Mathematics Policy

2021-2022

VISION:

Challenging educational orthodoxies so that every child makes good progress in core subjects;
all teachers are committed to personal improvement and fulfil their responsibilities;
all children receive a broad and balanced curriculum;
all academies strive to be outstanding.



Written by L. Hessey (CEO/NLE/FCCT)

Agreed by Maths Network Leaders

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1. Introduction

At The Forge Trust, we believe that Mathematics, alongside English, is one of the two most important subjects that children need a firm grasp of by the time they leave primary school.

Although there are many topics in Mathematics, we prioritise calculation and mental arithmetic, along with using and applying and reasoning skills, because we consider these areas to be the most crucial everyday skills that children will need in later life to survive and prosper.

The purpose of this policy is to inform teachers, leaders, trustees and parents of the teaching of Mathematics in The Forge Trust's academies. It is intended to state categorically that we believe children should leave school with a firm grasp of Mathematics, and the necessary grades to compliment this. Exam results are 'currency' for children who attend academies in The Forge Trust, which prepares them well for the next phase of their education, and which can result in children accessing further education at a later age, and securing quality jobs in the real world of work.

2. Aims

The aim for teachers of Mathematics is to encourage and enable children to recognise the importance of the subject in every day life and the world around us. We want children to be confident and enjoy the subject. We aim for children to enjoy the subject, and develop patience and persistence when solving problems. The process of applying logical and critical thinking to a mathematical problem in order to work out the correct strategy to solve the problem is called 'reasoning'. This is a key area for children to grasp and become able mathematicians. Children should be proficient at written arithmetic and calculation, and be able to use and apply these skills competently.

3. What does daily Mathematics look like in The Forge Trust?

Mathematics lessons vary in length depending on key stage.

A typical Forge school in Foundation Stage 2:

Duration of Session	Lesson Aspects
45 mins	Mathematics
30 mins	Intervention and 'catch up' / Whole School Target Setting

A typical Forge school in Key Stage 1:

Duration of Session	Lesson Aspects
55 mins	Mathematics-written arithmetic and using and applying (reasoning)
30 mins	Whole School Target Setting

A typical Forge school in Key Stage 2:

Duration of Session	Lesson Aspects
60 mins	Mathematics- written arithmetic & using and applying (reasoning)
30 mins	Whole School Target Setting

From Year 1, all children have two books in Mathematics. A formal squared paged Maths book, and a Mental Maths Jotter.

3.1 The Mental Maths Jotter

It is important for teachers to think carefully about evidence and how they use it to support making an informed judgement about children. The mental/oral starter is one situation where such evidence might occur. This evidence might be something a child said or something they recorded. If they recorded it on a white board then this might easily be rubbed off and the evidence is lost. However, if children have a mental recording book that supplements white board use, then the evidence builds and does not need repeated trips to the photocopier! This is only one occasion when a mental maths book could be used.

Other occasions might include:

- for gap analysis to precision teach specific questions a child got wrong in a termly assessment or pre-test for a topic.

See Appendix 3 for detailed guidance on The Mental Maths Jotter.

3.2 The Forge Trust's Definition of 'Mastery'

'Mastery' is a widely used term used by the profession. It embraces the idea that children should not move on to the next 'level' of learning (for example, a pupil in Y5 achieves all criteria for ARE should not move on to Y6 objectives). It is widely accepted by the Mathematics specialists that children should display a high degree of competence before progressing. Although the trust's stance recognises the value in getting children to apply their learning, whether it be through open ended investigations or other consolidation activities at an age related level, we disagree with not challenging children with expectations higher that their age related expectation. We set for Mathematics across the trust, and the lower sets cover age related material because we have high expectations. Therefore by upper Stage 2 children in higher sets are completing content higher that their age related expectations. The trust's vision statement for the trust states that we 'challenge educational orthodoxies', and this is one example. We can back our stance as a trust because standards in the subjects are above national average in the vast majority of our schools. We also challenge educational orthodoxies because the teaching profession is largely against setting, and we believe it is a vital tool in accelerating pupil progress.

4. Planning

4.1 *Long Term Planning*

Full coverage of each year group's ARE (age related expectations) is covered in the appendices in Appendix 1. These objectives are covered in the short-term weekly planning for each year group. In Mathematics, we organise learning in sets. We believe this allows for the more able mathematicians to make better progress and lessons are differentiated to ensure that all children are suitably challenged. It is important to note that the 'lowest' sets still cover age related material linked to national standards.

4.2 *Medium-term Planning/weekly short-term Planning*

Class teachers complete a sequence of lessons with an overarching learning journey for the teaching of key topics in Mathematics in each year group. This lists specific learning objectives and success criteria for each lesson, with details of how the lessons are to be taught (see appendix 2). These are evaluated to inform future planning.

In order to personalise teaching for each set in Mathematics, teachers pre-test children using written pupil interviews that include the full range of national curriculum criterion for each topic. This written document for each child allows teachers to better plan to fill the gaps in knowledge and therefore accelerate pupil progress. There is no need to cover age related material that children already know. A similar process can be followed after a termly

summative test, where teachers perform a gap analysis of the question areas and subsequently plan a learning journey to meet the needs of the children in the set.

5. Calculation Policy

In all year groups, our trust's approach to calculation is structured and prioritised above all other areas of Mathematics. The policy ensures that there is consistency in the development of calculation across the trust. In the autumn term, calculation as a strand is intensely covered. For example, by the end of Year 5 the expectation is that all children are proficient in written methods for all four operations. We believe this gives children a great foundation to go on and be very able mathematicians with crucial life skills.

See Appendix 5 for The Forge Trust's Calculation Policy.

6. Mental Maths

This is an important area of Mathematics and the National Curriculum states that by the end of year 4, children should know their multiplication facts to 12 times 12. We encourage children to learn their tables at home and at school. All schools use 'Times Table Rockstars', where each child completes online challenges aimed at speeding up their recall of multiplication facts and times tables. Teachers also use written forms for children to complete times tables activities in five minute starters. Children are challenged on basic facts and eventually are able to multiply decimals mentally. For paper versions of times tables challenges see Appendix 6.

7. Whole School Target Setting

There are two approaches to formulating termly targets throughout school.

1. Take Year 6 areas for development (from SATs analysis) and cascade these down throughout school from Y6 to Y1;
2. Separate KS2 and KS1 and use the SATs analysis from both key stages to set targets for each key stage the following year.

A discussion should take place between the school's SLT and a member of the trust's ESLT to decide on the best approach for each school.

Note: There should be a visual display in each school of whole school targets from Year 1 to Year 6 showing tracked objectives (taken from each cohort's ARE grids) that teachers and school leaders can refer to in assemblies. This strategy helps maths school improvement to stay high profile throughout school.

Month → Year Group	October	December	February	April	July
Flight Path Year 6	60 %	65 %	70 %	75 %	**80 %**
Year 5	55 %	60 %	65 %	70 %	**75 %**
Year 4	55 %	60 %	65 %	70 %	**75 %**
Year 3	50 %	55 %	60 %	65 %	**70 %**
Year 2	50 %	55 %	60 %	65 %	**70 %**
Year 1	45 %	50 %	55 %	60 %	**65 %**
Foundation Stage 2	50 %	55 %	60 %	65 %	**70 % (ELG)**
Foundation Stage 1	45 %	50 %	55 %	60 %	**65 % (40-60B)**

8. Attainment Flight Path-End of Year Expectations

9. Assessment

9.1 Key Assessment Points

The trust recognises the key check points to gather data. However, they key points are as follows:

- *EYFS-Foundation Stage 1 Baseline and Foundation Stage 2 end of year data*
- *Year 2 SATs*
- *Year 4 Times Tables test and 'level'*
- *Year 6 SATs*

9.2 Teacher Assessment, Pupil Interviews and Marking and Feedback

Teacher assessment involves teachers making a judgement on what each child can do independently against specific criterion (Appendix 3). Teachers should give each child a pupil interview at the end of each term (Appendix 8) where children answer questions related to every criterion related to their age expectations. Appendix 8 quantifies the child's attainment level.

Pupil interviews can be used for each 'topic', and can be used to pre-and end-test each child before and after a unit of work. This strategy is particularly useful to aid planning, and ensure that coverage is relevant and therefore pupil progress is maximised. Work should always be pitched just above the child's current ability level.

Formative assessment through marking and feedback is crucial for children to learn and make good progress. The quality of written 'prompts' is crucial for children to respond to misconceptions. This is vital evidence of learning for each child.

10. The Expectations for Mathematics Leaders in each Academy

At the end of each academic year, it is the job of the Mathematics leader to analyse the data from each cohort and identify the weakest areas. In a report (one page of A4) leaders should then highlight strengths across school, and more importantly recommend the three weakest areas throughout school to work on in an extra weekly target setting session (20-30 mins per week). These termly targets form the whole school target setting, where teachers pre-and end-test children with progressively harder questions. It is our intention for each child to demonstrate progress in that particular strand. For example, fractions.

Leaders also need to have a grip on when the monitoring tasks for their subject are happening, and work closely with the Principal and Vice/Assistant Principals on these monitoring activities. Typically, monitoring activities will include a round of formal observations, various TMVs (informal observations) and a full work scrutiny (planning and marking and feedback). Leaders will also assess the data throughout school following each termly assessment point, and discuss any remedial actions with the wider leadership team.

The Forge Trust's termly network groups are the vehicle to implement improvements and discuss challenges with other Mathematics leaders across the trust.

11. Monitoring and Review

Monitoring of the subject is undertaken on a regular basis, through planning and book scrutinies, lesson observations and pupil interviews. The current dates are available in the Monitoring & Evaluation Policy 2020-2021.

This policy will be reviewed during the Autumn Term 2021.

T. Airey (Maths Leader)
The Sir Donald Bailey Academy

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The Parkgate Academy

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The Forest View Academy

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The Python Hill Academy

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The Forge Trust

Appendix 1 – Template for Maths Planning 2020-2021

	Maths Plans Subject: **English** Term: **Autumn**	**Set:** **Date:**	THE sir DONALD BAILEY ACADEMY LABOR OMNIA VINCIT		
Learning Objective: HA/MA/LA Process Led **Success Criteria (HA/MA/LA):** • **NC Link:**		**PHASES OF LESSON**			
		Whole Class Input (Key Questions) (Separate exposition?)	Independent/Group Activities (including ***differentiation***)	**Guided Group** (where the teacher goes when children are completing activities)	**Plenary** (Think about 4 'C's: Consolidate, Challenge, Create, Celebrate)
Lesson 1	Consider different learning objectives for different groups of children.	Make sure teachers bullet point phases of lesson. Someone else should be able to follow your planning! • …….. (5 mins) • ……..(10 mins) Note: Make sure each page has headings!			Plenary should never be just to celebrate! Also, mini-plenaries can be included mid-lesson. Teachers use discretion.

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The Mental Maths Jotter

1	2	3	4	5	6	7	8	9	10
5	10	15	20	25	30	35	40	45	50
10	20	30	40	50	60	70	80	90	100
15	30	45	60	75	90	105	120	135	150
20	40	60	80	100	120	140	160	180	200
25	50	75	100	125	150	175	200	225	250
30	60	90	120	150	180	210	240	270	300
35	70	105	140	175	210	245	280	315	350
40	80	120	160	200	240	280	320	360	400
45	90	135	180	225	270	315	360	405	450
50	100	150	200	250	300	350	400	450	500

Why should we use it?

How could we use it?

Written by L. Hessey

September 2020

Introduction

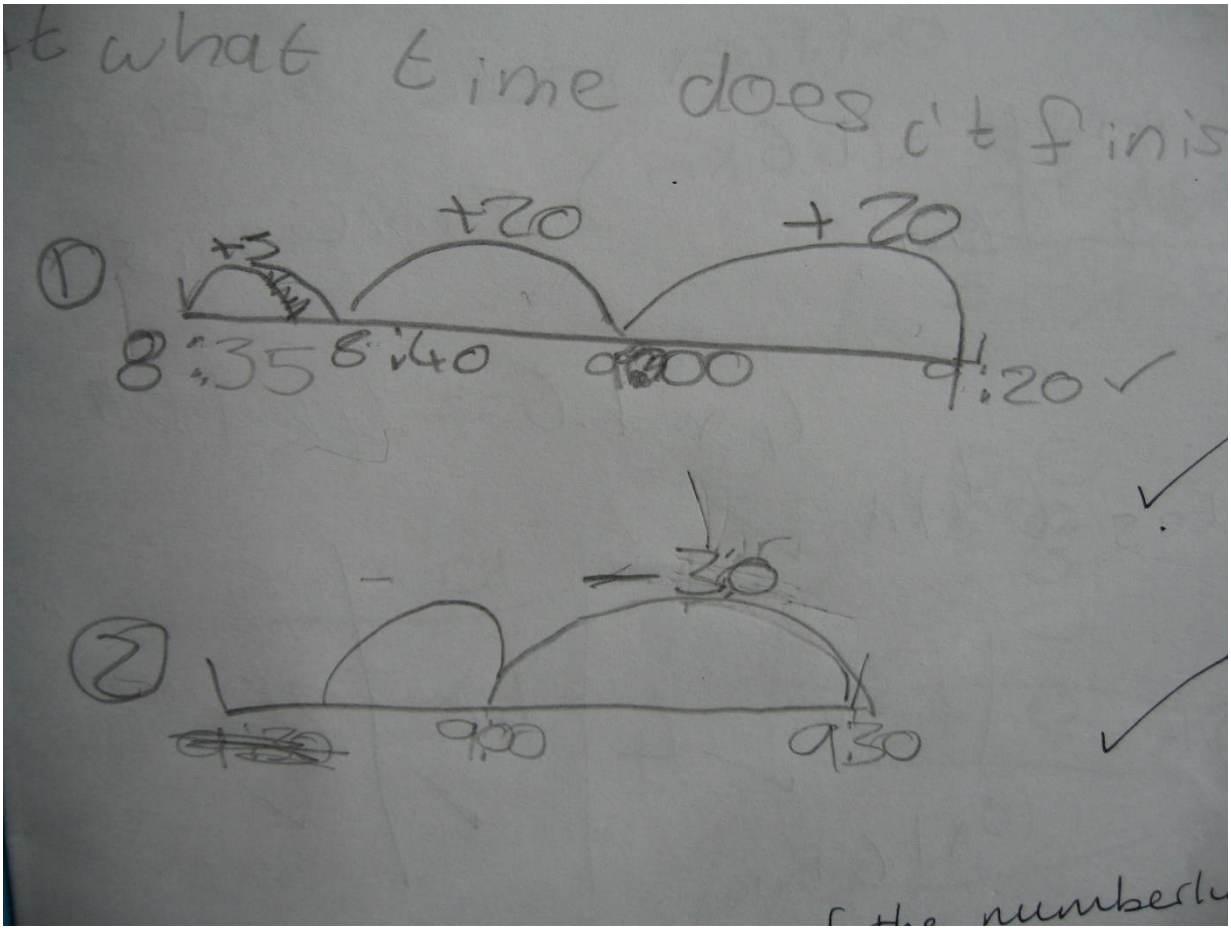
It is important for teachers to think carefully about evidence and how they use it to support making an informed judgement about children. The mental/oral starter is one situation where such evidence might occur. This evidence might be something a child said or something they recorded. If they recorded it on a white board then this might easily be rubbed off and the evidence is lost. However, if children have a mental recording book that supplements white board use, then the evidence builds and does not need repeated trips to the photocopier!

This is only one occasion when a mental maths book could be used. This document aims to consider other ways in which a mental maths book could be used productively in classroom practice.

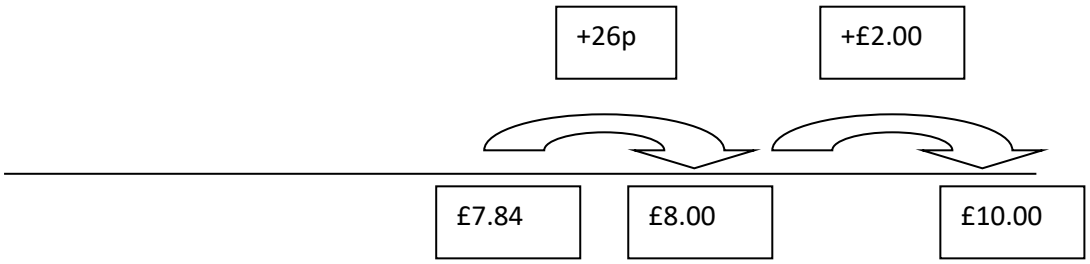
To Inform Planning

Children's recordings clearly show their thinking. If a child is promoted to show a number line in their mental maths book, like the one below, they not only break down how they attempt a calculation but also show small steps that might be missing. These small steps could be holding the child back and might represent difficulties that a collection of children have. This informs our planning so that we can make messages explicit but also consider possible intervention they need.

Appendix 1 and 2 both discuss jottings and give some child examples.



Working out change



If a child made the mistake above and recorded an answer of £2.26 change from £10.00 when spending £7.84 we obviously know where they have gone wrong but a number line shows more. This child does not jump to the next 10p. We would want to address this so our planning and provision for the child reacts to their needs.

Assessment *of* Learning

The previous example 'Working out change' clearly shows assessment *for* learning. When considering assessment *of* learning we not only want to see if they can carry out a skill but if they can apply it. Applying a skill might involve a word problem, a real context or a problem solving task. The key element is that children should show some choice. We cannot confidently say a child has a good grasp of a skill until they select it and use it successfully in a given context.

If you gave the following calculations to your children which ones would you expect them to partition (both numbers or one and then count on) and which ones should they compensate and adjust? Or are there other methods they might select?

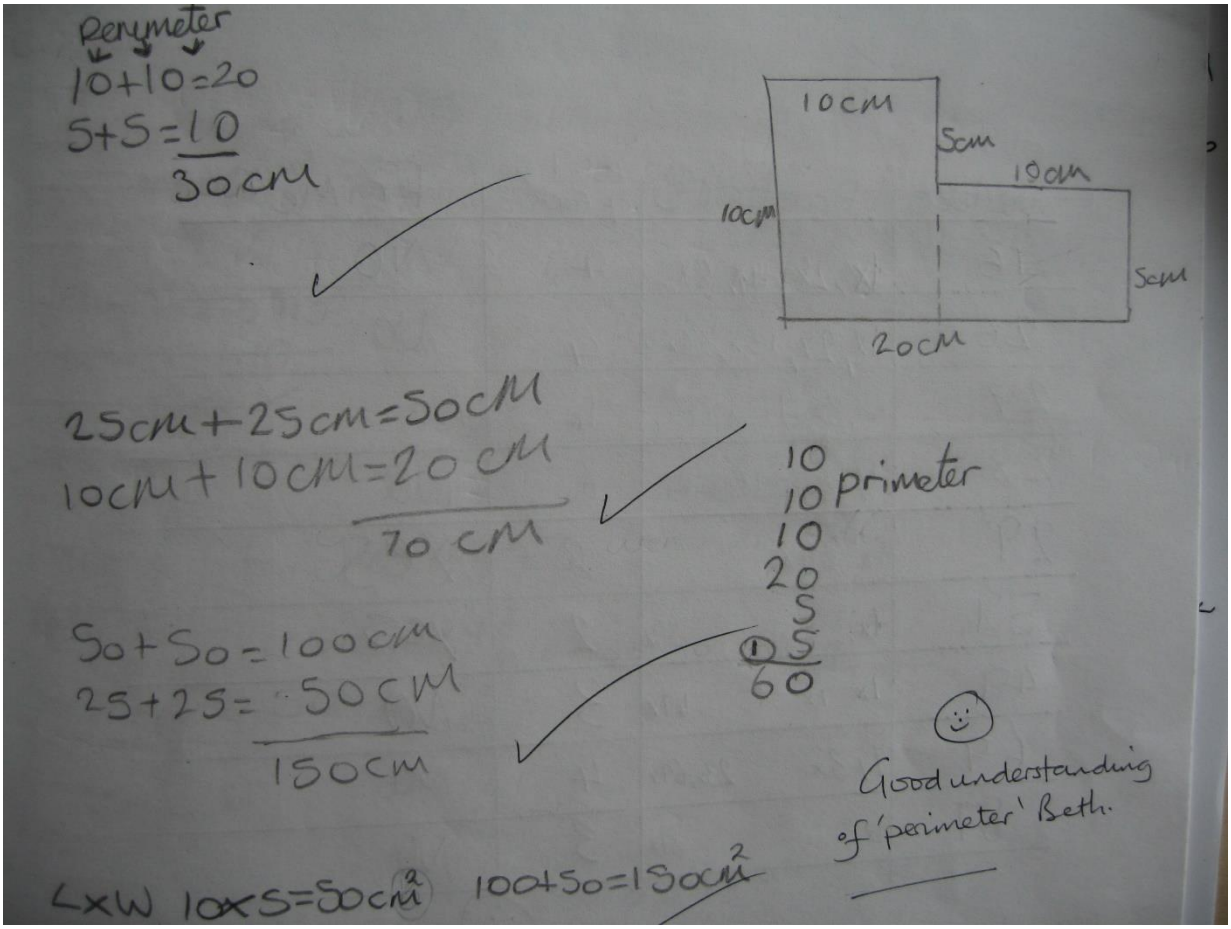
£3.95 + £2.50=

75cm + 36cm=

37 + 19=

76 + 28=

Children can explain how they worked out a calculation but this can be tricky to assess when considering the whole class. The mental maths jotter could be a place where children clearly record the steps they take to solve a problem. This also promotes the idea that the journey from the question has a value. Not just the answer.

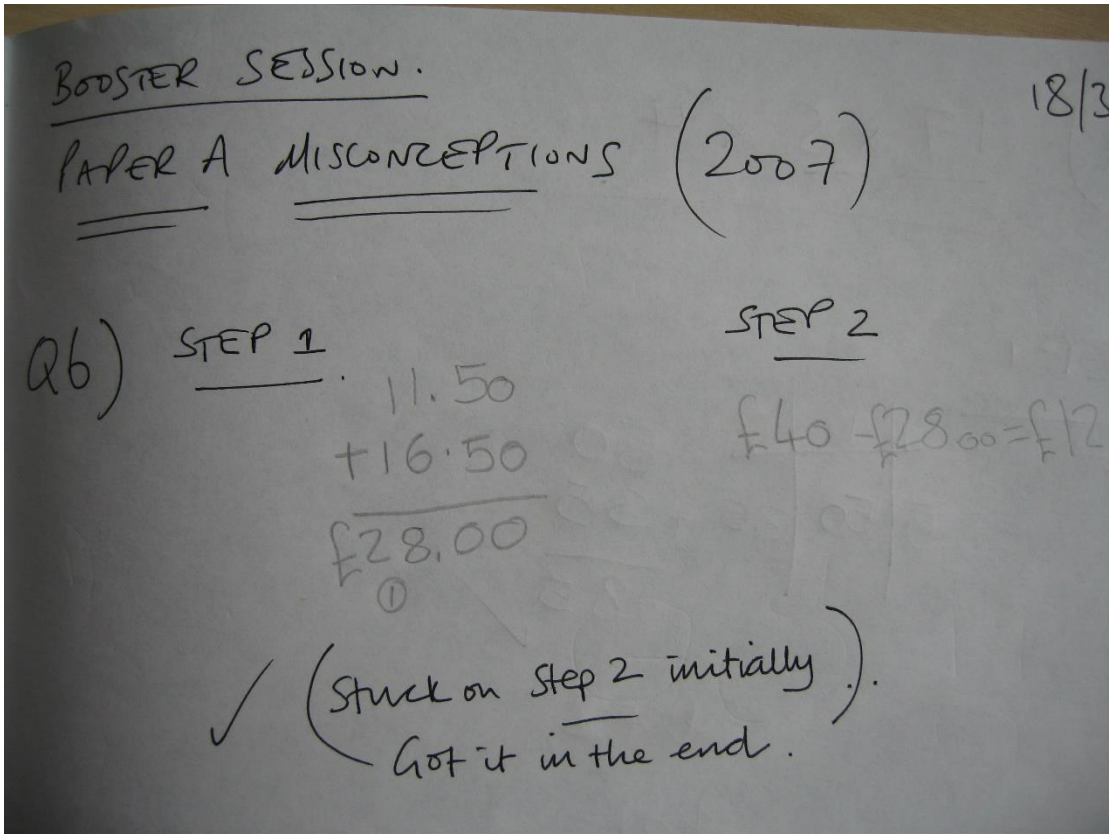


The 6 Rs.

When considering the mental/oral starter it is worth thinking about the 6 Rs below. Do children in your class experience this range? Reviewing the content of children's mental maths book would help consider this question (Obviously not all starters require recording).

Six Rs	Learning focus	Possible activities
Rehearse	To practise and consolidate existing skills, usually mental calculation skills, set in a context to involve children in problem solving through the use and application of these skills; use of vocabulary and language of number, properties of shapes or describing and reasoning.	Interpret words such as *more*, *less*, *sum*, *altogether*, *difference*, *subtract*; find missing numbers or missing angles on a straight line; say the number of days in four weeks or the number of 5p coins that make up 35p; describe part-revealed shapes, hidden solids; describe patterns or relationships; explain decisions or why something meets criteria.
Recall	To secure knowledge of facts, usually number facts; build up speed and accuracy; recall quickly names and properties of shapes, units of measure or types of charts, graphs to represent data.	Count on and back in steps of constant size; recite the 6-times table and derive associated division facts; name a shape with five sides or a solid with five flat faces; list properties of cuboids; state units of time and their relationships.
Refresh	To draw on and revisit previous learning; to assess, review and strengthen children's previously acquired knowledge and skills relevant to later learning; return to aspects of mathematics with which the children have had difficulty; draw out key points from learning.	Refresh multiplication facts or properties of shapes and associated vocabulary; find factor pairs for given multiples; return to earlier work on identifying fractional parts of given shapes; locate shapes in a grid as preparation for lesson on coordinates; refer to general cases and identify new cases.
Refine	To sharpen methods and procedures; explain strategies and solutions; extend ideas and develop and deepen the children's knowledge; reinforce their understanding of key concepts; build on earlier learning so that strategies and techniques become more efficient and precise.	Find differences between two two-digit numbers, extend to three-digit numbers to develop skill; find 10% of quantities, then 5% and 20% by halving and doubling; use audible and quiet counting techniques to extend skills; give coordinates of shapes in different orientations to hone concept; review informal calculation strategies.
Read	To use mathematical vocabulary and interpret images, diagrams and symbols correctly; read number sentences and provide equivalents; describe and explain diagrams and features involving scales, tables or graphs; identify shapes from a list of their properties; read and interpret word problems and puzzles; create their own problems and lines of enquiry.	Tell a story using an interactive bar chart, alter the chart for children to retell the story; start with a number sentence (e.g. 2 + 11 = 13) children generate and read equivalent statements for 13; read values on scales with different intervals; read information about a shape and eliminate possible shapes; set number sentences in given contexts; read others' results and offer new questions and ideas for enquiry.
Reason	To use and apply acquired knowledge, skills and understanding; make informed choices and decisions, predict and hypothesise; use deductive reasoning to eliminate or conclude; provide examples that satisfy a condition always, sometimes or never and say why.	Sort shapes into groups and give reasons for selection; discuss why alternative methods of calculation work and when to use them; decide what calculation to do in a problem and explain the choice; deduce a solid from a 2-D picture; use fractions to express proportions; draw conclusions from given statements to solve puzzles.

Scaffolding



Scaffolding children's learning has a variety of forms. One such way might involve breaking down a task into manageable 'chunks' for the children. You can annotate key boundaries or signposts for children to follow as they work through a problem (Similar to a writing frame).

For the above example we can see that a child needed support breaking down a SATs question which required the skill of finding change after working out a total. This approach can be used in a wide range of mathematical situations. Within mental maths you might discover a weakness and once you begin to unpick why a child struggles with a concept you can then begin to consider the small steps that they need to become

successful. Once you consider the small steps you can begin to focus the scaffolding towards their needs. The above example obviously follows on from some verbal work. Scaffolding within the jotter might involve the teacher part-working through an area of maths.

For example:

Underlined would be where a child fills in

Approximate the answer to 32x76=

32 rounded is 30

76 rounded is 80

Use tables facts and place value to multiply 30 and 80

3 x 8= 24

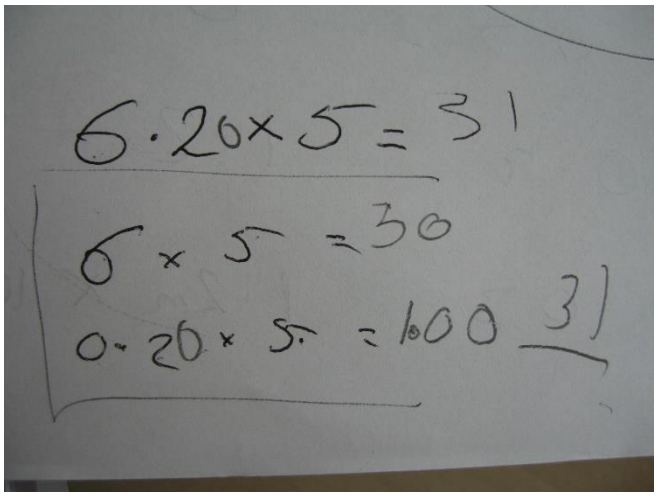
so 30 x 80 = 2400

As well as written recording you might include photographs of the steps. For example, if we had a group of children who had

received some support on multiplying and dividing by ten by moving left and right on chairs, we could use the photographs of before and after the moves to act as a reminder. This would support younger children to help remember the journey towards an answer by basing it on an activity they had previously encountered.

WAGOLL- What a good one looks like

Children need to know what the learning objective is and what the success criteria are (the steps they need to take so they can do well). To support this we should also aim to model what a good one *might* look like. The word *might* is important here as we want to promote a range of methods.



The above example shows more scaffolding and a WAGOLL for multiplying by decimals. This is not the only way to tackle the calculation but it did follow on from a conversation about multiplying money. That is why you see the zero added in after 6.2. It helped the child gain a better understanding of what decimals are. Another WAGOLL might look like the following:

6.2 x 5=

62 x 5= 60 x 5=300 and 2 x 5=10 so 62 x 5=310

So we know 6.2 x 5=31

We might then move the child on to x10 then ÷2

We often put WAGOLLs on display on classroom walls. The maths jotter is another suitable place to give children good examples of expectations. Children might record their own for future reference. If you had young children who struggle counting accurately they might receive some corrective action as part of a guided group. This input could be photographed and placed in their jotters if they worked on a flipchart of a whiteboard as part of a group. The teacher can then promote the child to apply the skills in class and use the jotter to aid this.

Other Adults (including Teaching Assistants)

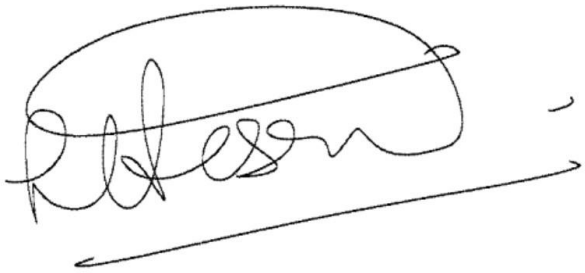
It is important that 'other adults' who support teachers in our schools are skilled at teaching. They can work one-to-one with a child or support any group with their learning, following the guidance and advice of the teachers. Communication between the teacher and the other adult is vital if their work is to be successful. Time is valuable in school, and it is not always easy for the other adult and teacher to discuss work that has taken place. The jotter can become a tool to aid communication as a record book. This does not mean a collection of sheets! It could however, have the work the children did with some annotations (e.g. What they found difficult, how they moved on, what small steps they have improved, what they still find difficult). This would give feedback on the group and help with assessments as it is vital to check for the impact of the work. Furthermore, it should show the thinking that has taken place as well as the learning. As discussed in the WAGOLL section, we might also put photographs of support into books to aid the application of skills and knowledge in the classroom.

Summary

In essence the mental maths jotter is a record of work similar to a normal exercise book. It does however promote children to think more carefully about their methods and not just practise skills towards a correct answer. It does look at the accuracy of an answer, but more importantly the journey the child took to get the answer.

The ideas in this document are just a few examples of how a teacher might choose to use a mental maths jotter. The jotter can also be used for problem solving as children are not restricted in how they record.

Be creative and use the jotter in what ever way you feel necessary as long as it supports learning and has an impact.



L. Hessey (Principal / CEO)

Appendix 4-ARE Expectations and Coverage in Mathematics

Vision:

Challenging educational orthodoxies so that every child makes good progress in core subjects; all teachers are committed to personal improvement and fulfil their responsibilities; all children receive a broad and balanced curriculum; all academies strive to be outstanding.

Mathematics ARE National Curriculum Expectations

- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Year 6

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Year 1 ARE Maths Expectations	Achieved (✓) & Dated	Depth (✓) & Dated
Number and Place Value		
I can count to and across 100 (forwards and backwards)		
I can read and write numbers to 100 in numerals		
I can count forwards in multiples of two, five and ten		
I can identify one more or less than a given number		
I can identify and represent numbers using objects and pictorial representations (including the number line)		
I can use the language of equal to, more than, less than (fewer), most and least		
I can read and write numbers from 1 to 20 in numerals and words		
Addition and Subtraction		
I can read, write and interpret mathematical statements involving addition (+) subtraction (-) and equals (=) signs		
I can represent and use number bonds and related subtraction facts within 20		
I can add and subtract one digit and two digit numbers to 20, including zero		
I can solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations		
I can solve missing number problems such as: 7 = __ - 9		
Multiplication and Division		
I can make connections between arrays, number patterns and counting in steps of 2, 5 and 10		
I can use concrete objects, pictorial representations and arrays to solve one-step problems involving multiplication and division (with support of the teacher)		
Fractions		
I can recognise, find and name half as one of two equal parts of an object, shape or quantity		
I can recognise, find and name a quarter as one of four equal parts of an object, shape or quantity		
Measurement		
I can measure and begin to record: ○ lengths and heights ○ mass/weight ○ capacity and volume ○ time (hours, minutes, seconds)		
I can compare and describe using accurate language: ○ lengths and heights (for example, long/short, longer/shorter, tall/short, double/half) ○ mass/weight (for example, heavy/light, heavier than, lighter than) ○ capacity and volume (for example, full/empty, more than, less than, half, half full, quarter) ○ time (for example, quicker, slower, earlier, later)		
I can recognise and know the value of different denominations of coins and notes		
I can sequence events in chronological order using accurate language (for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening)		
I can recognise and use language relating to dates, including days of the week, weeks, months and years		

Geometry		
I can recognise and name common 2-D and 3-D shapes: ○ 2-D shapes: for example, rectangles (including squares), circles and triangles ○ 3-D shapes: for example, cuboids (including cubes), pyramids and spheres		
I can describe position, direction and movement, including whole, half, quarter and three-quarter turns		

Greater Depth
I can apply my skills or knowledge without asking the teacher **(Independence).**
I can apply with a high level of confidence and show good resilience **(Fluency).**
I can apply skills which I have learned to different problems and in different subjects **(Application).**
I can use my skills, knowledge and understanding consistently **(Consistency).**
I can use what I already know to help me solve new problems **(Synthesise).**
I can use knowledge and skills, I have already learned, after a break **(Re-visit).**
I can explain and justify my learning to others and help them understand **(Explain).**

Below	Working Towards	At National Standard	Greater Depth Standard
0-11	12-20	21/23	Achieved against individual objectives, not dependent on coverage of objectives.

Notes: The achieved box should be ticked when the teacher is satisfied that the child can independently succeed against the given statement. This should be backed up with evidence from Maths books and pupil interview assessment data at the end of each sequence of work.

0 – 23 scale above relates to curriculum coverage and "Greater Depth" relates to a deeper understanding/application within individual objectives. This can be accessed/achieved regardless of curriculum coverage.

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Year 2 ARE Maths Expectations	Achieved (✓) & Dated	Depth (✓) & Dated
Number and Place Value		
I can count in steps of 2, 3, and 5 from 0		
I can count in tens from any number, forward and backward		
I can recognise the place value of each digit in a two-digit number (tens, ones)		
I can identify, represent and estimate numbers using different representations (including the number line)		
I can compare and order numbers from 0 up to 100 (use <, > and = signs)		
I can read and write numbers to 100 in numerals and in words		
I can use place value and number facts to solve problems		
I can recognise odd and even numbers		
Addition and Subtraction		
I can use concrete objects and pictorial representations to solve addition and subtraction problems involving numbers, quantities and measures		
I can apply my increasing knowledge of mental and written methods to solve problems involving addition and subtraction		
I can recall and use addition and subtraction facts to 20 fluently and begin to derive and use related facts up to 100		
I can add and subtract numbers using concrete objects, pictorial representations, and mentally: ➢ a 2-digit number and ones		
I can add and subtract numbers using concrete objects, pictorial representations, and mentally: ➢ a 2-digit number and tens		
I can add and subtract numbers using concrete objects, pictorial representations, and mentally: ➢ two 2-digit numbers		
I can add numbers using concrete objects, pictorial representations, and mentally: ➢ adding three 1-digit numbers		
I understand that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot		
I can recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems		
Multiplication and Division		
I can recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables		
I can calculate mathematical statements for multiplication and division (within 12x12) and write them using the multiplication (×), division (÷) and equals (=) signs		
I understand that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot		
I can solve problems involving multiplication and division using materials, arrays, repeated addition, mental methods, and multiplication and division facts (including problems in different contexts)		
Fractions		
I can recognise, find, name and write ⅓, ¼, 2/4 and ¾ when shown as a fraction of a length, shape, set of objects or quantity		
I can recognise the equivalence of two quarters and one half		
Measurement		
I can choose and use appropriate units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit (using rulers, scales, thermometers and measuring vessels)		

I can compare and order lengths, mass, volume/capacity and record the results using >, < and =		
I can recognise and use symbols for pounds (£) and pence (p) and I can combine amounts to make a particular value		
I can find different combinations of coins that equal the same amount of money		
I can solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change		
I can compare and sequence intervals of time		
I can tell and write the time to five minutes (including quarter past/to the hour) and draw the hands on a clock face to show these times		
I know the number of minutes in an hour and the number of hours in a day		
Statistics		
I can construct and interpret simple pictograms, tally charts, block diagrams and simple tables		
I can ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity		
I can ask and answer questions about comparing categorical data		
Geometry		
I can identify and describe the properties of 2-D shapes, including the number of sides and line symmetry		
I can identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces		
I can identify 2-D shapes on the surface of 3-D shapes (for example, a circle on a cylinder and a triangle on a pyramid)		
I can compare and sort common 2-D and 3-D shapes and everyday objects		
I can order and arrange combinations of mathematical objects in patterns and sequences		
I can use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)		

Greater Depth
I can apply my skills or knowledge without asking the teacher **(Independence).**
I can apply with a high level of confidence and show good resilience **(Fluency).**
I can apply skills which I have learned to different problems and in different subjects **(Application).**
I can use my skills, knowledge and understanding consistently **(Consistency).**
I can use what I already know to help me solve new problems **(Synthesise).**
I can use knowledge and skills, I have already learned, after a break **(Re-visit).**
I can explain and justify my learning to others and help them understand **(Explain).**

Below	Working Towards	At National Standard	Greater Depth Standard
0-19	20-39	40/40	Achieved against individual objectives, not dependent on coverage of objectives.

Notes: The achieved box should be ticked when the teacher is satisfied that the child can independently succeed against the given statement. This should be backed up with evidence from Maths books and pupil interview assessment data at the end of each sequence of work.

0 – 40 scale above relates to curriculum coverage and "Greater Depth" relates to a deeper understanding/application within individual objectives. This can be accessed/achieved regardless of curriculum coverage.

THE FORGE TRUST

Year 3 ARE Maths Expectations	Achieved (✓) & Dated	Depth (✓) & Dated
Number and Place Value		
I can count from 0 in multiples of 4, 8, 50 and 100		
I can find 10 or 100 more or less than a given number		
I can recognise the place value of each digit in a three-digit number (hundreds, tens, ones)		
I can compare and order numbers up to 1000		
I can identify, represent and estimate numbers using different representations		
I can read and write numbers up to 1000 in numerals and in words		
I can solve number problems and practical problems relating to number and place value		
Addition and Subtraction		
I can add and subtract numbers mentally: ➢ a 3-digit number and ones		
I can add and subtract numbers mentally: ➢ a 3-digit number and tens		
I can add and subtract numbers mentally: ➢ a 3-digit number and hundreds		
I can add and subtract numbers with up to three digits, using formal written methods of column addition and subtraction		
I can estimate the answer to a calculation and use inverse operations to check answers		
I can solve problems (including missing number problems) using number facts, place value, and more complex addition and subtraction		
Multiplication and Division		
I can recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables		
I can write and calculate mathematical statements for multiplication and division (using the multiplication tables that they know), including for 2-digit numbers x 1-digit numbers, using mental methods and progressing to formal written methods		
I can solve problems, including missing number problems, involving multiplication and division (including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects)		
Fractions		
I can count up and down in tenths and recognise that tenths arise from dividing an object into 10 equal		
I can recognise, find and write fractions of a discrete set of objects		
I can recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators		
I can recognise and show - using diagrams - equivalent fractions with small denominators		
I can add and subtract fractions with the same denominator within one whole (for example, $^5/_7 + {}^1/_7 = {}^6/_7$)		
I can compare and order unit fractions, and fractions with the same denominator		
I can solve problems involving fractions		
Measurement		
I can measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)		
I can measure the perimeter of simple 2-D shapes		
I can add and subtract amounts of money to give change, using both £ and p in practical contexts		
I can tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks		

I can estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight		
I know the number of seconds in a minute and the number of days in each month, year and leap year		
I can compare durations of events (for example, to calculate the time taken by particular events or tasks)		
Statistics		
I can interpret and present data using bar charts, pictograms and tables		
I can solve one-step and two-step questions (for example, 'How many more?' and 'How many fewer?') using information presented in scaled bar charts and pictograms and tables		
Geometry		
I can draw 2-D shapes and make 3-D shapes using modelling materials		
I can recognise 3-D shapes in different orientations and describe them		
I can recognise angles as a property of shape or as a description of a turn		
I can identify right angles and recognise that two right angles make a half-turn, three make three quarters of a turn and four make a complete turn		
I can identify whether angles are greater than or less than a right angle		
I can identify horizontal and vertical lines and pairs of perpendicular and parallel lines		
Greater Depth		
I can apply my skills or knowledge without asking the teacher **(Independence).**		
I can apply with a high level of confidence and show good resilience **(Fluency).**		
I can apply skills which I have learned to different problems and in different subjects **(Application).**		
I can use my skills, knowledge and understanding consistently **(Consistency).**		
I can use what I already know to help me solve new problems **(Synthesise).**		
I can use knowledge and skills, I have already learned, after a break **(Re-visit).**		
I can explain and justify my learning to others and help them understand **(Explain).**		

Below	Working Towards	At National Standard	Greater Depth Standard
0-18	18-35	36/38	Achieved against individual objectives, not dependent on coverage of objectives.

Notes: The achieved box should be ticked when the teacher is satisfied that the child can independently succeed against the given statement. This should be backed up with evidence from Maths books and pupil interview assessment data at the end of each sequence of work.

0 – 38 scale above relates to curriculum coverage and "Greater Depth" relates to a deeper understanding/application within individual objectives. This can be accessed/achieved regardless of curriculum coverage.

THE FORGE TRUST

Year 4 ARE Maths Expectations	Achieved (✓) & Dated	Depth (✓) & Dated
Number and Place Value		
I can count in multiples of 6, 7, 9, 25 and 1000		
I can find 1000 more or less than a given number		
I can count backwards through zero to include negative numbers		
I can recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)		
I can order and compare numbers beyond 1000		
I can identify, represent and estimate numbers using different representations		
I can round any number to the nearest 10, 100 or 1000		
I can solve number and practical problems that involve all of the above and with increasingly large positive numbers		
I can read Roman numerals to 100 (I to C) and know that, over time, the numeral system changed to include the concept of zero and place value		
Addition and Subtraction		
I can add and subtract numbers with up to 4 digits using formal written methods of column addition and subtraction		
I can estimate and use inverse operations to check answers to a calculation		
I can solve addition and subtraction two-step problems in contexts - deciding which operations and methods to use and why		
Multiplication and Division		
I can recall multiplication and division facts for multiplication tables up to 12 × 12		
I can use place value, known and derived facts to multiply and divide mentally (including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers)		
I can recognise and use factor pairs and commutative laws in mental calculations		
I can multiply two-digit and three-digit numbers by a one-digit number using formal written layout		
I can solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as *n* objects are connected to *m* objects.		
Fractions and Decimals		
I can recognise and show - using diagrams - families of common equivalent fractions		
I can count up and down in hundredths		
I can recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten		
I can solve problems involving increasingly harder fractions to calculate quantities		
I can add and subtract fractions with the same denominator		
I can recognise and write decimal equivalents of any number of tenths or hundredths		
I can recognise and write decimal equivalents to: ¼, ½, ¾		
I can find the effect of dividing a one- or two-digit number by 10 and 100 and identify the value of the digits in the answer as ones, tenths and hundredths		
I can round decimals with one decimal place to the nearest whole number		
I can compare numbers with the same number of decimal places up to two decimal places		
I can solve simple measure and money problems involving fractions and decimals to two decimal places		

Measurement		
I can convert between different units of measure (for example, km to m; hour to minute)		
I can measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres		
I can find the area of rectilinear shapes by counting squares		
I can estimate, compare and calculate different measures (including money in pounds and pence)		
I can read, write and convert time between analogue and digital 12- and 24-hour clock		
I can solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days		
Statistics		
I can interpret and present discrete and continuous data using appropriate graphical methods (including bar charts and time graphs)		
I can solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs		
Geometry		
I can compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes		
I can identify acute and obtuse angles and compare and order angles up to two right angles by size		
I can identify lines of symmetry in 2-D shapes presented in different orientations		
I can complete a simple symmetric figure with respect to a specific line of symmetry		
I can describe positions on a 2-D grid as coordinates in the first quadrant		
I can describe movements between positions as translations of a given unit to the left/right and up/down		
I can plot specified points and draw sides to complete a given polygon		
Greater Depth		
I can apply my skills or knowledge without asking the teacher **(Independence).**		
I can apply with a high level of confidence and show good resilience **(Fluency).**		
I can apply skills which I have learned to different problems and in different subjects **(Application).**		
I can use my skills, knowledge and understanding consistently **(Consistency).**		
I can use what I already know to help me solve new problems **(Synthesise).**		
I can use knowledge and skills, I have already learned, after a break **(Re-visit).**		
I can explain and justify my learning to others and help them understand **(Explain).**		

Below	Working Towards	At National Standard	Greater Depth Standard
0-19	20-40	41/43	Achieved against individual objectives, not dependent on coverage of objectives.

Notes: The achieved box should be ticked when the teacher is satisfied that the child can independently succeed against the given statement. This should be backed up with evidence from Maths books and pupil interview assessment data at the end of each sequence of work.

0 – 43 scale above relates to curriculum coverage and "Greater Depth" relates to a deeper understanding/application within individual objectives. This can be accessed/achieved regardless of curriculum coverage.

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Year 5 ARE Maths Expectations	Achieved (✓) & Dated	Depth (✓) & Dated
Number and Place Value		
I can read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit		
I can count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000		
I can interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero		
I can round any number up to 1,000,000 to the nearest 10; 100; 1,000; 10,000 and 100,000		
I can solve number problems and practical problems involving the above		
I can read Roman numerals to 1000 (M) and recognise years written in Roman numerals		
Addition and Subtraction		
I can add and subtract whole numbers with more than 4 digits, including using formal written methods (column addition and subtraction)		
I can add and subtract numbers mentally with increasingly large numbers		
I can use rounding to check answers to calculations and determine - in the context of a problem - levels of accuracy		
I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why		
Multiplication and Division		
I can identify multiples and factors - including finding all factor pairs of a number and common factors of 2 numbers		
I know and can use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers		
I can establish whether a number up to 100 is prime and recall prime numbers up to 19		
I can multiply numbers up to 4 digits by a 1-digit or 2-digit number using a formal written method, including long multiplication for two-digit numbers		
I can multiply and divide numbers mentally, drawing upon known facts		
I can divide numbers up to 4 digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context		
I can multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000		
I can recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})		
I can solve problems involving multiplication and division (using knowledge of factors and multiples, squares and cube)		
I can solve problems involving addition, subtraction, multiplication and division and a combination of these		
I can solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates		
Fractions, Decimals and Percentages		
I can compare and order fractions whose denominators are all multiples of the same number		
I can identify, name and write equivalent fractions of a given fraction, represented visually and including tenths and hundredths		
I can recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number (for example, $^2/_5+^4/_5=^6/_5= 1^1/_5$)		
I can add and subtract fractions with the same denominator and denominators that are multiples of the same number		
I can multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams		

I can read and write decimal numbers as fractions (for example: 0.71 $= {}^{71}/_{100}$)		
I can recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents		
I can round decimals with two decimal places to the nearest whole number and to one decimal place		
I can read, write, order and compare numbers with up to three decimal places		
I can solve problems involving numbers up to three decimal places		
I can recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction (with the denominator 100) and as a decimal		
I can solve problems which require knowing percentage and decimal equivalents of $^1/_2$, $^1/_4$, $^1/_5$, $^2/_5$ and those fractions with a denominator of a multiple of 10 or 25		
Measurement		
I can convert between different units of metric measure (E.g: km and m; cm and m; cm and mm; g and kg; l and ml)		
I can understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints		
I can measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres		
I can calculate and compare the area of rectangles (including squares) including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes		
I can estimate volume (for example, using 1 cm^3 blocks to build cuboids) and capacity (for example, using water)		
I can solve problems that involve converting between units of time		
I can use all four operations to solve problems involving measure (E.g: length, mass, volume, money)		
Statistics		
I can solve comparison, sum and difference problems using information presented in a line graph		
I can complete, read and interpret information in tables (including timetables)		
Geometry		
I can identify 3-D shapes, including cubes and other cuboids, from 2-D representations		
I know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles		
I can draw given angles, and measure them in degrees (°)		
I can identify: > angles at a point and one whole turn (total 360°) > angles at a point on a straight line and ½ a turn (total 180°) > other multiples of 90°		
I can use the properties of rectangles to deduce related facts and find missing lengths and angles		
I can distinguish between regular and irregular polygons based on reasoning about equal sides and angles		
I can identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language and know that the shape has not changed		

Greater Depth
I can apply my skills or knowledge without asking the teacher **(Independence).**
I can apply with a high level of confidence and show good resilience **(Fluency).**
I can apply skills which I have learned to different problems and in different subjects **(Application).**
I can use my skills, knowledge and understanding consistently **(Consistency).**
I can use what I already know to help me solve new problems **(Synthesise).**
I can use knowledge and skills, I have already learned, after a break **(Re-visit).**
I can explain and justify my learning to others and help them understand **(Explain).**

Below	Working Towards	At National Standard	Greater Depth Standard
0-22	22-46	47/49	Achieved against individual objectives, not dependent on coverage of objectives.

Notes: The achieved box should be ticked when the teacher is satisfied that the child can independently succeed against the given statement. This should be backed up with evidence from Maths books and pupil interview assessment data at the end of each sequence of work.

0 – 49 scale above relates to curriculum coverage and "Greater Depth" relates to a deeper understanding/application within individual objectives. This can be accessed/achieved regardless of curriculum coverage.

THE FORGE TRUST

Year 6 ARE Maths Expectations	Achieved (✓) & Dated	Depth (✓) & Dated
Number and Place Value		
I can read, write, order and compare numbers up to 10,000,000 and determine the value of each digit		
I can round any whole number to a required degree of accuracy		
I can use negative numbers in context, and calculate intervals across zero		
I can solve number problems and practical problems that involve all of the above		
Addition, Subtraction, Multiplication and Division		
I can multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication		
I can divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division, and interpret remainders as: whole number remainders; fractions; or by rounding (as appropriate for the context)		
I can divide numbers up to 4 digits by a 2-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context		
I can perform mental calculations, including with mixed operations and large numbers		
I can identify common factors, common multiples and prime numbers		
I can use knowledge of the order of operations to carry out calculations involving the four operations		
I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why		
I can solve problems involving addition, subtraction, multiplication and division		
I can use estimation to check answers to calculations and determine - in the context of a problem - an appropriate degree of accuracy		
Algebra		
I can use simple formulae		
I can generate and describe linear number sequences		
I can express missing number problems algebraically		
I can find pairs of numbers that satisfy number sentences involving two unknowns		
I can enumerate possibilities of combinations of two variables		
Fractions, Decimals and Percentages		
I can use common factors to simplify fractions; use common multiples to express fractions in the same denomination		
I can compare and order fractions, including fractions >1		
I can add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions		
I can multiply simple pairs of proper fractions, writing the answer in its simplest form (for example: $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$)		
I can divide proper fractions by whole numbers (for example, $\frac{1}{3} \div 2 = \frac{1}{6}$)		
I can associate a fraction with division and calculate decimal fraction equivalents (for example, 0.375= $\frac{3}{8}$)		
I can identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1,000 - giving answers up to three decimal places		
I can multiply 1-digit numbers (with up to two decimal places) by whole numbers		
I can use written division methods in cases where the answer has up to two decimal places		
I can solve problems which require answers to be rounded to specified degrees of accuracy		
I can recall and use equivalences between simple fractions, decimals and percentages (including in different contexts)		
Ratio and Proportion		
I can solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts		
I can solve problems involving the calculation of percentages (for example, of measures, and such as 15% of 360) and use percentages for comparison		
I can solve problems involving similar shapes where the scale factor is known or can be found		

I can solve problems involving unequal sharing and grouping using knowledge of fractions and multiples		
Measurement		
I can solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate		
I can use, read, write and convert between standard units (convert measurements of length, mass, volume and time from a smaller unit of measure to a larger unit - and vice versa - using decimal notation to up to three decimal places)		
I can convert between miles and kilometres		
I can recognise that shapes with the same areas can have different perimeters and vice versa		
I can recognise when it is possible to use the formulae for area and volume of shapes		
I can calculate the area of parallelograms and triangles		
I can calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units (for example, mm^3 and km^3)		
Statistics		
I can interpret and construct pie charts and line graphs and use these to solve problems		
I can calculate and interpret the mean as an average		
Geometry		
I can draw 2-D shapes using given dimensions and angles		
I can recognise, describe and build simple 3-D shapes (including making nets)		
I can compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons		
I can illustrate and name parts of circle (radius, diameter and circumference) and know that the diameter is twice the radius		
I can recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles		
I can describe positions on the full coordinate grid (all four quadrants)		
I can draw and translate simple shapes on the coordinate plane, and reflect them in the axes		

Greater Depth
I can apply my skills or knowledge without asking the teacher **(Independence).**
I can apply with a high level of confidence and show good resilience **(Fluency).**
I can apply skills which I have learned to different problems and in different subjects **(Application).**
I can use my skills, knowledge and understanding consistently **(Consistency).**
I can use what I already know to help me solve new problems **(Synthesise).**
I can use knowledge and skills, I have already learned, after a break **(Re-visit).**
I can explain and justify my learning to others and help them understand **(Explain).**

Below	Working Towards	At National Standard	Greater Depth Standard
0-21	22-46	47/49	Achieved against individual objectives, not dependent on coverage of objectives.

Notes: The achieved box should be ticked when the teacher is satisfied that the child can independently succeed against the given statement. This should be backed up with evidence from Maths books and pupil interview assessment data at the end of each sequence of work.

0 – 49 scale above relates to curriculum coverage and "Greater Depth" relates to a deeper understanding/application within individual objectives. This can be accessed/achieved regardless of curriculum coverage.

Appendix 5-Parents' Evening Slips for Schools in The Forge Trust

THE FORGE TRUST

Labor Omnia Vincit

Parents' Evening Date: Name:

Class:

Subject	Strengths	Areas for Development	Effort Grades 1-Excellent 2-Good 3-Requires Improvement
Maths Reading	• •	• •	
Writing & SPaG	•	•	
Any other Comments:			

Please circle, as appropriate:

Is on track to be at W1 W2 N A national standards in Maths

Is on track to be at W1 W2 N A national standards in Reading

Is on track to be at W1 W2 N A national standards in Writing

Is on track to be at W1 W2 N A national standards in SPaG

Attendance: % LA: 95% average School Target: 98%

Number of days absence:

Signed: (Teacher)

CALCULATION POLICY

+ - × ÷

The maths work your child is doing at school may look very different to the kind of 'sums' you remember. This is because children are encouraged to work mentally, where possible, using personal jottings to help support their thinking. Even when children are taught more formal written methods (from late year 3 onwards), they are only encouraged to use these methods for calculations they cannot solve in their heads.

Discussing the efficiency and suitability of different strategies is an important part of maths lessons.

Parental Guidance

- Talk to your child about how you work
- Ask your child to explain their thinking

When faced with a calculation problem, encourage your child to ask the following:

- ✓ Can I do this in my head?
- ✓ Could I do this in my head using drawings or jottings to help me?
- ✓ Do I need to use a written method?
- ✓ Should I use a calculator?

Also help your child to estimate and then check the answer. Encourage them to ask whether or not the answer is sensible.

Addition

This chart shows examples of how we teach addition and how we develop skills through the school.

Each child must be confident at one stage before moving to the next and strategies may be reinforced from previous year groups or taught from the next, depending on each child's ability.

Our learning is supported by a wide range of resources, e.g. 100 square, whiteboards, counting sticks, number fans, etc.

Problem solving is built in weekly and at the end of each unit.

- *Children could draw pictures to help them work out the answer*
- *Children could use dots or tally marks to represent objects (quicker than drawing pictures)*
- *Drawing an empty number line helps children to record the steps they have taken in a calculation.*
- *Children will be taught written calculations for calculations they cannot do in their heads. Expanded methods build on mental methods and make the value of the digits clear to children. The language used is very important.*
- *When children are confident using the standard method this can be 'squashed' into the traditional compact method.*

Early Years Foundation Stage

- Counting along a number line
- Singing nursery rhymes
- Counting in real situations
- Using fingers
- Adding objects to a group

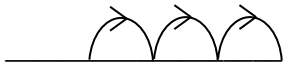
☺ ☺ ☺ ☺ ☺

and introducing the + and = signs

2 + 3 = 5

At a party, I eat 2 cakes and my friend eats 3.

How many cakes did we eat altogether?

- Using a number line to solve simple problems
- 

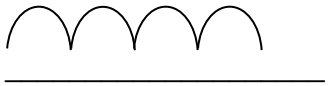
0 1 2 3 4 5

2 + 3 = 5

- Recognising the **+** symbol

Year 1

- Using a number line for simple problems by counting on



5 6 7 8 9 10

5 + 4 = 9

- Adding a two digit and single digit number (putting the larger digit first)

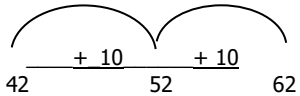
15 16 17 1 8 1 9

15 + 4 =1 9

- Introduced to the concept of a number sentence
- Use ☐ and △ to represent missing numbers
- Using partitioning of numbers between 11 and 20
  e.g. 15 → 10 + 5

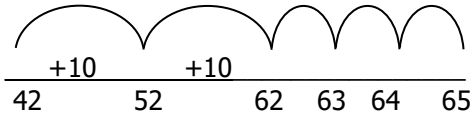
Year 2

- Using a blank number line to add 10(s) to a 2 digit number



42 + 20 = 62

- Using a blank number line to add two 2 digit numbers
- Adding larger numbers on a number line with partitioning. *(Note: Only partition the smaller number – show the larger number on the number line as the starting point)*



42 + 23 = 65

42 + 10 + 10 + 1 + 1 + 1 =65

- Progressing onto adding tens together in one jump.
- Adding using partitioning and peanut method

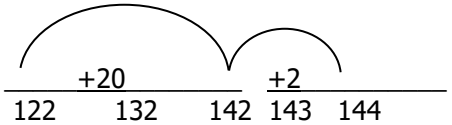
2 4 6

42 + **34** = **76**

40 30 = 70

Year 3

- Adding a 2 digit number to a 3 digit number on a number line (not crossing tens boundary)

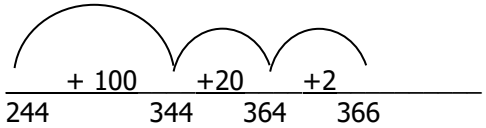


122 + 22 = 144

- Progressing onto crossing the tens boundary.

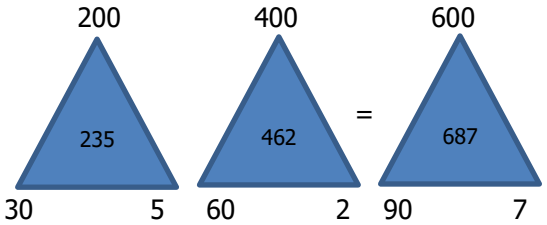
128 + 24 = 152

- Adding two 3 digit numbers together (starting with the largest)



244 + 122 = 366

- Moving to a triangle method for 3 digit addition



Year 3 (continued)

- Linking to a formal written method, with no carrying, starting with least significant digit, in this case units

35	235
+ 62	+ 62
7	**7**
90	90
97	200
	297

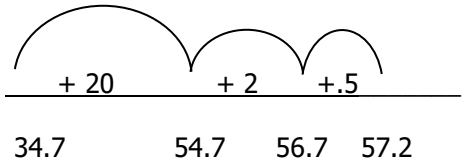
Year 4

- continuing the 2 digit and 3 digit 'semi-compact' method
- moving to a standard method starting with least significant digit

35	235
+ 62	+ 62
9 7	**2 97**

Year 5

- adding a mixture of two, three and four digit numbers with carrying
- adding thousands with carrying
- adding money and decimals to one decimal place



34.7 + 22.5 = 57.2

- using mixed units (converting to the smallest)

£3.55 + 60p =

355p + 60p = 415p

= £4.15

- Progressing onto choosing most appropriate units for conversion.

Year 6

- Extending to add several numbers, using zeros as placeholders and extending to two places of decimals

```
 124 . 90
+  7 . 25
 132 . 15
   11
```

- coping with decimals to one and two places, e.g.

40.8 + 0.75 =

```
 40 . 8
+ 0 . 75
 41 . 55
   1
```

Year 3 (continued) ▪ Adding two 3 digit numbers by partitioning (expanded method) 245 → 200 and 40 and 5* 122 → 100 and 20 and 2 367 ← 300 and 60 and 7 * Always start with the units first	**Year 4 (continued)** ▪ starting to add with 'carrying' 625 + 48 = **673** (1) 783 + 42 = **825** (1) 367 + 85 = **452** (11) ▪ using this to begin to add simple sums of money		

Subtraction

This chart shows examples of how we teach subtraction, and how we develop skills through the school.

Each child must be confident at one stage before moving to the next and strategies may be reinforced from previous year groups or taught from the next, depending on each child's ability

Our learning is supported by a wide range of resources, e.g. 100 square, whiteboards, counting sticks, number fans, etc.

Problem solving is built in weekly and at the end of each unit.

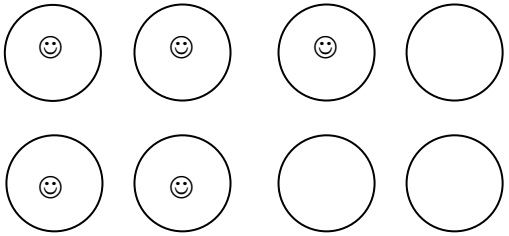
- *Drawing a picture helps children to visualise the problem*
- *Using dots or tally marks is quicker than drawing a detailed picture.*
- *Children could count back using an empty number line. This is a really good way for them to record the steps they have taken.*
- *Children could count up from the smallest number to the biggest, using an empty number line.*
- *It is easier to count up to the next multiple of 10 then count on in tens.*

Early Years Foundation Stage

- Counting backwards out loud
- Singing nursery rhymes
- Counting in real situations
- Using fingers
- Taking away objects from a group, and counting those left
- Drawing pictures/marks and crossing out

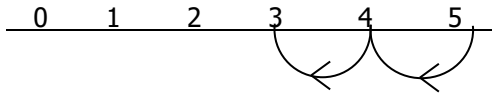
5 – 2 = 3

- Physically finding the difference



4 -2 = 2

- Using a number line to solve simple problems (making jumps underneath to show counting back)

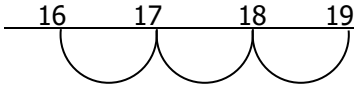


5 – 3 = 2

- Recognising the **–** and **=** symbols

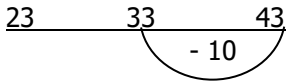
Year 1

- Counting forwards and backwards in 10s.
- Using a number line to solve simple 'take away' problems by counting back (single digit from a 2 digit)



19 – 3 = 16

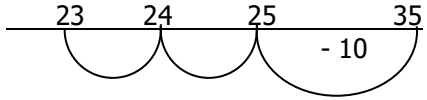
- Taking away 10 from a 2 digit number.



43 -10 = 33

Year 2

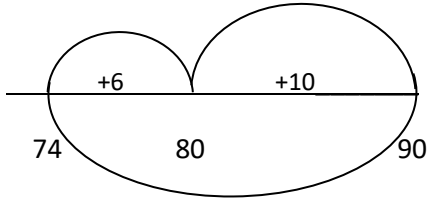
- Taking away a 2 digit number form another 2 digit number (using partitioning on a number line)



35 – 12 = 23

- Developing the idea of 'difference' and using a number line to count on where numbers are close together

90 – 74 = ☐



difference 16

- Using partitioning of numbers to tens and units

65 – 43

5 – 3 = 2

60 – 40 = 20

- Introduced to ' peanut' recording for numbers that do not bridge 10. *(see Addition)*

Year 3	Year 4	Year 5	Year 6
▪ Linking to a formal written method, emphasising tens and units in correct columns, with partitioning of numbers and no bridging of tens or hundreds. 18 46 - 6 -21 12 25 ▪ Where needed, support this partitioning) 860 = 800 + 60 + 0 - 530 = 500 + 30 + 0 300 + 30 + 0 = 330 ▪ Using a formal written method, with 2 digit numbers, using simple decomposition. The language we use speaks of '**moving**' a ten, we do not borrow, take or exchange. 62 → ~~60~~ and 2 50 and 12 - 44 → 40 and 4 18 ← 10 and 8	▪ If needed decomposition of three digit numbers and beyond (p*lace value cards)* 754 = 700 and 50 and 4 - 286 = 200 and 80 and 6 = 700 and 40 and 14 200 and 80 and 6 = 600 and 140 and 14 200 and 80 and 6 = 400 and 60 and 8 = 468 ▪ Progress onto compact written method (crossing 10s then 100s, then both together). 823 ~~8~~ ~~2~~ 13 -274 2 7 4 549 5 4 9	▪ Using number line strategies as aid to mental work, informal jottings and a calculator to check working . Using shorthand formal decomposition method, as shown in Stage Seven	▪ Fully confident with a short-hand formal decomposition method where this is more appropriate than a mental method 6 4 6 7 - 2 6 8 4 3 7 8 3 Extend to subtraction where zeros are present, and subtraction with decimals

Year 3	Year 4	Year 5	Year 6
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Multiplication

This chart shows examples of how we teach multiplication, and how we develop skills through the school. Each child must be confident at one stage before moving to the next and strategies may be reinforced from previous year groups or taught from the next, depending on each child's ability. Our learning is supported by a wide range of resources, e.g. 100 square, whiteboards, counting sticks, number fans, etc.

Problem solving is built in weekly and at the end of each unit.

- Again a picture can be useful
- Dots or tally charts can be drawn in groups.
- Drawing an array gives children an image of the answer.
- Children can count on in equal steps recording jumps on an empty number line.
- When numbers get number, children are encouraged to split the numbers to make use of key *number facts e.g. 22 x 7*
  10 x 7 = 70
  10 x 7 = 70
  2 x 7 = 14
  70 + 70 + 14 = 154
- In the grid method a number may be split in to hundreds, tens and units.
- The grid method also works for long multiplication.

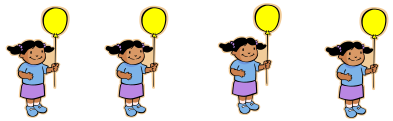
Early Years Foundation Stage

- Putting objects into equal groups or sets
- Introducing counting in tens

Year 1

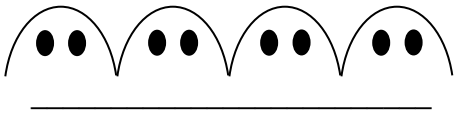
- Counting in 2s, 5s and 10s
- Introduced to doubling of numbers up to 20
- Introduce 'repeated addition'

Each child has two eyes. How many eyes do four children have?



2 + 2 + 2 + 2

- Demonstrate repeated addition on a number line



0 1 2 3 4 5 6 7 8

2 + 2 + 2 + 2 = 8

Year 2

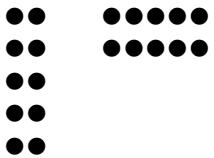
- Using a blank number line to show equal jumps
- Using pictorial representations to solve problems
- Introduce the terms times and multiply
- Introduce the **x** sign
- show the link to repeated addition

5 + 5 + 5 + 5
and 4 x 5 = 20

- Counting in 2s, 3s, 5s and 10s
- Learning simple multiplication facts from the 2x, 3x, 5x and 10x tables, including working with missing numbers

4 X 5 = △

- Drawing an array (2 lots of 5 or 5 lots of 2) gives children an image of the answer. It also helps develop the understanding that 2x5 is the same as 5x2



Relate to real life problems

Year 3

- Introduce the term product

- consolidating the link between multiplication and repeated addition
- using arrays to show the reversibility of multiplication

♦ ♦ ♦ ♦

♦ ♦ ♦ ♦

2 x 4 = 4 x 2 = 8

- using symbols for missing numbers e.g.

10 x ϒ = 80

- using a grid method to multiply a two digit number by a one digit number, e.g. 23 x 8 = 184

x	20	3	
8	160	24	= 184

- rapid recall of doubles by partitioning larger numbers e.g. double 43 = double 40 and double 3 = 80 =+ 6 = 86
- learning tables 4x, 11x

Year 4

- consolidating all the previously learnt tables facts and then adding 6x, 7x, 8x, 9x, 12x
- using grid method to multiply any 2 two digit numbers
- extending the grid method to be able to multiply any three digit number by any one digit number e.g. 346 x 7 =

x	300	40	6
7	2100	280	42

= 2100 + 280 + 42 = 2422

- use a formal, short-hand vertical method to multiply a two digit number by a one digit number (starting with an expanded method)

```
    2 3
x     7
    2 1
  1 4 0
  1 6 1
```

- Moving to a compact method to multiply 2 and 3 digit numbers by a single digit number.

```
    3 4 6
x       9
  3 1 14
    4 5
```

- Using key facts to solve problems

e.g. 22 x 7 =

10 x 7 = 70 10 x 7 = 70 2 x 7 = 14 154

Year 5

- Multiply two 2 digit numbers using the grid method.

X	70	2
30	2100	60
4	280	8

72 x 34 = 2448

- leading to a formal, short-hand vertical method to multiply a three digit number by a two digit number (demonstrate with an expanded method initially)

```
    3 2 4
x     8 6
    1 2

  1 9 4 4
2 5 9 2 0

  1 3
2 7 8 6 4
  1
```

- extending to one decimal place

343.4 x 82 (take out decimal point and put back in later)
becomes 3434 x 82.

Year 6

- expanding the grid method to larger numbers e.g.234 x 25 =

x	200	30	4
20	4000	600	80
5	1000	150	20

5000 + 750 + 100 = 5850

- leading to a formal method

```
    3 4
x   2 5
  1 7 0
    2
  6 8 0
  8 5 0
```

- extending to include, for example, two places of decimals (take decimal point out and put it back in after calculation).

8.6 x 7.4 = 63.64
86 x 74

```
    86
x   74
   344
  6020
  6364
```

Insert decimal point back in
63.64

Division

This chart shows examples of how we teach division, and how we develop skills through the school.

Each child must be confident at one stage before moving to the next and strategies may be reinforced from previous year groups or taught from the next, depending on each child's ability

Our learning is supported by a wide range of resources, e.g. 100 square, whiteboards, counting sticks, number fans, etc.

Problem solving is built in weekly and at the end of each unit.

- *Drawing still gives children a way into problems.*
- *Dots or tally marks can either be shared out one at a time or split into groups.*
- *To work out how many fives in 20, draw jumps along a number line.*
- *For bigger numbers children are encouraged to split the numbers into chunks.*
- *It is helpful to split the numbers into chunks which are multiples of the number that they are dividing by.*

Early Years Foundation Stage

- Sharing a number of objects into equal groups or sets

Year 1

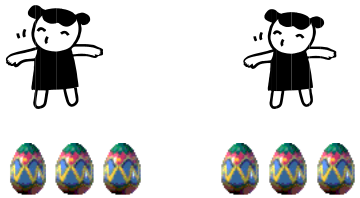
- Using real objects to solve simple problems
- Introduced to halving of numbers up to 20
- answering 'how may twos was that?' when counting in twos, and 'how may tens was that?' when counting in tens

Year 2

- Using pictorial representations to solve problems

e.g.

6 Easter eggs are shared between two children. How many eggs do they get each?



Sharing between 2

There are 6 Easter eggs. How many children can have two each?

Grouping into 2s

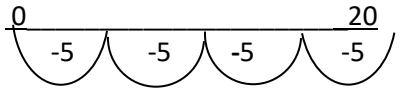
- Introduce the terms divide, halve, share by, groups of
- Counting in 2s, 3s, 5s and 10s

Year 2 (continued)

- Introduced to the ÷ sign
- Show grouping as repeated subtraction

20 - 5 - 5 - 5 - 5 = 0

and 20 ÷ 4 = 5



- Learning simple division facts e.g. how many 2s, 5s or 10s in a given number
- Using symbols for a missing number,

e.g. □ and △

- Finding halves and quarters of shapes and numbers.
- Demonstrate the link between multiplication and division

Year 3

- Finding three quarters, a third and two thirds of shapes and numbers.
- consolidating the link between division and repeated subtraction
- using arrays to show the reversibility of division

♦ ♦ ♦ ♦

♦ ♦ ♦ ♦

8 ÷ 4 = 2 and 8 ÷ 2 = 4

- using symbols for missing numbers e.g.

70 ÷ ♈ = 7

- halving multiples of 10 and 100 and dividing multiples of 100 by 10 or 100

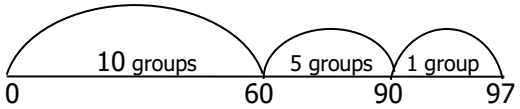
Year 4

- knowing **'useful facts'** for each number, e.g. for 97 ÷ 6

1 x 6 = 6
10 x 6 = 60
5 x 6 = 30

These facts enable children who have poor tables recall to access division

- Using chunking on a number line



- And chunking vertically

97 ÷ 6
- 60 (10x6)
37
- 30 (5x6)
7
- 6 (1x6)
r 1 16

97 ÷ 6 = 16 r1

- recording simple divisions like this in a standard compact form e.g.

```
      1 6 r 1
6 )   9 7
```

Year 5

- extending this recording to larger numbers and use related facts.

```
                 3 2 r 4
6-1x        6 ) 1 9 6
12-2x         - 1 8 0   (30 x 6)
18-3x           1 6
24-4x         - 1 2     (2 x 6)
30-5x
36-6x               R4
30 X 6 = 180
```

The related fact here was 3 x 6 = 18, so 30 x 6 = 180.

- using this format to record division to one decimal place

```
        3 2 r 3
6 )     1 9 5
=       3 2.5
```

Year 6

- further extending the format to divide four digit numbers by a one digit number

```
        4 1 2
6 ) 2 4 7 2
```

- introduced to a way of expressing long division, i.e. a three or four digit number by a two digit number.

```
      0 2 4 . 0 5
17 ) 4 0 9. 0 0        17-1x
    -3 4               34-2x
       6 9             51-3x
     - 6 8             68-4x
         1 0 0         85-5x
       -   8 5
           1 5
```

- introduced to long division including decimals where the divisor must be a whole number and therefore be multiplied by 10/100/1000 etc. You must x the dividend and divisor by the same amount.

12 divided by 0.03 =

1200 divided by 3 (x by 100)

Then complete long division as normal. It will not change the answer (quotient).

Glossary

Arrays
A visual represent of a multiplication or division calculation.

Blank number line
A horizontal line where children can insert their own numbers to aid calculations.

Bridging or crossing the tens boundary
Adding or subtracting across a multiple of 10, or counting on in multiples of 10.

Chunking
Breaking complex calculation into manageable parts using key facts

Compact method
The traditional method of solving a calculation.

Decomposition
A strategy used in subtraction, of moving 100's or 10's to facilitate calculation.

Difference
The difference between two numbers is the *amount* between them.

Digits
A single symbol that represents a counting number. 0 – 9 are one digit numbers.

Expanded method
A written method that shows the intermediate stages in the calculation.

Number sentences
Horizontal calculations using numbers and symbols e.g. 2 + 7 = 9

Jotting
Any method of recording numbers/calculations that is not formalised.

Factor
A whole number that divides exactly into another number.

Grid method
Splitting numbers into hundreds, tens and units for multiplication.

Grouping
Dividing things into equal groups.

Inverse operations
The notion that each operation has an opposite. Addition/subtraction; multiplication/division.

Key Facts
Easily remembered pieces of information used to help with a more complicated calculation.

Most/least significant digit
In place value the most significant digit is placed further to the left, having the highest value, and the least furthest to the right, having the lowest value.

.

Glossary

Number stories
Putting calculations into the context of a story.

Mental calculations
Calculations done in the head.

Multiple
5, 10, 15, 20 are all multiples of the five times table.

Operations
The four rules of calculations + - X ÷

Partitioning
Splitting numbers into 100's, 10's and units to help mental calculation.

Pattern
A recurring sequence.

Place holder
The use of the numeral 0 in an empty column to ensure that the other digits are in the correct column and hold their value. E.g. 103, 210.

Place value
The value of a digit depending on its place in a number.

Product
The result when two numbers are multiplied.

Number bonds
All the pairs of numbers that total a given number, e.g. number bonds to 10, 7 + 3, 5 + 5 etc.

Number line
Horizontal line to show sequencing of numbers in a calculation.

Recombining
Bringing numbers back together in order to complete a calculation after partitioning.

Remainder
The amount left over after dividing a number

Repeated addition
A simple introduction to multiplication

Repeated subtraction
A simple introduction to division.

Tens boundary
The position occupied on a number line by multiples of 10.

Tally
Using straight lines instead of numbers to make counting easier.

Sharing
Dividing things into equal groups by distributing one at a time.

Vertical method
Any written method set out in a vertical format.

PARENTAL GUIDANCE

Real Life Problems

- ✓ Go shopping with your child to buy two or three items. Ask them to work out the total amount spent and how much change you will get.
- ✓ Buy some items with a percentage extra free. Help your child to calculate how much of the product is free.
- ✓ Plan an outing during the holidays. Ask your child to think about what time you will need to set off and how much money you will need to take.
- ✓ Use a TV guide. Ask your child to work out the length of their favourite programmes. Can they calculate how long they spend watching TV each day / each week?
- ✓ Use a bus or train timetable. Ask your child to work out how long a journey between two places should take? Go on the journey. Do you arrive earlier or later than expected? How much earlier/later?
- ✓ Help your child to scale a recipe up or down to feed the right amount of people.
- ✓ Work together to plan a party or meal on a budget.

These are just a few ideas to give you a starting point. Try to involve your child in as many problem-solving activities as possible. The more 'real' a problem is, the more motivated they will be when trying to solve it.

Shapes and Measures

- ✓ Choose a shape of the week e.g. cylinder. Look for this shape in the environment (tins, candles etc). Ask your child to describe the shape to you (2 circular faces, 2 curved edges)
- ✓ Play 'guess my shape'. You think of a shape. Your child asks questions to try to identify it but you can only answer 'yes' or 'no' (e.g. Does it have more than 4 corners? Does it have any curved sides?)
- ✓ Hunt for right angles around your home. Can your child also spot angles bigger or smaller than a right angle?
- ✓ Look for symmetrical objects. Help your child to draw or paint symmetrical pictures / patterns?
- ✓ Make a model using boxes/containers of different shapes and sizes. Ask your child to describe their model.
- ✓ Practise measuring the lengths or heights of objects (in metres or cm). Help your child to use different rulers and tape measures correctly. Encourage them to estimate before measuring.
- ✓ Let your child help with cooking at home. Help them to measure ingredients accurately using weighing scales or measuring jugs. Talk about what each division on the scale stands for.
- ✓ Choose some food items out of the cupboard. Try to put the objects in order of weight, by feel alone. Check by looking at the amounts on the packets.
- ✓ Practise telling the time with your child. Use both digital and analogue clocks. Ask your child to be a 'timekeeper' (e.g. tell me when it is half past four because then we are going swimming).
- ✓ Use a stop clock to time how long it takes to do everyday tasks (e.g. how long does it take to get dressed?). Encourage your child to estimate first.

Practising Number Facts

- ✓ Find out which number facts your child is learning at school (addition facts to 10, times tables, doubles etc). Try to practise for a few minutes each day using a range of vocabulary.
- ✓ Have a 'fact of the day'. Pin this fact up around the house. Practise reading it in a quiet, loud, squeaky voice. Ask your child over the day if they can recall the fact.
- ✓ Play 'ping pong' to practise complements with your child. You say a number. They reply with how much more is needed to make 10. You can also play this game with numbers totalling 20, 100 or 1000. Encourage your child to answer quickly, without counting or using fingers.
- ✓ Throw 2 dice. Ask your child to find the total of the numbers (+), the difference between them (-) or the product (x). Can they do this without counting?
- ✓ Use a set of playing cards (no pictures). Turn over two cards and ask your child to add or multiply the numbers. If they answer correctly, they keep the cards. How many cards can they collect in 2 minutes?
- ✓ Play Bingo. Each player chooses five answers (e.g. numbers to 10 to practise simple addition, multiples of 5 to practise the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first player to cross off all their answers.
- ✓ Give your child an answer. Ask them to write as many addition sentences as they can with this answer (e.g. 10 = ▪ + ▪). Try with multiplication or subtraction.
- ✓ Give your child a number fact (e.g. 5+3=8). Ask them what else they can find out from this fact (e.g. 3+5=8, 8-5=3, 8-3=5, 50+30=80, 500+300=800, 5+4=9, 15+3=18). Add to the list over the next few days. Try starting with a x fact as well.

Counting Ideas

- ✓ Practise chanting the number names. Encourage your child to join in with you. When they are confident, try starting from different numbers - 4, 5, 6 . . .
- ✓ Sing number rhymes together - there are lots of commercial tapes and CD's available.
- ✓ Give your child the opportunity to count a range of interesting objects (coins, pasta shapes, buttons etc.). Encourage them to touch and move each object as they count.
- ✓ Count things you cannot touch or see (more difficult!!). Try lights on the ceiling, window panes, jumps, claps or oranges in a bag.
- ✓ Play games that involve counting (e.g. snakes and ladders, dice games, games that involve collecting objects).
- ✓ Look for numerals in the environment. You can spot numerals at home, in the street or when out shopping.
- ✓ Cut out numerals from newspapers, magazines or birthday cards. Then help your child to put the numbers in orders.
- ✓ Make mistakes when chanting, counting or ordering numbers. Can your child spot what you have done wrong?
- ✓ Choose a number of the week e.g. 5. Practise counting to 5 and on from 5. Count out groups
- ✓ of 5 objects (5 dolls, 5 bricks, 5 pens). See how many places you can spot the numeral 5.