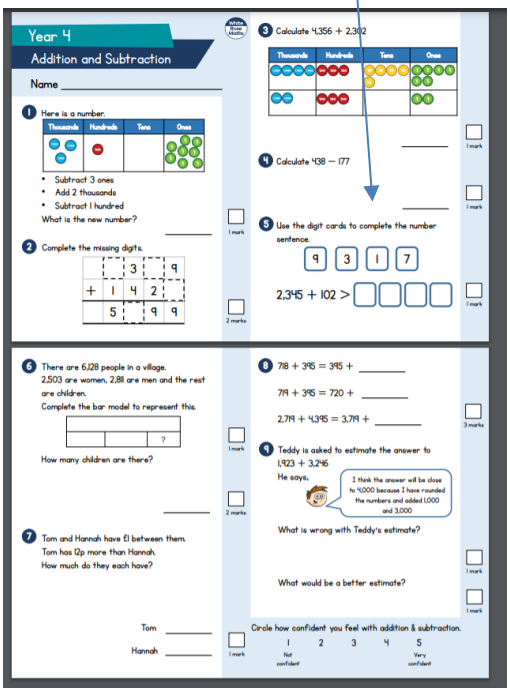
## End of Unit White Rose test

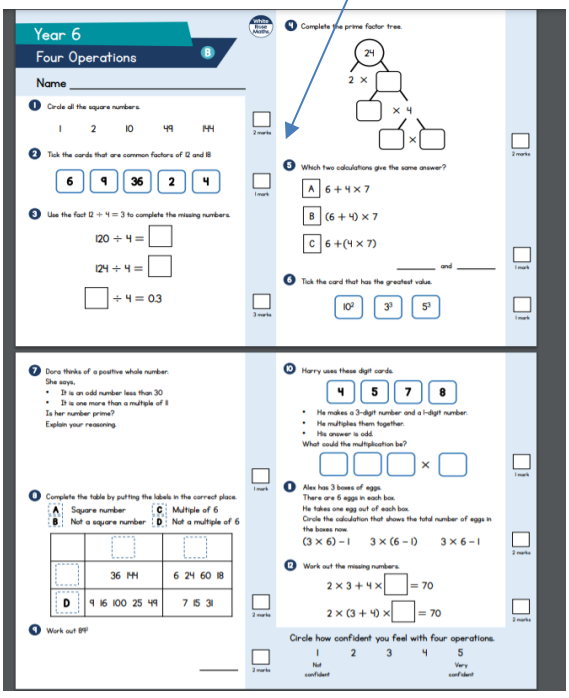



Once the tests have been completed independently at the end of a unit, the rest of the lesson should be spent marking and going through each question; addressing any misconceptions and giving further examples if appropriate. These tests are to be stuck into Maths books at the end of a unit and should show how the child has progressed throughout this unit. Any incorrect answers should be edited in green pen. The end of test mark should be clearly displayed.

These tests will then guide learning support when carrying out any in class interventions, clearly highlighting where the individual needs more support and guidance. These tests will support as evidence when submitting your teacher assessment onto itrack and making an overall judgement.



## Marking

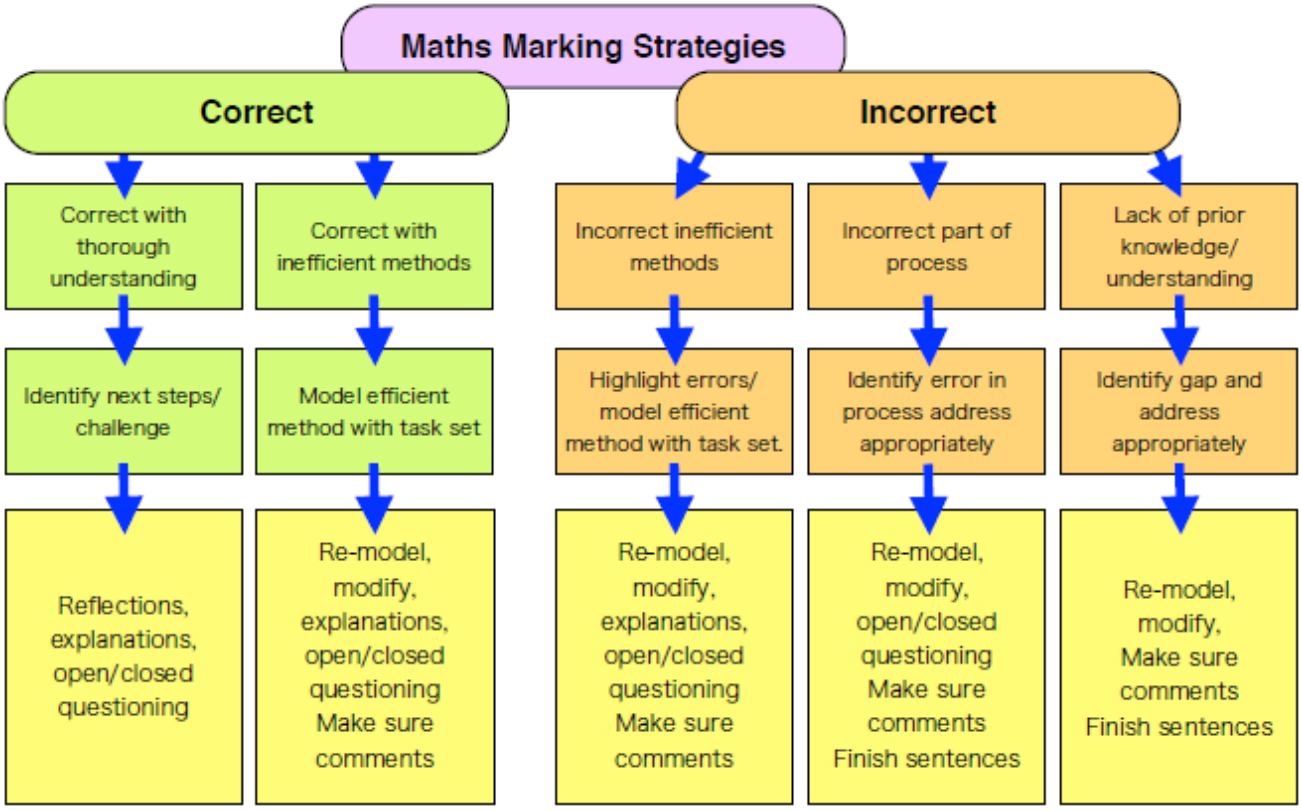
The main priority for Mathematics marking is to ensure the feedback/ next steps support progression and move the children's learning forward. Children are given daily 'fix it' time to ensure they go back through their work and amend any corrections or answer any problems / comments made by the teacher in green pen. Teachers marking in Maths is always in red pen.

**The Principles That Guide the School's Approach to Marking and Feedback**

**Marking and feedback should:**

- ✓ Be manageable for the teaching team and accessible to the children
- ✓ Give recognition and praise for achievement and clear strategies for improvement
- ✓ Relate to the learning intention
- ✓ Involve the whole teaching team working with the children
- ✓ Allow specific time for children to read, reflect and respond to marking
- ✓ Respond to individual learning needs taking opportunities to give verbal feedback where appropriate
- ✓ Inform future planning
- ✓ Ultimately be seen by children as a positive approach to improving their learning

Guidance with effective marking:



***Possible responses might look like this...***

## Explanations

Ask children to explain reasons for mathematical statements

Would a chocolate lover ½ or ⅓ of a bar of chocolate?

What tips would you give someone who is learning to round numbers to the nearest 10?

Explain why a number ending in 3 cannot be a multiple of 4.

Why is 16 a square number?

## Reflections

Ask children to think deeply about their work

Could there be a quicker way to do this?

Do you think that this could work with other numbers?

When could you use this strategy?

Have you thought of all possibilities? Can you be sure?

## Re-Modelling

| If child recorded | Model the correct method |
|---|---|
| 52 - 38 = | 52 - 38 = |
| 50 - 30 = 20 | 52 - 30 = 22 |
| 8 - 2 = 6 | 22 - 8 = 14 |
| 52 -38 = 26 | Now try this one... |

## Closed questions

Provide children with questions that have only one answer

If you start with 93 and count back in 10s what would be the smallest number you would reach on a 100 square.

Put these numbers in order 836, 535, 388, 508. What would the second number be?

I buy three books costing each costing £2.99, How much do I spend to the nearest whole pound?

A 90 minute film starts at 4:15pm at what time will it end?

## Finishing sentences

Provide children with appropriate mathematical sentences to complete

36 can be partitioned into _____ and _____

Two numbers < 200 are _____ and _____

All multiples of 5 end with _____ and _____

Acute angles are_____

A pencil weighs about _____

## Open questions

Provide children with questions that have more than one answer

Tell me 2 three digit numbers with a difference of 26

Give me three division questions with a remainder of 1

What 3 lengths total 1m? ___ + 9 = 3__

## Make sure comments

Provide children with reminders for next time

Make sure you count on from the larger number

Make sure you record one hundred and two as 102 not 1002

## Modifying

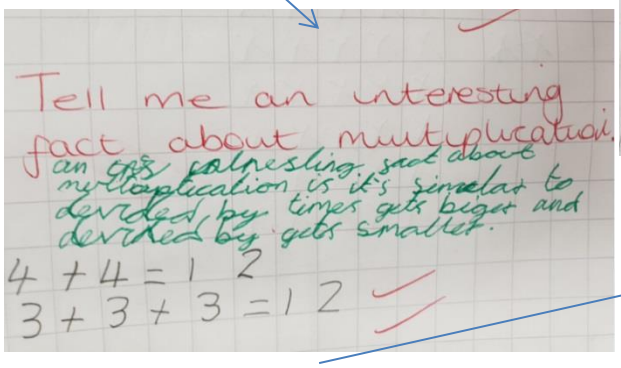
Use comments that challenge the children to look over their own work and processes used.

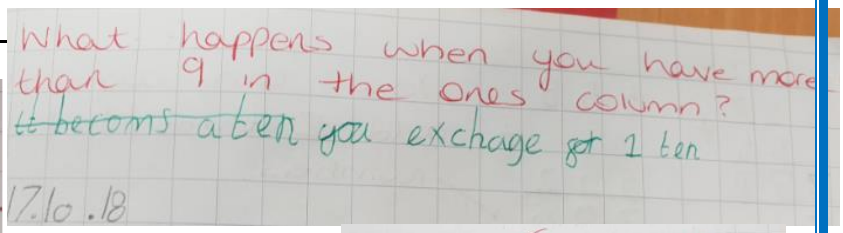
Can you see where you have made your mistake?

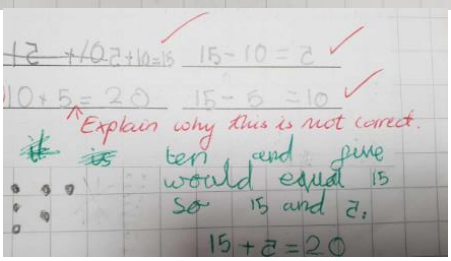
Check your place value in Q5 and correct it.

I calculate the answer to be X, check if I am right.

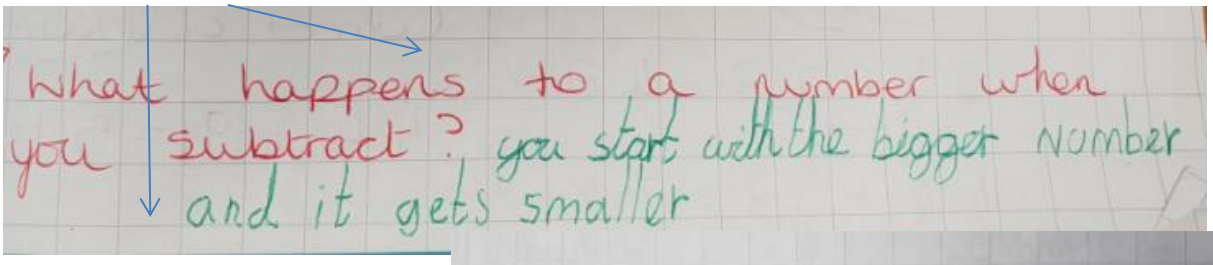
**Reflections**

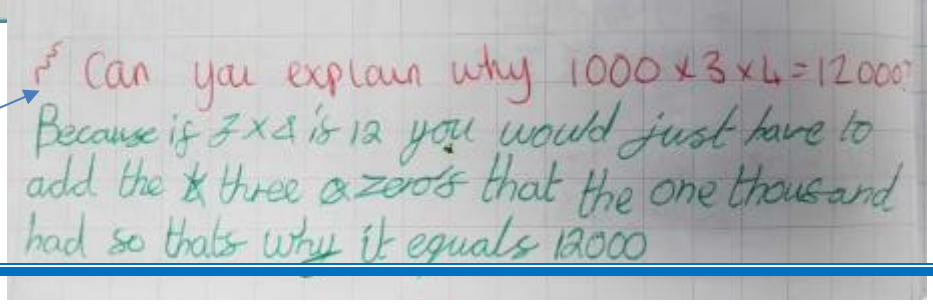


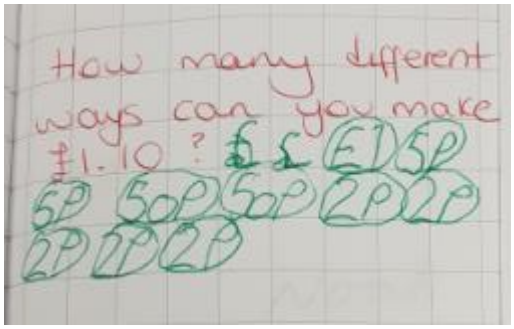



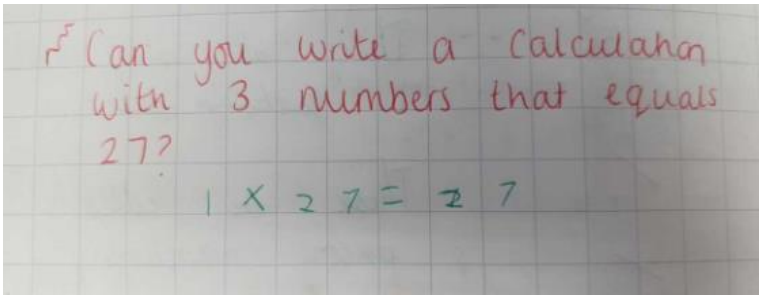

**Explanations**



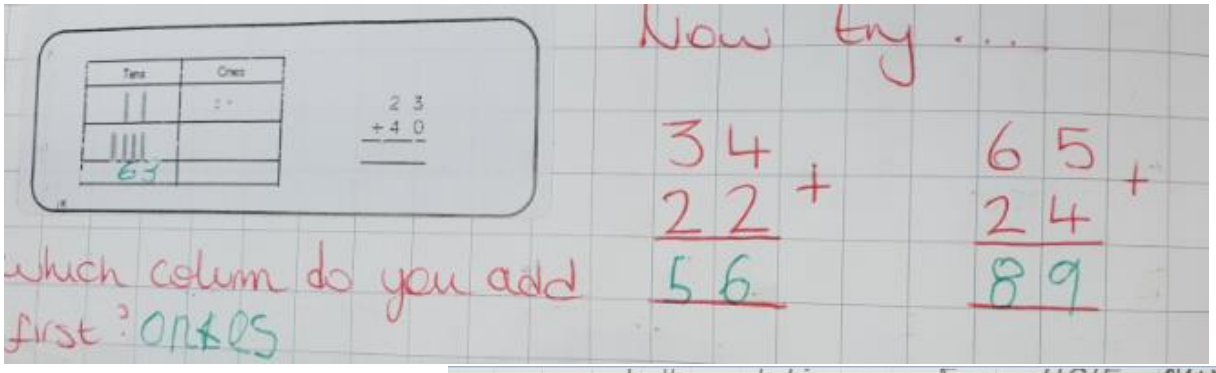



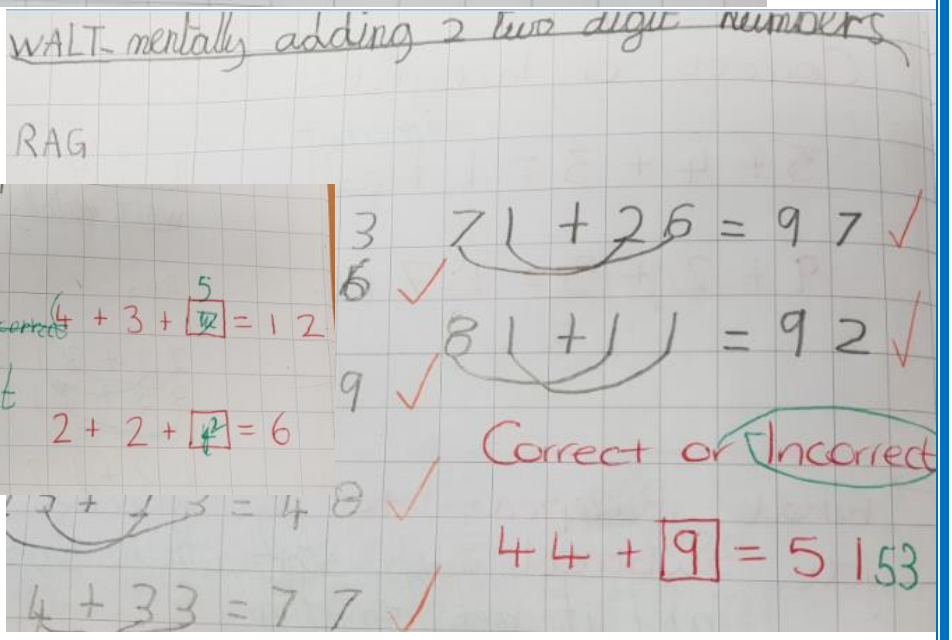
**Open questions**

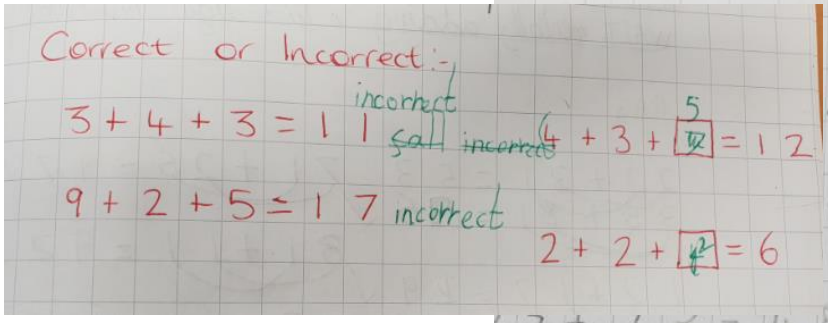


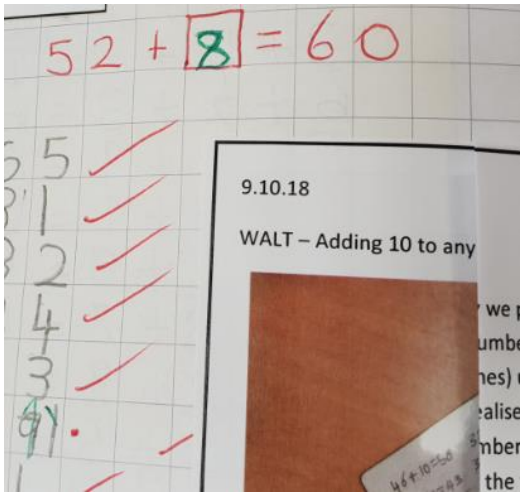

**Closed questions**



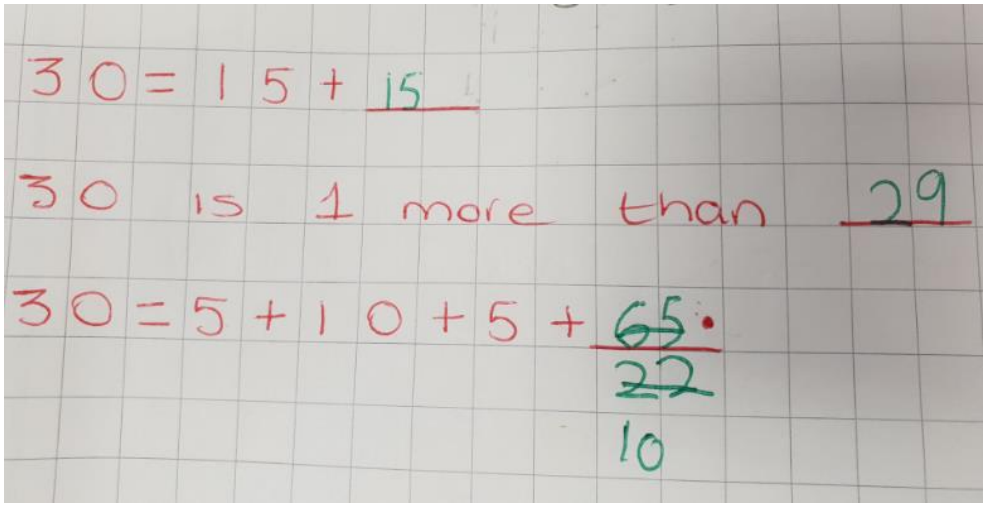



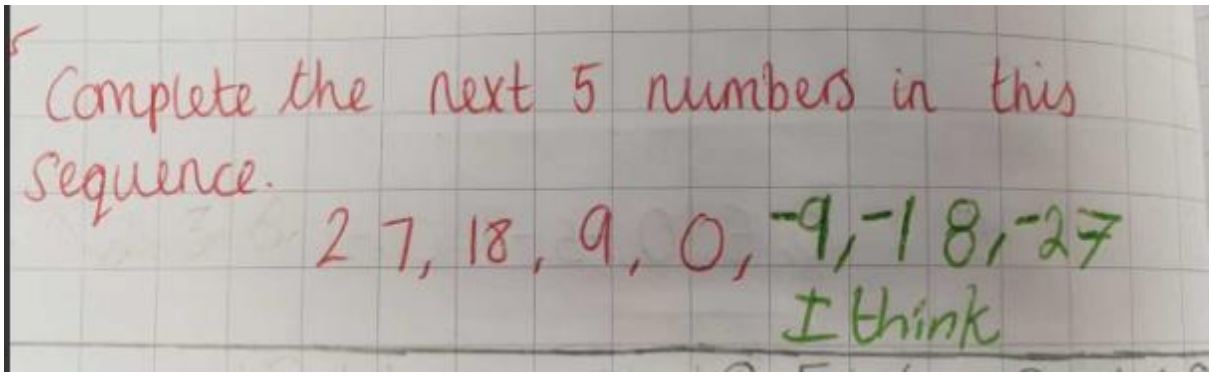




**Remodelling**

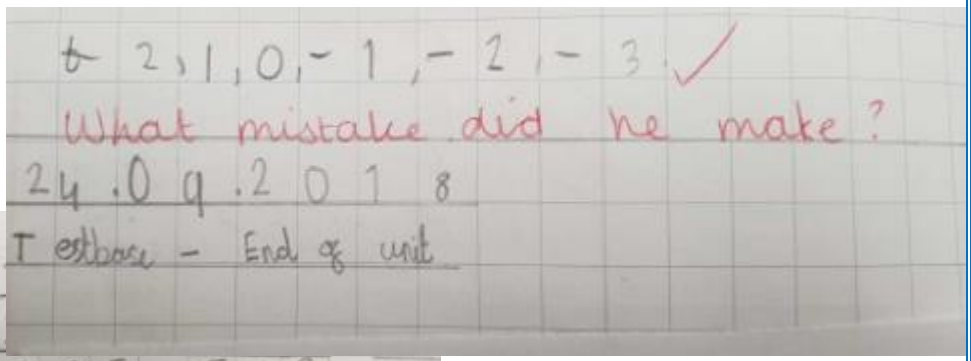


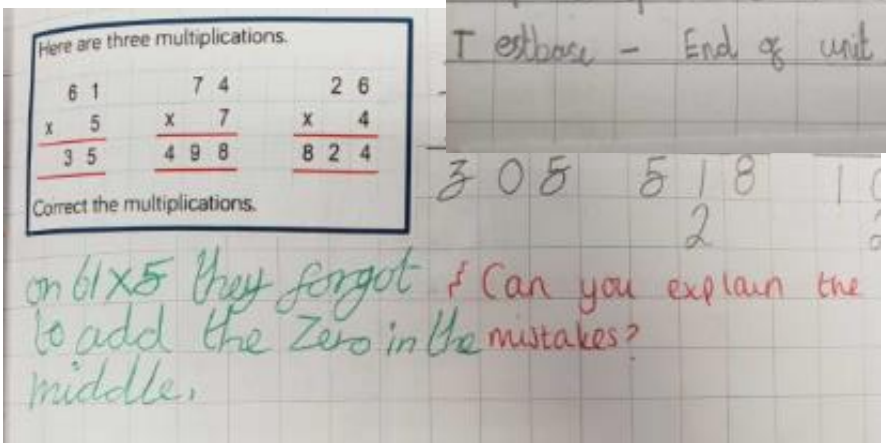
**Finishing Sentences**



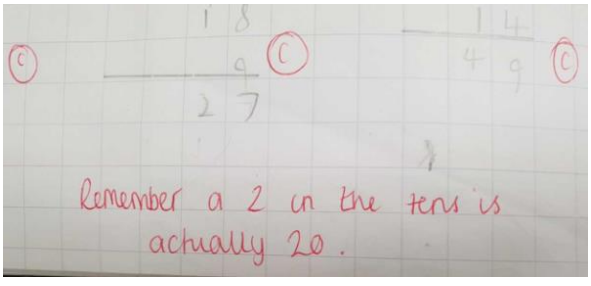




**Modifying**

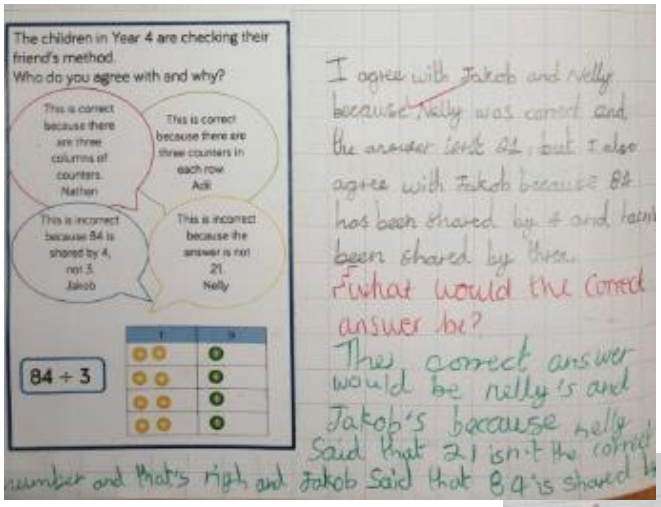


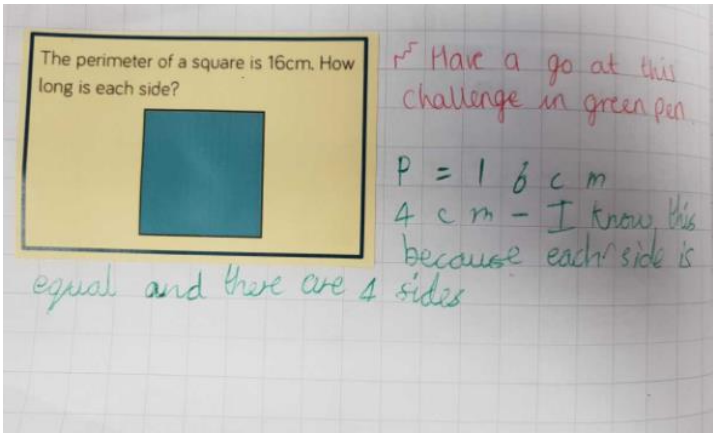



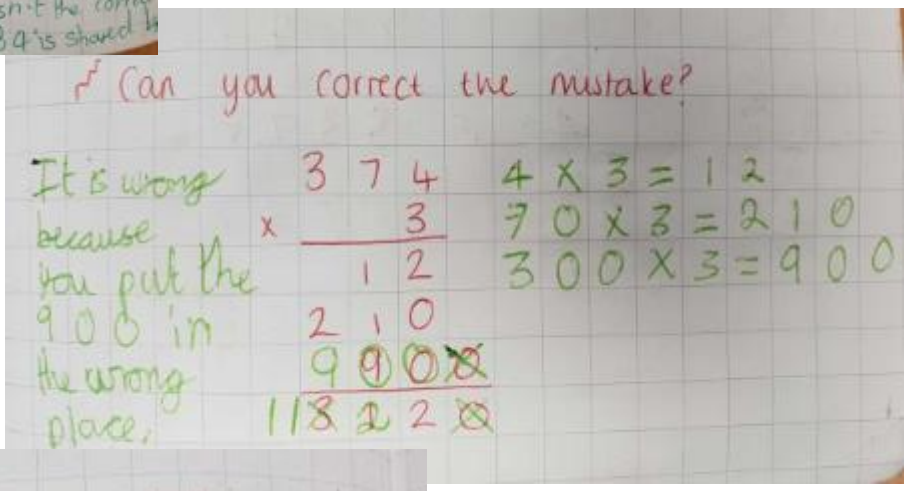

**Make Sure comments**

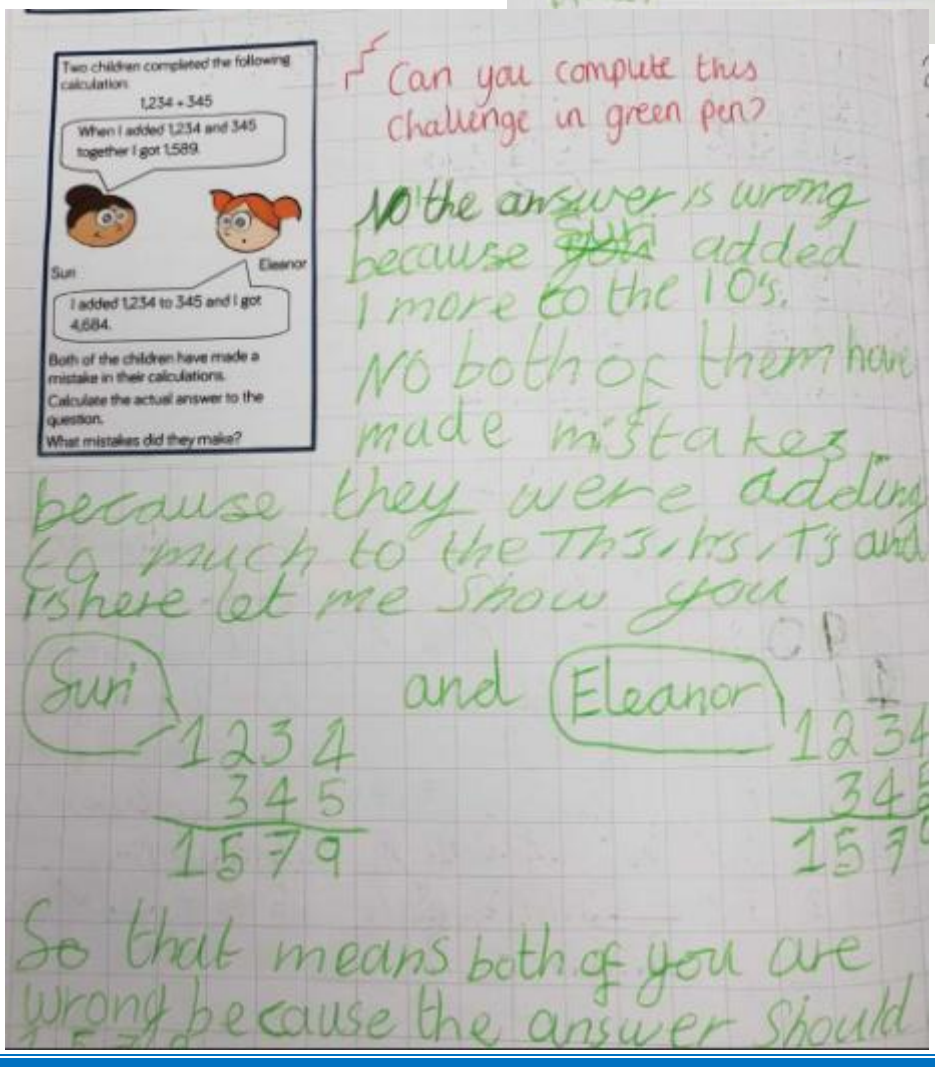


## Next Step challenges to deepen learning



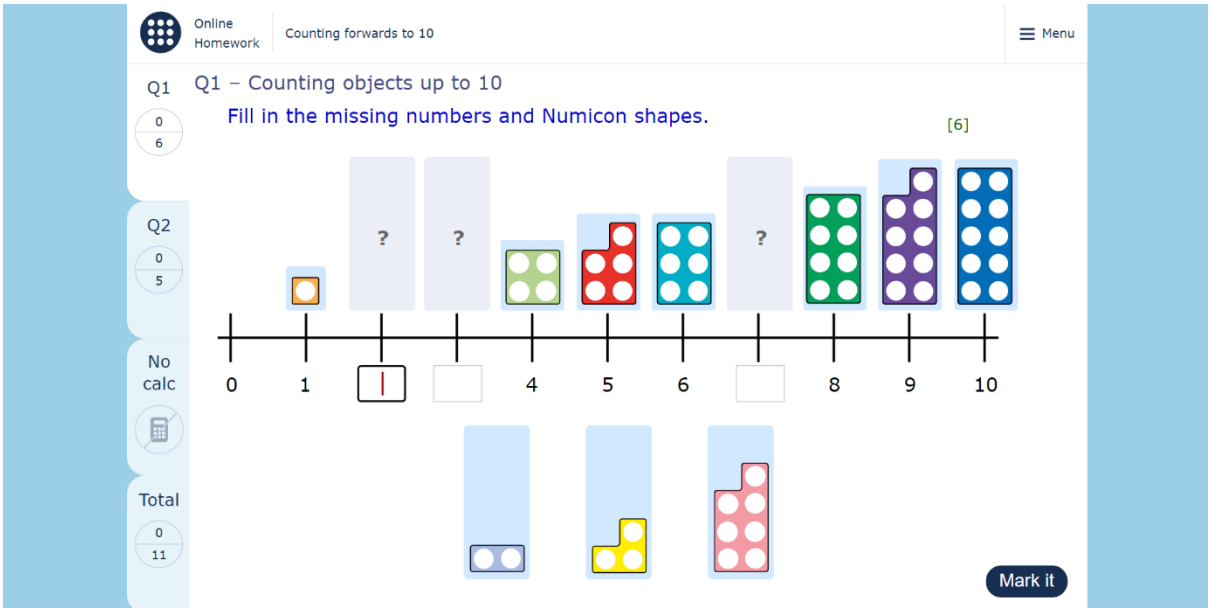



## Homework

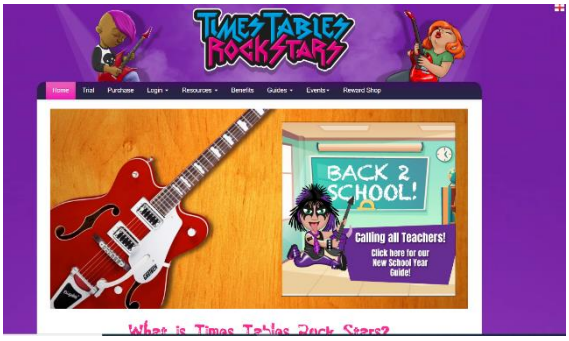
Maths homework is set weekly on MyMaths for years 1-6 and has online tutorials, practice questions and tasks related to each learning objective. The children have their own individual log in and you can check their work that is automatically marked, leave a comment and set another task if appropriate. You can differentiate work and leave a date for completion. The children also have a log in for Timetables Rockstars to practice daily at home and certificates are awarded in our weekly celebration assembly for points scored. The children can play against each other and other schools. The children also have access to Maths seeds to practice key skills and number knowledge.

In the home learning log which is sent out weekly on seesaw, there should be practical Maths activities set that are linked to other subjects where possible. E.g., it could be a cooking activity where children weigh ingredients or they could write a diary entry of what they did during half term, adding in times.

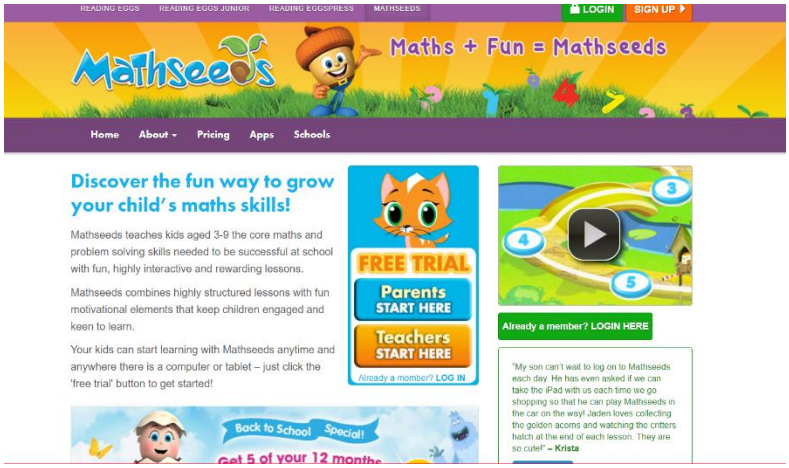
## MyMaths




## Timetables Rockstars



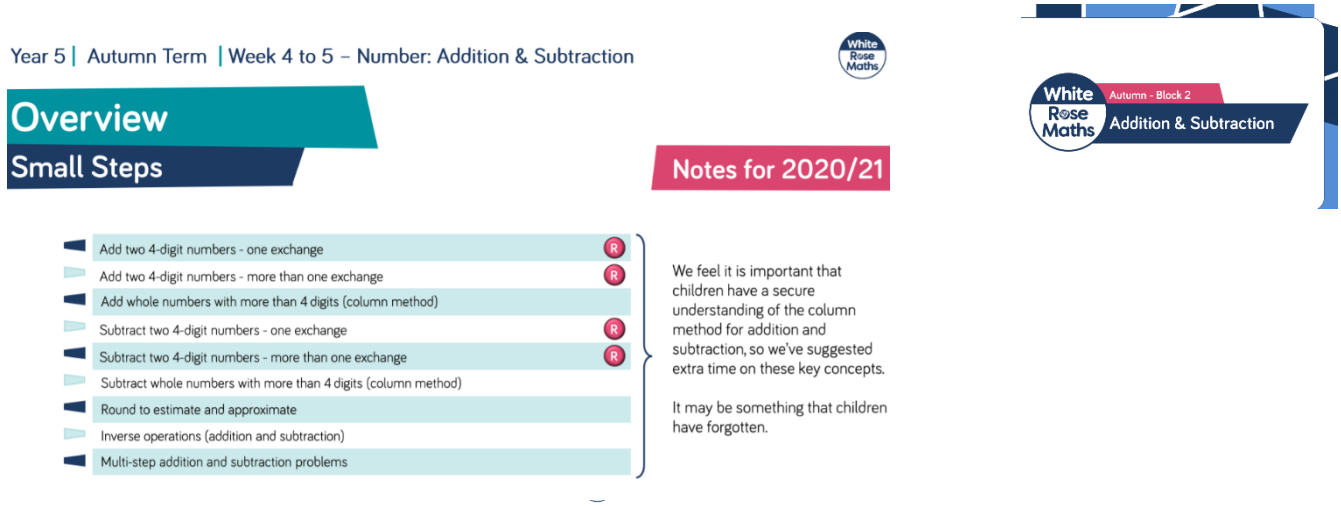

## Mathseeds



# Additional material to support teaching and learning of Mathematics

## White Rose Schemes of Learning

These schemes of learning (SOL) are to be used by class teachers as a planning tool to ensure coverage, clear progression, challenge and opportunities for fluency, reasoning and problem solving. They provide an excellent overview of 'small steps' for each unit, notes and guidance of how to approach each objective and appropriate questions ('Malks talk') to aid discussions. See below for examples.


Year 5 | Autumn Term | Week 4 to 5 – Number: Addition & Subtraction

Overview

Small Steps

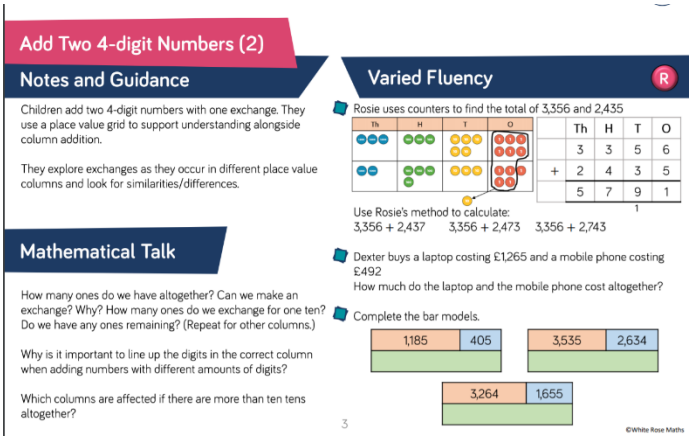
Notes for 2020/21

White Rose Maths – Autumn - Block 2 – Addition & Subtraction

- Add two 4-digit numbers - one exchange (R)
- Add two 4-digit numbers - more than one exchange (R)
- Add whole numbers with more than 4 digits (column method)
- Subtract two 4-digit numbers - one exchange (R)
- Subtract two 4-digit numbers - more than one exchange (R)
- Subtract whole numbers with more than 4 digits (column method)
- Round to estimate and approximate
- Inverse operations (addition and subtraction)
- Multi-step addition and subtraction problems

We feel it is important that children have a secure understanding of the column method for addition and subtraction, so we've suggested extra time on these key concepts.

It may be something that children have forgotten.


Add Two 4-digit Numbers (2)

Notes and Guidance

Children add two 4-digit numbers with one exchange. They use a place value grid to support understanding alongside column addition.

They explore exchanges as they occur in different place value columns and look for similarities/differences.

Mathematical Talk

How many ones do we have altogether? Can we make an exchange? Why? How many ones do we exchange for one ten? Do we have any ones remaining? (Repeat for other columns.)

Why is it important to line up the digits in the correct column when adding numbers with different amounts of digits?

Which columns are affected if there are more than ten tens altogether?

Varied Fluency (R)

Rosie uses counters to find the total of 3,356 and 2,435

| | Th | H | T | O |
|---|---|---|---|---|
| | 3 | 3 | 5 | 6 |
| + | 2 | 4 | 3 | 5 |
| | 5 | 7 | 9 | 1 |
| | | 1 | | |

Use Rosie's method to calculate:
3,356 + 2,437 3,356 + 2,473 3,356 + 2,743

Dexter buys a laptop costing £1,265 and a mobile phone costing £492
How much do the laptop and the mobile phone cost altogether?

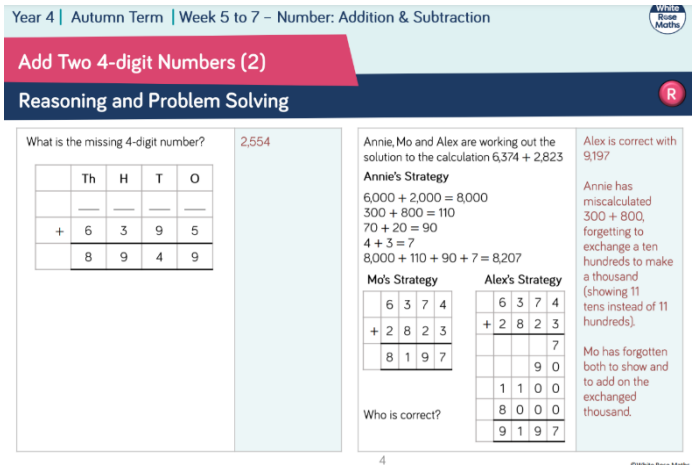
Complete the bar models.

1,185 | 405

3,535 | 2,634

3,264 | 1,655

3


Year 4 | Autumn Term | Week 5 to 7 – Number: Addition & Subtraction

Add Two 4-digit Numbers (2)

Reasoning and Problem Solving (R)

What is the missing 4-digit number?

| | Th | H | T | O |
|---|---|---|---|---|
| | ___ | ___ | ___ | ___ |
| + | 6 | 3 | 9 | 5 |
| | 8 | 9 | 4 | 9 |

2,554

Annie, Mo and Alex are working out the solution to the calculation 6,374 + 2,823

Annie's Strategy

6,000 + 2,000 = 8,000
300 + 800 = 110
70 + 20 = 90
4 + 3 = 7
8,000 + 110 + 90 + 7 = 8,207

Mo's Strategy

| | | | | |
|---|---|---|---|---|
| | 6 | 3 | 7 | 4 |
| + | 2 | 8 | 2 | 3 |
| | 8 | 1 | 9 | 7 |

Alex's Strategy

| | | | | |
|---|---|---|---|---|
| | 6 | 3 | 7 | 4 |
| + | 2 | 8 | 2 | 3 |
| | | | | 7 |
| | | | 9 | 0 |
| | 1 | 1 | 0 | 0 |
| | 8 | 0 | 0 | 0 |
| | 9 | 1 | 9 | 7 |

Who is correct?

Alex is correct with 9,197

Annie has miscalculated 300 + 800, forgetting to exchange a ten hundreds to make a thousand (showing 11 tens instead of 11 hundreds).

Mo has forgotten both to show and to add on the exchanged thousand.

4

## Power Maths

Power Maths is a resource we have bought into that supports the use of White Rose Schemes of Learning and provides a whole-class mastery programme that fits alongside these Schemes. Power Maths is designed to spark curiosity and excitement and help nurture confidence in Maths. It is recommended by the DfE, having met the NCETM's criteria for high-quality textbooks, and have been judged as "fully delivering a mastery approach".

Discover | Share | Think Together | Practice | Reflect

## Discover

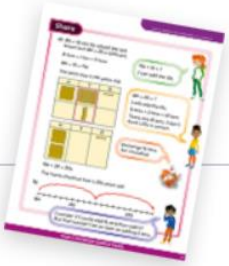
Every lesson starts with a Discover task to get children to solve a problem that aims to generate curiosity. During the Discover section children may use manipulatives to help them understand the maths and explain their method.



Discover | Share | Think Together | Practice | Reflect

## Share

The next stage encourages children to Share the methods they have tried to solve the problem in Discover.



Discover | Share | Think Together | Practice | Reflect

## Think Together

We only learn when we are thinking! In this section Power Maths takes the approach "I do, we do, you do", as children apply the knowledge they have just learned in a series of problems that continue to encourage thinking throughout.

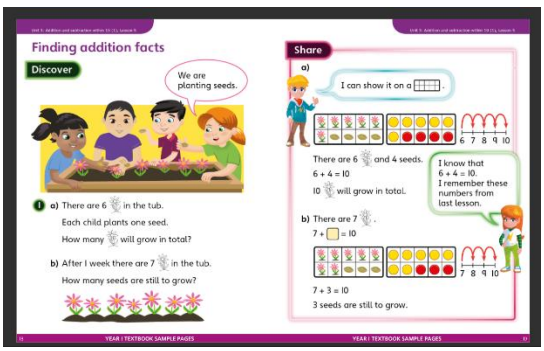


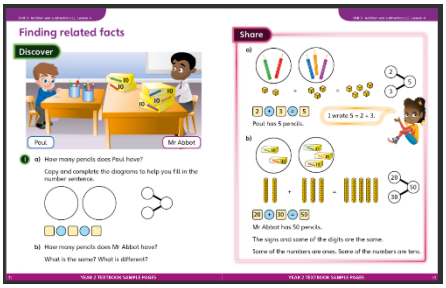
Discover | Share | Think Together | Practice | Reflect

## Practice

Children are then ready for some independent Practice.





## NCETM Spines

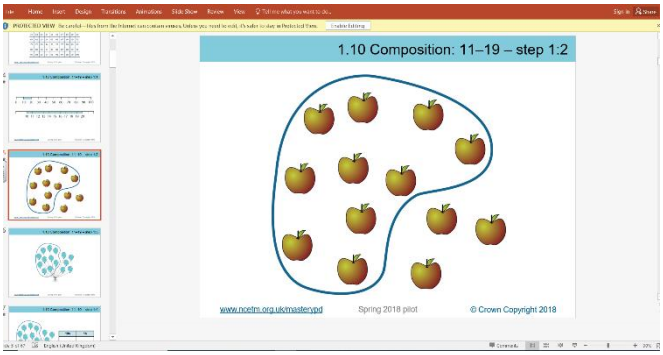
https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/

NCETM spines is a free resource that supports the teaching of Mathematics in school. The spines have been developed with a detailed teacher guide for each unit, including images and text. The images are also presented as animated PowerPoint slides, which further enhance teacher knowledge and can be used in the classroom.

These materials are not, in any way, lesson plans, but they can be used in conjunction with White Rose to support planning. For some segments, there's also an introductory video summing up what each segment covers.

"Your subject knowledge is key to successful teaching for mastery, as well as your understanding of the learning steps required, and the order of those steps. We have designed these materials with this in mind. They will assist you in your professional development and enable you to deliver teaching for mastery with confidence."

Please see below some examples….




PDF

1.9 Composition of numbers: 20–100

Teacher guide | Year 1

**Teaching point 1:**
There is a set counting sequence for counting to 100 and beyond.

**Teaching point 2:**
Objects can be counted efficiently by making groups of ten. The digits in the numbers 20–99 tell us about their value.

**Teaching point 3:**
Each number on the 0–100 number line has a unique position.

**Teaching point 4:**
The relative size of two two-digit numbers can be determined by first examining the tens digits and then, if necessary, examining the ones digits, with reference to the cardinal or ordinal value of the numbers.

**Teaching point 5:**
Each two-digit number can be partitioned into a tens part and a ones part.

**Teaching point 6:**
The tens and ones structure of two-digit numbers can be used to support additive calculation.

**Overview of learning**

In this segment children will:

- learn how to count to 100 and beyond, by making use of the pattern and structure of our number naming
- count collections of objects efficiently by making groups of ten
- represent numbers from 20–100 using base-ten equipment (for example, Dienes or straws), numerals and number names
- explore the position of two-digit numbers in the number system – identifying the previous and next multiple of ten, placing them on a number line, and making links to measures
- compare the size of two-digit numbers
- use their understanding of the structure of two-digit numbers to partition them into tens and ones
- apply partitioning into tens and ones to calculations such as $20 + 3 = 23$ and $64 - 4 = 60$.

**Teaching point 1:**
There is a set counting sequence for counting to 100 and beyond.

Steps in learning

| | Guidance | Representations |
|---|---|---|
| 1:1 | Provide children with practice counting to 100, and beyond, before beginning the detailed examination of the numbers 20–100 in *Teaching point 2*.<br>It is likely that children will already have experienced counting within 100 in several ways:<br>• You may have practised ordinal counting (oral counting with no object reference), with the whole class practising saying the sequence of number names – *'One, two, three…'* – possibly up as far as 100 or even beyond. In this type of practice children get used to the sound of the number names, and the pattern in which one follows the next.<br>• In other contexts, you may have used the counting sequence to enumerate a quantity of objects (with the focus on cardinality) – for example, to count the number of children, or pieces of equipment. In this type of counting children get used to linking number names with quantities.<br>• You may also have practised counting whilst pointing to numbers written in digits (for example, on a hundred square, number line or Gattegno chart). Here children get used to linking number names with the digits that represent them.<br>Note that each type of counting is reinforcing a different type of number knowledge. Before and during the segment, practise each type of counting. Classroom routines often provide useful contexts for the first two types described above; for example: | Hundred square:<br>1 2 3 4 5 6 7 8 9 10<br>11 12 13 14 15 16 17 18 19 20<br>21 22 23 24 25 26 27 28 29 30<br>31 32 33 34 35 36 37 38 39 40<br>41 42 43 44 45 46 47 48 49 50<br>51 52 53 54 55 56 57 58 59 60<br>61 62 63 64 65 66 67 68 69 70<br>71 72 73 74 75 76 77 78 79 80<br>81 82 83 84 85 86 87 88 89 90<br>91 92 93 94 95 96 97 98 99 100<br><br>Gattegno chart:<br>1000 2000 3000 4000 5000 6000 7000 8000 9000<br>100 200 300 400 500 600 700 800 900<br>10 20 30 40 50 60 70 80 90<br>1 2 3 4 5 6 7 8 9 |

**Journey through a unit checklist for Teachers**

| What a unit must include | Is there evidence in books? | Comments |
|---|---|---|
| Unit RAG Cover sheets filled in (incl prior knowledge and key vocab box) | | |
| Discussion day mind map | | |
| WALTS – traffic light to show self-assessment | | |
| Differentiation using red, amber, green colours and children circling RAG | | |
| Fluency, Reasoning and Problem Solving activities | | |
| Testbase questions | | |
| Outdoor learning opportunities | | |
| Cross curricular links in Science/ Topic | | |
| Self and peer assessment | | |
| Links to growth mindset (stickers) | | |
| Different marking strategies e.g. open questions, remodelling, explanations, finishing sentences etc. | | |
| Children responding to marking/comments in green pen | | |
| End of unit white rose test, marked and edited | | |