Cradley CE Primary School
Maths Policy

Believe, belong, be happy; every child, every chance, every day.

Maths curriculum design

At Cradley CE we believe that mathematics is a *tool for everyday life* and therefore teach using a concrete resources before moving through pictorial onto abstract concepts allowing for a *deep and sustainable understanding of maths*. . It is a whole *network of concepts* and relationships which provide a way of viewing and making sense of the world. It is used to analyse and communicate information and ideas and to tackle a range of practical tasks and real life problems. Our curriculum is devised to ensure that children learn content in an order which enables them to *make helpful links between concepts*. Children revisit concepts in a *spiralled approach* so that they have a chance to recall the previous learning from memory in a timely way and enhance and depend their understanding allowing them to *master the content* of the curriculum.

At Cradley we aim for all our children to be *confident in number* so that they are able to reason and apply their knowledge of calculations and understandings of number structure in a wider context. All concepts are built with a *firm foundation grounded in concrete exploration*. These fundamental principles are then enhanced with pictorials before children transition to abstract representation. We *build upon children's previous learning* to ensure that all children are on a journey towards mastering age related curriculum expectations. Children who have mastered the curriculum are *challenged* to explore concepts in depth and draw upon wider knowledge and understanding to solve complex problems. Daily maths lessons include an introductory phase including *retrieval practice* and an *oral mental starter*, main teaching to introduce current learning, followed by independent/group/guided activities to consolidate and apply learning and ended with a plenary.

Our curriculum content is chosen allow all children to become *fluent* in the fundamentals of mathematics so that they are *efficient* in using and selecting the appropriate *written algorithms and mental methods*, underpinned by mathematical concepts. The skill of problem solving is built in the curriculum by applying their mathematics to a variety of problems with increasing sophistication, including unfamiliar contexts and to *model real-life scenarios*.

Every child will have the ability to be able to *reason mathematically* by following a line of enquiry and present a justification, *using mathematical language*. enjoyment of learning is promoted through practical activity, exploration and discussion; and *promote confidence and competence* with numbers and the number system; a practical understanding of the ways in which information is gathered and presented; an understanding of geometry and statistics. Through Maths, children have a clear focus on *direct, instructional teaching and interactive oral work*, children should be engaged at all times and *'doing' as well as listening*.

Rationale

At Cradley C of E Primary School we believe that mathematics is a tool for everyday life. It is a whole network of concepts and relationships which provide a way of viewing and making sense of the world. It is used to analyse and communicate information and ideas and to tackle a range of practical tasks and real life problems. Our school vision 'Believe, belong, be happy; every child, every chance, every day' will be interwoven into each and every maths lesson. In addition to this, our 6 core values will be fundamental in promoting positive learning behaviours.

Our Curriculum

It is our aim to develop:

- all children to become **fluent** in the fundamentals of mathematics so that they are efficient in using and selecting the appropriate written algorithms and mental methods, underpinned by mathematical concepts
- a child's ability to **solve problems** applying their mathematics to a variety of problems with increasing sophistication, including unfamiliar contexts and to model real-life scenarios
- a child's ability to be able to **reason mathematically** by following a line of enquiry and develop and present a justification, argument or proof using mathematical language and promote enjoyment of learning through practical activity, exploration and discussion; and promote confidence and competence with numbers and the number system;
- a practical understanding of the ways in which information is gathered and presented;
- an understanding of geometry and statistics.

Intent

At Cradley we aim for all our children to be confident in number so that they are able to reason and apply their knowledge of calculations and understandings of number structure in a wider context. All concepts are built with a firm foundation grounded in concrete exploration. These fundamental principles are then enhanced with pictorials before children transition to abstract representation. We build upon children's previous learning to ensure that all children are on a journey towards mastering age related curriculum expectations. Children who have mastered the curriculum are challenged to explore concepts in depth and draw upon wider knowledge and understanding to solve complex problems. All children are taught strategies to become fluent in recall of number facts. Children explore shape, space and measure developing an understanding which allows them to apply their learning to the wider world and equips them for the application of skills later in life. Children are excited by maths and look forward to solving challenging calculations, algorithms and problems which require them to think deeply and reason.

Planning and Lesson format

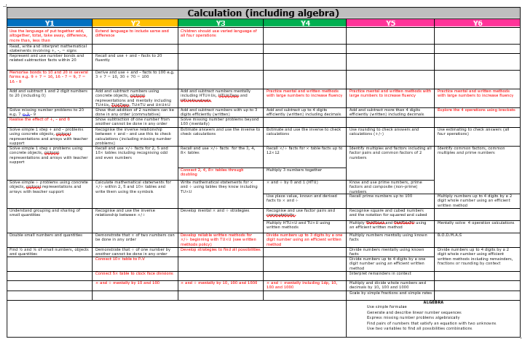
The approach to the teaching of mathematics within the school is based on a mathematics lesson every day which will usually consist of an introductory phase including retrieval practice and an oral mental starter, main teaching to introduce current learning, followed by independent/group/guided activities to consolidate and apply learning and ended with a plenary.

Long term planning overviews

All year groups have a yearly overview which chunks the curriculum over the course of the year. This is devised strategically to ensure that children learn content in an order which enables them to make helpful links between concepts. Children revisit concepts in a spiralled approach so that they have a chance to recall the previous learning from memory in a timely way and enhance and depend their understanding allowing them to master the content of the curriculum.

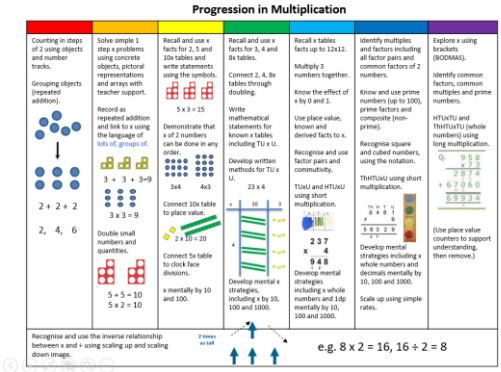
Maths Curriculum Overview

Teacher have access to the curriculum assessment grid which outlines statements and outcomes taken from the 2014 National Curriculum which for their year group within each sub division of the maths curriculum. It also provides some statements in red which are bridging statements. These statements are content which does not appear within the National curriculum but a stepping stone which school believes is crucial to aid the child's next phase of learning in the subsequent year.



Calculation progression

The schools calculation policy is followed throughout the school. The stages are colour coded as a pose to labelling them by year group to honour the child's starting point within the calculation. The policy contains lots of visual representations to guide teaching and learning using the concrete, pictorial abstract approach.



Daily lesson planning

Retrieval Practice

Retrieval practice begins the lesson with an opportunity to revisit something which has been stored in children's short-term memory. By revisiting regularly methods and knowledge retrieval not only become more fluent and rapid but they are also committed further into long term memory. Teachers choose to look at last lesson's learning, last week's learning, last month's learning and last year's learning as a focus at the start of each session. This task should be pacey and include an opportunity for talk but most importantly should include the children retrieving previously taught information, not learning new material. For further guidance, please see the OMS and Retrieval consistency guide.

Oral Mental Starter

The oral mental starter should focus on one skill which the child should be mentally fluent in over the course of a week. The skills should first be modelled by the teacher, then problems involving the skills should be attempted using a scaffold by the end of the week children should not only be fluent in these skills but they should have reached a level where they can attempt these skills in complex problems.

Modelled Teaching and input

This should have a clear focus on direct, instructional teaching and interactive oral work, children should be engaged at all times and 'doing' as well as listening. Practical resources will be used wherever possible to introduce new concepts. At Cradley we understand that maths should be taught as a concrete concept before it moves to pictorial then abstract as it allows a deep and sustainable understanding of maths.

Concrete - is the "doing" stage, using concrete objects to model problems. Instead of the traditional method of Maths teaching, where a teacher demonstrates how to solve a problem, the concrete approach brings concepts to life by allowing children to experience and handle physical objects themselves. For example, if a problem is about adding up four baskets of fruit, the children might first handle actual fruit before progressing to handling counters or cubes which are used to represent the fruit. Practical resources are stored in the Maths cupboard in the staffroom and some classes have their own practical resources kept in their rooms.

Pictorial - is the "seeing" stage, using representations of the objects to model problems. This stage encourages children to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem.

Building or drawing a model makes it easier for children to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

Abstract - is the "symbolic" stage, where children are able to use abstract symbols to model problems. Only once a child has demonstrated that they have a solid

understanding of the "concrete" and "pictorial" representations of the problem, can the teacher introduce the more "abstract" concept, such as mathematical symbols.

Although CPA has been shown as three distinct stages, teachers will go back and forth between each representation to reinforce concepts.

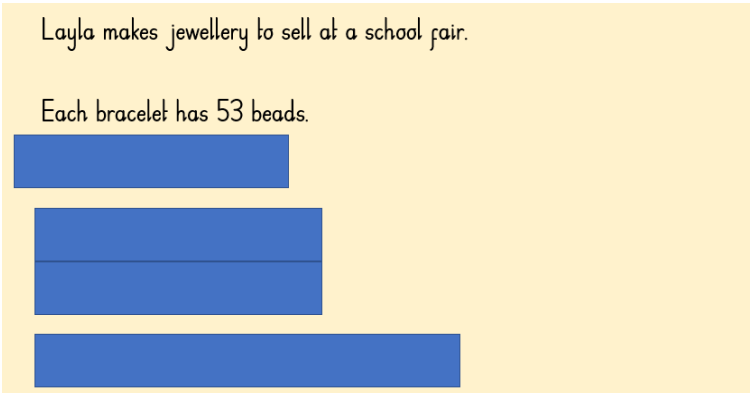
Our approach encourages teachers to vary the apparatus the children use in class, for example, one day they might use counters, another day they might use a ten frame Children are encouraged to represent the day's Maths problem in a variety of ways, for example, drawing an array, a number bond diagram or a bar model. By systematically varying the apparatus and methods they use to solve a problem, we help children to make quicker mental connections between the concrete, pictorial and abstract phases.

In addition to this, reasoning skills need to be explicitly modelled and taught. Methods should be verbalised by staff so children can repeat on their own when needed. 'Talking Maths' is a key concept for success in reasoning in the same way that 'Talk for Writing' is a key concept in English.

Reasoning prompts should be also displayed for children and use when they are asked to reason in Maths (see appendix 3). They could be attached to traffic lights or on the wall.

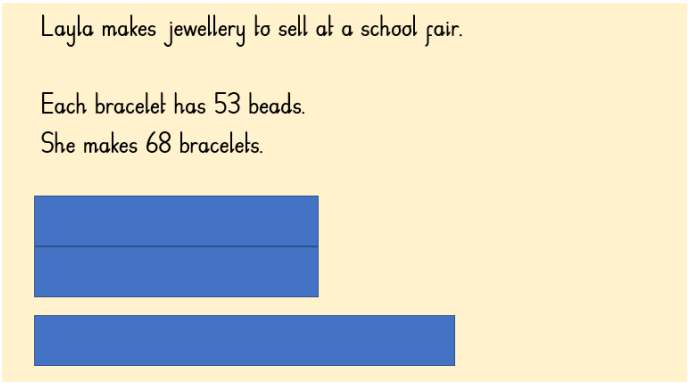
Teaching reasoning and problem-solving skills

Problem solving – modelled teaching
When an object is secure with the children, teachers should select a word problem and display it to the children with parts of the problem blacked-out like below:



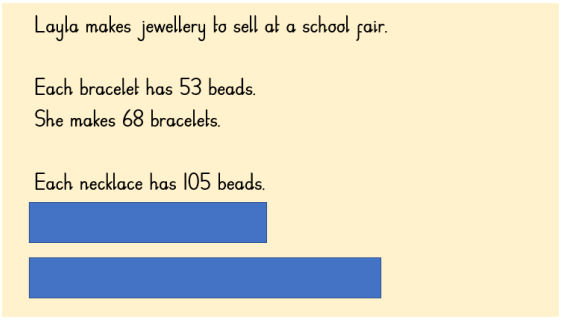
Discussions should be had as to what could be under the blacked-out sections.
'What could we be being asked here?'
'If we had 3 bracelets, what would we have to do? What operation would that involve?'

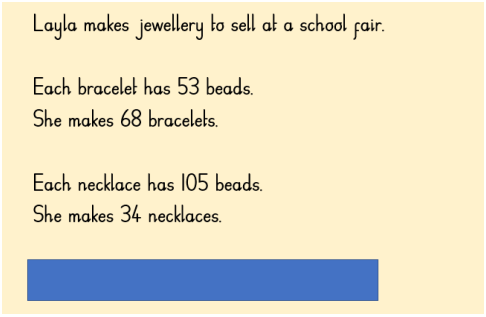
The problem should then have another element of it revealed.

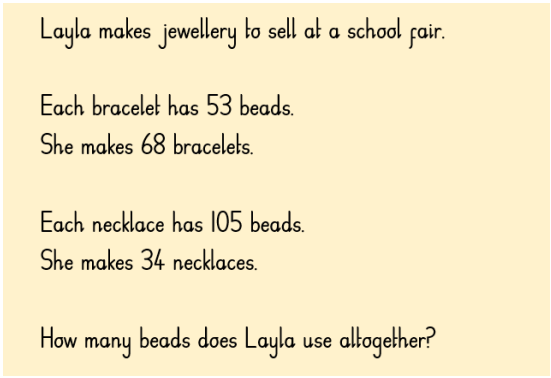


Discussions again should be held with the children:
'What do we need to do?'
'What could we be asked to do next? It says jewellery so could it be something else that Layla makes?'

The different parts of the question should be revealed to the children gradually until the whole question is revealed.







Discussions are important throughout this activity so the children can identify which operation is needed and why and how we know what information is needed to solve the question.

Another example can be found in the guide at the end of the document.
This practice should be completed Monday-Thursday each week.

Independent tasks

Task	Definition
Ignition	This section will allow children to practise key methods, skills or concepts that are needed in order to access the 'launch' section. It is also used to increase fluency, accuracy and to ensure age related objectives are met.
Launch	The 'launch' section is to allow children to apply their knowledge in a context that they are somewhat familiar with and should involve an element of reasoning. Following the completion of this section it can be assumed that the child has secured the age-related expectation.
Blast off	For this section, children are expected to solve problems with greater complexity in a context that they are not familiar with; they should demonstrate this with creativity and ingenuity. They could also be expected to explore and investigate mathematical structures. Following the completion of this section it can be assumed that the child has mastered the age-related expectation.
Greater Depths of	This section may require children to draw on previously taught concepts which have been embedded and the foundations of their mathematical

space!	knowledge to grapple with difficult and complex problems with fluency, high level thinking and reasoning. This may include open ended problem solving, If a child completes this task independently then they can be considered as working above age related expectation within this strand.

Plenary

While this will usually take place at the end of the lesson, several mini plenaries could take place within a lesson especially if children a showing they need extra support in understanding a concept. They could also be used to extend, consolidate or provoke deeper thinking through questioning. They can be used to assess understanding of the content from that lesson or assess understanding of a new concept that is to be taught the next day/week

Vocabulary

Children are taught vocabulary relevant to their age group and curriculum content. The vocabulary is introduced using a visual symbol and is chanted and rehearsed. Oracy is a fundamental principal at Cradley and it is an expectation that children use the vocabulary they have learnt both orally and in written responses.

Times tables and fluency

Children are taught Times tables in line with the recommended curriculum content. Children are shown visually using concrete and pictorial representation how the numbers accumulate in order to increase their understanding. The school focuses on chanting in and out of order giving the multiple and the whole calculation '1X5 is 5.'
Children in KS2 have access to Times table rockstars subscriptions which are tailored to their starting points and monitor their progress and speed within this skill set.
Infants also have the opportunity to practise number bonds, subitising and mental addition and subtraction using the numbots progression of skills.
Weekly challenges are set in school focussing on speed, accuracy, effort, improvement and time spent practising in order to raise the profile of fluency.

Problem solving /open ended investigations

All children are regularly given the opportunity to problem solve in all aspects of maths. This includes solving multi step problems, attempting concepts without scaffolding, open ended investigations and finding all possibilities.

Resources

The school invests in a number of physical and virtual resources to aid and enhance the maths curriculum. Cradley C of E promotes the use of concrete apparatus in all

lessons and therefore is well resources in double sided counters, Numicon, unifix, base 10, Cuisenaire and a range of other practical equipment to support learning.

We also subscribe to the following web services to enhance provision: Times table rockstars, numbots, classroom secrets, I see reasoning and I see problem solving.

Our teachers also use elements of the following resources to aid with planning: white rose, testbase & NCETM.

Differentiation

Children will be taught at a level appropriate to their ability but teachers will always be working towards age related expectations (ARE) and end of year requirements for the vast majority of children. Since Curriculum 2014 class teaching will scaffold to try and help all children reach ARE through use of manipulatives, adults or visual representations.
Where appropriate, differentiation can be used in the following ways:
Where children do not grasp a concept, additional work should be put in place outside of the maths lesson to ensure gaps do not become wider.

Cross-curricular opportunities

Throughout the whole curriculum opportunities exist to extend and promote mathematics. The curriculum overviews have been designed with opportunities in mind e.g. Statistics units matched with athletics in sport for record keeping, timelines in history, days of week in French and length and height matched with growing plants in science. These are just a couple of examples of where teachers seek to take advantage of all mathematical links where possible.

Recording work

Each child will have a maths book to record daily lessons. These books will contain the date and learning objective for each lesson. Where the lesson is practical a brief statement may be written to explain learning. All books are squared and children are encouraged to write in the squares. Where squared paper is not appropriate, sheets may be used and then stuck in neatly. Formal recording is not necessary for every lesson. Types of activities should be balanced with a variety across a week.

Exercise Books for Recording

It is school policy that the following pattern is used:

Reception blue exercise books with 2cm squares
Year 1: blue exercise books with 2cm squares
Year 2 red 1cm square books
Year 3,4,5,6: red 7 mm squares books

All children are encouraged to work neatly when recording their work. When using squares, one square should be used for each digit.

Marking

The quality of marking is crucial and will always be completed before a book is handed back to a child.
Marking will be done in line with the school marking and feedback policy.
There may be times when children mark their own work in maths as this can give them immediate feedback on and errors they may have made. Where children do this a green pen will be used so it is easily distinguishable.

Assessment

The main purpose of assessment is to find out what the children can do and what their next steps are. This should then be used to plan so work meets the needs of the children.

Formal Assessment

Children will use weekly assertive mentoring tests (each test will be completed twice once with support and once independently). These will then be sent home for parents to see how well children have done.
Arithmetic – Rising stars arithmetic tests will be completed at least 3 every half term.
NFER termly assessment tests - will be carried out at three points during the year (Christmas, spring and end of year).

Information gained from all assessments (both in class and from tests) will be used to assess children against our in-school assessment system. (see assessment policy for further details). This will be done at three points during the year (Christmas, Spring, end of year) data will be uploaded directly into Integris.
SLT will use the assessments to plan any interventions necessary during pupil progress meetings. Key groups of children will be analysed including: Pupil premium, SEN and gender.

Reporting to parents

Parents are given the opportunity to discuss their child's progress on two official occasions but understand that the schools' 'open door' policy enables them to address concerns throughout the year.
Reports are completed during the summer term and are sent out in July. They contain a summative assessment of each child's achievements across the year.
Teachers use the information gathered from their assessments to help them comment on individual children's progress.
Target booklets are sent home at the beginning of the year so parents understand age related expectations for the year group their child is working in.

Working walls

Working walls show current learning (as an aid memoir for children to access if they get stuck) as well as previous work. Working walls will be split into areas which display:

- an area for relevant taught vocabulary,
- an area for SOS where the today's taught method will be modelled alongside a practical example
- Our learning journey: where examples of modelling which have been worked through with the children across the week building upon their knowledge and demonstrated using concrete, pictorial and abstract concepts.

Additional displays should include: number lines, number bonds, hundred squares, tens frames, base 10 & part whole diagrams as (age) appropriate.
They will be added to regularly and reflect current classroom work.

Homework

In Reception, Year 1 and Year 2 children will complete maths homework on a fortnightly basis. Year 3,4,5 and 6 will have a piece of numeracy homework to complete most weeks. This will be set in line with our homework policy. Children also have the opportunity to take part in a weekly challenge on numbots or Times table Rockstars.

Monitoring and review: role of the maths leader

The maths leader will undertake weekly monitoring tasks including: monitoring of planning, lessons & books as part of a cycle.

Other duties will include:

- To take the lead in policy development
- To support colleagues in teaching, assessing, planning and delivery.
- To monitor progress in Mathematics – eg leading staff CPD, scrutiny of work, analysis of formal assessment data.
- To take responsibility for the choice, purchase and organisation of central resources for Mathematics, in consultation with colleagues.
- To liaise with other members of staff to form a coherent and progressive scheme of work which ensures both experience of, and capability in, Mathematics.
- To be familiar with current thinking concerning the teaching of Mathematics, and to disseminate information to colleagues.
- The co-ordinator will be responsible to the Headteacher and will liaise with the named link Governors.

Written by Z Parkinson Nov 2019
Revised April 2024