



Year 2
Mathematics and
Science
Autumn Term
2020

**A collection of learning
from our classrooms**

As part of our Year 2 Mathematics and Science training this autumn term, we asked schools attending to engage with a gap task between sessions. This is the outcome.

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Our year group training days for 2020-2021 have been adapted both in format and content to reflect the current educational needs in response to COVID-19 (including the summer 2020 lockdown and subsequent blended learning approach being adopted by schools).

We broke our traditional training day into four sessions: two mathematics and two English sessions. Participants attended their first mathematics and English in Autumn 1 and then attended the second session in Autumn 2. Participants were encouraged to engage in a gap task focused on applying the CPD delivered and its impact. The training was delivered online.

This report shares our findings and approaches to addressing the gaps in learning for Mathematics and Science in Year 2. The overarching aim is achieving equity in education for all. In Autumn 2020 it was important to identify what was missed learning; where the gap was between where a cohort should be and where it was due to missed learning and where gaps had arisen due to conceptual understanding.

The overall aims for the session 1 were:

- Understanding where to begin in order to plan effectively for your pupils
- Growing familiarity with the Year 2 National Curriculum requirements for Mathematics
- Raise awareness of the DfE Mathematics Guidance June 2020 and how it can support teaching and learning 2020-21
- Exploring what 'on-track' looks like for end of Autumn, Spring and Summer Terms
- Developing planning to meet the expectations of the year group through active engagement and meaningful learning experiences

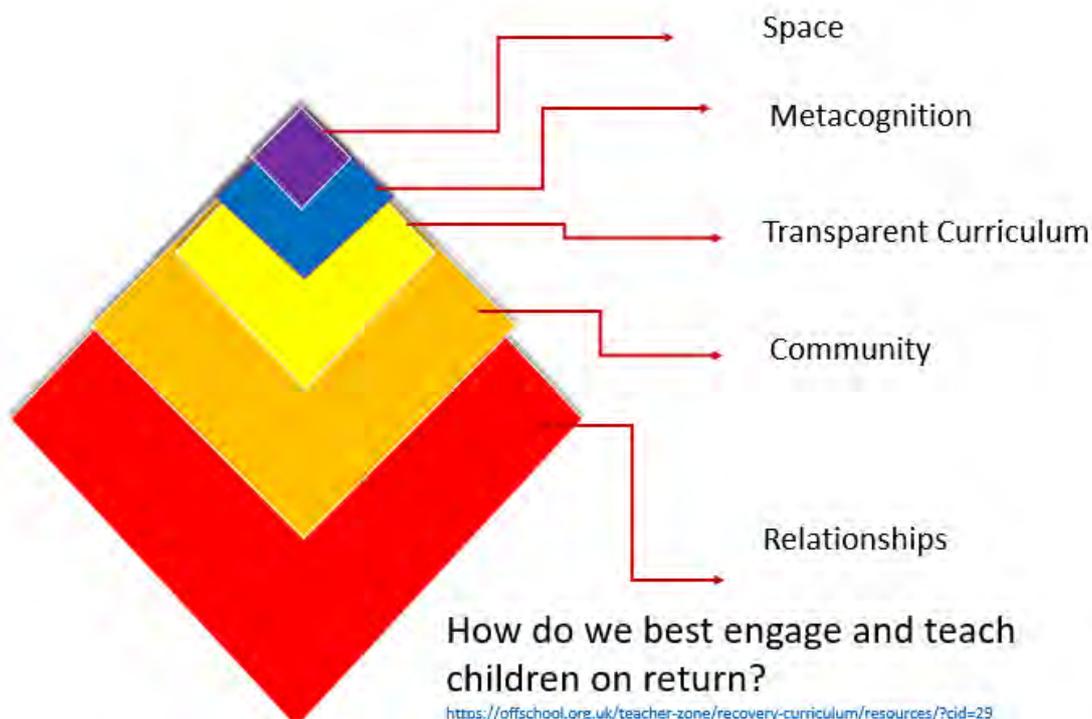
The key messages explored in session 1, which also formed the focus of the gap task were:

- The unique child and their journey so far
- Transition from Year 1 to Year 2 -different curriculums
- Assessment for Learning
- Lesson structure. Using Rosenshine's principles of instruction from theory to practice to close the gaps

Concerns

- Anxious about the gaps, how do we close them?? Are there commercial schemes? How effective are they?
- Children sluggish and tired. Not as resilient as before. Stamina needs to be increased
- How do we catch up?
- Where to begin?
- If bubbles /classes burst how do we cope?
- What about staff being ill- impact on learning
- How do we re-engage with the children? Activate the positive mind-sets
- How do we use manipulatives every day put stop the spread of C-19
- Deficit in language, big regression.
- Parents very demanding/ some are very grateful
- Reasoning and Problem Solving needs to be activated and embedded
- Mental and oral strategies are sluggish
- SATs - how will we get through the content?
- Lots of time given over to wellbeing and phonics
- A lot of maths strands in Year 1 are covered in Summer Term –Fractions/ Decimals. There are big strands in Year 2
- DfE Guidance should we be using it?
- Will Ofsted be expecting the DfE guidance to be in place
- Amount of time spent washing hands and phonics
- Not every child engaged in the remote/home school learning
- How will we close the mathematical language gap? How do we close the gaps?
- Gaps have widened
- Interventions-When, How, Who!

The recovery Curriculum= Barry Carpenter



Mathematical Wellbeing

“What we have taken into account first and foremost, is children’s mathematical well-being for future learning. In other words, what matters most-

- Building children’s confidence
- Their willingness to have a go
- Their mathematical self-esteem and enjoyment
- Establishing firm relationships with the adults in school and with their families

Identifying the gaps- What are the barriers children face?

- **Difficulties with numerosity – understanding how many**
- **Difficulties using words – grammar and sense making**
 - Communication, hearing and articulation
 - Difficulties with attention and listening
 - Memory
 - Sequencing difficulties
 - Motoric aspects of counting (direction, movement, counting of objects....)
 - Attitude (anxiety, passivity etc....)

First Steps

- The most important aspect when the children returned to Year 1 was that routines, safety and well-being were addressed.
- Children would not learn if they were anxious and stressed.
- Initially children struggled with sustained learning and it would have to be in bitesize pieces, which were engaging and within their ability. It was felt it was not the time to stretch and challenge the children (Unless they are ready for it).
- Nor was it time to use summative assessments. As Dylan Wiliam has stated now is the time for assessment **for** learning not assessment **of** learning.
- So timetables needed adapting, and schools will have to be led by the children in their care. Schools will need to respond to need. Some schools had 2 x 30 minutes sessions, others had a 45 minute session and then a 30 minute session in the afternoon

So what needed to happen?

Assessment **for** Learning

- Low threshold, high ceiling activities (LTHC)
- Pre-teach to find starting points
- Plan for common errors and misconceptions
- Track errors in the moment
- Be systematic and observant in checking responses- table by table, row by row
- Instant feedback
- Note errors
- Timely intervention - who needs additional support?
- Same day keep up – when and who?
- Motoric aspects of counting (direction, movement, counting of objects....)
- Attitude (anxiety, passivity etc....)

EEF - A tiered approach to 2020 –21 academic year planning

High-quality assessment is essential to great teaching, helping us understand what pupils have (or have not) learned. Targeted diagnostic assessments can support teachers to monitor pupils’ progress, particularly as they re-establish classroom routines and recover any learning loss.

It will be important to differentiate between learning that has been forgotten due to extended absence from the classroom and material that hasn't been learnt properly. Effective diagnostic assessments are therefore rooted in classroom practice.

Missed Learning

Whatever long term plan schools were using in 2019-20, it will be worth checking what the missed learning was in Year 1. If schools were following White Rose Multiplication and division, Fractions, Geometry-Position and Direction, Money and Time can be regarded as missed learning. Schools will need to plan a Year 2 curriculum which addresses these shortfalls.

Year 1 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value (within 10)			Number: Addition and Subtraction (within 10)				Geometry: Shape	Number: Place Value (within 20)		Consolidation	
Spring	Number: Addition and Subtraction (within 20)			Number: Place Value (within 50) (Multiples of 2, 5 and 10 to be included)			Measurement: Length and Height		Measurement: Weight and Volume		Consolidation	
Summer	Number: Multiplication and Division (Reinforce multiples of 2, 5 and 10 to be included)		Number: Fractions		Geometry: position and direction	Number: Place Value (within 100)		Measurement : money	Time		Consolidation	

When we feel children are ready to learn what support is there?

We need to consider a range of possibilities:

- teaching and learning- whole class, blended, complete distance
- Teaching and learning being led by teachers, support staff, family and individually/ no support
- What access families have to technology
- What prior learning had taken place, if any?

In June 2020 the DfE issued their Mathematical Guidance.

<https://www.gov.uk/government/publications/teaching-mathematics-in-primary-schools>

A survey of teachers attending the course suggested that some had to still engage fully with the recommendations

Engagement with DfE Guidance June 2020



Vast majority of responses – I haven't heard of it with a few voting 'heard of it' and 'heard and read'. With a small minority embedding in planning as directed by subject leads

THEP strongly recommended that schools engaged fully and whilst the guidance is not statutory it is excellent. Clear guidance is provided to support key core mathematical concepts which need to be taught and understood so that children can progress successfully in their mathematical journey. It supports teachers planning and teaching when identifying missed learning and the pedagogy required to ensure children make progress. THEP shared a document to support teachers accessing it and other relevant support.

Planning Support

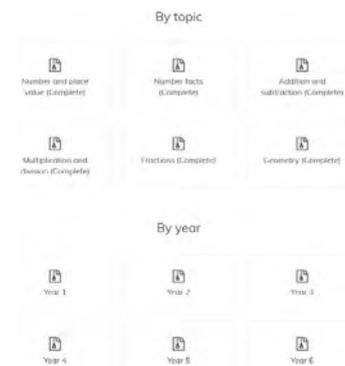
Familiarise yourself with the DfE Maths Guidance Introduction

- Download <https://www.gov.uk/government/publications/teaching-mathematics-in-primary-schools>
 - Watch the videos
 - Introduction <https://www.youtube.com/playlist?list=PL6gGtLyXoeq-FMWk00AlclPo3fhGmi03D> This explains the structure of the guidance
 - The year group relevant to your cohort. This will explain
 - ❖ Representations (and manipulatives) /teacher guidance
 - ❖ Language
 - ❖ Connections
 - ❖ Assessment
 - ❖ Calculation and Fluency
- Year 1 <https://www.youtube.com/watch?v=GZQC0duYGKk&list=PL6gGtLyXoeq-FMWk00AlclPo3fhGmi03D&index=2>

Identify the strand to be taught eg Place Value on the Ready To Progress (RTP) Grid and click the blue hyperlink which will take you to the specific guidance for your year group eg **1NPV1** for that strand.

The NCETM have produced a set of PPTs which supports your maths pedagogy <https://www.ncetm.org.uk/classroom-resources/exemplification-of-ready-to-progress-criteria/>

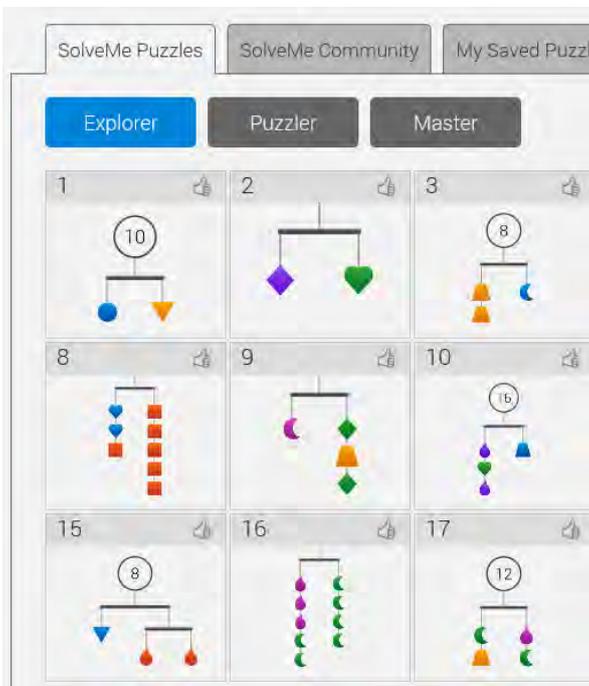
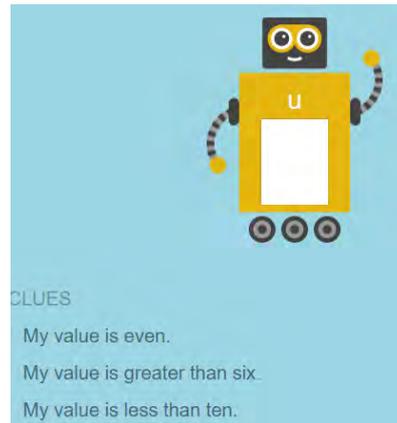
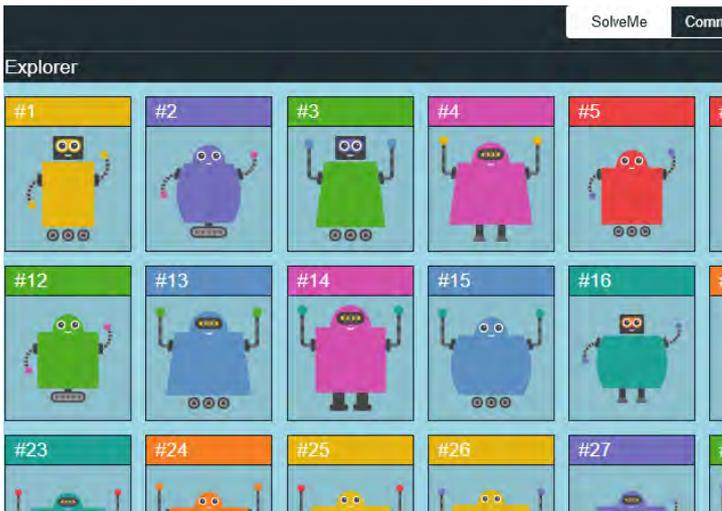
This link opens up into a series of specific ppt. You can search according to Year group which will allow you unpick all the learning for your year of you can search by topic which will allow you unpick the prior learning from previous years as well as the learning which belongs to your year group.



Once you are secure with the pedagogy you may wish to explore the series of videos which NCETM produced <https://www.ncetm.org.uk/in-the-classroom/support-for-schools-addressing-ongoing-coronavirus-impact/primary-video-lessons/>

Or the videos produced by White Rose <https://resources.whiterosemaths.com/resources/>

Low Threshold High Ceiling (LTHC) Tasks
 Solve me <https://solveme.edc.org/whoami/>



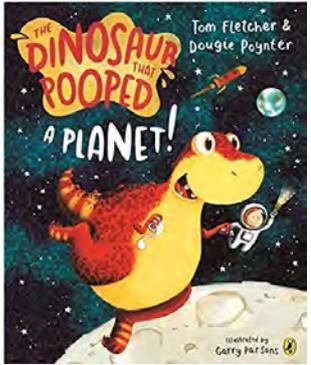
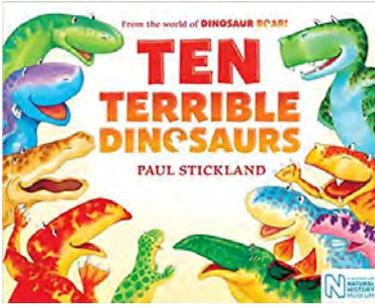
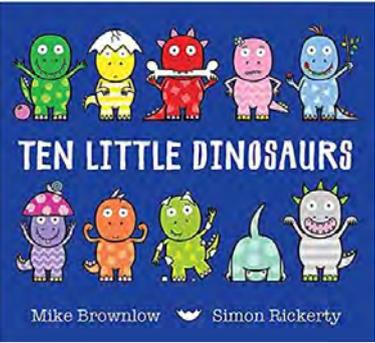
♥ = □ ■ = 3

Mathematics from fiction books



Tower Hamlets Education Partnership
IMPROVING SCHOOLS TOGETHER

Year 2 staff reported that following children's interests that had mathematics possibilities was a key way to re-engage pupils. Dinosaurs are always popular!



Talking together
Guess my rule

Look at the following dinosaurs features. Why might some have been picked out to make a set? What is the rule?

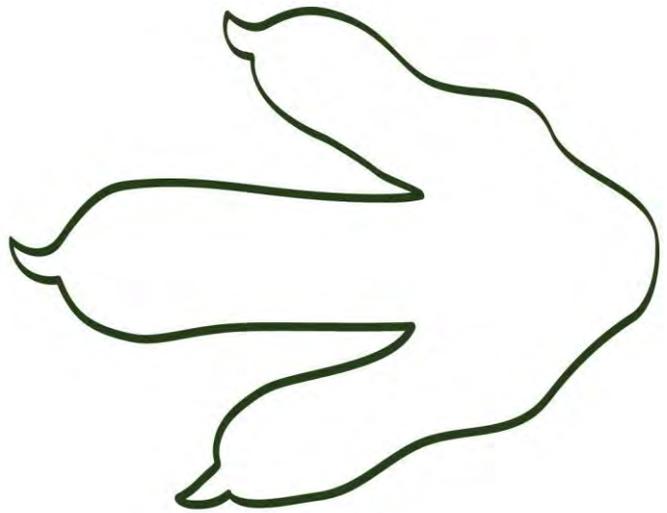
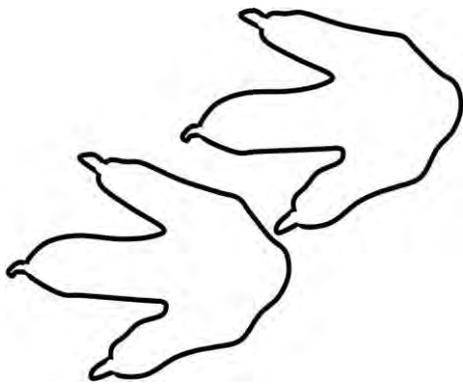


Beginning with a low threshold activity teachers reported was key to reactivate learning and then step the learning up into ARE Year 2 work. It was also an opportunity to develop reasoning and Problem Solving language.

Teachers also raised how useful it was to search for any missed learning opportunities that could be exploited. In this case standard and non-standard measures (Length) which could then lead to statistics and the language of comparison.

How big is the foot?

How big is your foot?



Teachers felt that to close the gaps and address missed learning required knowing where children had come from and where they need to go was essential.

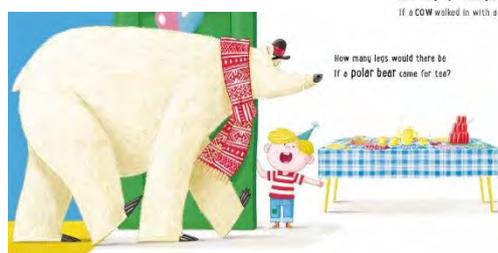
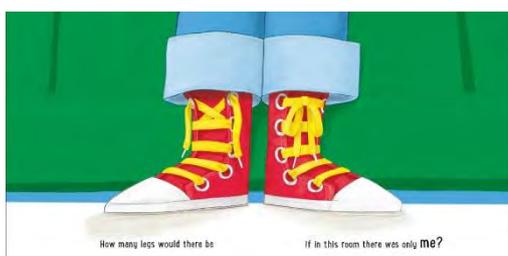
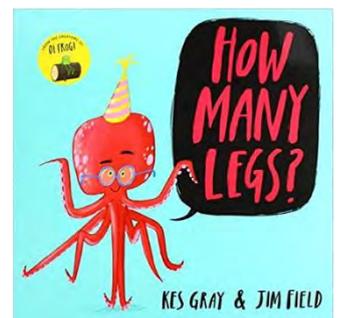
Knowing where children were along this journey helped teachers to plan appropriately to meet their needs.

A breakout room felt it was important to identify the knowledge, skills and understanding that Year 2 children need by the end of the year?

What language do they need? And plan an overall structure for the year, taking the long term view was more manageable for all.

Another group spoke of using the same book and revisit its mathematical possibilities for the month. A good example would be 'How many Legs' by Grey and Field, which also links to Zogs and Noah's Ark from-Nrich

Potential opportunities for adding, subtraction, counting to 20, Simple patterns, Complex patterns, Shape and space.



Another breakout room felt there were opportunities for counting in 2, 5, 10 for example

Skip counting from 0 or from another number. How many legs if there was only me in the room? How many legs if all the boys in the class were in the room?



What would happen if an alien with 5 legs was in the room- How many legs?

What would happen if the Alien was joined by 7 more friends?

What about an alien with 10 arms?

How many fingers?

Recovery Curriculum

Some schools reported that they had planned a recovery curriculum to address missed learning eg

Recovery Curriculum- Mowlem/ Marion Richardson

Year 6 2020-21												
	1	2	3	4	5	6	7	8	9	10	11	12
20-21	Number and Place Value		Number: Addition, Subtraction, Multiplication and Division					Number: Fractions			Geometry: Position and Direction	
C19	Number and Place Value		Number: Addition, Subtraction, Multiplication and Division					Geometry: Position and Direction		Decimals		
C19 Additional curriculum areas	Ongoing <ul style="list-style-type: none"> Know by heart all times table facts up to 12x12. Find pairs of decimals with a sum of 0.1, 1 or 10. Derive related facts from those already known, e.g. 5x0.7 linked to 5x7; and 2+8 linked to 0.2+0.8. Mentally multiply and divide 2-digit and single digit numbers. Use partitioning to double or halve any number. Mentally multiply and divide pairs of multiples by 10 and 100. Mentally multiply and divide 2-digit decimals by a single digit number, e.g. $U \times U$ or $U \div U$. Identify the multiples/factors of given numbers 											

However other schools were using commercial schemes to support the teaching of the missed learning from the Summer term

Year 2 – Autumn Term

Lesson by lesson overview 2020/21



Week	Day	Topic	NPV-1
1 07/09/2020	Monday	Counting forwards and backwards within 20	NPV-1
	Tuesday	Tens and ones within 20	NPV-1
	Wednesday	Counting forwards and backwards within 50	NPV-1
	Thursday	Tens and ones within 50	NPV-1
	Friday	Compare numbers within 50	NPV-2
2 14/09/2020	Monday	Count objects to 100	NPV-1
	Tuesday	Read and write numbers to 100 in numerals and words	NPV-1
	Wednesday	Represent numbers to 100 activity	NPV-1
	Thursday	Represent numbers to 100	NPV-1
	Friday	Tens and ones using a part-whole	NPV-1
3 21/09/2020	Monday	Tens and ones using addition	NPV-1
	Tuesday	Use a place value chart	NPV-1
	Wednesday	Compare objects	NPV-2
	Thursday	Compare numbers	NPV-2
	Friday	Order objects and numbers	NPV-2
4 28/09/2020	Monday	Count in 5s	NPV-2
	Tuesday	Count in 5s	NPV-2
	Wednesday	Count in 10s	NPV-2
	Thursday	Count in 5s	NPV-2
	Friday	Mini assessment	

1. PV: Addition and Subtraction Unit 1. Place value in 2-digit numbers 13 days 2. Place 2-digit numbers on their number line 3. Addition subtraction and estimation 4. Column subtraction and estimation 5. Mental and written calculation strategies	2. Decimals and Fractions (A) Unit 1. Add or subtract decimals 10 days 2. Subtract 1 and compare decimals 3. Understand decimals with their place 4. Add/subtract multiples of 0.1, 0.5, 0.20, 0.200	3. Algebra Unit 1. Generate and use simple formulae 8 days 2. Solve equations with one unknown 3. Generate and continue linear sequences
4. Multiplication and Division Unit 1. Multiples, factors and prime numbers 13 days 2. Solve short multiplication problems 3. Use short division to solve problems 4. Long multiplication problems 5. Formal and informal calculation strategies	4. Decimals and Fractions (B) Unit 1. Decimals, fractions, compare, order 7 days 2. Equivalent fractions, add and subtract 3. Add and subtract	5. Shape Unit 1. 2-D shapes (sides and quadrilaterals) 10 days 2. Draw, tessellate, reflect polygons 3. Draw 3-D shapes, find missing angles 4. Construct 3-D shapes using nets
5. More PV: Addition, Subtraction Unit 1. Add, subtract & round 2-3 digit numbers 10 days 2. Understand/translate negative numbers 3. Strategies in mental & written calculation 4. Unit brackets and order of operations		

Some schools went on to plan for all types of learning Recovery Curriculum- Mowlem/ Marion Richardson

Year 6 Decimals			
WR small steps	Oral Mental Starters (reactivating prior learning)	Maths + (direct teaching of potential new learning)	Home Learning
Adding decimals within one	Explain mistakes: Which is the correct answer? Do you agree/disagree? Why? Estimate the answer. Rank the calculation by difficulty. How many ways can you add these two decimals together?	Represent decimal numbers on a place value chart and add decimals crossing over. Place value chart, hundred square. Relate this to percentages. Use of CPA.	Follow up from direct teaching: https://vimeo.com/501347571
Subtracting decimals within one	Explain mistakes: Which is the correct answer? Do you agree/disagree? Why? Estimate the answer. Rank the calculation by difficulty. How many ways can you add these two decimals together?	Represent decimal numbers on a place value chart and add decimals crossing over. Use a place value chart, hundred square. Relate this to percentages. Use of CPA.	Follow up from direct teaching: https://vimeo.com/501347571
Complements to 1 (number bonds to a whole)	Number bonds to a whole in tenths or hundredths, assuming previous small steps have been taught.		Make use of problem solving and reasoning tasks in complements using White Rose complements to 1. https://vimeo.com/44416476 https://vimeo.com/501347571
Adding decimals crossing the whole		Represent decimal numbers on a place value chart and add decimals crossing over the whole. Place value chart, hundred square. Very important children understand bridging. Use of CPA.	
Adding decimals with the same number of decimal places	Explain mistakes: Which is the correct answer? Do you agree/disagree? Why? Estimate the answer. Rank the calculation by difficulty. How many ways can you add these two decimals together?	Teach using CPA, place value chart.	Follow up from direct teaching: https://vimeo.com/501347571 https://vimeo.com/44416476

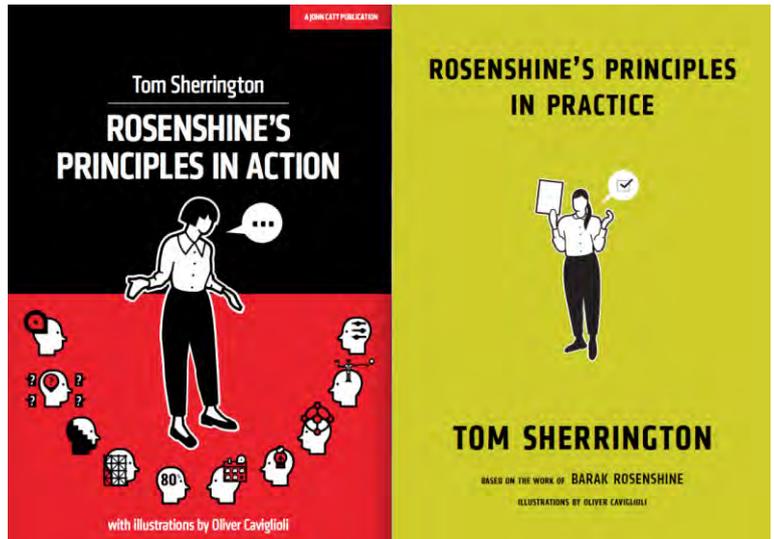
How can we close gaps ?

In Tom Sherrington's books *Rosenshine's principles in Action/ Practice* they identify that teachers need to focus principally upon planning coherent sequences of lessons. Some tasks help children to grasp key ideas/concept/schemata, which over the years they continue to develop rather like a Russian doll or onion which gains layers over time through challenging their conceptual understanding. Whilst some activities break down calculations, other activities are prompts for generating discussion and challenges for deepen learning.

Rosenshine's 17 Principles are

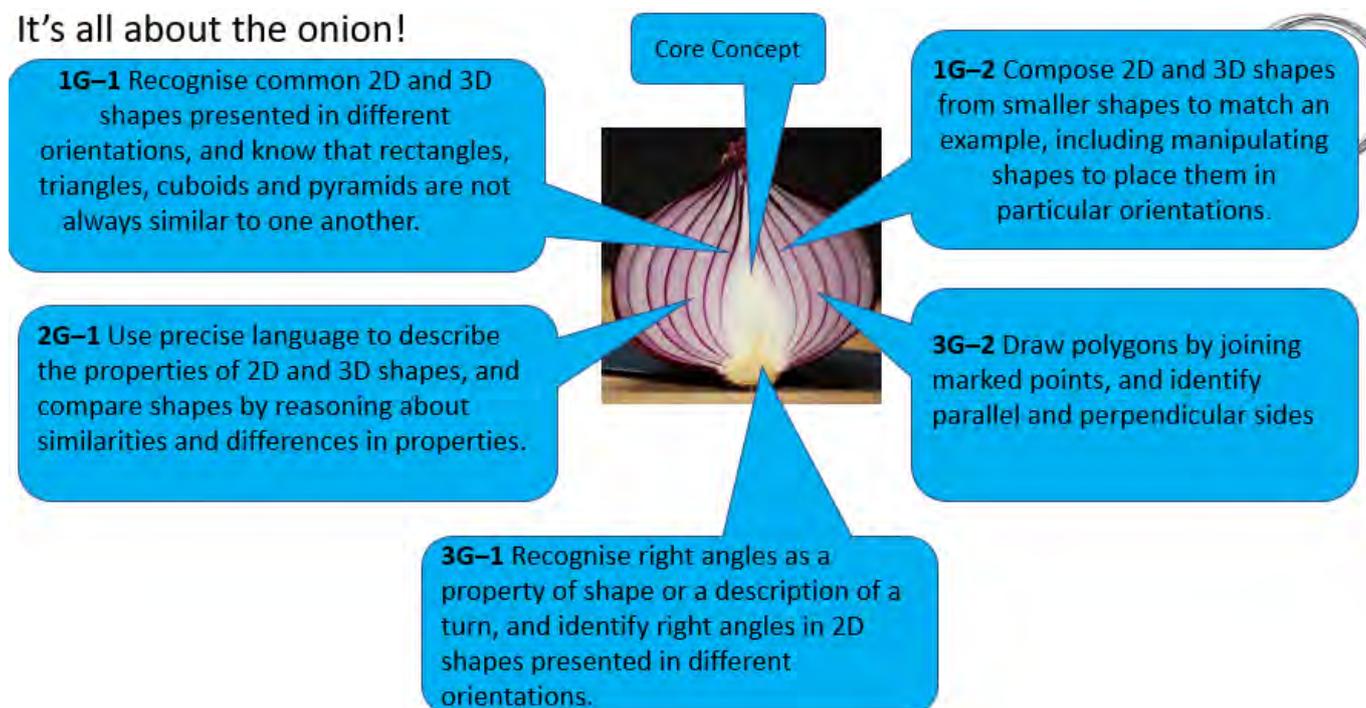
1. Begin a lesson with a short review of previous learning.
2. Present new material in small steps with student practice after each step.
3. Limit the amount of material students receive at one time.
4. Give clear and detailed instructions and explanations.
5. Ask a large number of questions and check for understanding.
6. Provide a high level of active practice for all students.
7. Guide students as they begin to practice.
8. Think aloud and model steps.
9. Provide models of worked-out problems.
10. Ask students to explain what they have learned.
11. Check the responses of all students.
12. Provide systematic feedback and corrections.
13. Use more time to provide explanations.
14. Provide many examples.
15. Reteach material when necessary.
16. Prepare students for independent practice.
17. Monitor students when they begin independent practice.

One element of Rosenshine's principles is the layering up of conceptual understanding within a lesson and over time.

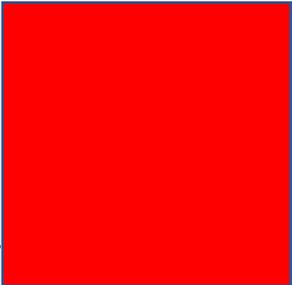


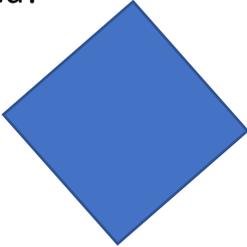
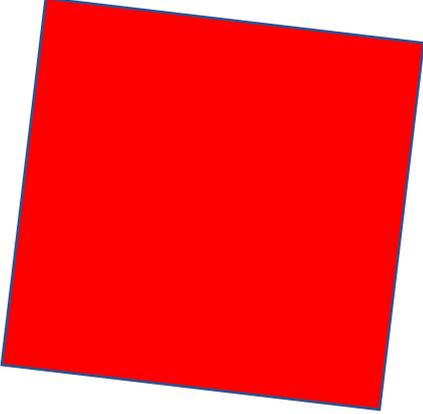
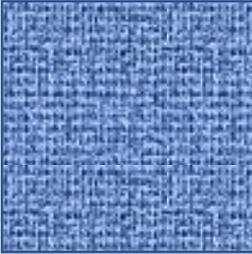
Rosenshine talks about layering up learning rather like an onion or a set of Russian dolls where the teacher plans each activity to add another dimension to strengthen and deepen the schemata.

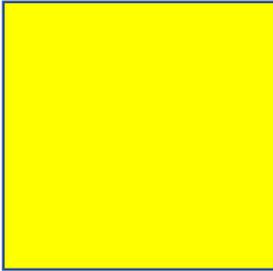
It's all about the onion!



So using an idea from the THEP History and geography curriculum project an example of layering up understanding (this would be used in conjunction with other shape activities) would be to show children a set of slides where properties of squares and non- squares could be developed. This would work well for remote learning.

Slide	Image	Purpose
1	<p>What is this shape called? How do you know?</p> 	Example recognition and Properties
2	<p>What is this shape called? How do you know?</p> 	Example recognition and Properties NB only change is the size.
3	<p>Is this a square?</p>  <p>Can you explain your answer..... <i>This shape is a square because.....</i> <i>This shape is not a square because.....</i></p>	Example recognition and Properties NB only change is the colour Justification and vocabulary- recognition and Properties

4	<p>What is this shape called?</p> 	<p>Example recognition and Properties NB only change is the orientation</p>
5	<p>What is this shape called?</p> 	<p>Example recognition and Properties NB only change from the previous slide is the size and colour</p> <p>Justification using properties and key language</p>
6	<p>Is this a square?</p>  <p>Can you explain your answer..... <i>This shape is a square because.....</i> <i>This shape is not a square because.....</i></p>	<p>Non Example Example recognition and Properties Justification using properties and key language</p>
7	<p>Is this a square?</p>  <p>Can you explain your answer..... <i>This shape is a square because.....</i> <i>This shape is not a square because.....</i></p>	<p>Justification using properties and key language</p> <p>NB here the texture has changed but it still remain a blue square</p>
8	<p>Is this a square?</p> <p>Can you explain your answer..... <i>This shape is a square because.....</i> <i>This shape is not a square because...</i></p> 	<p>Justification using properties and key language NB here there is no longer a block of colour but it still remains a square</p>

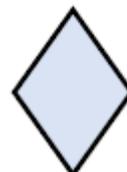
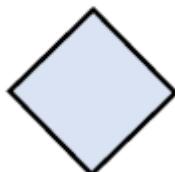
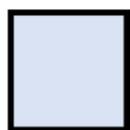
9	<p>Is this a square?</p>  <p>Can you explain your answer..... <i>This shape is a square because.....</i> <i>This shape is not a square because.....</i></p>	<p>Non-example Justification using properties and key language NB here the shape remains blue, has 4 sides and 4 angles however the angles and not right angles and the sides are different lengths</p>
10	<p>Is this a square?</p>  <p>Can you explain your answer..... <i>This shape is a square because.....</i> <i>This shape is not a square because.....</i></p>	<p>Reinforce Recognition and Properties</p>

After this layered learning children will be able to complete these tasks, justifying with the appropriate language.

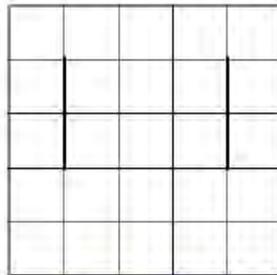
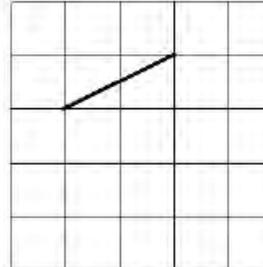
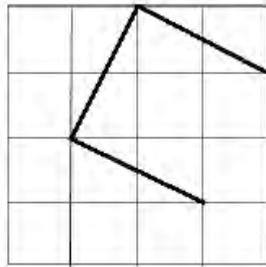
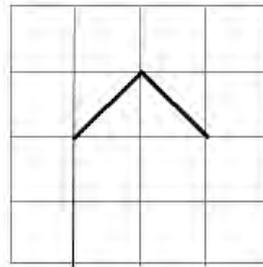
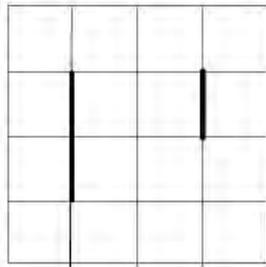
How would you sort these shapes?
Squares/Not Squares?



Odd one out



Heading



<http://nrich.maths.org/2910>

Naming 2-D shapes and their properties

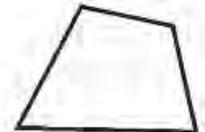
Ask pupils to tell you what they know about a square. As they explain, draw shapes that match their description but do not necessarily look like a square. After each description, encourage pupils to refine their description. For example:



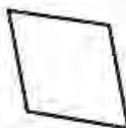
It has 4 sides



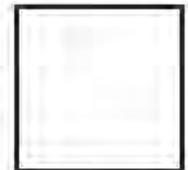
It has four vertices so all the sides join.
To be a shape there has to be no gaps



All the sides are the same length.
All of the vertices are the same.



It looks the same after each quarter turn



Clarify that a square is a 4-sided shape. All the sides are the same length and all the angles at the vertices are also the same size.

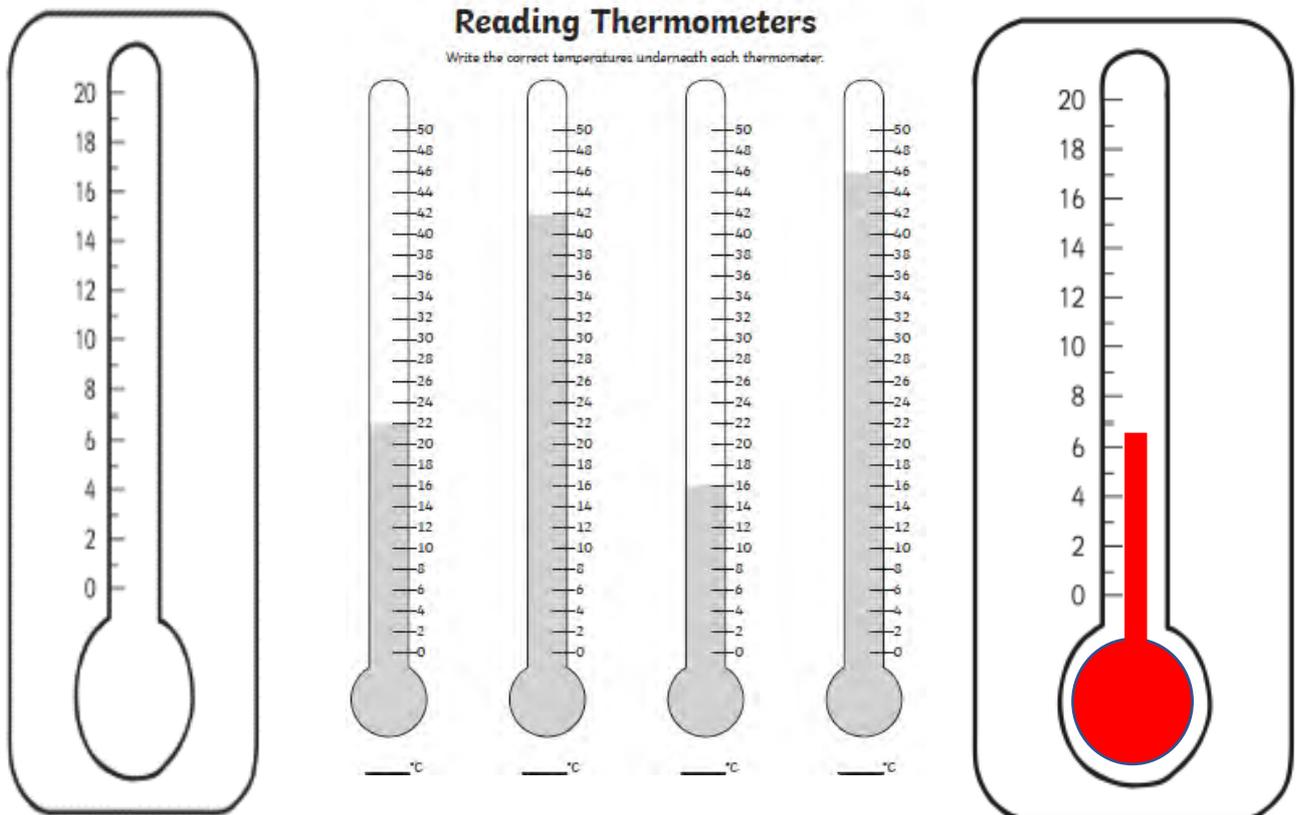
Mathematics over time

THEP would also recommend Schools consider developing conceptual understanding over time. A good example is in Measures and Number-Scales and Number lines

- Horizontal
- Vertical

Thermometers

- 1 step intervals- Record the temperature, read the temperature from somewhere else, what's the difference
- Find the difference this week /last week, this month/last month
- 2 step intervals-Record the temperature, read the temperature from somewhere else, what's the difference
- Find the difference this week /last week, this month/last month
- 5 step intervals-Record the temperature, read the temperature from somewhere else, what's the difference
- Find the difference this week /last week, this month/last month
- Ten step intervals-Record the temperature, read the temperature from somewhere else, what's the difference
- Find the difference this week /last week, this month/last month



Teachers in Autumn 2020 considered the theory to classroom could look like

Rosenshine's criterion	
Begin a lesson with a short review of previous learning	
Present new material in small steps with student practice after each step.	Small Difference Questions and I know... so... In these tasks, there are small differences between questions in a sequence. This draws children's attention to key patterns and ideas. If a question changes but the answer stays the same, how can this be explained?
Limit the amount of material students receive at one time	Small steps/ it's nothing new
Give clear and detailed instructions and explanations	Modelled work with CPA and appropriate language
Ask a large number of questions and check for understanding.	Which Answer? Agree or Disagree? and Correct or Incorrect: Here, children need to spot correct responses and explain mistakes that have been made, this deepens their understanding by considering non-examples. Explain the Mistakes: Common mistakes can be used so children can understand key differences between correct and incorrect thinking.
Provide a high level of active practice for all students.	Varied Fluency
Guide students as they begin to practice.	Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.
Think aloud and model steps.	Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.
Provide models of worked-out problems.	Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.
Ask students to explain what they have learned.	Explain: For these prompts, children consider relationships, explain patterns and make generalisations. Sentence stems may be used to scaffold responses.
Check the responses of all students.	Which Answer? Agree or Disagree? and Correct or Incorrect: Here, children need to spot correct responses and explain

	<p>mistakes that have been made, this deepens their understanding by considering non examples.</p> <p>Explain the Mistakes: Common mistakes can be used so children can understand key differences between correct and incorrect thinking</p>
Provide systematic feedback and corrections	Quizzes, Whiteboards, Mini plenaries
Use more time to provide explanations.	
Provide many examples	<p>Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.</p> <p>Varied Fluency</p>
Reteach material when necessary	Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.
Prepare students for independent practice	Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.
Monitor students when they begin independent practice.	
And then!	<p>Extend and Multi-Skill: To answer these questions, children have to work through a range of steps or use knowledge from different parts of the maths curriculum. This type of activity deepens and allows the adult assess the depth of understanding</p> <p>How Many Ways? The ultimate challenge of these tasks is for children to find all the possible answers to the question. For this, a system is needed to know that every solution has been identified.</p>

Teachers identified a range of activities teachers could plan and children engage in- Contexts: Context examples are used to connect maths concepts to real world scenarios. For example, Negative Numbers look at contexts where negative numbers are/are not used.

Explain the Mistakes: Common mistakes can be used so children can understand key differences between correct and incorrect thinking. For example, when developing understanding of Angle, children explain mistakes when measuring an angle with a protractor.

Which Answer? Agree or Disagree? and Correct or Incorrect: Here, children need to spot correct responses and explain mistakes that have been made, this deepens their understanding by considering non examples.

Estimate: These tasks show the thought process behind making relatively accurate estimates and asks children to consider the validity of their answers. The use of estimation deepens understanding

Next Step and Part-Complete Examples: These tasks break calculation procedures down into small steps. Children's attention is drawn to the key next step.

Small Difference Questions and I know... so...

In these tasks, there are small differences between questions in a sequence. This draws children's attention to key patterns and ideas. If a question changes but the answer stays the same, how can this be explained?

Explain: For these prompts, children consider relationships, explain patterns and make generalisations. Sentence stems may be used to scaffold responses.

Different Ways and Rank by Difficulty: These tasks encourage children to use different calculation techniques and compare strategies, deepening conversations.

Extend and Multi-Skill: To answer these questions, children have to work through a range of steps or use knowledge from different parts of the maths curriculum. This type of activity deepens and allows the adult assess the depth of understanding

How Many Ways? The ultimate challenge of these tasks is for children to find all the possible answers to the question. For this, a system is needed to know that every solution has been identified.

How can we close gaps? Recommendations by Year 2 teachers

- Use Rosenshine's criteria as an aide memoire
- Reactivate prior learning
- Small stepped learning planned
- Link with prior learning
- Engage through children's interests eg Dinosaurs/ Fiction and Non-Fiction
- Adapt teaching and learning to children's responses. Assessment For Learning. Same day intervention. Leaving no one behind
- Use LTHC tasks
- Break learning sessions into smaller amounts of time
- Weave in Reasoning and Problem Solving to ensure all 3 National Curriculum aims are taught.
- Identify, model and insist on appropriate language structures (THEP Year 2 Language –email Carolyn.Lindsay@the-partnership.org.uk)
- Identify cross curricular opportunities in other areas eg Science
- Revisit mathematical strands within other strands eg measures->Place value and 4 calculations
- Consider the long term plan for learning- we have a year!

- The length and structure of each lesson
- How the children will be grouped / 'sat' / location
- Time to practice and consolidate other areas and previously taught language – 'starters'
- Planning other areas of maths into a lesson - where pupils are revising / applying learning
- The use of other adults
- Ensuring the children are doing most of the work
- What will be recorded / where
- How challenge for all is provided

"If we do not use concrete manipulations, then we can not understand mathematics. If we only use concrete manipulations, then we are not doing mathematics."
Gu (2015)

Concrete manipulatives are essential learning tools, but if pupils use only concrete resources, then they will become mechanics of maths, rather than mathematicians. Switching through the three different modes develops and deepens understanding.

Take away/ Research task

- Plan a maths lesson/session (feel free to send it to Carolyn.Lindsay@the-partnership.org.uk if you want some additional suggestions/support)
- Deliver the lesson
- Get someone to take lots of photographs during the lesson and of the outcomes
- Be prepared to share! (Thank you in advance!)

Examples of work from participating schools
 Amanda Naidoo and Amelia Sheppard,
 St Luke's C of E Primary School

Gap task lesson – subtracting a 2-digit number from a 2-digit number using column method

Review previous learning on how to subtract using dienes.

Teacher models how to subtract using dienes.

2 Draw base 10 to represent the number 35



Now cross out 12
 What number is left?

35 - 12 =

Children have a go on their whiteboards to complete the following calculation using dienes.

48 - 23 =

Teacher explains and models how to put a subtraction calculation in the column method.

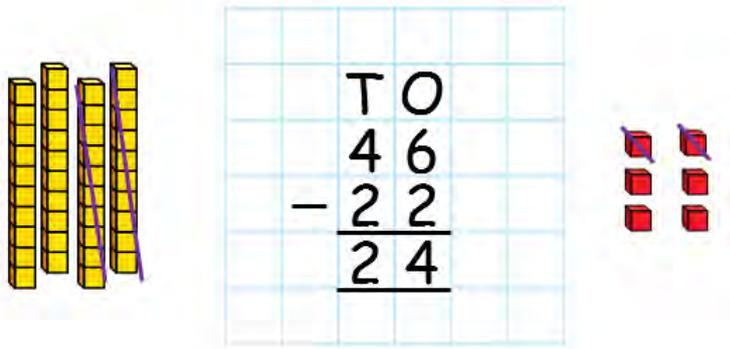
Teacher allows children to have a go at writing a subtraction calculation in column method on whiteboards.

TO TO TO
 46 - 13 = 33

- Let's check together....
- Do you have the Tens and Ones columns?
- Did you write your numbers in the correct columns?
- Did you put your subtraction sign and equals to signs in the correct place?

—
 —

Teacher to check children's responses.



- Allow children to share their thinking.
- Children complete their calculation on their whiteboards.
- Teacher models column method again.
- Children have another go on their whiteboards.
- Teacher to provide feedback and corrections.
- Provide more examples and reteach where necessary to ensure that children are prepared and confident to complete their independent work.

Impact

- Found Rosenshine's principles useful to organise planning
- Consolidation / Reactivation of understanding. The review was helpful as it allowed early identification of children requiring pre-teaching TA's were primed
- The focus on modelling, then children try with scaffolding and using manipulatives meant that conceptual understanding was rapid and deeper
- Differentiation was easily identified and therefore could be assigned appropriately
- Resilience and motivation was higher
- Language of explanation, also using conceptual understanding to explain
- A greater number of children achieving

Kate Ashcroft
Olga Primary School

The learning focus centred on the strand of money. We decided to begin by recapping on prior learning where children revisited

- Counting in 1's, 2's, 5's and 10's forwards and backwards using a counting stick, bead strings and number squares. Children were also encouraged to identify patterns eg counting in 5's the last digit is either a zero or five. The children moved on to counting forwards and backwards from numbers other than zero. This ensured children were able to apply this knowledge to repeated addition to make amounts
- Partitioning numbers using manipulatives and pictorial strategies

As children had missed the money strand in Year 1 the teachers used the DfE guidance to consider the prior learning (Ready to Progress and NCETM website) and the small steps that would be required. This careful layering of conceptual understanding was especially necessary as many children in today's society have a very abstract sense of money. Most children have no sense of the value of the coins. This was the starting point. Children were presented with a series of tokens and were asked could they sort them into groups. Children were then presented with the question what is the same and what is different about the tokens. Children quickly noticed that all the tokens were the same shape and size, but had different numbers of dots on them. Eg



Children started to question why there wasn't a circle with 4 and 3 dots.

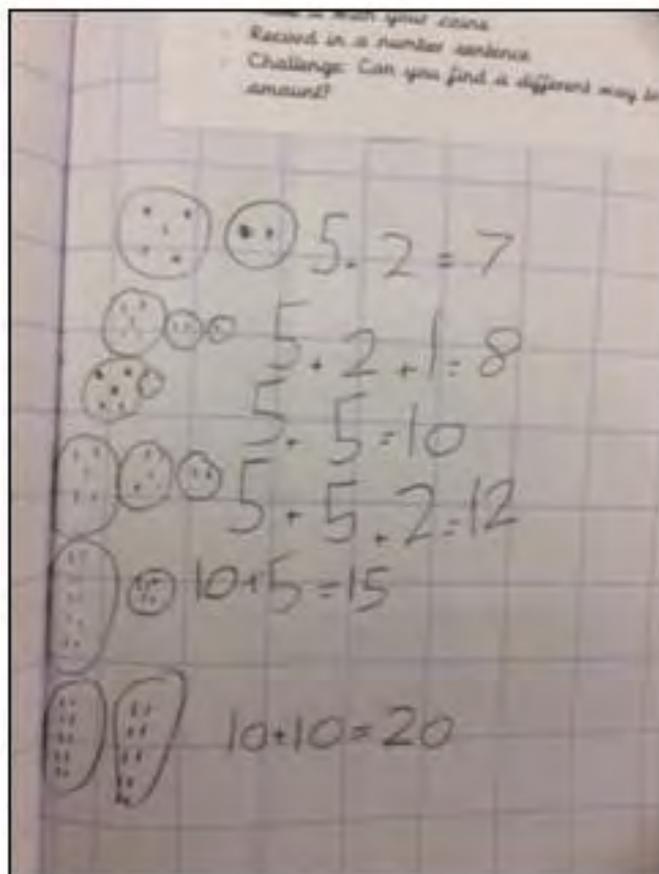
The children then started to make amounts.

The teacher modelled using 3 tokens what the smallest and largest amounts that could be made.

The children were asked to find different ways of making 7. This was differentiated where the outcome was determined by the children's stamina. W@GD children were encouraged to work systematically.

Children were encouraged to find their own ways of recording the combinations.

The teacher began to introduce recording with the first row showing the tokens, with the second row showing a pictorial representations and then the third rowing showing the abstract form.



The next day children were introduced to 1p, 2p, 5p and 10p coins alongside the tokens. They were asked what was the same and different about the tokens and coins. Children were able to relate the coins to the tokens with similar values. Children were able also to realise that a 2p had two 1p's inside. The teachers spent time with children emphasising the value of the coins.

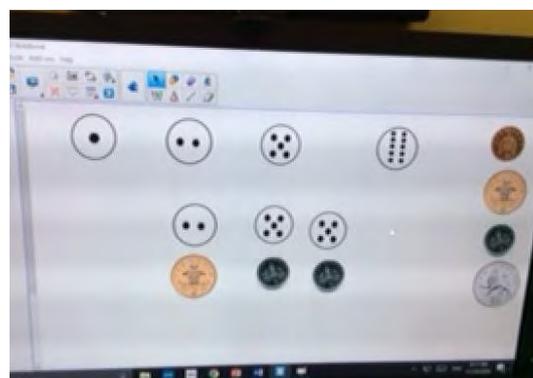
Children then went on to identify similarities and differences between coins. Children then went onto predict 'What am I holding in my hand?'

This allowed the teachers develop a range of questions with the children focusing on attributes. For example-

Is it a bronze coin?

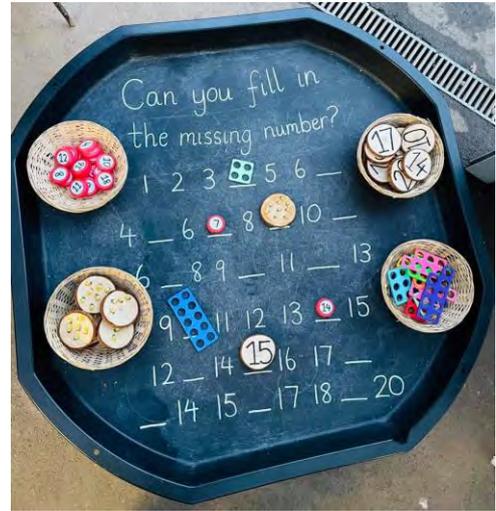
Is it a silver coin?

Is it a small/large coin?



Closing the gap

Finding as many ways to represent a number using a range of manipulatives



Jade Lam
Marion Richardson Primary School

We started off the learning with recapping tens and ones, then using concrete base 10 to add 2 two-digit numbers. Once the children were confident making a given number sentence using concrete materials we introduced the column method. (We did use a template, not shown in photograph).



	T	O
+		

Following on from this lesson we progressed on to adding two digit numbers - crossing ten. We used lots of role play/modelling, banker and customer, exchanging tens.

Children were confidently able to exchange but had to be reminded not to take a ten from the banker's bowl, instead take it off of the column method template. Children were heard telling their peers to "exchange it", and "No! I need 10 ones". One problem we encountered during independent tasks was that children were not adding fully exchanged ones. Instead they were adding onto the existing ones to make ten. I stopped independent learning, and refocused children to the whiteboard where I addressed the misconception.

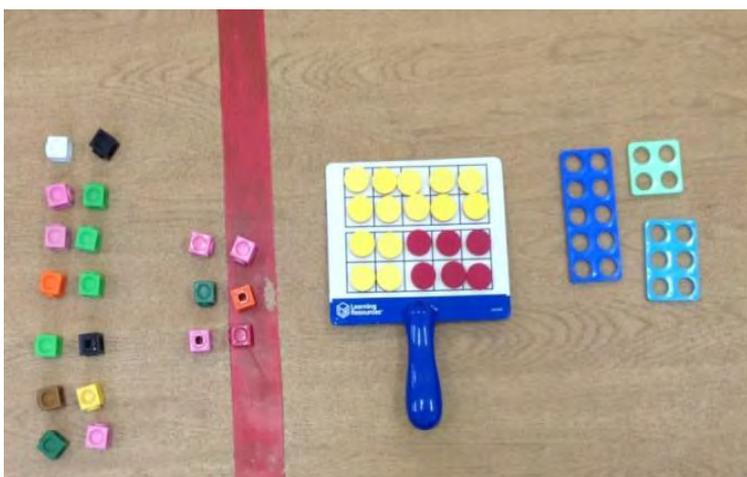
When asked which method children found easier (this was a form of assessment) the collective response was column method over number sentences.

When shown a range of questions

$$30 + 3 \quad 39 + 7 \quad 34 + 4$$

Children identified 1 as the easier one to answer as it doesn't require adding.

We decided, in order to continue with addition and subtraction we needed to ensure children were secure with their bonds and also related facts, so we revisited this using different concrete materials.



Impact

- Found Rosenshine's principles useful to organise planning
- Consolidation / Reactivation of understanding.
- The focus on modelling, then children try with scaffolding and using manipulatives meant that conceptual understanding was rapid and deeper
- Differentiation was easily to plan as I had a very clear vision of the key concept and how I was layering it up.
- Resilience and motivation was much higher
- Language of explanation, also using conceptual understanding to explain
- A greater number of children achieving

Language development

Who's left standing?

Children write a multiple of 2 0-25 on a piece of paper/post-it

Everyone stands, look at their number. They sit down if the number on their card is the answer to

- 4 times 2
- 7 multiplied by 2
- 12 times 2
- 8 sets of 2
- 2 times 2
- 9 lots of 2
- 1 times 2
- 3 groups of 2
- 11 multiplied by 2
- 10 times 2
- 5 times 2

The winners are the children still standing with 12 on their piece of paper

Who's left standing.

Add and subtract mentally, including a 2-digit number and tens.

- Provide children with a card with a 2-digit number (74,27,29,45,78,63,56,30,52,43,61, 38)
- Everyone stands
- Look at the number on your card, sit down if the number on your card is the answer to-
 - 44 plus 30
 - 57 minus 30
 - The difference between 79 and 50
 - 10 more than 35
 - 38 add 40
 - 10 less than 73
 - 96 take away 40
 - 10 more than 20
 - 32 plus 20
 - 83 subtract 40
 - 91 minus 30

Alice Tomlinson

Cyril Jackson Primary School

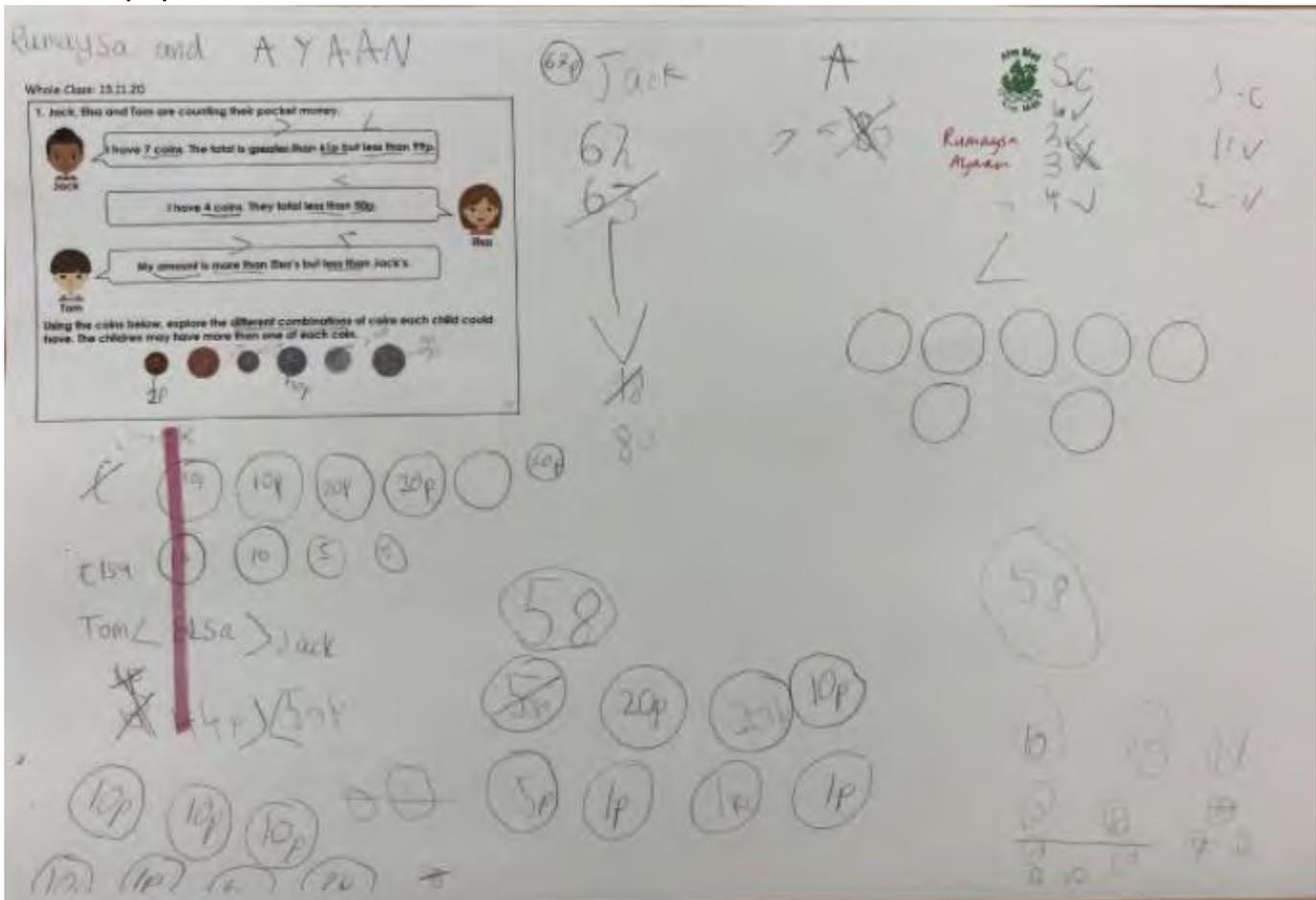
Context: Top Set Problem Solving

The children have been really struggling with problem solving, particularly in questions with more than one step. They struggle to understand what is being asked of them and ways to organise their thoughts.

I've been using the structure from the word problem video. Three Reads

<https://earlymath.erikson.edu/exploring-3-reads-math-protocol-word-problems/>

with any problem solving or word problems. It has been really useful for moving them on from practical resources to visual and to help them organise their thoughts on paper.



This example is from our latest lesson where the children worked in pairs to solve a problem.

I read it to them first using the strategies from the video. I then had them read it aloud to their partner in turn and then retell it.

We then discussed the steps needed to solve the problem and how they could work together.

We still have a long way to go but it has had big impact on the quality of their discussion and collaboration.

Impact

- Found Rosenshine's principles useful to organise planning
- Consolidation / Reactivation of understanding.
- Using the 3 Reads as a model /structure meant that the children were able to unpick the mathematics
- The focus on modelling, then children try with scaffolding and using manipulatives meant that conceptual understanding was rapid and deeper
- Differentiation was easily identified and therefore could be assigned appropriately
- Resilience, more focused and motivation was higher
- Breaking the learning into small chunks meant children were focused and not daunted by a challenging task
- Language of explanation, also using conceptual understanding to explain
- A greater number of children achieving

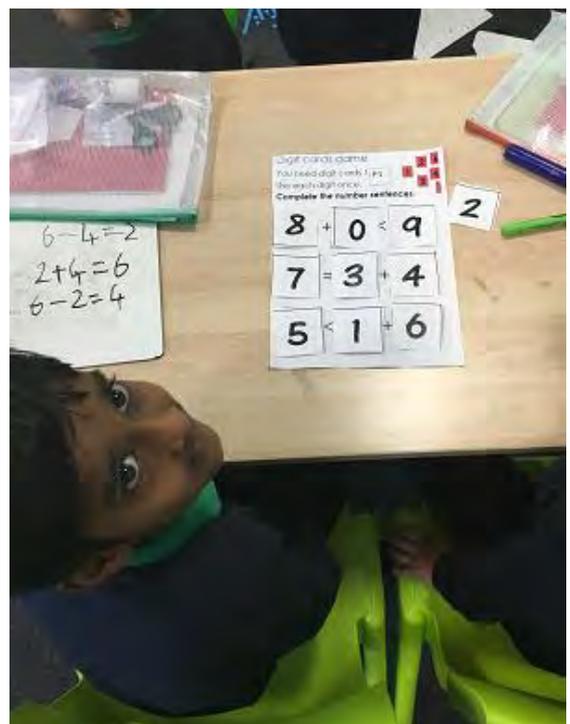
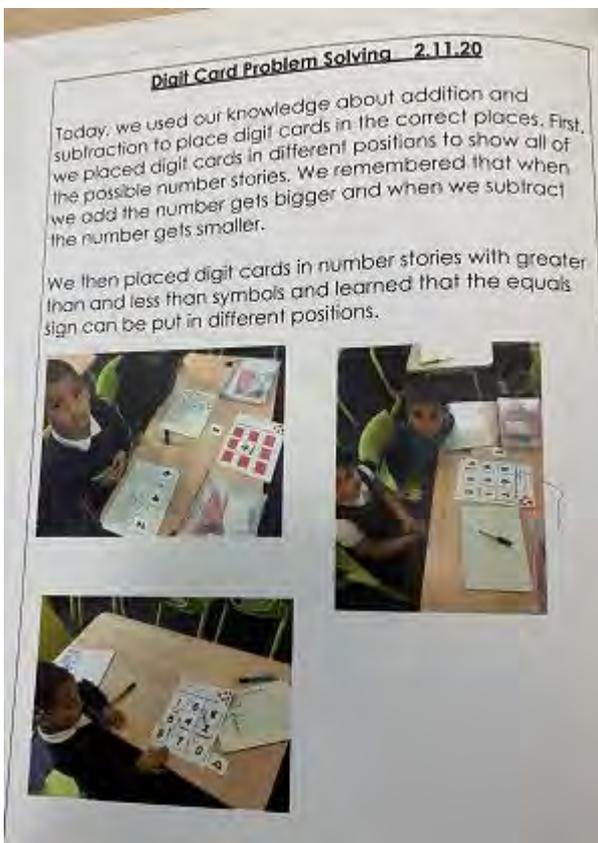
Reactivating prior learning- How would you sort these shapes?



Matt Dove
Woolmore Primary School

Focus on structured modelled and scaffolded Reason and Problem Solving task. We used manipulatives. Children were able to explore their knowledge of calculations to allow them explore lines of inquiry. The lesson went very well - physically being able to move the digits helped understanding. The task helped them think systematically - Most of the class were able to use trial and error to see if the number sentences worked and managed to complete their sheet successfully.

We also uncovered a few misconceptions and areas to work on - Some children in the class were finding the comparative symbols difficult and the placement of the equals sign in different places definitely threw them a little bit.





Impact

- Found Rosenshine's principles useful to organise planning
- Use of manipulatives meant all children could access the task and therefore confidence and engagement was high.
- The focus on modelling, then children try with scaffolding and using manipulatives meant that conceptual understanding was rapid and deeper
- Differentiation was easily identified and therefore could be assigned appropriately
- Resilience and motivation was higher
- Language of explanation, also using conceptual understanding to explain
- A greater number of children achieving

Context

Thomas Buxton Primary School is a two-formed entry school.

There are four Phase Leaders in the school; each is responsible for a 'middle room.' Currently the school has a middle room in Years 2, 3, 4 and 6 for Maths and English four times each week.

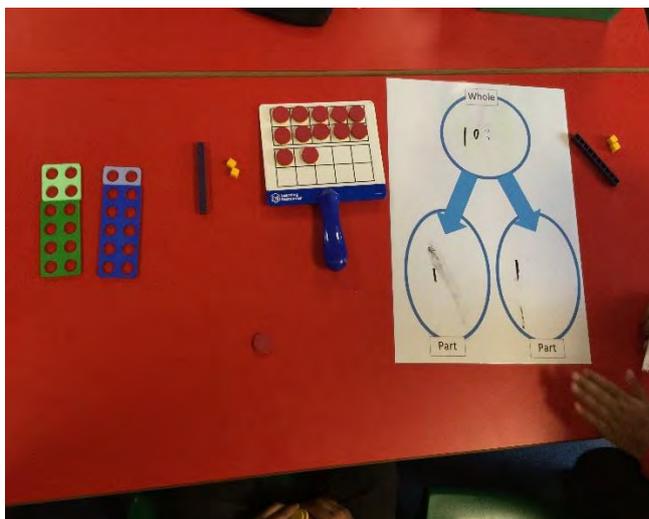
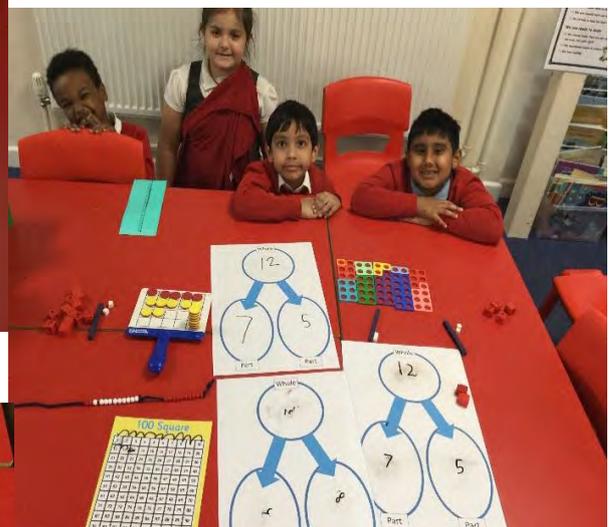
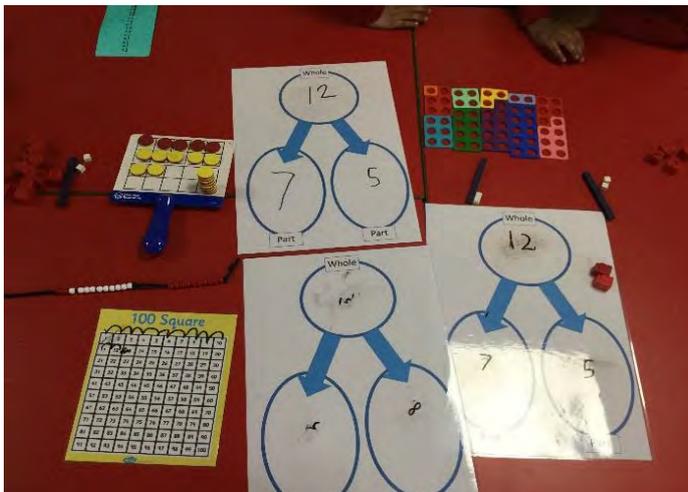
Currently there are 10 children in the Year 2 maths middle room and each child was identified in Year 1 as not making age-related progress. The Year 2 class teachers used this data and their own teacher judgements from the first few weeks of September 2020 to decide who would be in the Year 2 middle room. The children in the group change based on the needs of the cohort.

The school follows the White Rose scheme and has a big emphasis of representing the same concept in different ways.

The lessons in question follow on from the children learning about 'place value' and now are in the 'addition and subtraction' area of the White Rose curriculum.

Task

On Monday the children started the lesson by using their 'maths resource box' which is out for every lesson to show me in as many different ways how they could make the number 12.



By completing this activity as the starter of the lesson, I was able to identify which resources the children were able to use confidently and independently and those which we would need to work on together during subsequent lessons.

The main aim of Monday's lesson was for the children to recall their number bonds to 20 using concrete resources. As the children needed support using the part-part-whole model during the starter activity, then this was the focus of the first lesson.

I aimed at enhancing the “**provide a high level of active practice for all students**” element of Rosenshine's principles.

We first of all spoke about where the answer of 20 would go on the part-part-whole model and came to the conclusion that it would go in the “whole” part.



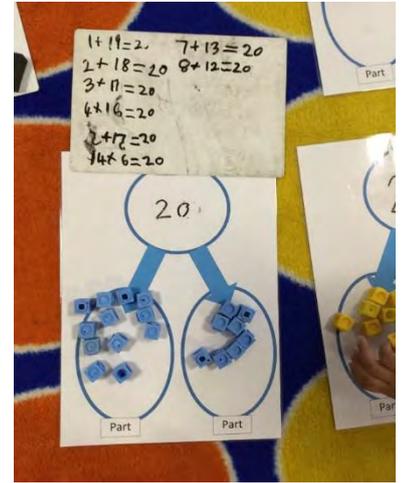
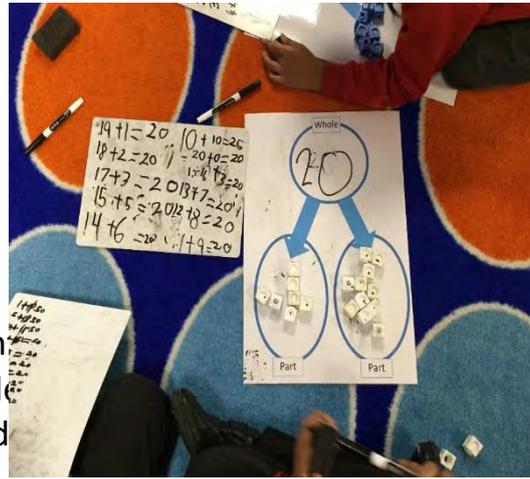
I then modelled how to complete the first number bond. We counted 20 cubes together and put them into one of the “parts.” We then said the number bond sentence out aloud together and touched each part of the diagram as we said it. I then scribed the calculation we said orally onto a whiteboard.

After completing a few of these together, I asked the children to work systematically and in pairs to try and complete as many as possible.

During the remainder of the session I worked with each pair to ensure they were able to

complete the task confidently.

The aim of the lesson wasn't to complete all of the number bonds to 20, it was to ensure they understood the method of using the part-part-whole method as a strategy to complete their number bonds to 20.

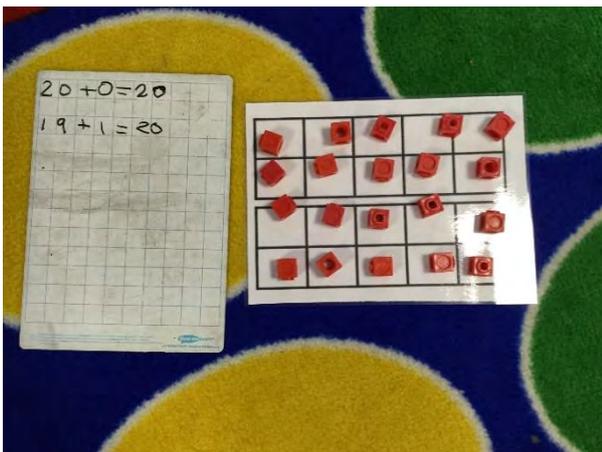


bonds to 20.

I then introduced another strategy to the children – using the Ten Frames to complete their number bonds to 20.

The main emphasis of this lesson was to model how to record their answers correctly, as the children struggled with doing this on Monday.

Again, I modelled how to complete the activity first. We then did a few questions together.

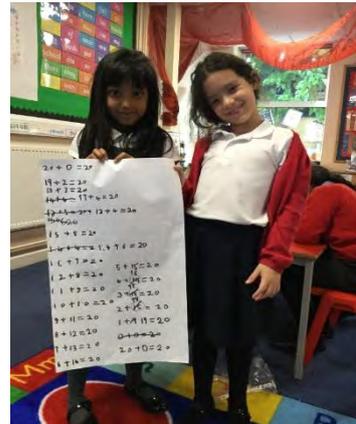
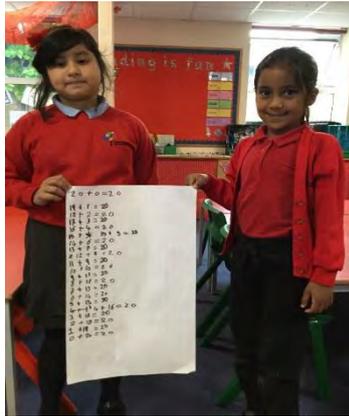
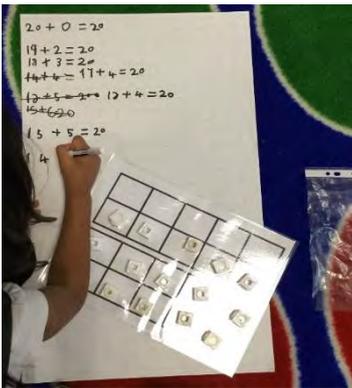


Like on Monday, I asked the children to get into pairs and systematically work on their number bonds to 20.

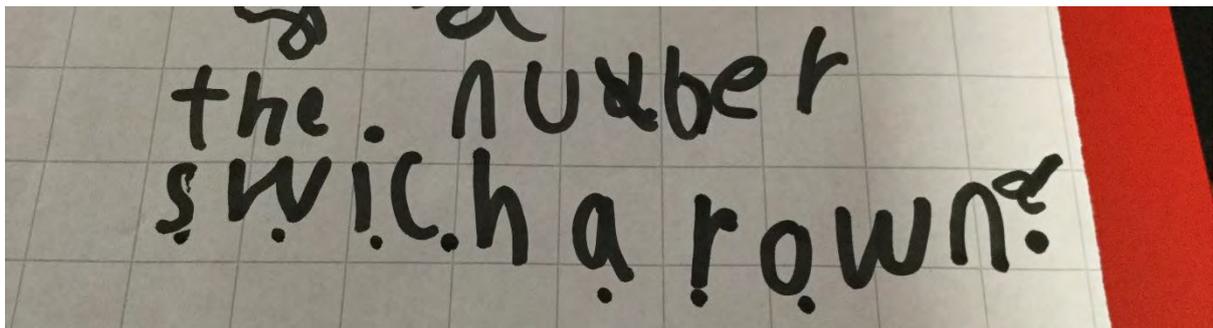
I found that the children were able to do this more quickly and confidently on Tuesday.



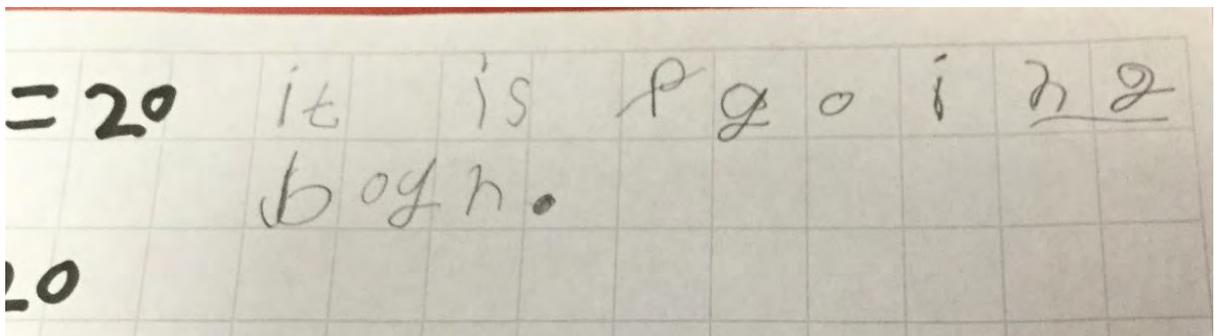
The children were able to write their calculations quicker this time. Again, I went around to ensure that any mistakes were 'double-checked' by the children.



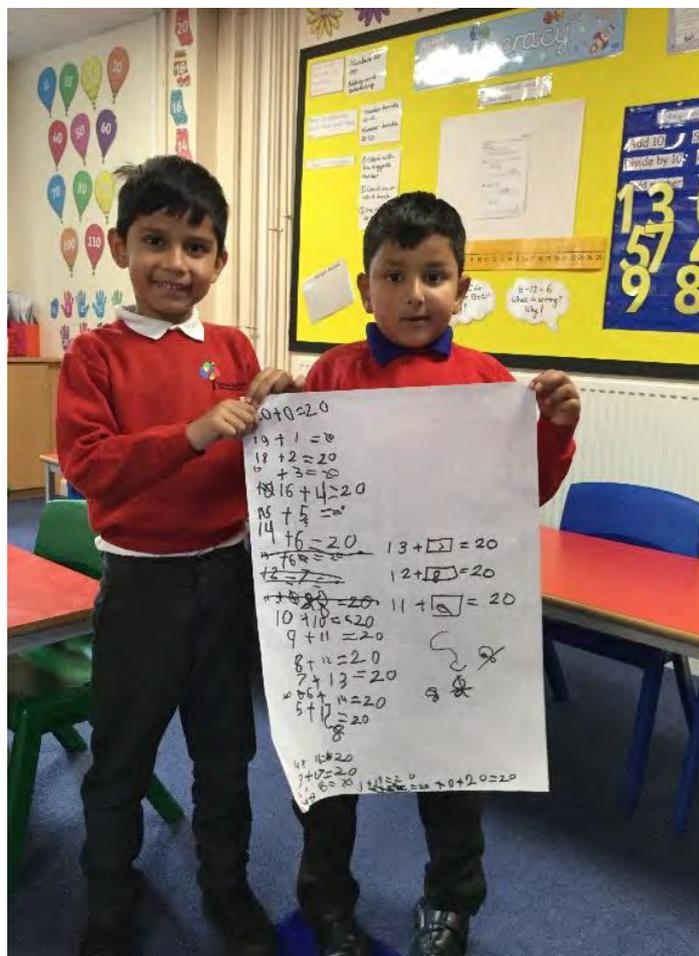
To extend the learning on, I asked the children to think about if they could see any patterns with the number bonds. I asked the children to discuss this without much input from me and to have a go at scribing their answers. One pair could see that the same number bond repeated, but the numbers were "switched around."



Another pair could see that the numbers were "going down."



Moving forwards, I will need to work on their fluency with the number bonds to 20. Moving from concrete to pictorial and abstract. I will also need to develop their oracy and reasoning skills, so that they can articulate their answers using better mathematical language. However, the lessons went well, the children were engaged and they met the lessons' objectives!



Impact

- Found Rosenshine's principles useful to organise planning
- Focus on small steps and adding layers meant that learning developed rapidly and understanding was greater as demonstrated by children transfer learning and extending their schemata's.
- Consolidation / Reactivation of understanding.
- The focus on modelling, then children try with scaffolding and using manipulatives meant that conceptual understanding was rapid and deeper
- Children are well placed to move on and close the gaps
- Resilience and motivation was higher
- Language of explanation, also using conceptual understanding to explain
- A greater number of children achieving

Science

Key to addressing gaps and missed learning is in planning. There is a range of support strategies but THEP would recommend PLAN Knowledge Matrices <https://www.planassessment.com/plan-knowledge-matrices-teacher>

	Year	2	Topic	Uses of everyday materials
	<ul style="list-style-type: none"> Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 			

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. A material can be suitable for different purposes and an object can be made of different materials.</p> <p>Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness.</p>	<ul style="list-style-type: none"> Can name an object, say what material it is made from, identify its properties and make a link between the properties and a particular use Can label a picture or diagram of an object made from different materials For a given object can identify what properties a suitable material needs to have Whilst changing the shape of an object can describe the action used Can use the words flexible and/or stretchy to describe materials that can be changed in shape and stiff and/or rigid for those that cannot Can recognise that a material may come in different forms which have different properties
<p>Key vocabulary</p> <p>Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard</p> <p>Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid</p> <p>Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching</p>	

Common misconceptions	
<p>Some children may think:</p> <ul style="list-style-type: none"> only fabrics are materials only building materials are materials only writing materials are materials the word rock describes an object rather than a material solid is another word for hard. 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> Classify materials. Make suggestions about alternative materials for a purpose that are both suitable and unsuitable Test the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat 	<ul style="list-style-type: none"> Can sort materials using a range of properties Can explain using the key properties why a material is suitable or not suitable for a purpose Can begin to choose an appropriate method for testing a material for a particular property Can use their test evidence to select appropriate material for a purpose e.g. Which material is the best for a rain hat?

Working Scientifically

	<h3>Working scientifically skills Year 1 & 2</h3>
Asking simple questions and recognising that they can be answered in different ways	
<ul style="list-style-type: none">• While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.• The children answer questions developed with the teacher often through a scenario.• The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	
Observing closely, using simple equipment	
<ul style="list-style-type: none">• Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.• They begin to take measurements, initially by comparisons, then using non-standard units.	
Performing simple tests	
<ul style="list-style-type: none">• The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.	
Identifying and classifying	
<ul style="list-style-type: none">• Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.• They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	

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Examples of work across a unit

<https://www.planassessment.com/teacher>



Examples of Work
Glory
Uses of everyday materials - Year 2



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Look specifically at the skill of observing & measuring in science:

What opportunities are there to do this in the uses of everyday materials unit?

- Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.
- They begin to take measurements, initially by comparisons, then using non-standard units.

Identify and describe the suitability of a variety of everyday materials, including wood, metal, glass, brick, rock, paper and cardboard for particular uses.

Poetry as stimuli

Woolly Saucepan

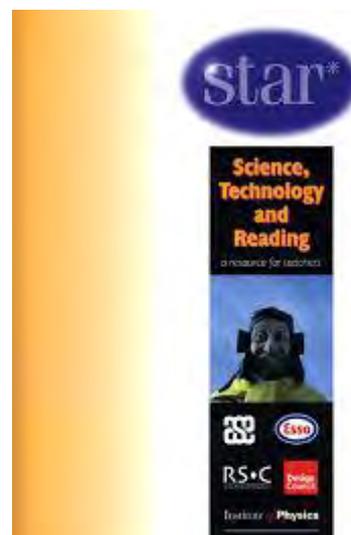
Could I have
a woolly saucepan
a metal jumper
a glass chair
and a wooden
window-pane please?

Er – sorry I mean
a woolly chair
a glass jumper
a wooden saucepan
and a metal
window-pane
please?

Could I have
a woolly saucepan
a metal jumper
a glass chair
and a wooden window-pane
please?

Er – sorry I mean
Oh – blow it!
You know what I mean
don't you

**from Star* 'Science
Technology and Reading' by
Michael Rosen**



Odd one out?



Material sort

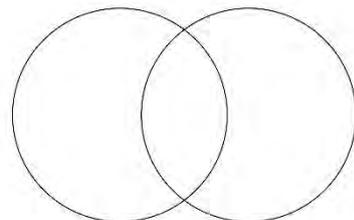
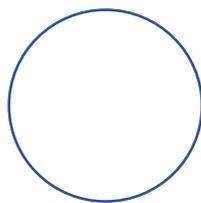
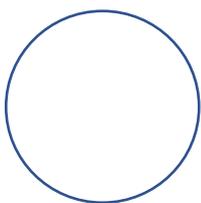
Observe carefully, compare and contrast a collection of kitchen equipment . Use your sense of touch as well as sight to explore them.

Make sure to have a collection of the same object e.g. spoons but made of different materials for discussion.

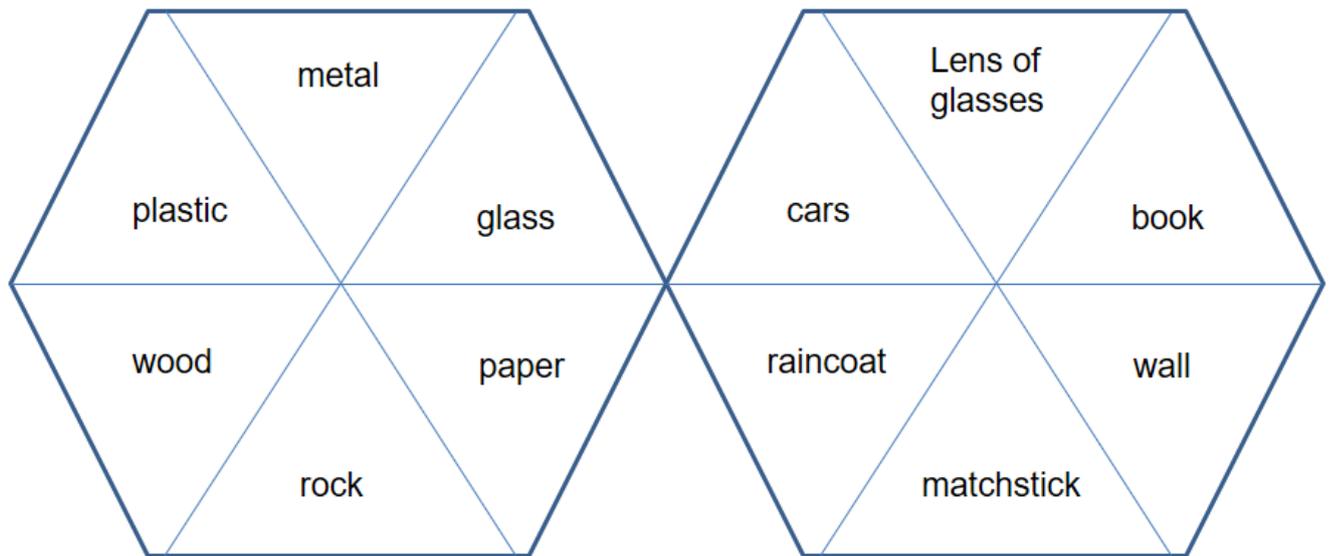
- Y1: They are the same because.....
- They are different because.....is.....and.....is.....
- They are alike because they are both.....
- Y2: They are the same because.....
- They are similar because.....
- They are different because..... is.....and.....is.....
- They are alike because they are both.....
- It feels different because this one..... and that one.....

Material sort

- Group and sort in a variety of ways (could use sorting rings or Venn diagrams)
- Establish criteria for sorting, e.g. 'these are all...shiny, rough, soft'
- Re-organise e.g. from shiniest to dullest, thickest to thinnest, and...

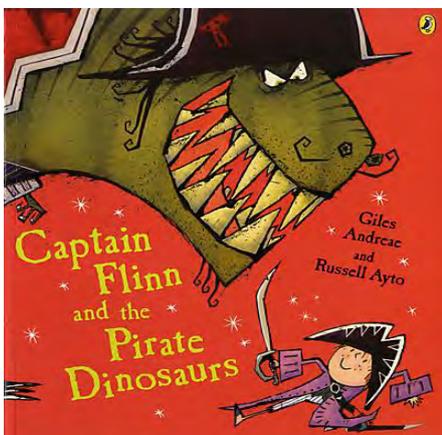


Silly or sensible



Hold the paper clip at the centre with a pencil or pen and spin it to select a material and an object. Is this a good choice or silly choice of material?

Where's the maths in that?



What's the tallest tower you can make from these different biscuits to help Iggy?



Which is the strongest wood for making a plank for my ship?

**Where's the measuring in that?
How would you do it?**

Help! I need a new outfit
which is both stretchy
and strong!



Please help to find me
the best materials for a
new raincoat.



**Where's the measuring in that?
How would you do it?**

MACINTOSH'S EXPERIMENT



Key Question

Which substance will make the cotton most waterproof?

Substances

Pritt Stick, PVA, vegetable oil

Prediction

I think that the _____ will be the best substance because _____.

Method

1. Sandwich a thin layer of each substance between two squares of cotton.
2. Place the fabric onto the beaker, using an elastic band to keep it on.
3. Use a syringe to pour 10ml of water onto the material.
4. Observe how quickly the water goes through the material.

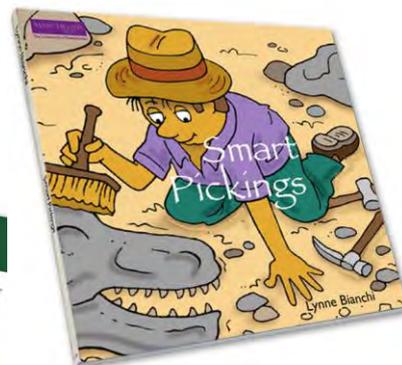
Results table

<u>Substance</u>	<u>Observations</u>
PVA	
Pritt Stick	
Oil	

Conclusion

I found out that _____ was the best substance to make cotton waterproof.

Help pupils to understand that there are choices:



The measuring kit bag – *what could you use to measure the height of the towers?*



Reference books:

