



Math's Policy

Our Lady and St Joseph Catholic Primary School

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Checked DPO:

School Vision

A high quality mathematics education provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics and a sense of enjoyment and curiosity about the subject. (National Curriculum 2014)

Mathematics teaches us how to make sense of the world around us through developing our ability to calculate, communicate, reason and solve problems. It enables children to explore, understand and appreciate relationships and patterns, both in number and shape, in their everyday lives.

At Our Lady and St Joseph Catholic Primary School, we believe that every child can achieve in mathematics when given high quality teaching, carefully sequenced learning and appropriate support and challenge.

This policy outlines the teaching, learning and leadership of mathematics at Our Lady and St Joseph Catholic Primary School and is based on the statutory National Curriculum for mathematics.

Intent

At Our Lady and St Joseph Catholic Primary School we aim, at our core, for our children to:

- Become fluent in the fundamentals of mathematics
- Be able to reason mathematically
- Solve problems by applying their mathematical skills

Our intent is that all pupils:

- Develop secure conceptual understanding and procedural fluency that can be recalled and applied accurately
- Use mathematical language to explain, justify and generalise their thinking
- Apply their learning to rich problems, real life contexts and other areas of the curriculum
- Develop positive attitudes to mathematics including resilience, curiosity and enjoyment

We are committed to ensuring that pupils recognise the importance of mathematics in the wider world and can use their skills and knowledge confidently in a range of contexts, now and in their future lives.

At Our Lady and St Joseph these skills are embedded within maths lessons and where appropriate within our curriculum so they are developed consistently over time. We want all children to enjoy mathematics and to experience success in the subject, with the ability to reason mathematically. We are committed to developing children's curiosity about the subject, as well as an appreciation of the beauty and power of mathematics.

Implementation

Curriculum Design

Our curriculum closely follows the White Rose Maths schemes of learning from EYFS to Year 6, which provide small steps progression across all strands of the National Curriculum. Teachers adapt these schemes using high quality resources including NCETM materials, Maths Shed, Third Space Learning and Oak Academy to meet the needs of their classes.

Long term curriculum maps outline the topics taught in each year group from Nursery to Year 6. Medium term plans are based on White Rose units and NCETM curriculum maps. Teachers then plan sequences of lessons that build knowledge in small steps, identify key representations and vocabulary, and secure fluency, reasoning and problem solving for all pupils.

Mathematics is taught for approximately 45 minutes per day in Key Stage 1 and approximately 60 minutes per day in Key Stage 2. In the Early Years Foundation Stage, mathematics is taught through a combination of short adult led sessions and continuous provision, moving towards the Key Stage 1 structure by the end of Reception.

In addition, Mastering Number sessions are taught four times per week in Reception and Key Stage 1, and in Years 4 and 5, to secure fluency and flexibility with number. Lower Key Stage 2 classes explicitly teach times tables in short focused sessions at least four times per week and Upper Key Stage 2 classes provide at least two weekly intervention or overlearning sessions to address gaps in mathematical understanding.

All pupils are entitled to a broad mathematics curriculum in which their learning needs are identified and met. Pupils should experience a range of practical and written activities on number, measurement, geometry and statistics.

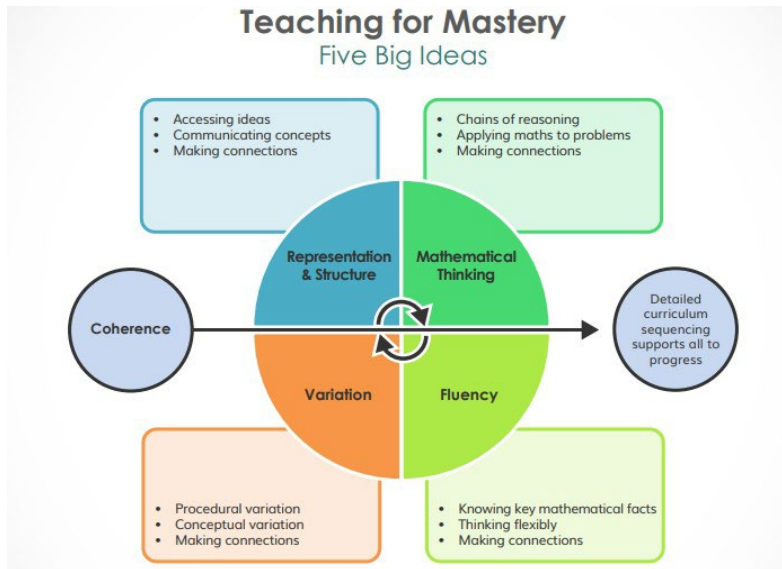
Classrooms should be rich in discussion between pupils and between teacher and pupils. Some facts will need to be memorised, others will need to be practised but underpinning all of this will be the development of mathematical reasoning and understanding through exploration, problem solving and investigation.

Teaching for Mastery

The content and principles underpinning the mathematics curriculum and the OLSJ maths curriculum reflect those advocated by the mastery approach found in high performing education systems internationally.

Mastery of mathematics is not a fixed state but a continuum. At each stage of learning, pupils should acquire and demonstrate sufficient grasp of the mathematics relevant to their year group, so that their learning is sustainable over time and can be built upon in subsequent years. This requires development of depth through looking at concepts in detail using a variety of representations and contexts and committing key facts, such as number bonds and times tables, to memory. (Teaching for Mastery, NCETM 2015)

We adopt the NCETM Teaching for Mastery approach, with the following key principles:



The Five Big Ideas (first published by the NCETM in 2017):

Coherence

Lessons are broken down into small connected steps that gradually unfold new concepts, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.

Representation and Structure

Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation.

Mathematical Thinking

If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others.

Fluency

Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.

Variation

Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

These principles and features characterise this approach and convey how our curriculum is implemented: Teachers reinforce an expectation that all children are capable of achieving high standards in mathematics. The large majority of children progress through the curriculum

content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention. Teaching is underpinned by methodical curriculum design and supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge. Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts. Teachers use precise questioning in class to test conceptual and procedural knowledge and assess children regularly to identify those requiring intervention, so that all children keep up.

Teachers may draw upon supporting materials from a range of mastery resources such as: the NCETM curriculum prioritisation materials; White Rose Maths; Maths Shed; Third Space Learning and Oak Academy, whilst planning, and the school's ongoing engagement with the NCETM Maths Hub and THEP programme continues to ensure that staff at all levels understand the pedagogy of the approach. New concepts are shared using a topic card, where new vocabulary is shared to support with mathematical language and to support with sentence stems. Mathematical topics are taught in blocks, to enable the achievement of 'mastery' over time. Each lesson phase provides the means to achieve greater depth, with more able children being offered rich and sophisticated problems, as well as exploratory, investigative tasks, within the lesson as appropriate.

Curriculum maps for each block are written in the form of learning objectives to ensure that lessons are sequential and that skills are built on over time. There is a consistent use of the CPA (concrete, pictorial, abstract) approach across the school, which helps children develop mastery across all the operations in an efficient and reliable way.

Lesson Design

Our preferred approach to teaching mathematics follows a clear sequence of **model, guided practice and independent practice**. Teachers use worked examples and sentence stems to support pupils in developing understanding and mathematical language. As pupils gain confidence and competence, scaffolds are gradually removed to promote independence. In problem solving, careful attention is given to managing cognitive load through chunking learning into small, manageable steps, while also developing pupils' metacognitive skills so they can reflect on and articulate their thinking.

While we do not prescribe a fixed lesson format, effective lessons at OLSJ typically include: In Years 5 and 6 pupils write the date in Roman numerals as part of developing number sense and mathematical curiosity.

Pre-Starter

Fluent in Five

Starter

This needs to link to the lesson or recap previous learning. Starters can also be based on the RTP Prioritisation Curriculum to support gaps in learning, whole class intervention or consolidating concepts.

Main Teaching/Activity

Key features include:

- *Use of the CPA (concrete, pictorial, abstract) approach*

- *Use of whiteboards during lessons and jottings in books*
- *Activities addressing fluency, reasoning and word problems*
- *Challenge ensuring all children are challenged in every lesson*
- *Mathematical language supported by stem sentences and topic cards*

Teachers ensure the Five Big Ideas are present in all lessons to ensure a mastery approach.

Plenary

Examples include:

- Self-assessment (as a class or independently)
- Peer assessment
- Solving a reasoning or challenge question together as a class
- Children writing their thought process for solving a problem or a method

Mini-plenaries can be carried out throughout the lesson.

Teachers use topic vocabulary cards and stem sentences to support mathematical talk in every lesson.

Concrete Pictorial Abstract (CPA) Approach

We use a CPA approach to teaching maths. The Concrete Pictorial Abstract (CPA) approach is a system of learning that uses physical and visual aids to build a child's understanding of abstract topics.

Pupils are introduced to a new mathematical concept through the use of concrete resources (e.g. fruit, Dienes blocks etc). When they are comfortable solving problems with physical aids, they are given problems with pictures – usually pictorial representations of the concrete objects they were using.

Then they are asked to solve problems where they only have the abstract i.e. numbers or other symbols. Building these steps across a lesson can help pupils better understand the relationship between numbers and the real world, and therefore helps secure their understanding of the mathematical concept they are learning.

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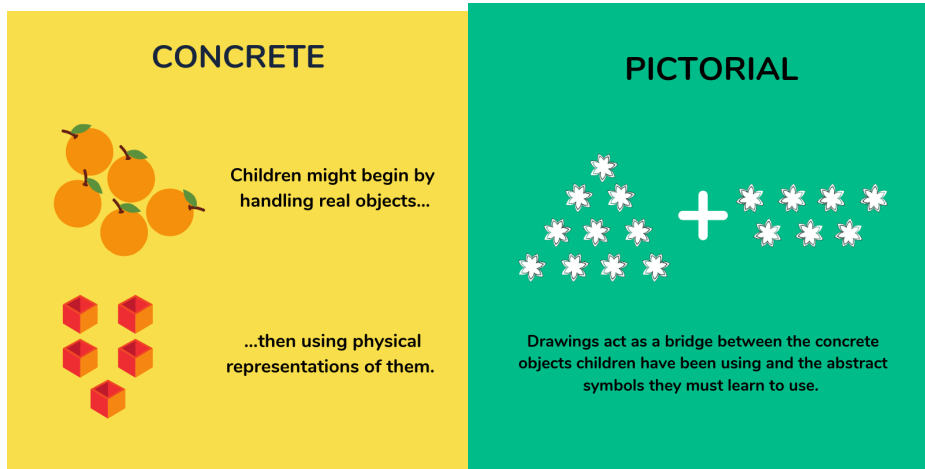
Why use the Concrete Pictorial Abstract approach in Maths?

Pupils achieve a much deeper understanding if they don't have to resort to rote learning and are able to solve problems without having to memorise.

When teaching reading to young children, we accept that children need to have seen what the word is to understand it. Putting together the letters c-a-t would be meaningless and abstract if children had no idea what a cat was or had never seen a picture.

People often don't think of this when it comes to maths, but to children many mathematical concepts can be equally meaningless without a concrete resource or picture to go with it. This applies equally to mathematics teaching at KS1 or at KS2.

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Finally, children learn to use abstract symbols to solve problems.

$$10 + 7 = 17$$

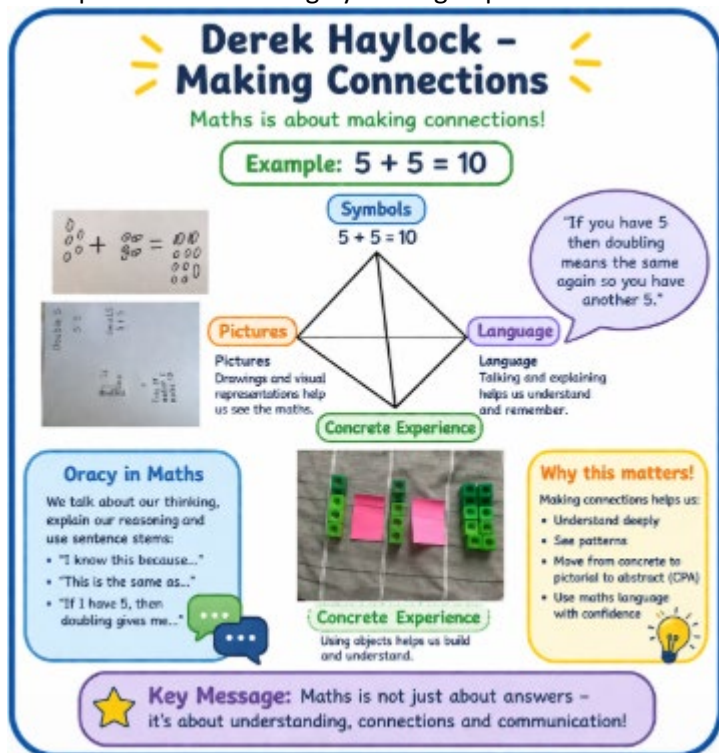
The detailed progression of written methods and CPA representations is set out in Appendix A: Calculation Policy and CPA Progression, which all teachers are expected to follow.

Oracy in Maths

Oracy is a key component of our mathematics teaching, enabling pupils to articulate their thinking, reason mathematically and make meaningful connections. Through structured talk, discussion and the use of precise mathematical vocabulary, pupils are supported to explain their understanding and justify their reasoning. This is closely linked to the CPA (Concrete–Pictorial–Abstract) approach, drawing on research by Derek Haylock, where language is used to bridge understanding between concrete experiences, pictorial representations and abstract concepts. By encouraging pupils to verbalise their thinking at each stage, we strengthen conceptual understanding and deepen mathematical connections.

Children use stem sentences to expose the structure of mathematics, enabling them to generalise patterns, make connections and communicate their reasoning with increasing

precision. Research suggests that structured mathematical talk and the use of sentence stems support pupils in organising their thinking, reducing cognitive load and developing deeper conceptual understanding by making implicit mathematical structures explicit.



Haylock, D. and Thangata, F. (2007) 'Making connections.' In *Key concepts in teaching primary mathematics*. London: SAGE Publications

Mastering Number

In OLSJ, we follow NCETM's Mastering Number Programme. The programme aims to secure firm foundations in the development of good number sense for all children in Reception, KS1, Year 4 and Year 5. The aim over time is that children will leave KS1 with fluency in calculation and confidence and flexibility with number, which will continue to be developed in KS2. Attention is given to key knowledge and understanding needed in Reception classes, and progression through KS1 to support success in the future. There is an expectation that each class participating provides up to 4 teaching sessions a week for all children of 10 to 15 minutes, in addition to their normal maths lesson.

Our staff receive central training (online and face-to-face) and a wealth of pupil-facing resources. As a result, our staff will be able to clearly communicate their mathematical ideas; develop a secure understanding of how to build firm mathematical foundation; work to develop intentional teaching strategies focused on developing fluency in calculation and number sense for all children and develop understanding and use of appropriate manipulatives to support their teaching of mathematical structures.

Impact

We evaluate the impact of our mathematics curriculum through a broad range of evidence, ensuring that pupils develop secure, cumulative knowledge and the ability to apply, explain and connect mathematical ideas with confidence.

Pupils demonstrate secure understanding, evidenced through their ability to explain, apply and connect mathematical ideas. Outcomes reflect consistent progress across groups, including disadvantaged and SEND pupils.

- **Attitudes to learning**
Pupils demonstrate positive attitudes towards mathematics, including high levels of engagement, resilience and confidence. They are able to articulate their thinking, justify their reasoning and approach challenges with increasing independence.
- **Outcomes in statutory assessments**
Outcomes in statutory assessments, including the Year 4 Multiplication Tables Check and end of Key Stage 2 SATs, reflect pupils' secure understanding and automaticity in key facts, alongside their ability to apply knowledge accurately.
- **Outcomes in internal assessments (Sonar)**
Internal assessment information is used diagnostically to identify gaps and inform responsive teaching. Outcomes demonstrate consistent progress over time for all groups of pupils, including disadvantaged and SEND.
- **Work in books**
Pupils' work provides evidence of coherent progression through the curriculum, including the effective use of concrete, pictorial and abstract representations. It shows increasing depth in reasoning, problem-solving and mathematical communication.
- **Pupil voice**
Through discussion, pupils demonstrate a secure understanding of key concepts, using precise mathematical vocabulary to explain their thinking and make connections across areas of learning.
- **Monitoring and evaluation**
Findings from Maths Health Checks, lesson observations and planning scrutiny show that teaching is adaptively responsive, misconceptions are identified and addressed promptly, and the curriculum is delivered with consistency and ambition.
There is a consistent approach to teaching mathematics, including the use of representations, models and questioning strategies.
Professional development ensures teachers have strong subject and pedagogical knowledge.

Assessment, Recording and Reporting

To develop learning, pupils are continuously assessed using observation, questioning and feedback in line with the school's feedback policy. In the EYFS, pupils are assessed against the Early Learning Goals and the Foundation Stage profile is completed throughout the year.

In Key Stages 1 and 2, children complete assessments at the end of units and at agreed assessment points across the year. Teachers use a combination of White Rose assessments, in class tasks and teacher judgement to decide whether pupils are working below, at or above age related expectations. Assessment information is recorded on Sonar (online assessment tool) and used to inform planning, identify gaps and select pupils for intervention.

At the end of every block and half term an assessment is carried out. Data from these assessments is recorded onto an assessment excel sheet and the school's tracking system, Arbor (Sonar assessment tool), and then used to inform future planning and to identify children for intervention and support.

Statutory assessments are administered in accordance with national requirements, including the Year 4 Multiplication Tables Check at the end of lower Key Stage 2 and the end of Key Stage 2 mathematics SATs.

Parent consultations are held during the Autumn and Spring terms where teachers discuss children's targets and progress in mathematics. In accordance with statutory requirements, an annual report is sent to parents towards the end of the Summer term. This report includes a summary of progress and attainment in mathematics and, where applicable, outcomes of statutory assessments.

For additional information, refer to the school Assessment Policy.

Inclusion and Equalities

We are committed to providing a high-quality mathematics education for all pupils, including those with special educational needs and disabilities, pupils who are disadvantaged, pupils with English as an additional language and those working at greater depth.

Teachers use a range of strategies to remove barriers and secure access to learning, including:

- Careful use of manipulatives and visual representations
- Pre-teaching of vocabulary and key concepts
- Scaffolding, modelling and guided practice
- Adapted tasks that maintain high expectations
- Additional adult support where appropriate
- Challenge tasks that deepen and extend thinking for pupils working at greater depth

Provision for pupils with SEND is planned in collaboration with the SENDCo and is in line with the school's SEND and Equality policies. We closely monitor the progress of key groups, including SEND, disadvantaged and vulnerable, EAL and White British pupils, with the aim of narrowing attainment gaps and ensuring all pupils make good progress towards their personal targets.

This commitment links directly to whole school priorities including:

- Strengthening assessment practice to ensure accurate identification of needs
- Securing access to learning for all pupils through appropriate scaffolding and challenge
- Closing attainment gaps for key groups
- Raising attainment at greater depth

Resources and Learning Environment

Pupils engage in activities from a variety of sources including practical apparatus, textbooks, worksheets and the environment. Through regular access to these resources as well as Chromebooks and laptops, they experience the fascination of mathematical exploration and investigation. They should also have the power to solve real and challenging problems.

Each classroom has a variety of teaching aids to support mathematics and there is a large maths resources store for staff to borrow equipment from depending on the needs of a lesson. All classes have access to a wide variety of equipment including multilink, Numicon, Cuisenaire rods, number lines as well as measuring and weighing equipment.

Pupils are encouraged to choose resources which are relevant to their work, take care of and return them.

Our Environment

The school aims to provide a mathematically stimulating environment:

- Through classroom displays that promote mathematical thinking and discussion
- Through classroom displays of pupils' work that celebrate achievement
- By providing a good range of resources for teachers and pupils to use
-

Every classroom displays key mathematical supports appropriate to the year group, such as number lines, hundred squares, place value charts and multiplication squares. In every classroom, resources such as number lines, hundred square, place value charts and multiplication squares are displayed as appropriate and used as resources for whole class or individual work, for children to become confident in their use and understanding of the number system. Maths working walls and resource areas are regularly updated to reflect current learning and to promote independence.

Interventions and Additional Support

Interventions are provided to boost children's progression in maths and are tightly planned, with success criteria set and assessments made frequently to ensure progress is being made.

Interventions are carried out mostly by our teaching assistants however it is the responsibility of the teacher to decide how it is planned and delivered. Communication is paramount to ensure the intervention is being carried out correctly and effectively.

We make use of Ready to Progress criteria, prior year group objectives and assessment information from Arbor to identify specific gaps. Support may include pre-teaching, same day intervention or short-term small group programmes focused on key concepts and number facts. Data analysis taken from Arbor (Sonar assessment tool) is used to identify children who require additional support in specific areas, examine existing interventions and start new interventions. The progress of pupils receiving intervention is reviewed during Pupil Progress Meetings and through Maths Health Checks and plans are adjusted accordingly.

Home Learning and Digital Tools

Home learning in mathematics is used to reinforce key skills, particularly number facts and times tables.

The main online platforms used are Numbots in Key Stage 1 and Times Tables Rock Stars in Key Stages 1 and 2 to support fluency in number bonds and multiplication facts. Teachers may also set occasional tasks through Google Classroom to consolidate current learning.

Expectations for the frequency and type of homework are communicated to parents at the beginning of each half term through class letters and the school website, in line with the school's homework guidelines.

Times Tables and the Multiplication Tables Check

Securing rapid and accurate recall of multiplication and division facts is a whole school priority.

Our approach includes:

- A clear whole school times table sequence established by the Maths Leader
- Explicit teaching of times tables in Lower Key Stage 2 and continued practice in Upper Key Stage 2
- Regular opportunities for practice in class and through Times Tables Rock Stars
- Ongoing gap analysis and tracking of pupils' progress with tables using Arbor and class spreadsheets
- Parental engagement through text messages and communications that highlight the current focus tables
- Positive reinforcement including certificates and celebrations for progress and achievement

This approach prepares pupils well for the statutory Year 4 Multiplication Tables Check and supports fluency across the curriculum.

Detailed expectations from the Maths Action Plan:

1. Explicit Teaching of Times Tables: Ensure that teachers follow the times table sequence established by the Maths Lead and teach it consistently
2. Gap Analysis and Tracking: Conduct a gap analysis at key intervals and record results in the appropriate spreadsheet and on Arbor
3. Regular Practice: Provide regular opportunities for children to practise both their focus times table and all other times tables, with progress tracked and recorded on a spreadsheet
4. Parental Engagement: Send text messages to parents highlighting the current focus times table to encourage support at home
5. Positive Reinforcement: Implement a system of certificates and other positive reinforcement measures, with results tracked in a spreadsheet

Cross Curricular Links and STEM

Mathematics is an integral part of our daily lives and therefore manifests itself in many areas of the curriculum. At Our Lady and St Joseph our aim for Science, Technology, Engineering and Maths (STEM) is to inspire and engage our children and to prepare them for their future lives and career paths. We are committed to ensuring that our children are able to recognise the importance of STEM within the wider world. Children are given the ability to demonstrate the knowledge and skills learnt within mathematics and science and apply them to real life contexts through computing and design and technology where appropriate and for a purpose.

Teachers plan opportunities for pupils to apply their mathematical skills in subjects such as science, computing, design and technology, geography and physical education. Examples include collecting and presenting data from scientific investigations, using measures in design projects and interpreting charts and graphs in geography.

Leadership and Management

The role of the Maths Leader:

- Ensure quality first teaching
- Ensure a core of high quality material is available
- Ensure progress is made by all
- Review and monitor planning
- Monitor maths teaching and evaluate pupils' work
- Arrange liaison with outside consultants
- Work alongside staff to support if required
- Attend relevant courses to be aware of new ideas and disseminate these to all staff
- Support the teaching and learning of maths
- Arrange appropriate inset for colleagues
- Be responsible for ordering all maths resources
- Carry out a curriculum review and relay findings to the governors and staff
- Update the policy document and schemes of work as necessary
- Provide workshops for parents

The Maths Leader works closely with the Senior Leadership Team, the SENDCo and phase leaders. Maths Health Checks, which include lesson observations, book looks, pupil voice and data analysis, are used to evaluate provision and identify next steps for improvement. The school's involvement with the Maths Hub and NCETM programmes supports ongoing development of mastery pedagogy.

Staff Induction and Professional Development

Induction of Staff

New members of staff will be introduced to the Maths Policy, given a "Maths at OLSJ" handbook which outlines expectations and gives links to supporting documents and resources, planning requirements, specific targets and resources by the Maths Leader.

The Maths Leader provides induction support including signposting to Appendix A: Calculation Policy and CPA Progression, White Rose and NCETM materials and offers coaching or team teaching where appropriate.

Ongoing professional development is planned in response to school priorities, Maths Health Check outcomes and individual staff needs and may include in house training, Maths Hub work groups and external courses.

Liaison Across Key Stages

Regular meetings will take place between phase leaders in the EYFS, KS1 and KS2 to ensure best practice.

Monitoring, Evaluation and Review

Evaluation

This policy is reflected in classroom practice and is monitored and evaluated by the Headteacher, Senior Leadership Team and Maths Leader through Maths Health Checks, lesson observations, discussion and regular scrutiny of planning and pupils' work, and pupil and staff voice.

Findings from monitoring feed into the School Improvement Plan and the Maths Action Plan. Inset and professional development are planned to address identified priorities and to support individual staff development.

Whole School Issues

This policy will be considered annually when updating our School Improvement Plan and Maths Action Plan. Inset will be planned to support whole school responses and where possible individual professional needs.

This policy will be reviewed annually or earlier if required by changes in national guidance or school priorities.

Appendix A: Calculation Policy and CPA Progression

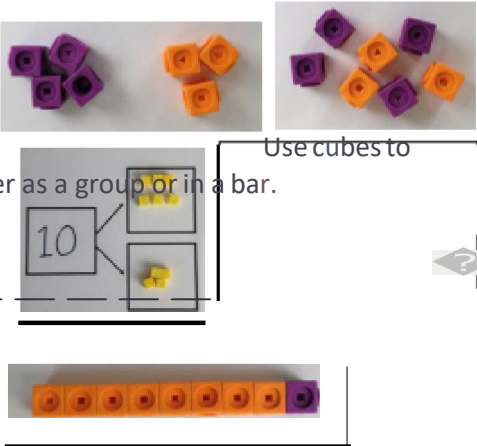
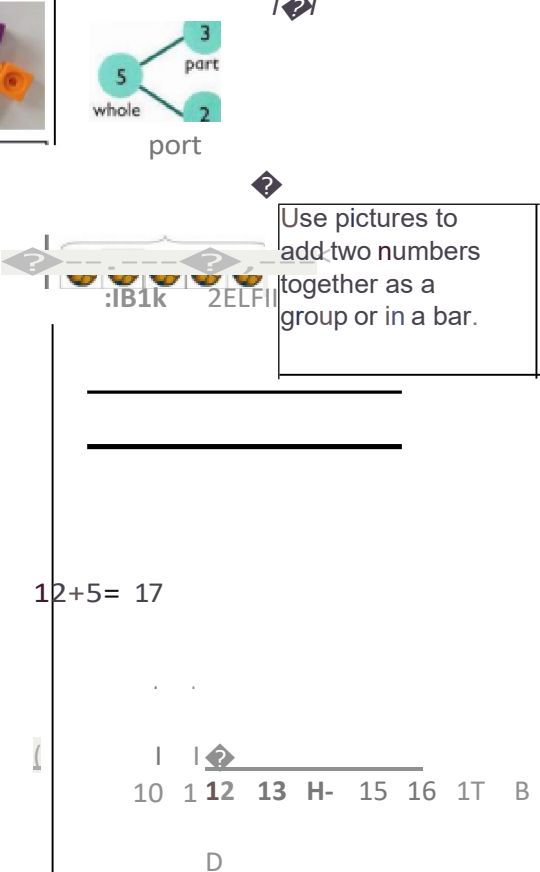
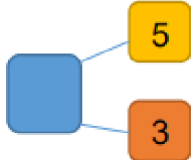
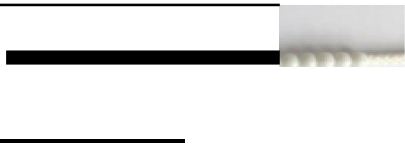
This appendix contains the detailed progression in written calculation methods for addition, subtraction, multiplication and division from Year 1 to Year 6, including examples of the concrete pictorial abstract approach.

It should be used alongside the main policy when planning and teaching mathematics across the school.

Progression Across Year Groups

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on. Regrouping to make 10.	Adding three single digits. Column method – no regrouping.	Column method- regrouping. (up to 3 digits)	Column method- regrouping. (up to 4 digits)	Column method- regrouping. (with more than 4 digits) (Decimals- with the same amount of decimal places)	Column method- regrouping. (Decimals- with different amounts of decimal places)
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10	Counting back Find the difference Part whole model Make 10 Column method- no regrouping	Column method with regrouping. (up to 3 digits)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. (with more than 4 digits) (Decimals- with the same amount of decimal places)	Column method with regrouping. (Decimals- with different amounts of decimal places)
Multiplication	Doubling Counting in multiples Arrays (with support)	Doubling Counting in multiples Repeated addition Arrays- showing commutative multiplication	Counting in multiples Repeated addition Arrays- showing commutative multiplication Grid method	Column multiplication (2 and 3 digit multiplied by 1 digit)	Column multiplication (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication (multi digit up to 4 digits by a 2 digit number)
Division	Sharing objects into groups Division as grouping	Division as grouping Division within arrays	Division within arrays Division with a remainder Short division (2 digits by 1 digit- concrete and pictorial)	Division within arrays Division with a remainder Short division (up to 3 digits by 1 digit- concrete and pictorial)	Short division (up to 4 digits by a 1 digit number interpret remainders appropriately for the context)	Short division Long division (up to 4 digits by a 2 digit number- interpret remainders as whole numbers, fractions or round)

Addition

Objective and Strategies	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model add two numbers together as a group or in a bar.	Use cubes to 	Use pictures to add two numbers together as a group or in a bar. 	$4 + 3 = 7$ $10 = 6 + 4$  Use the part-whole diagram as shown above to move into the $5 + 12 = 17$ Place the larger number in
Starting at the bigger number and counting on the bead string and then count on to the smaller number 11 by 1 to find the answer.	Start with the larger number on 	$12 + 5 = 17$ 	your head and count on the smaller number to find your answer.

Regrouping to make 10.

6+5=11

3 + 9 =

Use pictures or a number line. Regroup or partition the smaller number to make 10.

7 + 4 = 11

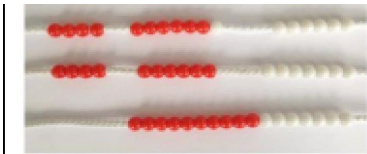
If I am at seven, how many more do I need to make 10. How many more do I add on now?

Adding three

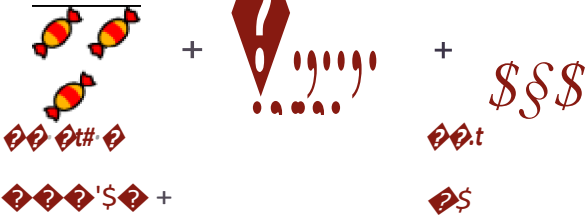
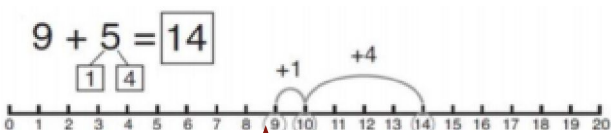
4 + 7 + 6 = 17

single digits

Put 4 and 6 together to make 10. Add on 7.



Start with the bigger number and use the smaller number to make 10.



Add together three groups of objects. Draw a picture to recombine the groups to make 10.

4 + 7 + 6 = 17

Combine the two numbers that make 10 and then add on the remainder.

Column method-

no

24 + 15 =

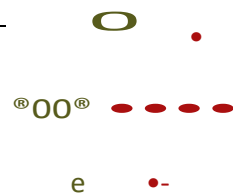
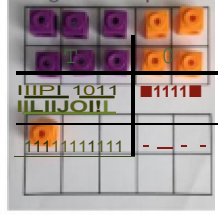
Add together the ones first

Then add the
tens. Use the
Base 10 blocks
first before

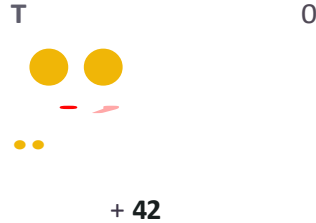
regrouping

After practically using the base 10
blocks and place value counters,
children can draw the counters to
help them to solve additions.

moving the place value counters.



Calculations

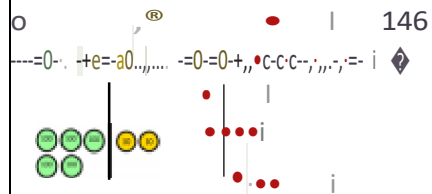


$$21 + 42 =$$

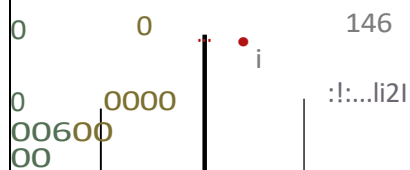
2

Column
method-
regrouping

Make both numbers on a place value grid.



Add up the units and exchange 10 ones for 10.



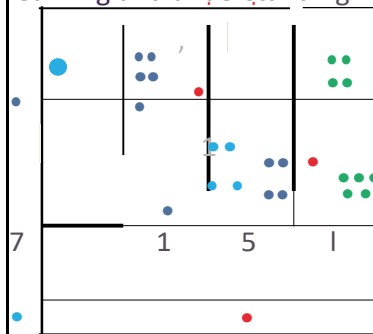
Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

As children move on to decimals, money and decimal place value counters can be used to support learning.

columns and place value counters to further support

their Children can draw a pictorial representation of the learning and understanding.



Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

$$\begin{array}{r} 20 \\ 40 \\ 60 \end{array} + 8 = 73$$

5:6

As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

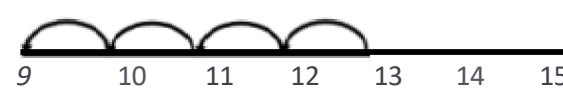
7.

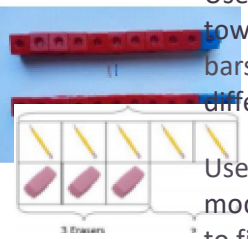
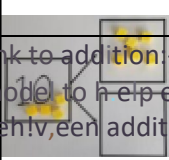
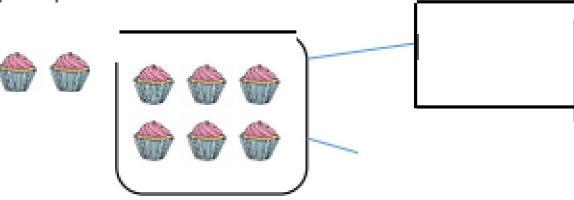
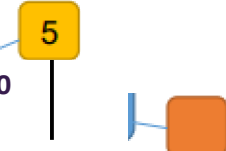
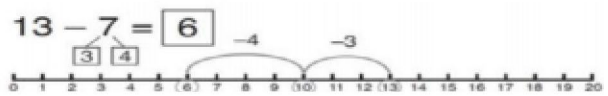
54.6

127.

$$\begin{array}{r} 11 \\ 11 \\ 2 \end{array} + \begin{array}{r} 54.6 \\ 127. \end{array} = \begin{array}{r} 11 \\ 11 \\ 2 \end{array} + \begin{array}{r} 54.6 \\ 127. \end{array}$$

Subtraction

Objective and Strategies	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects; counters; cubes etc to show how objects can be taken away. 6-2=4  ... 	Cross out drawn objects to show what has been taken away.  6-2=4 11-3=?	18-3=15 8-2=6
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13-4  Use counters and move them away from the group as you take them away counting backwards as you go. 	Count back on a number line or number track  Start at the bigger number and count back the smaller number showing the jumps on the number line.  This can progress all the way to counting back using two 2 digit numbers.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

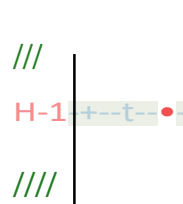
Find the difference	Compare amounts and objects to find the difference.  Use cubes to build towers or make bars to find the difference. Use basic bar models with items to find the difference.	Count on to find the difference. 13 ? Draw bars to find the difference between 2 numbers. 	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.
Part-Whole Model	link to addition: use the part-whole model to help explain the inverse relationship between addition and subtraction.  If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part-whole model.  D	 Move to using numbers within the part-whole model.
Make 10	14 - 9 = 		16 - 8 = How many do we take off to reach the next 10?

Make U on the ten frame. Take away the four first to make 10 and then take away one more so you have taken away 5. You are left with 1 the answer of 9.	Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	How many do we have left to take off?
---	--	--

Column

method
without
regrouping

Use Base 10 to make the



Show how
you partition
numbers to
subtract. Again
make the
larger number
first.

bigger
number then
take the
smaller
number
away.



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176-64=

176



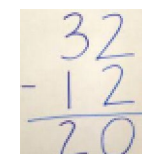
Draw the Base 10 or
place

32

value counters
alongside the
written
calculation to
help to show
working.

$$\begin{array}{r} 176 \\ - 64 \\ \hline 112 \end{array}$$

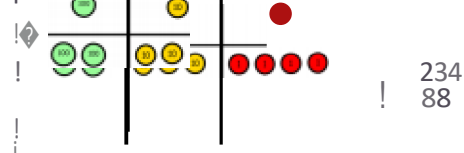
This will lead to a clear
written column
subtraction.



Column method
with regrouping

Use Base 10 to start with before
moving on to place value counters.
Start with one exchange before
moving onto subtractions with 2
exchanges.

Make the larger number with the
place value counters



Start with the ones. can I take away 8
from 4 easily? I need to exchange one

of
my
tens
for

ten		
ones	12	6
		5
3	5	



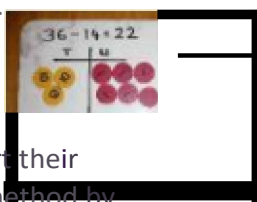
Draw the counters onto a place
value grid and show what you have
taken away by crossing the
counters out as well as clearly
showing the exchanges you make.

When confident, children can make
their own way to record the
exchange/regrouping.

Just writing the numbers as shown

here shows that
the child
understands the
method

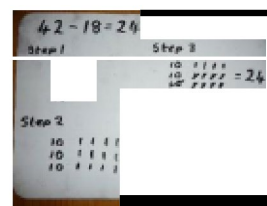
T
Do-13 it
200 :r:i
!100 MT



Children can start their
formal written method by
partitioning the number into
clear place value columns.

$$\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$$

and 11 rows when to exchange/regroup.

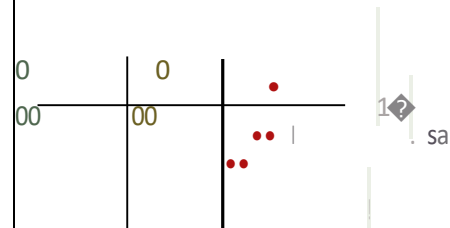


Moving forward the children use a more
compact method.

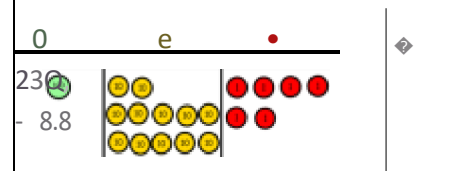
$$\begin{array}{r} 836 - 254 = 582 \\ \hline \end{array}$$

$$\begin{array}{r} 728 - 582 = 146 \\ \hline \end{array}$$

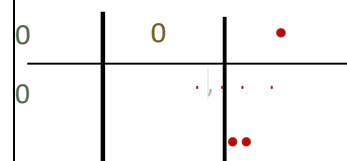
Now I can subtract my ones_



Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens_



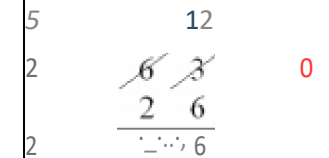
Now I can take away eight tens and complete my subtraction



Show children how the concrete method links to the written method alongside your working_ Cross out false

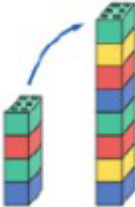
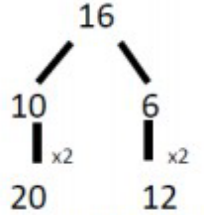
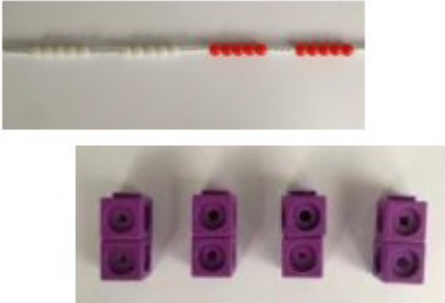
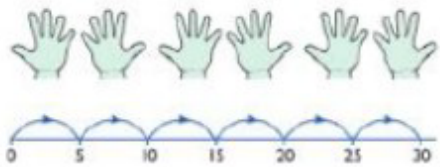


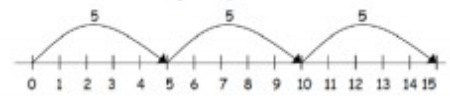
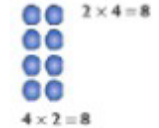
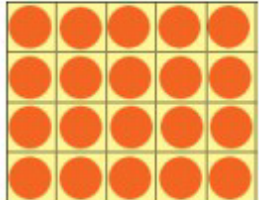
This will lead to an understanding of subtracting any number including decimals_



	numbers Viltien exchanging 1 and show :where we write our new amount		
--	---	--	--

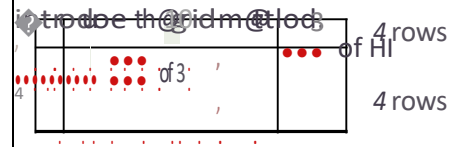
Multiplication

Objective and Strategies	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number.  double 4 is 8 $4 \times 2 = 8$	Draw pictures to show how to double a number. Double 4 is 8 	 Partition a number and then double each part before recombining it back together.
Counting in multiples	 Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30

Repeated addition	   Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures.  2 + 2 + 2 + 2 + 2 = 10
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find commutative multiplication sentences.    Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Grid Method

Show link with arrays to first



Move on to using Base 10 to move towards a more compact method.



Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.

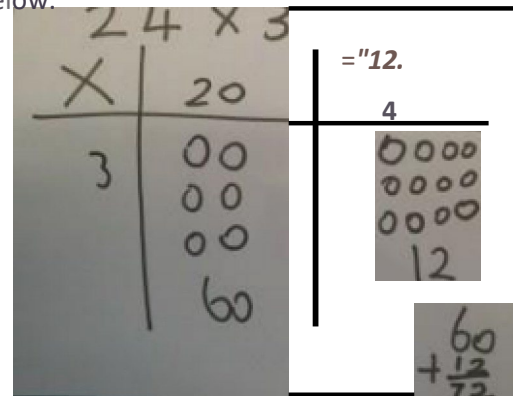


Fill each row with 126.



Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their linking as shown below.



Start with multiplying by one digit number and showing the clear addition alongside the grid.

X	30	5
7	210	35

$$210 + 35 = 245$$

Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

100	80
30	24

10,

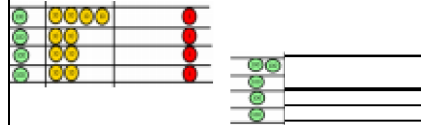
10

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4Jt 126



Add up each column, starting with the ones making any exchanges needed. e 0 •

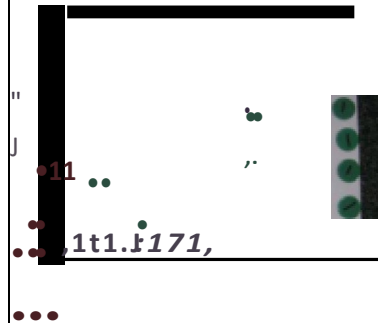


Then ou have our answer.

f	101)1	300	40
Z			
111	!!0000	3000	400
		2.0	
8	SOCO	2400	310 I(;

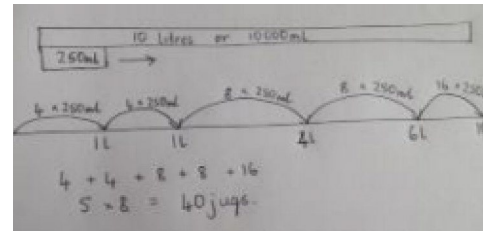
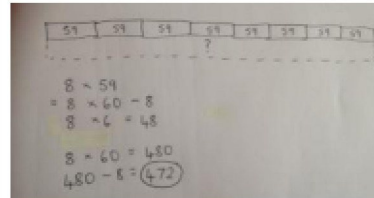
Column multiplication

Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



Start with long multiplication, reminding the children about lining up their numbers clearly in columns.

If it helps, children can write out what they are solving next to their answer.

$$\begin{array}{r} 32 \\ \times 24 \\ \hline 128 \\ 640 \\ \hline 768 \end{array}$$

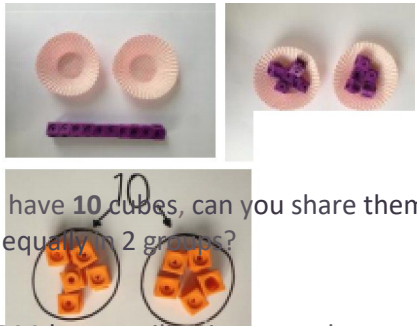
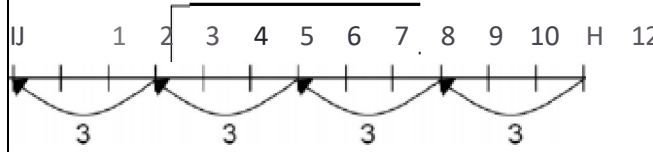
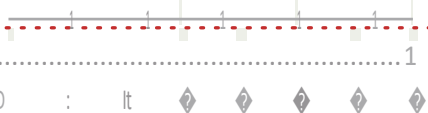
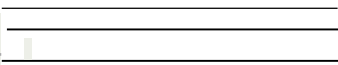
$$\begin{array}{r} 1 \\ > 2 \\ + 4 \\ \hline 6 \end{array}$$

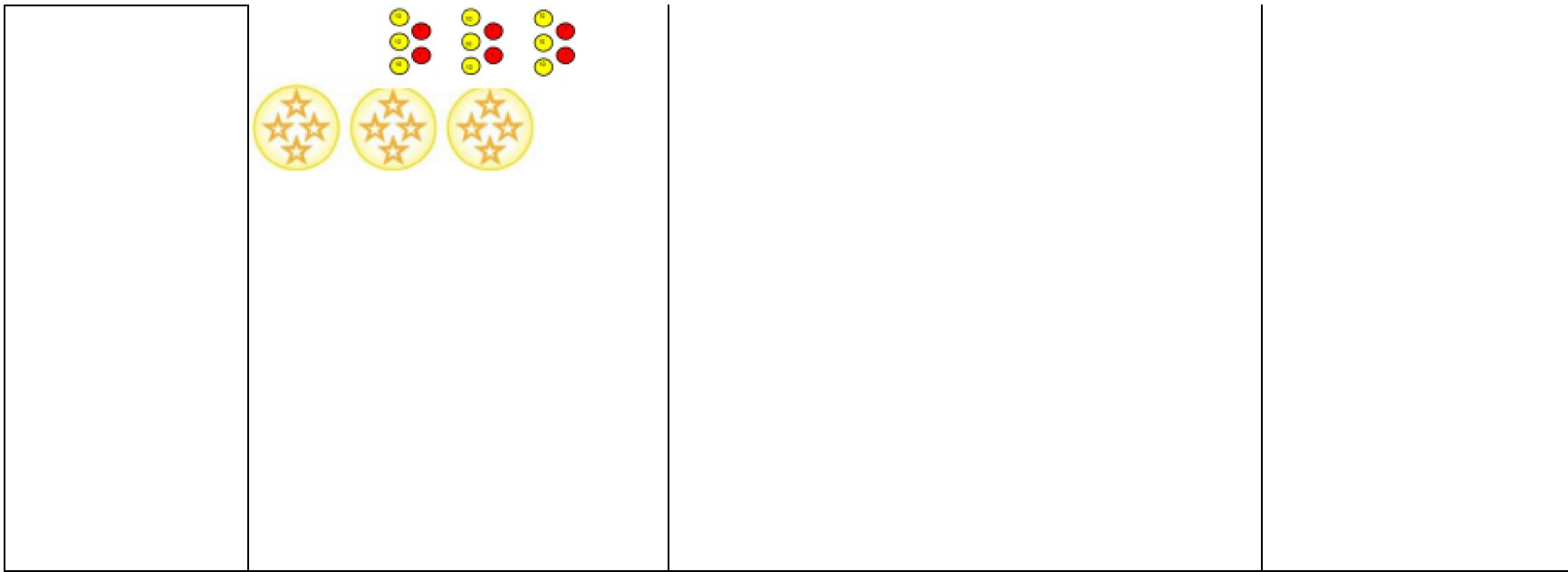
His moves to the more compact method.

1342

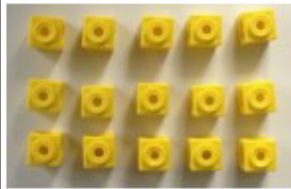
		<u>X</u>	<u>18</u>
		13420	
		10736	
		24156	

Division

Objective and Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	 I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities. $10 \div 2 = 5$ Use a number line to show jumps in groups. The number of jumps equals the number of groups. 	Share 9 buns between three people.
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place <u>value counters</u> to aid understanding.   96 ... 3 -- 32	Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 20  $20 \div 5 = ?$ $5 \times ? = 20$	28 $\div$ 7 = 4 Divide 28 into 7 groups. How many are in each group?



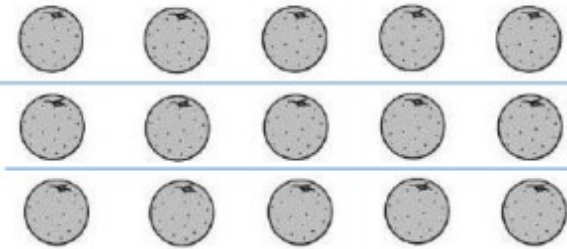
Division within arrays



Link division
to
multiplication
by creating
an array and
thinking
about the

number sentences that can be created.

Eg $15 \div 3 = 5$ $5 \times 3 = 15$
 $15 \div 5 = 3$ $3 \times 5 = 15$



Draw an array and use lines to split the array into groups to make multiplication and division sentences.

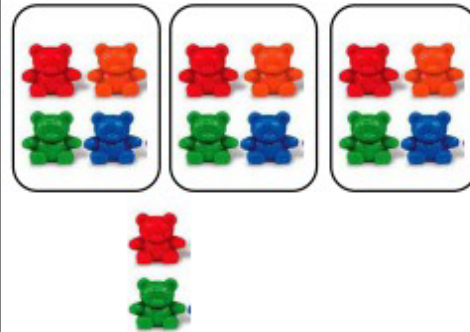
Find the inverse of multiplication and division sentences by creating four linking number sentences.

$$\begin{array}{l} 7 \times 4 = 28 \\ 4 \times 7 = 28 \\ 28 \div 7 = 4 \\ 28 \div 4 = 7 \end{array}$$

Division with a remainder

$14 \div 3 =$

Divide objects between groups and see how much is left over



Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.



Draw dots and group them to divide an amount and clearly show a remainder.



Complete written divisions and show the remainder using r.

$$\begin{array}{ccccccc} 29 & \div & 8 & = & 3 & \text{REMAINDER } 5 \\ \uparrow & & \uparrow & & \uparrow & & \uparrow \\ \text{dividend} & & \text{divisor} & & \text{quotient} & & \text{remainder} \end{array}$$

Short division

Tens

3
G) 00

3

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Units,
2 $Q_{0.0}$

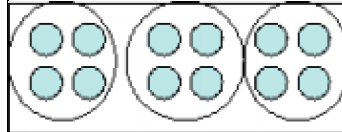
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gside

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Begin with divisions
that divide equally
with no remainder.

2

1 a

Use place value counters to divide using the bus stop method alone

0000

• •

42 ÷ 3

4.2 ÷ 3 =

Start with the biggest place value, we are sharing 14.0 into three groups. We can put 1 ten in each group and we have 1 ten left over.

10 1 1

10 1 1

We exchange this ten for ten ones and then share the ones equally among the

groups.

1 1

We look how much in 1 group so the answer is 4..

Encourage them to move towards counting in multiples to divide more efficiently.

418

7 2

Move onto divisions with a remainder.

8 6 r 2

5 2

Finally move into decimal places to divide the total accurately.

		4	6
11	3 5	5	21
		1	0

2544;1.12

How many groups of 12 thousands do we have? No! 1.e

Exchange 2 hundreds for 20 tens.

M T O

@)(:!(
e,eee 1212'544 process.

Instead of using physical counters, students can draw the counters and circle the groups on a whiteboard or in their books.

Use this method to explain what is happening and as soon as they have understood what move on to the abstract method as this can be a time consuming

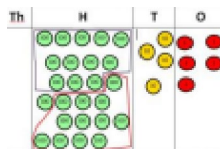
2011,336 s
3 1 8 r5

How many groups of 12 are in 25 hundreds? 2 groups.

Circle them.

We have grouped 24 hundreds so, can take them off and we are left with 1 one.

1211:44
24-



JL

3 s
2 0
1 6 5

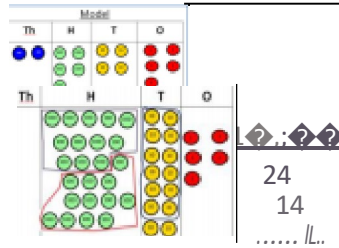
1 6 0
5

Exchange 1 hundred for ten tens so now we have 14 tens.

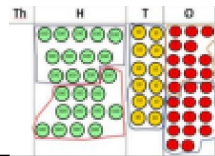
How many groups of 12 are in 14? 1 remainder 2

Long division

2.
Exchange the two LeM for twenty Oil'es so, now we have 24 Oil'es. How many groups of 112 are in 24? 2



$$\begin{array}{r}
 112 \\
 24 \overline{) 112} \\
 \underline{48} \\
 160 \\
 \underline{168} \\
 -16
 \end{array}$$



End of Appendix A

END OF POLICY DOCUMENT