

Big Maths

by Ben Harding

Big Maths:
The CLIC Book



Andrell Education Ltd
Raising Standards in Education



Big Maths: The CLIC Book

The class teacher's guide to Big Maths CLIC

by Ben Harding

Big Maths: The CLIC Book

The class teacher's guide to Big Maths CLIC

Premier House, High Street, Crigglestone, Wakefield WF4 3EB

© Andrell Education Ltd 2013

The moral rights of the author have been asserted.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form by any means, without the prior permission in writing of Andrell Education Ltd, or as expressly permitted by law, by licence or under terms agreed with the appropriate reprographics rights organisation.

This work must not be circulated in any other form and this condition must be imposed on any acquirer.

2nd Edition

ISBN 978-0-9572057-6-5

Printed in the United Kingdom by Universal Office Products.

All stock photography from www.shutterstock.com

For more information on Big Maths visit our website

www.AndrellEducation.com

Call us on 01924 229380 | Send us a fax on 01924 250412
Email us at contact@andrelleducation.com



Twitter: @AndrellEvents | @BenBigMaths

Contents

| | |
|-----------------------|-----|
| Introduction..... | 5 |
| Counting..... | 17 |
| Learn Its..... | 93 |
| It's Nothing New..... | 127 |
| Calculation..... | 209 |
| Addition..... | 215 |
| Subtraction..... | 271 |
| Multiplication..... | 325 |
| Division..... | 359 |



1 + 1 = 2



Introduction

Big Maths is a new way of looking at the Primary Mathematics curriculum. It is based on 5 simple principles that are just common sense and self-evident (and often under-used). Big Maths is already used in thousands of schools across the UK and internationally because it provides a genuine numeracy framework that blends all 5 of these vital principles into one simple programme.

1. Children become numerate through following a natural sequence of progression: e.g. for a child to know double 70, they need to know double 7 first. We call these steps of progression 'Progress Drives'.

In summary... use sequences of progression.

2. Children need to have basic skills in order to use basic skills: Therefore it is important to separate out the acquisition of core basic skills for Mathematics from the 'using and applying' of those skills. We call the basic skills 'Core Numeracy' and the use of these skills 'Outer Numeracy'.

In summary... prioritise the teaching of Core Numeracy.

3. Children acquire the basic skills of Mathematics through the chronology of CLIC: When we look at Core Numeracy in more detail we see that it has a 4 stage process to it; Counting (children learn to count and to 'count on').

Learn Its (children then short-cut this counting by recalling their 'counting on' as facts).

It's Nothing New (children then 'swap the thing' to realise that the counting fact, or 'Learn It', can be applied to any object, amount or unit of measure). Calculation (the previous 3 phases are combined to provided a calculation structure).

In other words, Core Numeracy is CLIC! Children become numerate through the chronology of CLIC, and therefore we use CLIC as a strong, but simple, vehicle to teach the basic skills of Mathematics.

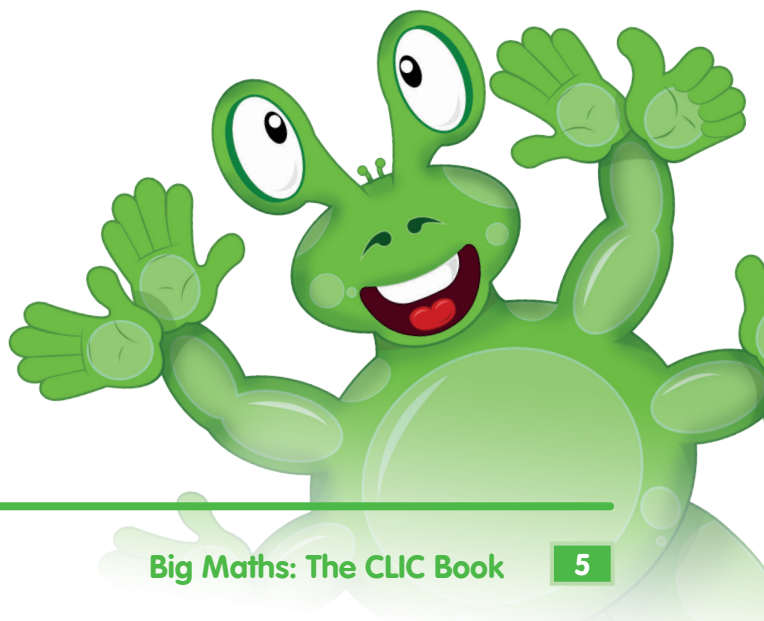
In summary... teach through CLIC.

4. Children need a structured, and regular, basic skills session: For children to become properly numerate they need a daily CLIC session, i.e. little and often. We might leave other areas of the primary curriculum for a period of time and then return to them, but this does not work for the basic skills. Children need to constantly be nudged up Progress Drives, with plenty of repetition, revisiting and reinforcement as they go.

In summary... provide a daily CLIC session.

5. Schools need to have whole-school organisation and alignment: A child should come through school with a basic skills journey of great continuity. The child should experience this journey as if they were being taught, and tracked, by one teacher. For this to happen all teachers need to be using the same steps of progression and teaching each individual step in a uniform manner. The CLIC framework therefore provides instantaneous whole-school organisation and alignment.

In summary... use CLIC across the school



About the author

Ben has been working in education for over 20 years, including 8 years of headship. He has written numerous publications that have totalled over 100,000 sales reflecting their impact in schools. As the creator of Big Maths he presents high-quality training in a clear, accessible and humorous way, travelling across the UK and worldwide. Ben is also a current Ofsted inspector.

It can be seen then that the Big Maths numeracy framework is designed;

- with empathy for the child who is learning to become numerate and then learning to use that numeracy,
- with empathy for the teacher that wishes to plan, teach and assess with great effectiveness and yet with great efficiency, and
- with empathy for the school leader wishing to establish a well embedded, consistent, transparent numeracy learning journey across the school that leads to the highest of standards.

If we 'drill-down' on each of these principles we see that they lead to other important approaches and fundamental teaching practices. This detail is all described in the partner book, 'The Big Maths Journey' by Ben Harding, which provides guidance on 'how to teach' Big Maths (whereas this book provides a 'what to teach' guide, and in which order). Here is an overview of the 5 principles:

1. Use Progress Drives

Big Maths harnesses the natural laws of science that apply to maths. This makes maths easy because it is a logical subject that follows a sequence of progression

obeying natural laws. For example, you can't count to 40 before you can count to 30. Historically, there has not been sufficient focus on identifying sequences of progression.

Big Maths promotes the use of pre-agreed sequences of progression (called 'Progress Drives') which prevent teachers from having to spend time 'reinventing the wheel' or second-guessing what senior members of staff might be looking for when analysing maths planning for progression. In this book you will find all of the Progress Drives for CLIC. When they appear in the book you first of all see the actual Progress Drive (this gives us progression at a glance) and then you see a break down of the teaching points to consider at each individual step (this gives us the progression in detail).

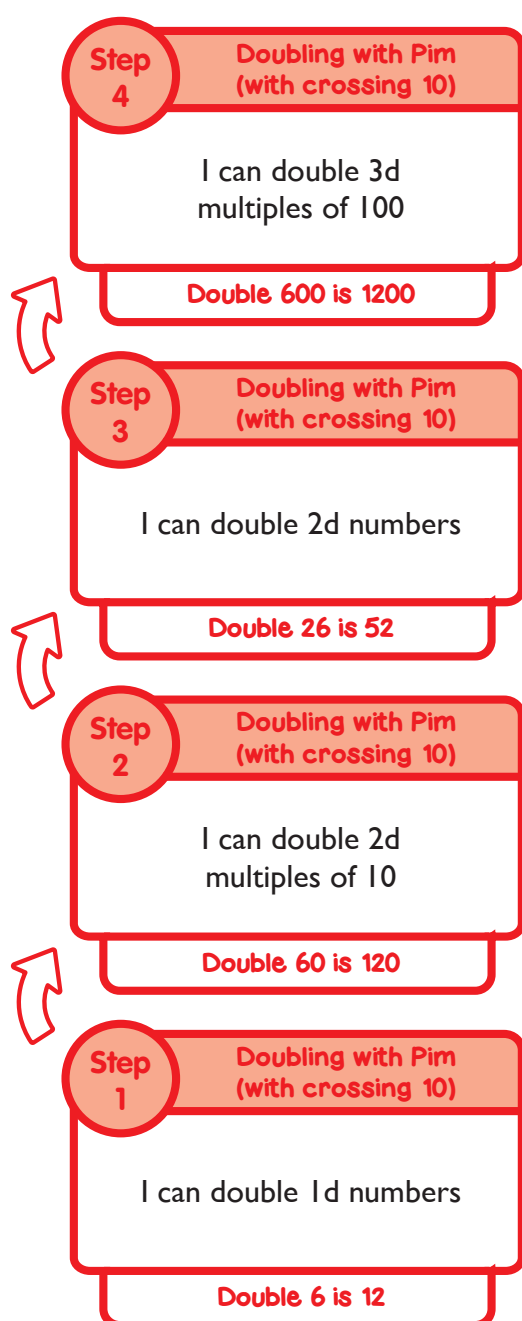
When using Progress Drives the teacher follows a 5 stage model that puts the child at the heart of the learning experience:

1. Know which step the learner is currently at (current attainment).
2. Know the next step (this comes from subject knowledge).
3. Re-locate the learner by teaching him / her well (this 'next location' comes from subject expertise, i.e. we apply our subject knowledge in a teaching and learning situation).
4. Check the learner has re-located by assessing collaboratively (this requires a further assessment).
5. Communicate the next location to the learner as a target.

A Progress Drive is just a sequence of progression for a thread of numeracy. They are very simple and very obvious, but they are also very powerful. In Big Maths we use them to plan from, to teach from, to assess against, to track with, to share, to save time, to celebrate and to gain whole school organisation and alignment!

Many children suffer from low confidence in maths. They either feel negative about maths as a subject or about their ability to cope with maths, or both. Big Maths seeks to address this by showing all children that the next step up the Progress Drive is always easy. For children to understand how and why it's easy, teachers need to understand how and why it is easy... and then pass on this understanding to the children.

Progress Drive Example



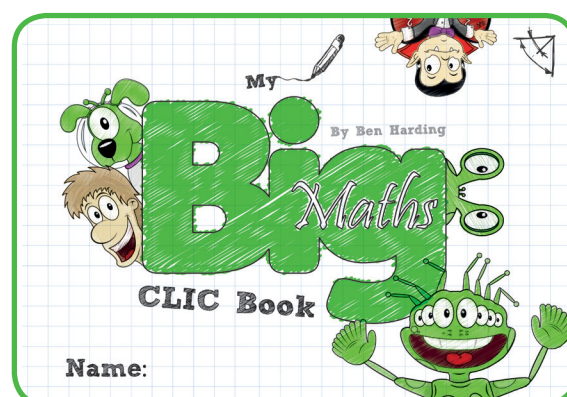
2. Prioritise CLIC

Big Maths clarifies the relationship between core numeracy, which includes the four essential elements of 'Counting', 'Learn Its', 'It's Nothing New' and 'Calculation' (CLIC) that lead to a person becoming numerate, and outer numeracy which is the use of core numeracy across the rest of the maths curriculum.

If we want children to 'use and apply' their numeracy successfully, then we need to get them numerate first! Once a child has a numerate ability then we can easily get them to use it in context. If a child knows $30 + 40$, then $30p + 40p$ is easy!

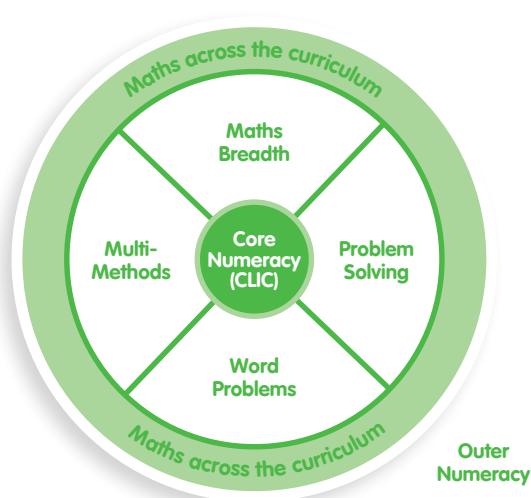
CLIC therefore needs to be prioritised. This is useful in itself since we are not left to face the enormity of the entire Mathematics curriculum. For example, at the school leadership level, getting a high quality CLIC journey embedded across the schools needs to be a priority before looking at Mathematics as a whole. It also means the individual teachers know that their focus each day is to input on the basic skills through the simple framework of CLIC, until the CLIC journey is complete. It also can be shared with the children so that they understand the CLIC framework and can see what their journey looks like.

Many schools like to use the children's CLIC book to show the CLIC journey, share the CLIC journey and celebrate every step of the CLIC journey with children, regardless of ability.



CLIC (i.e. Core Numeracy) is like a different subject to the rest of the Mathematics curriculum, and it needs to be treated differently. Quite often it needs its own way of teaching, it's own pedagogy (this is described in more detail in the partner book 'The Big Maths Journey').

For example, Core Numeracy is high on understanding but low on creativity. Children learn one core method that is taught the same way across the school, and only later on, as part of Outer Numeracy do we begin to teach and encourage multi-methods (see below).



It can be seen from the diagram that Outer Numeracy has 4 main areas:

1. **Maths Breadth:** this includes wider subject areas within the Mathematics curriculum, such as measures, probability etc.
2. **Problem Solving:** these are purely mathematical problems that in Big Maths we rephrase as 'Number Challenges'
3. **Word Problems:** these are mathematical problems wrapped up in a real life scenario. In Big Maths we rephrase these as 'Real Life Maths'
4. **Multi-methods:** here we look at different ways of solving the same

Mathematics question. The focus here is on efficiency rather than on understanding, and this leads us to look at the Column Methods for Calculation.

3. Teach Through CLIC

CLIC is fundamental to mathematical development because this is the learning sequence through which we all develop numeracy. It has a natural chronology;

First: Counting (children learn to count and to 'count on').

Second: Learn Its (children then short-cut this counting by recalling their 'counting on' as facts).

Third: It's Nothing New (children then 'swap the thing' to realise that the counting fact, or 'Learn It', can be applied to any object, amount or unit of measure).

Fourth: Calculation (the previous 3 phases are combined to provide a calculation structure).

As numerate adults, we all went through this chronology. As teachers, it is our job to ensure that this evolution takes place for all our pupils. This happens by guiding the children through the Progress Drives (sequences of progression) that naturally exist within each of the four elements of CLIC.

CLIC obeys the natural laws of progression and this chronology is logical for us, our brains are 'pre-wired' to accept this logic. For example, it doesn't make sense for a child to try to calculate 47 add 68 before he or she can add 40 and 60, and it doesn't make sense for them to learn $40 + 60$ before they have learnt $4 + 6$, and it doesn't make sense for children to learn $4 + 6$ before they can count to 10! Teaching through CLIC is productive and rewarding because it follows the natural sequence of mathematical development.

If we take children through the CLIC framework then they won't accumulate learning gaps in their basic skills.

It is also vital to have a weekly assessment package that assesses specifically against this framework. This weekly assessment should inform us what new learning has taken place during the week, as well as identifying any potential learning gaps that have not been spotted by the teacher.

This in turn allows us to plan for the next week ensuring children make continuous progress and addressing any unwanted learning gaps that may have developed. This is exactly what 'Big Maths Beat That' achieves. For further information regarding 'Big Maths Beat That' please see www.AndrellEducation.com

The CLIC Framework

Counting: There are 10 Progress Drives within Counting and they look like this:

| Step | Progress Drives | Amounts |
|------|--------------------|---------|
| 1 | Saying Numbers | 5 |
| 2 | Reading Numbers | 11 |
| 3 | Squiggleworth | 5 |
| 4 | CORE Numbers | 10 |
| 5 | Counting Skills | 5 |
| 6 | Actual Counting | 6 |
| 7 | Counting On | 5 |
| 8 | Counting Multiples | 9 |
| 9 | Count Fourways | 7 (x4) |
| 10 | Counting Along | 7 |

Learn Its: There is a single 15 Step Progress Drive for Learn Its and it looks like this:

| Step | Addition | Multiplication |
|------|--|-------------------------------|
| 1 | $1 + 1, 2 + 2$ | |
| 2 | $3 + 3, 4 + 4, 5 + 5$ | |
| 3 | $1 + 2, 2 + 3$ | Multiples of 10 - in Counting |
| 4 | $2 + 8, 3 + 7, 4 + 6$ | Multiples of 5 - in Counting |
| 5 | $4 + 2, 5 + 2, 6 + 2, 7 + 2, 9 + 2, 4 + 3, 5 + 3, 6 + 3$ | |
| 6 | $6 + 6, 7 + 7, 8 + 8, 9 + 9$ | Multiples of 2 - in Counting |
| 7 | $3 + 8, 3 + 9, 4 + 7, 4 + 8, 4 + 9$ | x 10 Table |
| 8 | $4 + 5, 5 + 6, 6 + 7, 7 + 8, 8 + 9$ | x 5 Table |
| 9 | $5 + 9, 6 + 9, 7 + 9, 5 + 7, 5 + 8, 6 + 8$ | x 2 Table |
| 10 | | x 3 Table |
| 11 | | x 4 Table |
| 12 | | x 8 Table |
| 13 | | The 6 Fact Challenge |
| 14 | | x 11 Table |
| 15 | | x 12 Table |

It's Nothing New: There are 10 Progress Drives within It's Nothing New and they look like this:

| Step | Progress Drives | Amounts |
|------|-----------------------|---------|
| 1 | The Pim Principle | 3 |
| 2 | Pim's Addition | 5 |
| 3 | Doubling / Halving | 5, 5, 6 |
| 4 | Jigsaw Numbers | 5 |
| 5 | $\times 10 / \div 10$ | 5, 5 |
| 6 | Smile Multiplication | 5 |
| 7 | Coin Multiplication | 5 |
| 8 | Where's Mully? | 5 |
| 9 | Pom's Words | 4 |
| 10 | Fact Families | 5 |

Calculation: There are 4 Progress Drives for Calculation and they look like this:

| Progress Drives | Amount of Steps |
|-----------------|-----------------|
| Addition | 41 |
| Subtraction | 37 |
| Multiplication | 19 |
| Division | 33 |

Column Methods: There are also 4 Progress Drives for the Column Methods. These Progress Drives and the teacher notes for each step can be found in the separate publication, 'Big Maths: The Column Methods' by Ben Harding. They look like this:

| Progress Drives | Amount of Steps |
|-----------------|-----------------|
| Addition | 14 |
| Subtraction | 12 |
| Multiplication | 11 |
| Division | 10 |



Overview of the CLIC Framework

| C | Progress Drive | Steps | Progress Drive | Steps |
|---|-----------------|-------|--------------------|--------|
| | Saying Numbers | 5 | Actual Counting | 6 |
| | Reading Numbers | 11 | Counting On | 5 |
| | Squiggleworth | 5 | Counting Multiples | 9 |
| | CORE Numbers | 10 | Count Fourways | 7 (x4) |
| | Counting Skills | 5 | Counting Along | 7 |

| L | The Learn Its Schedule |
|---|------------------------|
| | 15 |

| I | Progress Drive | Steps | Progress Drive | Steps |
|---|-------------------------|---------|----------------------|-------|
| | Pim the Alien | 3 | Smile Multiplication | 5 |
| | Adding with Pim | 5 | Coin Multiplication | 5 |
| | Doubling & Halving | 5, 5, 6 | Where's Mully? | 5 |
| | Jigsaw Numbers | 6 | Pom's Words | 4 |
| | $\times 10$ & $\div 10$ | 5, 5 | Fact Families | 5 |

| C | Progress Drive | Steps |
|---|----------------|-------|
| | Addition | 41 |
| | Subtraction | 37 |
| | Multiplication | 19 |
| | Division | 33 |

4. Have a Daily CLIC Session

CLIC is a sequential programme of daily basic skills for numeracy. Implementation of this programme ensures that all children have a constant, daily drive to 'up-level' their numeracy. This frequency and focus is an essential element of the approach.

Planning CLIC Sessions

At its most basic, CLIC involves teaching each stage in 4 roughly equal sized stages of 5 minutes each. This, then, leaves time for the main part of the mathematics lesson, which may be the extension of learning in an aspect of CLIC or may be an aspect of maths not addressed through CLIC, such as co-ordinates.

However, because CLIC covers the majority of the key areas of the maths curriculum, it may be that the entire lesson is sometimes devoted to it. The length of each of the four stages is flexible and may vary from day to day according to current priorities raised through formative assessment. Teachers should use their professional judgement to decide what would be most productive for the children on any given day. Sometimes it might be most profitable to miss out one of the four stages entirely. What is most important is to retain the basic structure, across the whole school, over time, as the constant focus is to drive progress forward so all children become properly numerate.

That good teaching requires teachers to know their children's academic abilities in detail is obvious, and clearly English and Mathematics require a higher profile than the rest of the curriculum areas. However,

what is less obvious is the priority within Mathematics that should be placed on Core Numeracy, i.e. CLIC! This book therefore is a vital tool for planning, teaching and assessing the basic skills for Mathematics. Since we have always had to teach the content in this book, for many teachers the actual mode of delivery may well be identical to how they already teach. In this case it is simply a case of:

- re-focussing on the basic skills as a priority,
- restructuring the basic skills session to follow the chronology of CLIC,
- using the Progress Drives to track every child carefully,
- assessing that rate of progress against the journey described in the 'CLIC on Your Planning' document (available from www.AndrellEducation.com)
- liaising in detail with other staff to ensure every child experiences a smooth numeracy journey through school without any learning gaps accumulating.

Teachers will not need to spend time planning how to teach the steps themselves since the Progress Drives, along with the planning notes, provide the detail most schools require (see example of suggested planning framework that follows). In other words, there is very little to write down.

Teachers may well wish to use the time released from adopting pre-agreed Progress Drives to gather their own resources for CLIC and to focus on the crucial issue of personalisation.

CLIC Planning for Progress: Weekly view

Class:
Date:

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|--|--|--|--|------------------------------|
| C | | | | | Big Maths Beat That |
| L | | | | | |
| I | | | | | |
| C | | | | | |
| | Personalisation (Meeting the needs of every child) | Personalisation (Meeting the needs of every child) | Personalisation (Meeting the needs of every child) | Personalisation (Meeting the needs of every child) | |
| | Revisits in day | Revisits in day | Revisits in day | Revisits in day | |

CLIC Planning for Progress: Weekly view

Class:
Date:

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|--|--|--|---|-----------------------------------|
| C | <p><u>Count Fourways (5s)</u></p> <p>Move class counting from 5s to 5 things (5 apples, 10 apples, 15 apples etc.)</p> | <p><u>Count Fourways (5s)</u></p> <p>Move class counting from 5 things to 5 tens (5 tens, 10 tens, 15 tens etc.), then to 50, 100, 150 etc.</p> | <p><u>Count Fourways (5s)</u></p> <p>Consolidate counting in 50s from yesterday</p> | <p><u>Count Fourways (5s)</u></p> <p>Move class counting from counting in 50s to 50 things, take into measures: 50g, 100g, 150g</p> | <p>Big Maths Beat That</p> |
| L | <p>$5 + 4 = 9$ $5 + 6 = 11$ $6 + 7 = 13$</p> | <p>$5 + 4 = 9$ $5 + 6 = 11$ $6 + 7 = 13$</p> | <p>$5 + 4 = 9$ $5 + 6 = 11$ $6 + 7 = 13$</p> | <p>$5 + 4 = 9$ $5 + 6 = 11$ $6 + 7 = 13$</p> | |
| I | <p><u>Jigsaw Numbers (Step 2)</u></p> <p>Revisit/Ensure all children secure with this step</p> | <p><u>Jigsaw Numbers (Step 3)</u></p> <p>Introduce jigsaw numbers to 100</p> | <p><u>Jigsaw Numbers (Step 3)</u></p> <p>Children set out on number line, showing one jump to 100 from 2d no</p> | <p><u>Jigsaw Numbers (Step 3)</u></p> <p>Shift understanding to new context: $100 - \quad = 34$</p> | |
| C | <p><u>Addition (Step 25)</u></p> <p>Move class along FAB continuum by getting them to 'show me' just the tens total and units total</p> | <p><u>Addition (Step 25)</u></p> <p>Progress from yesterday by expecting children to now also write total on Brain Scanners</p> | <p><u>Addition (Step 25)</u></p> <p>Expect all children to now just give answer to $2d + 2d$ questions, and solve completely mentally</p> | <p><u>Addition (Step 26)</u></p> <p>Introduce the 'parking up' of hundreds number in $3d + 2d$</p> | |
| | <p><u>Personalisation</u></p> <p>Jamie: still unsure with $5 + 6$ & $6 + 7$. Mark: still unsure with $5 + 6$ less/Dev/Sam: support with 10s total in addition</p> | <p><u>Personalisation</u></p> <p>Mark and Holly to both have TA time today. L3 CLIC test scores have flat-lined (low success on Qs3,4 and 8)</p> | <p><u>Personalisation</u></p> <p>Jessica/Andrew/Sam: assess carefully their $2d + 2d$ answers, drill down to tens answer if incorrect</p> | <p><u>Personalisation</u></p> <p>Jamie: in revisits today ask $2d + 2d$ Qs to class that include $50 + 60$ & $60 + 70$ so can re-assess Jamie's recall</p> | |
| | <p><u>Revisits in day</u></p> <p>5 times table fact families: 5×7, 5×9, 5×4</p> | <p><u>Revisits in day</u></p> <p>5 times table fact families: 5×8, 5×6, 5×3</p> | <p><u>Revisits in day</u></p> <p>$2d + 2d$ being solved totally mentally</p> | <p><u>Revisits in day</u></p> <p>$2d + 2d$ being solved totally mentally</p> | |

5. Use CLIC across the school

The Benefits

Where schools use the CLIC folders to support Big Maths the following benefits will be felt:

- All children will receive a focussed and personalised daily up-levelling of their numeracy in a simple progressive structure that they can themselves understand. This has the potential to transform levels of numeracy, and levels of numeracy confidence.
- All teachers will be providing common and consistent messages throughout the school. This provides children moving through the school with a smoother numeracy development journey and therefore more rapid progress.
- Children will be able to understand each new step on their journey because the Progress Drives and the teaching methods make the mathematical concepts easily accessible to all.
- Because national curriculum links are made (through the 'CLIC on Your Planning' document available from www.AndrellEducation.com) it is easier for teachers to relate pupils' learning outcomes to assessment evidence. It also means teachers can extend their knowledge of where national curriculum expectations aspects of numeracy are positioned at, and develop a more robust feel for which standard their pupils are currently attaining at.
- The Progress Drives provide all teachers with the subject knowledge needed for highly effective numeracy teaching. They also provide a common dialogue which enhances the quality of discussions and professional development activities in school.
- Sharing the Progress Drives with children enhances the 'assessment for learning' basis of Big Maths. Pupils can see their next steps and what they need to do next to make further progress. Children can also see the progress they are making and celebrate their achievements.
- Confidence levels for staff and children to understand numeracy development will be very high, and the strong belief that all children can become numerate will be passed on from staff to pupils.

