



Chalkhill Primary School

Policy for Maths

Includes, mental strategies and jottings

**Please also refer to the Written
Calculation Policy**



Chalkhill Primary School

Policy for Maths

Policy reviewed and updated: September 2015
Person responsible: Karima Peerwani (Maths Subject Leader)
Date of next review: September 2016

Introduction

Maths is an integral part of everyday life. It helps us to make sense of our world. Maths provides us with tools to:

- Tackle real life problems
- Communicate information
- Develop skills which are essential in most other areas of the curriculum
- Develop skills for life to achieve success in the work place and economic well being

In addition, a lot of enjoyment can be obtained from appreciating the power of maths.

Specific aims of Maths

Our Maths curriculum aims to:

- provide a positive attitude to maths by making it interesting purposeful and enjoyable
- develop an awareness of the relevance of maths in the real world
- offer a broad based curriculum which enables pupils to operate effectively at their own level within the framework of the National Curriculum
- promote and encourage children to use a variety of approaches in maths to solve problems and carry out investigations
- develop use and understand the language of maths at their own level (reading, writing, speaking and listening)
- be able to record their work in a clear, accurate and systematic way
- develop the ability to estimate and approximate with confidence
- develop the ability to think logically, reasonably and creatively in maths
- perform calculations mentally, written and using calculators and be able to choose the most appropriate method
- develop the ability to work both independently and collaboratively
- provide opportunities to use a variety of equipment to stimulate and develop mathematical learning situations
- achieve a sense of satisfaction through success
- develop self confidence and a positive attitude to their own abilities

Teaching methods and approaches

Refer to appendices:

Mental Strategies (poster for classroom; planning aid)

Mental Calculations Guidelines (expectations; assessment aid)

Written Calculations (Education Leeds document, 2003; planning and assessment aid)

Refer to other policies for teaching and learning:

eg Assessment, Marking, Teaching and Learning

It is essential to have continuity and progression throughout the maths curriculum so that it provides structure, purpose and meaning.

- The school follows the National Strategies Framework for maths. This provides flexibility, which allows teachers to be creative and develop professionally whilst at the same time, supports the less confident or newly qualified teachers.
- A balance between whole class, group and individual approaches in the teaching of maths is used throughout the school.
- When working with the whole class we use an interactive approach wherever possible.
- Each maths lesson consists of

- counting and quick recall
- mental and oral work
- introduction to the main part of the lesson
- group/individual activities
- plenary
- A balance of practical, investigative, oral and written activities is used throughout the school.
- Children are given opportunities for investigative work and problem solving, at all ages and levels, to develop their ability to apply their mathematical skills (eg reasoning and logic) to real life situations
- A cross-curricular approach is used to provide first hand experience wherever appropriate; we export skills into topic sessions and import topic content into maths lessons. These links are made to other areas of the curriculum, usually at the medium term planning stage, to encourage children to make links between maths and real life.
- The children develop their mathematical language through opportunities to question and explain their activities and in discussion with the teacher, support staff and each other.
- As a school, we have common high expectations and standards regarding both presentation and methodology in order to provide consistency and continuity. Children's recordings are encouraged to be
 - neat and of a high standard
 - presented in a clear and organised way
 - presented in a variety of forms eg diagrammatically, graphically, pictorially, as a model or in written form.
- When recording their calculations, investigations and other mathematical work
 - children are encouraged to formulate their own ways of recording their results
 - teachers are modelling the children's verbal explanations
 - teachers are demonstrating standard methods

Planning

Long and medium term

The National Strategies Framework provides the long term planning for maths taught in the school.

We use the Blocks and Units from the Framework as our medium term planning. (To be reviewed in September 2014) Whilst planning teachers use the inclusive checklist to ensure **SMSC** coverage

Short term

Chalkhill Primary School has a common format for short term planning which is used throughout the school from Y1 to Y6. It outlines essential elements of good maths planning. This is regularly monitored by the maths subject leader, Deputy Head teacher or Head teacher.

Assessment

Short and medium term

Good assessment is continuous and is strongly linked to AFL (assessment for learning.) Children's class work is assessed frequently through regular marking, analysing children's errors, questioning, discussion, use of mini-plenary, observation, peer assessment and self assessment. (AFL) Teachers are expected to keep daily records of objectives taught and achieved using a triangle system.

Moderating meetings to review the accuracy of judgements are held occasionally. Termly assessment forms the basis of pupil progress and / or performance management meetings.

Long term

Using the APP grids, end of year assessments are made against National Curriculum levels. We use SATs and QCA Optional SATs to inform this teacher assessment. This summative assessment forms the basis of target-setting for the following year and is communicated to parents / carers in end-of-year reports.

Organisation and time

Foundation

Mathematical elements of the Early Years Foundation Stage curriculum are referred to under the banner **Problem Solving, Reasoning and Numeracy**. Children have opportunities to learn maths through play with practitioners planning, teaching and providing activities, and assessing under the strands of Numbers as labels for counting, Calculating, and Shape, space and measures.

Key Stage 1

In KS1 there is a daily maths lesson of between 45 and 60 minutes for all children in mixed ability classes.

Differentiation is used to meet the needs of all children.

Key Stage 2

In KS2 there is a daily maths lesson of approximately 60 minutes for all children in mixed ability classes. Setting for ability across two year groups exists as a possibility depending on the needs of the children. Differentiation is used

to meet the needs of all children. At different times in the year there are intervention groups taught separately to the rest of the class using various materials.

Resources and display

In our school we have

- various teachers' resource books from different published schemes (class-based)
- age appropriate equipment for on-going use eg Numicon (class-based)
- practical maths equipment for specific use eg scales, clocks
- computers (net-books in Y4 and in the suite)
- calculators (class-based)

Children are encouraged to work independently where appropriate within the classroom, selecting the equipment they need, using it properly and appropriately and returning it to its correct place when an activity is completed.

We recognise the importance of a stimulating learning environment. Each classroom has a Working Wall ie a mathematical display area, which includes mathematical vocabulary, visual aids and interactive activities where appropriate.

ICT

Maths is taught through ICT where it is appropriate and where the use of ICT enhances the teaching and learning. This could be in the classroom using the interactive whiteboard or individual computers (net-books / ICT).

SEN and EAL

At our school children with SEN in maths or with EAL are included in the daily maths lesson through

- setting suitable learning objectives and learning steps
- responding to children's diverse learning needs eg kinaesthetic, visual
- overcoming potential barriers to learning and assessment for individuals and groups of children
- explicit teaching and repetition of vocabulary by the teacher and other adults
- use and display of vocabulary in contexts that are easy to understand and relate to

Interventions to enable inclusion may involve

- the use of Individual Educational Plans and Group Educational Plans
- Numbers Count intervention
- grouping for teaching purposes
- additional human resources
- different curriculum and teaching methods
- different use of resources

Where the interventions involve spending some time outside the classroom, it will be in the context of the inclusive curriculum.

Equal opportunities

At Chalkhill Primary School we believe that all children regardless of their gender, age, ethnicity, academic or physical ability, are given equal opportunities to develop their attainment in maths and to reach their full potential, confidently and successfully. We ensure that the specific needs of all pupils are met by providing tasks that are appropriate to the pupils' ability and that their learning is supported by good quality, relevant first hand experiences to consolidate and extend their mathematical learning.

We can ensure equal access in a variety of ways eg

- ensuring books and other resources etc use positive role models for both genders and reflecting different cultures
- encourage both boys and girls to work co-operatively and value the suggestions of others
- that girls as well as boys have equal access to teacher time and are encouraged to talk about their work
- a single sex grouping when either boys or girls are involved in less familiar activities and confidence building is necessary.

Parents and homework

Parents are involved in their children's learning of maths through

- the setting of regular maths homework
- regular parent workshops
- newsletters and annual reports to parents with suggestions for how parents can help

- useful suggestions of mathematical activities on the school website

Staff responsibilities

Head teacher / Deputy Head teacher/Assistant Head Teacher

- Lead, manage and monitor the development of maths in the school
- Support the maths subject leader in taking maths forward
- Carry out data analysis of overall learning, set numerical targets, review the action plan and monitor its progress
- Ensure that arrangements are made to meet the training needs of teachers and other adults involved
- Oversee the school's allocation of resource funding and release time
- Ensure parents are informed and involved

Maths Subject Leader

- Assist the assessment co-ordinator in carrying out data analysis
- Review and amend the action plan
- Manage the subject's allocation of resource funding and release time
- Prepare, organise and provide school-based INSET meetings, workshops and staff meetings
- Assist with the monitoring of teaching and planning and the analysis of SATs results
- Preparation, review and implementation of school policy documents and guidelines taking into account the DCSF, LA and other bodies' recommendations
- Liaison with staff in school ie work alongside them, give guidance and support
- Introduce, organise and maintain the school's maths resources
- Take responsibility for own professional development by attending courses and keeping up-to-date with current developments within maths education
- Liaison with maths leaders in other schools through attendance of meetings
- Provide an example to the school by taking a lead in teaching maths and classroom organisation
- Maintaining contacts beyond school with numeracy consultants, advisory staff and other outside agencies
- Working to achieve equality of opportunity for all pupils

SENCo/INCo

- Support and work co-operatively with the maths leader to implement and develop maths throughout school
- Organise and provide INSET for staff on special needs maths issues including **SMSC**
- Advise staff how best to support children with varying needs during maths lessons so that they meet the expectations of the yearly teaching programmes where possible
- Advise staff on the inclusion of mathematical objectives in IEPs and GEPs for children with SEN in maths
- Help to ensure that children who are capable of catching up their peer group do so as quickly as possible
- Advise the head teacher and staff on the effective use of teaching assistants and help support staff to develop their role

Teachers and other adults

Teachers are responsible for the planning and teaching of the daily maths lesson and the organisation of additional adults in the classroom. They are also responsible for implementing the contents of this policy within their classroom. Teachers must ensure that they and their class take care of the school's maths resources.

Learning support assistants support the teaching of maths under the direction of the class teacher.

All staff is encouraged to develop, assess and improve their teaching of maths.

Whenever possible we:

- encourage staff to attend maths courses
- make provision for the maths leader to work alongside colleagues in the classroom or shared areas
- provide school-based development
- involve staff with policy and decision making
- provide the opportunity to learn from colleagues' expertise
- encourage parental involvement at home and in school based workshops with their children

Arrangements for review

There will be a regular opportunity for the staff to discuss and evaluate the aspects of the maths policy to ensure that the aims are being met and that the teaching, learning and achievement of maths at Chalkhill Primary School continue to improve.

Mental Strategies



| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;">Addition</p> <p>Mental recall of number bonds to 10, 20 and 100 $3+7=10$, $30+70=100$</p> <p>Lots of counting on and back in repeated steps of 1, 10, 100, 1000; use 100 square $86+57=143$ by counting on in 10s then in 1s</p> <p>Add the nearest multiple of 10, 100, 1000 and adjust $24+19 = 24+20-1 = 43$</p> <p>Use the relationship between + and – (inverse)</p> <p>Doubles and near doubles $6+6=12$ $6+7=$ double 6 $+1=13$</p> <p>Mental addition using partitioning and recombining $34+45 = (30+40) + (4+5) = 79$</p> | <p style="text-align: center;">Subtraction</p> <p>Mental recall of addition and subtraction facts $20-17=3$, $100-?=45$</p> <p>Lots of counting on and back in repeated steps of 1, 10, 100, 1000; use 100 square $86-52=34$ by counting back in 10s then in 1s</p> <p>Subtract the nearest multiple of 10,100,1000 and adjust $24-19 = 24-20+1 = 5$</p> <p>Use the relationship between + and – (inverse)</p> <p>Find a small difference by counting up; show on a number line</p> |
| <p style="text-align: center;">Multiplication</p> <p>Doubling and halving and apply knowledge of this to known facts 8×6 is double 4×6</p> <p>Using multiplication facts Y2 → $2 \times$ $5 \times$ $10 \times$ Y3 → $2 \times$ $3 \times$ $4 \times$ $5 \times$ $6 \times$ $10 \times$ Y4 → recall all facts up to 12×12 quickly Y5,6 → all facts up to 12×12 in 5 seconds.</p> <p>Multiplying by 10 or 100</p> <p>Use closely related facts already known $13 \times 11 = (13 \times 10) + (13 \times 1)$</p> <p>Partitioning $23 \times 4 = (20 \times 4) + (3 \times 4)$</p> <p>Use of factors when x a multiple of 10 $8 \times 30 = 240$ so $8 \times 3 \times 10 = 240$</p> | <p style="text-align: center;">Division</p> <p>Doubling and halving halving is $\div 2$, halving and halving again is $\div 4$ / finding $\frac{1}{4}$ or 25%.</p> <p>Recall division facts for times tables</p> <p>Dividing by 10 or 100</p> <p>Use and apply division facts If I know $3 \times 7 = 21$, what else do I know? $30 \times 7 = 210$ $0.3 \times 7 = 2.1$ etc</p> |

Mental Calculations

Guidelines

These skills and facts are important...



...for me to do well in all areas of Maths.

Year 1

Recall all pairs of numbers that total 10 ($4+6$ or $3+7$)
Recall addition and subtraction facts for numbers up to 10
Know 1 more / less than a number; know 10 more / less than a multiple of ten
To double numbers up to double 5
To count in 2s, 5s and 10s
Count to 100
Read and write from 1 to 20 in numerals and words
Know $\frac{1}{2}$ and $\frac{1}{4}$ of amounts to 20

Year 2

Recall all pairs of numbers that total 10 and 20 ($4+6=10$ so $4+16=20$)
Recall all pairs of multiples of ten that total 100 ($40+60=100$)
Count on in tens from any 1 digit number (4, 14, 24, 34 etc)
Add and subtract multiples of 10 ($50+20=70$ and $40-20=20$)
By the end of the year all children should be able to recall the 2, 3, 5 and 10 times table and the related division facts
Double numbers up to double 10; corresponding halves
Read and write numbers up to 100 in numerals and words
Use place value to solve number facts
Know $\frac{3}{4}$ and $\frac{1}{3}$ of amounts to 100

Year 3

Add and subtract mentally combinations of 1, 2 digit and 3 digit numbers ($134+8=142$)
Recall all pairs of multiples of five and ten that total 100 ($40+60=100$ and $45+55=100$)
Recall 2,3,4,5, 6 and 8 times tables and the related division facts
Multiply 1 and 2 digit numbers by 10 and 100
Place value recognition up to 3 digits
Compare and order number to 1000
Identify, represent and estimate numbers using different representations
Solve a variety of number and practical problems involving all of above
Add and order simple fractions

Year 4

Derive and recall 12 x12 times table and the corresponding division facts
Double 2 digit numbers; corresponding halves
Double multiples of ten; corresponding halves
Recall all pairs of numbers that total 100 ($23+77=100$)
Find 100 more or less than a given number
Count backwards to include negative numbers

Round ANY number to the nearest 10, 100, 1000
Read Roman numerals to 100 (1 to C) and know that over time the numeral system changed to include 0 and place value

Solve a variety of number and practical problems involving all of above
Add and subtract simple fractions

Year 5

Recall quickly multiplication facts up to 12×12 and use them to multiply pairs of multiples of 10 and 100; derive quickly corresponding division facts

Derive sums and differences and doubles and halves of decimals (eg 6.5 ± 2.7 , half of 5.6, double 0.34)

Multiply a two-digit number by a one-digit number (eg 13×9)

Read and write numbers to at least 1,000,000

Count forwards and backwards with positive and negative integers

Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000, 100,000

Read Roman numerals to 100 (1 to C) and know that over time the numeral system changed to include 0 and place value

Solve a variety of number and practical problems involving all of above

Use mixed numbers SEE Yr 1-4 for fraction work

Year 6

Recall quickly squares of numbers to 12×12 and the corresponding squares of multiples of 10

Multiply and divide decimal numbers ($0.7 \times 5 = 3.5$)

Read write and compare numbers up to 10,000,000

Round any whole number accurately

Use negative numbers in context and calculate intervals across zero

Solve a variety of number and practical problems involving all of above

See Years 1-5 for fraction work, use simple formulae and algebra

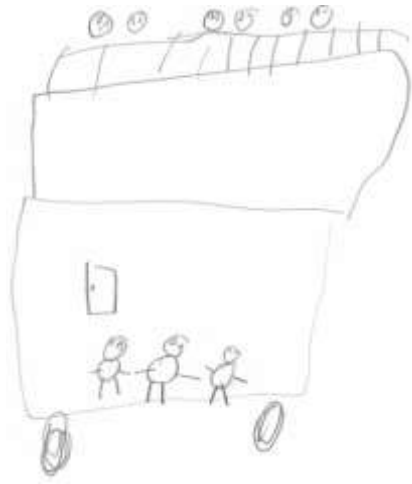
Addition

Practical activities using objects and discussion.
Demonstrating and modelling with apparatus and equipment.

Year Group: Reception

Pictures / Marks

- Six people are on a bus. At the bus stop three more people get on. How many people are on the bus now? Record your answer.



9 People.

- Five birds sitting in a tree. Three more birds land on the tree. How many now? Record your answer.



8 birds

Signs and Symbols

'Show me 3 fingers on one hand.

Show me 2 fingers on the other hand.

How many fingers altogether? (count 1,2,3... 1,2... 1,2,3,4,5.)

Say together: '3 and 2 is 5.'

Record **|||** + **||** is 5 leading to $3+2=5$

Number Tracks

Use a number track for teacher to model.

There are 2 cars in a garage, 3 more arrive. Let's count them:

1) Practically

2) Pictorial track or practically on number track



3) Number track using counters

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|----|

Other Jottings

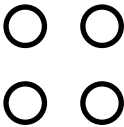
Find own ways of recording

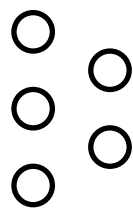


- Context - 3 clowns with 'juggling balls' (counters) to 'share' between them (Then children record their own responses)

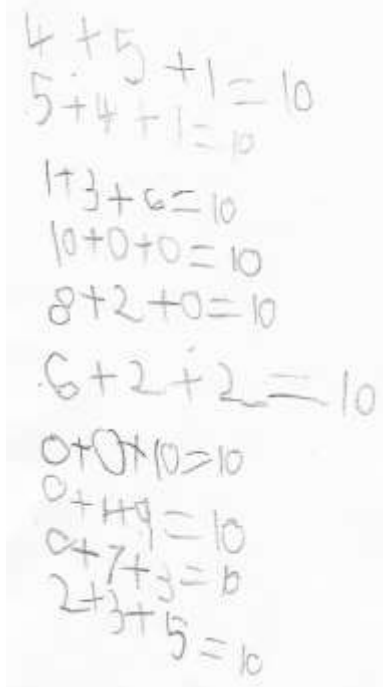
Starting with


Pictorial (see above example)

or





Leading to!

or





Explain methods and reasoning orally teacher recording

Explaining in writing and speaking

Use vocabulary of: more, and, add, make, sum, total, altogether, are more, how many more to make, ...

- 'There are 3 people on the bus. 1 more gets on. How many are on the bus now?' (Say together: '4 is 1 more than 3. 3 add 1 is 4')

Pencil and paper procedures

Formal pencil and paper methods are not appropriate for this year group

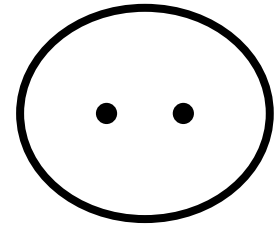
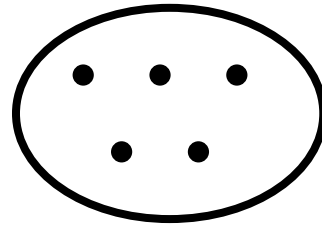
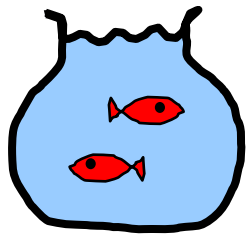
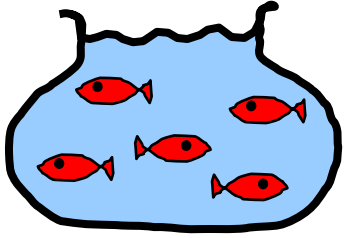
Addition

Children's recordings are the expectations for the end of Year 1

Year Group: 1

Pictures / Marks

- Jane has 5 fish, Bina has 2. How many fish do they have altogether?



Could represent fish with counters

Signs and Symbols

$$3+2=\square$$

$$\square=3+2$$

$$3+\triangle=5$$

$$5=\triangle+2$$

$$\square+2=5$$

$$5=2+\square$$

$$\triangle+\square=5$$

$$5=\square+\triangle$$

Adding 3 numbers

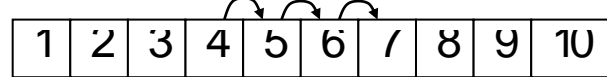
$$5+3+1=\square$$

$$5+3+\square=9$$

Number Lines

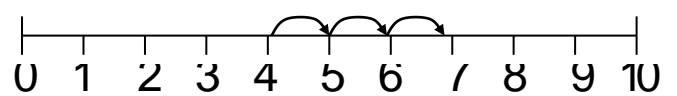
Numbertrack

$$4+3$$



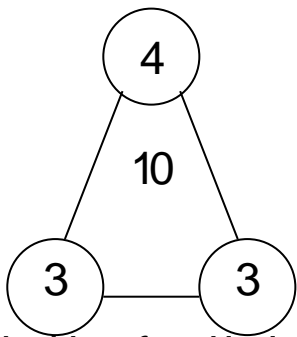
Prepared numbered line

$$4+3$$

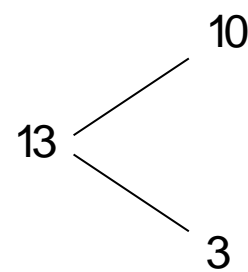
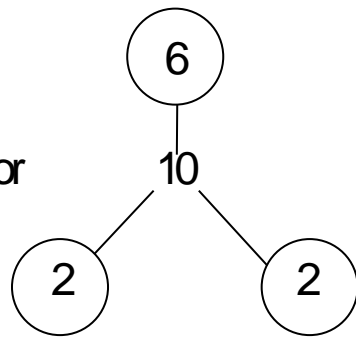


The transition from the use of a number track to a numbered line is important and needs consideration

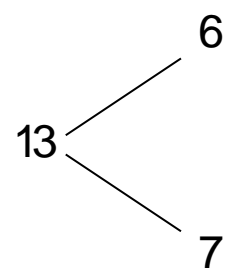
Other Jottings



or



and



Introduce the idea of partitioning

Explaining in writing and speaking

Explain methods and reasoning orally. (teacher recording)

e.g. When given the calculation $4+9$ the child's response was: 'I added 10 to make 14 and 1 less is 13.'

Pencil and paper procedures

Not appropriate for this year group.

Addition

Children's recordings are the expectations for the end of Year 2

Year Group: 2

Pictures / Marks

- There are 5 People on the bus, 8 more get on. How many people are on the bus?



Leading to



Signs and Symbols

$$9+3=\square$$

$$\square=9+3$$

$$\square+3=12$$

$$12=\square+3$$

$$9+\triangle=12$$

$$12=9+\triangle$$

$$\square+\triangle=12$$

$$12=\square+\triangle$$

Adding 3 numbers

$$1+\square+6=19$$

$$1+12+6=\square$$

Extend to

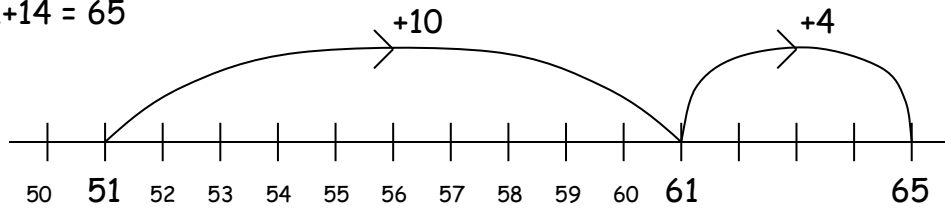
$$14+5=10+\square$$

Number Lines

Prepared numbered lines moving towards un-numbered lines

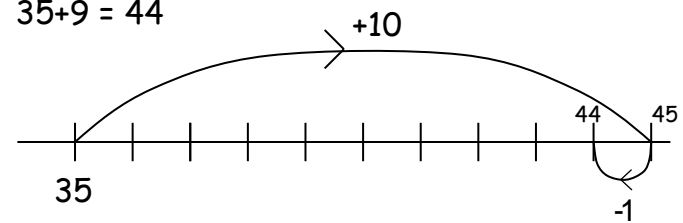
Partitioning

$$51+14=65$$



Compensation

$$35+9=44$$



Other Jottings

$$\begin{array}{c} 30 \\ \left. \begin{array}{c} 35 \\ 5 \end{array} \right\} \\ + \\ \begin{array}{c} 50 \\ \left. \begin{array}{c} 52 \\ 2 \end{array} \right\} \\ = \\ \begin{array}{c} 80 \\ \left. \begin{array}{c} 87 \\ 7 \end{array} \right\} \end{array}$$

Explaining in writing and speaking

Explain methods and reasoning orally. (teacher recording)

e.g. When asked what could $25+7=32$ mean?

'Twenty five people were on the bus, seven more got on. That made thirty two on the bus altogether.'

Pencil and paper procedures

Not appropriate for this year group.

Addition

Children's recordings are the expectations for the end of Year 3

Year Group: 3

Pictures / Marks

Children need to continue with pictures/marks as appropriate for this year group

Signs and Symbols

$$45 + 23 = \square$$

$$\triangle + 23 = 68$$

$$45 + \square = 68$$

$$\triangle + \square = 68$$

$$\square = 45 + 23$$

$$68 = \triangle + 23$$

$$68 = 45 + \square$$

$$68 = \square + \triangle$$

Adding 3 or 4 numbers

$$24 + \square + 6 = 51$$

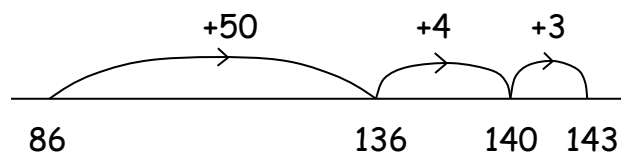
Extend to

$$27 + 12 = \square + 15$$

Open lines

Partitioning

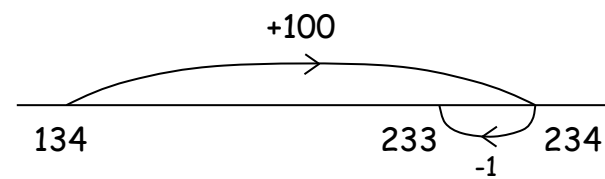
$$86 + 57 = 143$$



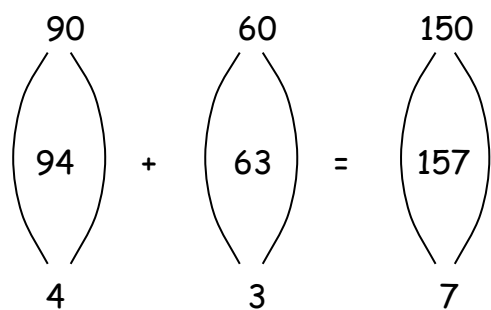
Number Lines

Compensation

$$134 + 99 = 233$$



Partitioning
 $94 + 63$



Other Jottings

$$\begin{aligned} 94 + 63 &= 90 + 4 + 60 + 3 \\ &= 90 + 60 + 4 + 3 \\ &= 150 + 7 \\ &= 157 \end{aligned}$$

$$\begin{aligned} &150 \\ 94 + 63 &= 150 + 7 = 157 \\ &7 \end{aligned}$$

Explaining in writing and speaking

$$63 + 17$$

'I added 17 and 3 to get 20, then 60 more to get 80.'

Pencil and paper procedures

Not appropriate for this year group.

Addition

Children's recordings are the expectations for the end of Year 4

Year Group: 4

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

$$\begin{aligned} 136 + 25 &= \square \\ \triangle + 25 &= 161 \\ 136 + \square &= 161 \\ \triangle + \square &= 161 \end{aligned}$$

$$\begin{aligned} \square &= 136 + 25 \\ 161 &= \triangle + 25 \\ 161 &= 136 + \square \\ 161 &= \triangle + \square \end{aligned}$$

Adding several numbers

$$131 + \square + \triangle + 41 = 208$$

Extend to

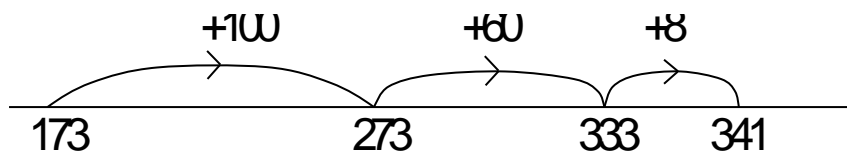
$$137 + 53 = \square + 46$$

Number Lines

Open lines

Partitioning

$$173 + 168 = 341$$



Other Jottings

Partitioning

$$68 + 89$$

$$\begin{pmatrix} 60 \\ 68 \\ 8 \end{pmatrix} + \begin{pmatrix} 80 \\ 89 \\ 9 \end{pmatrix} = \begin{pmatrix} 140 \\ 157 \\ 17 \end{pmatrix}$$

$$\begin{aligned} 173 + 168 &= 100 + 70 + 3 + 100 + 60 + 8 \\ &= 200 + 130 + 11 \\ &= 341 \end{aligned}$$

Explaining in writing and speaking

$$345 + 349 = 694$$

'350 + 350 = 700 so 345 + 349 is 700 - 5 - 1.'

Pencil and Paper Procedures

$$287 + 145$$

$$\begin{array}{r} + 200 \quad 80 \quad 7 \\ + 100 \quad 40 \quad 5 \\ \hline 300 \quad 120 \quad 12 \end{array} = 432$$

You may not need to teach this method for very long. You can move onto long column addition quickly.
Use base 10 apparatus to support horizontal methods.

Addition

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 5

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

$$\begin{aligned} 4350 + 3645 &= \square \\ \triangle + 3645 &= 7995 \\ 4350 + \square &= 7995 \\ \triangle + \square &= 7995 \end{aligned}$$

$$\begin{aligned} \square &= 3645 + 4350 \\ 7995 &= \triangle + 4350 \\ 7995 &= 3645 + \square \\ 7995 &= \triangle + \square \end{aligned}$$

Adding several numbers

$$\square + 650 + \triangle = 1925$$

Extend to

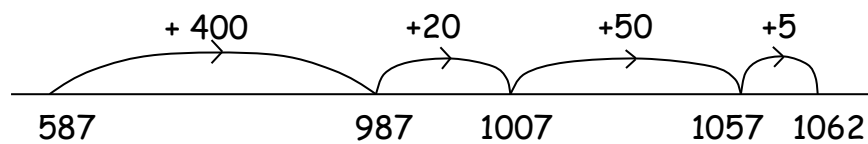
$$2950 + 3125 = \square + 4050$$

Number Lines

Open lines

Partitioning

$$587 + 475 = 1062$$



Other Jottings

Partitioning

$$587 + 475$$

$$\begin{aligned} 587 + 475 &= 500 + 80 + 7 + 400 + 70 + 5 \\ &= 900 + 150 + 12 \\ &= 1062 \end{aligned}$$

Explaining in writing and speaking

$$487 + 599$$

'I added 600 to 487 to make 1087. I then subtracted one to make 1086.'

Pencil and Paper Procedures

Long column

$$\begin{array}{r} 3596 \\ + 1874 \\ \hline 10 \\ 160 \\ 1300 \\ \hline 4000 \\ \hline 5470 \end{array}$$

Short column

$$\begin{array}{r} 3596 \\ + 1874 \\ \hline 5470 \\ \hline \end{array}$$

Both methods should be taught, however only change to short columns when the children are ready.

After a group is secure with short columns, teach decimal addition, as in the National Framework.

Before adding units, make the link with mental method by showing addition of big numbers first. Change to units can be done quickly.

Addition

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 6

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

$$\begin{aligned} 244+6.7 &= \square \\ \triangle +6.7 &= 31.1 \\ 244+ \square &= 31.1 \\ \triangle + \square &= 31.1 \end{aligned}$$

$$\begin{aligned} \square &= 244+6.7 \\ 31.1 &= \triangle +6.7 \\ 31.1 &= 244+ \square \\ 31.1 &= \triangle + \square \end{aligned}$$

Adding several numbers

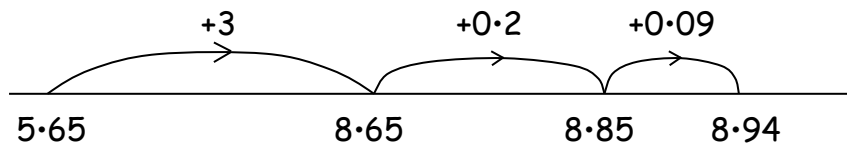
$$34+15+ \square = 55$$

Extend to

$$75+34= \square +2.9$$

Open line

$$5.65 + 3.29$$



Number Lines

Partitioning

$$\begin{aligned} 5.65 + 3.29 &= 5 + 0.6 + 0.05 + 3 + 0.2 + 0.09 \\ &= 8 + 0.8 + 0.14 \\ &= 8.94 \end{aligned}$$

Other Jottings

Explaining in writing and speaking

- What is the combined capacity of two drink containers measuring 1.665 l and 2.220 l

'I worked out that 1665 ml and 2220 ml are 3885 ml so 1.665 l + 2.220 l = 3.885 l.'

Pencil and Paper Procedures

$$\begin{array}{r} 6.25 \\ + 3.96 \\ \hline 2.47 \\ \hline 12.68 \\ 11 \end{array}$$

$$\begin{array}{r} 65.84 \\ + 58.48 \\ \hline 124.32 \\ 111 \end{array}$$

Some children may not progress to short columns, so continue to teach both.

It may not be appropriate to teach decimals to some children.

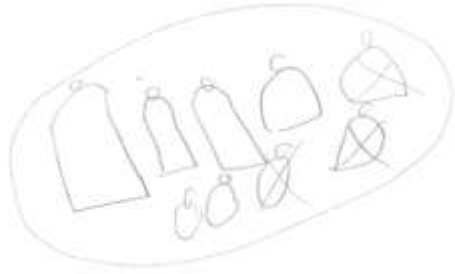
Subtraction

Practical activities using objects and discussion.
Demonstrating and modelling with apparatus and equipment.

Year Group: Reception

Pictures / Marks

- 'There are nine cakes on a plate. Sarah eats three. How many are left?' Record your answer.



6 cakes

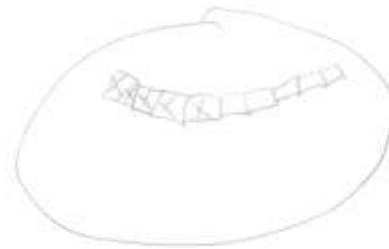


6 cakes

- 'Jack has ten chips on his tray. He eats five of them. How many chips has Jack got left?' Record your answer.



5 chips.



5 chips

Signs and Symbols

- 'There are 7 biscuits, Ian eats two. How many are left?'

Count the 7 biscuits, take 2 away. Say together 7 take away 2 is 5.

Record



is 5

$$7-2=5$$

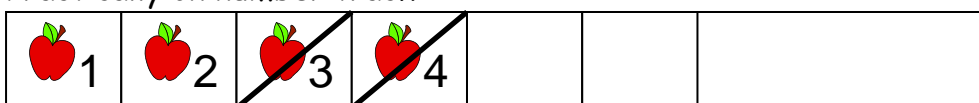
Number Tracks

Use a number track for teacher to model.

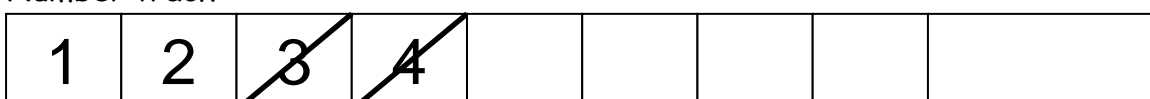
- There are 4 apples on a tree, 2 fall off. How many are left on the tree?

1) Practically

2) Practically on number track



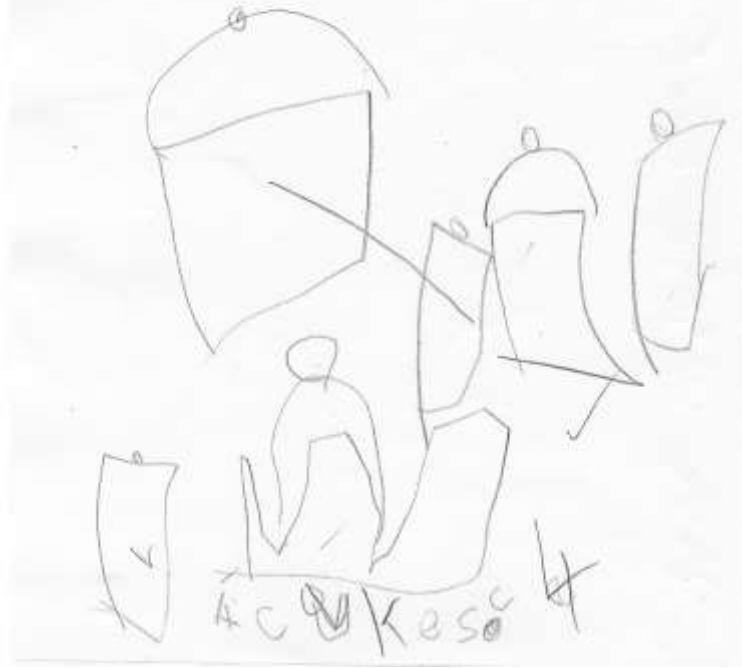
3) Number track



Other Jottings

Find own ways of recording

Unarmaine has 6 cakes.⁸
She eats 2. How many
has she got left?



Leading to



counters or tally
representing the cakes
(see Addition other Jottings section)

Explain methods and reasoning orally, teacher recording

Explaining in writing and speaking

Use vocabulary of: take away, leave, how many are left? How many are gone? How many less is... than? Difference between.

- There were 5 baby birds in the nest. 1 flew off. How many were left?

(Say together: '4 is 1 less than 5. 5 take away 1 is 4.')

Pencil and paper procedures

Formal pencil and paper methods are not appropriate for this year group

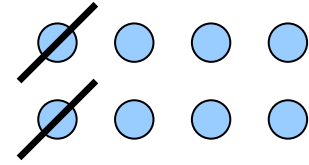
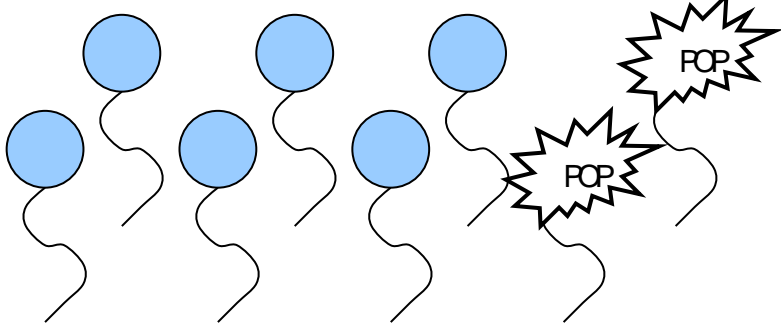
Subtraction

Children's recordings are the expectations for the end of Year 1

Year Group: 1

Pictures / Marks

- If I had 8 balloons and 2 popped, how many do I have left?



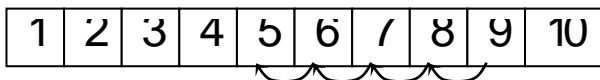
Could represent balloons with counters

Signs and Symbols

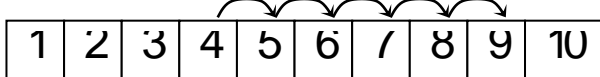
$$\begin{array}{ll}
 5-2=\square & \square=5-2 \\
 5-\triangle=3 & 3=\triangle-2 \\
 \square-2=3 & 3=5-\square \\
 \square-\triangle=3 & 3=\square-\triangle
 \end{array}$$

Number Track

Taking away
9-4



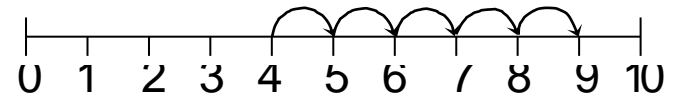
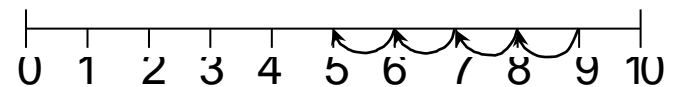
Counting on
9-4



Number Lines

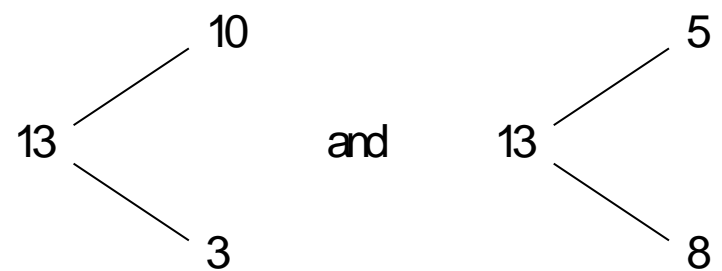
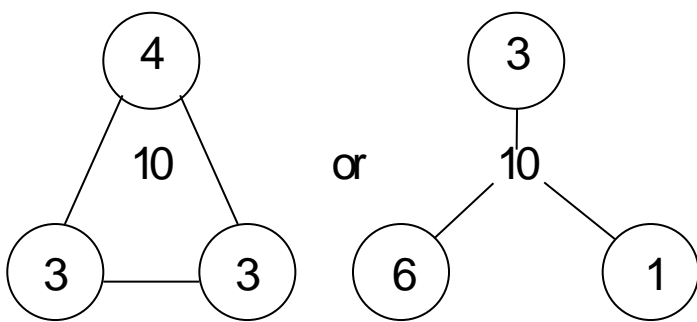


Prepared number lines



The transition from the use of a number track to a number line is important and needs consideration.

Other Jottings



Introduce the idea of partitioning

Explaining in writing and speaking

Explain methods and reasoning orally. (teacher recording)

e.g. for 5-3 'I stood on 5 and jumped back 3 spaces and landed on 2.'

Pencil and paper procedures

Not appropriate for this year group.

Subtraction

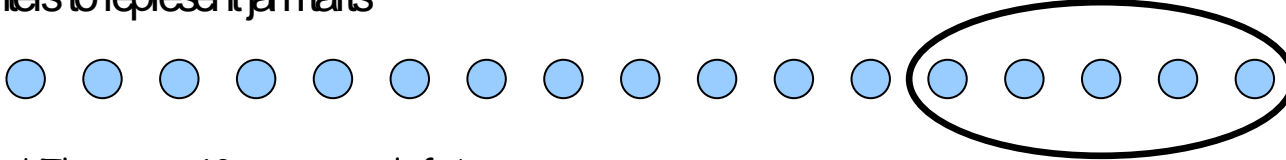
Children's recordings are the expectations for the end of Year 2

Year Group: 2

Pictures / Marks

There were 17 jam tarts on the plate. Louise ate 5. How many jam tarts were left?

Counters to represent jam tarts



' There are 12 jam tarts left.'

Signs and Symbols

$$12 - 3 = \square$$

$$\square = 12 - 3$$

$$12 - \square = 3$$

$$3 = 12 - \square$$

$$\triangle - 3 = 9$$

$$9 = 12 - \triangle$$

$$\square - \triangle = 3$$

$$3 = \square - \triangle$$

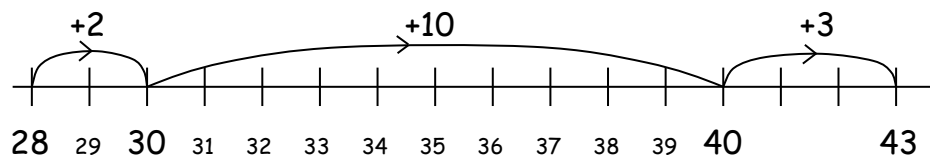
Extend to

$$14 + 5 = 20 - \square$$

Numbered Line

Counting on

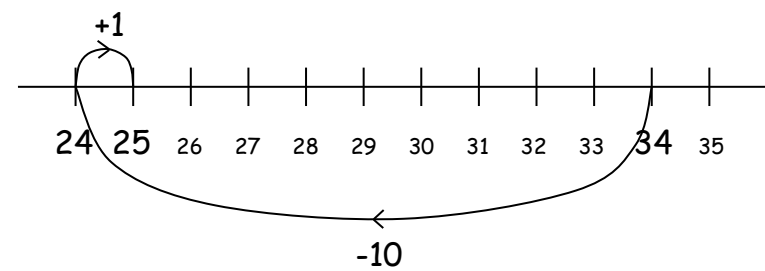
$$43 - 28 = 15$$



Number Lines

Compensate

$$34 - 9 = 25$$



Partitioning

Other Jottings

$$\begin{aligned} 37 - 12 &= 37 - 10 - 2 \\ &= 27 - 2 \\ &= 25 \end{aligned}$$

Explaining in writing and speaking

Explain methods and reasoning orally. (teacher recording)

e.g. There are 20 children in our class. Three are away today. How many are here?

' 2 away would be 18 so 3 away must be 17.'

Be aware of vocabulary and how you ask questions, eg; 7 take away 2 or take 2 from 7. Both are ok but it needs to be explained.

Pencil and paper procedures

Not appropriate for this year group.

Subtraction

Children's recordings are the expectations for the end of Year 3

Year Group: 3

Pictures / Marks

Children need to continue with pictures/marks as appropriate for this year group

Signs and Symbols

$$68 - 45 = \square$$

$$68 - \square = 23$$

$$\square - 45 = 23$$

$$\square - \triangle = 23$$

$$\square = 68 - 45$$

$$23 = 68 - \square$$

$$23 = \square - 45$$

$$23 = \square - \triangle$$

Extend to

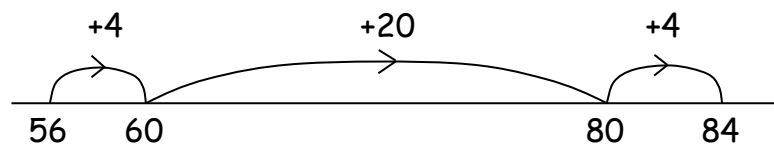
$$65 + 25 = 120 - \square$$

Number Lines

Open Lines

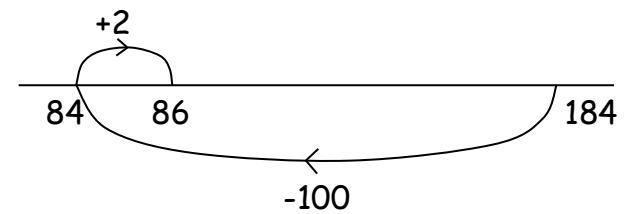
Counting on

$$84 - 56 = 28$$



Compensate

$$184 - 98 = 86$$



Partitioning

Other Jottings

$$\begin{aligned} 97 - 25 &= 97 - 20 - 5 \\ &= 77 - 5 \\ &= 72 \end{aligned}$$

Explaining in writing and speaking

150 - 29

'I did 150 take away 30 then added 1.'

Pencil and paper procedures

Formal pencil and paper procedures methods are not appropriate for this year group

Subtraction

Children's recordings are the expectations for the end of Year 4

Year Group: 4

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

$161 - 25 = \square$

$\square = 161 - 25$

Extend to

$\triangle - 25 = 136$

$136 = \triangle - 25$

$141 + 73 = 250 - \square$

$161 - \square = 136$

$136 = 161 - \square$

$\triangle - \square = 136$

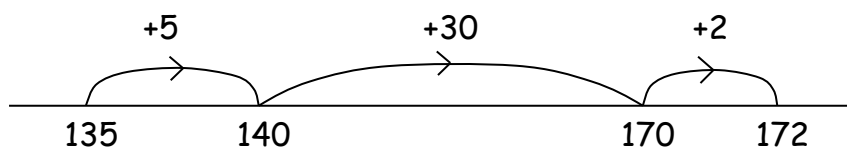
$136 = \triangle - \square$

Number Lines

Open line

Counting on

$172 - 135 = 37$



Partitioning

Other Jottings

$181 - 25 = 181 - 20 - 5$

$= 161 - 5$

$= 156$

Explaining in writing and speaking

- There are 176 boys and 193 girls in the school. Find how many more girls than boys.

'193 - 176 but 193 - 173 is 20 so 193 - 176 = 17.'

Pencil and Paper Procedures

567 - 276

$$\begin{array}{r}
 400 \quad 160 \\
 - 500 \quad 60 \quad 7 \\
 \hline
 200 \quad 70 \quad 6 \\
 \hline
 200 \quad 90 \quad 1 \quad = 291
 \end{array}$$

Be aware! Some groups of children should carry on using number lines for subtraction instead of this method.

Use base 10 apparatus to support.

Subtraction

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 5

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

$$\begin{aligned} 6250 - 2150 &= \square \\ \triangle - 2150 &= 4100 \\ 6250 - \square &= 4100 \\ \triangle - \square &= 4100 \end{aligned}$$

$$\begin{aligned} \square &= 6250 - 2150 \\ 4100 &= 6250 - \triangle \\ 4100 &= \square - 2150 \\ 4100 &= \square - \triangle \end{aligned}$$

Extend to

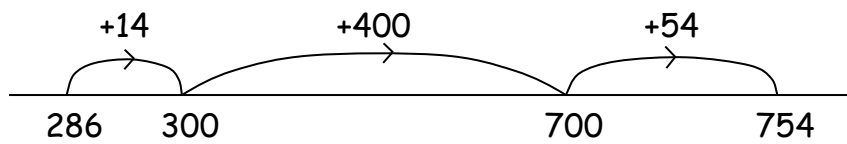
$$4550 - 450 = 8250 - \square$$

Number Lines

Open Line

Counting on

$$754 - 286 = 468$$



Other Jottings

Partitioning

$$\begin{aligned} 654 - 86 &= 654 - 80 - 6 \\ &= 574 - 6 \\ &= 568 \end{aligned}$$

Explaining in writing and speaking

▪ 1859 - 660

'I rounded 1859 up to 1860 and then subtracted 660 from the 860 leaving 200. I then added the 200 back onto the 1000 to give the answer, 1200 and took away the one giving the answer 1199.'

Pencil and Paper Procedures

3684 - 1773

$$\begin{array}{r} 3684 \\ - 1773 \\ \hline 1911 \end{array} = \begin{array}{r} 2000 \quad 1600 \\ \cancel{3000} \quad \cancel{600} \\ 1000 \quad 700 \\ \hline 1000 \quad 900 \end{array} \begin{array}{r} 80 \\ 70 \\ 10 \end{array} \begin{array}{r} 4 \\ 3 \\ 1 \end{array} = 1911$$



$$\begin{array}{r} 3684 \\ - 1773 \\ \hline 1911 \end{array}$$

Be aware! Some groups of children should carry on using number lines for subtraction instead of this method.

Both methods should be taught, however only change to short columns when the children are ready. After a group is secure with short columns, teach decimal subtraction, as in the national framework.

Subtraction

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 6

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

$$\begin{aligned} 7.65 - 6.85 &= \square \\ \triangle - 6.85 &= 0.80 \\ 7.65 - \square &= 0.80 \\ \triangle - \square &= 0.80 \end{aligned}$$

$$\begin{aligned} \square &= 7.65 - 6.85 \\ 0.80 &= \triangle - 6.85 \\ 0.80 &= 7.65 - \square \\ 0.80 &= \square - \triangle \end{aligned}$$

Extend to

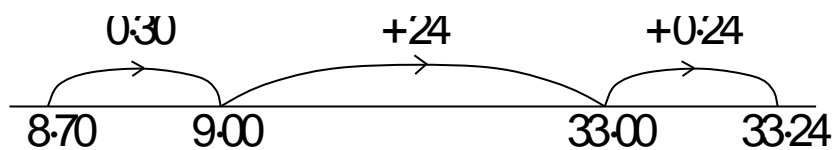
$$11.45 - 6.3 = 9.5 - \square$$

Number Lines

Open Line

Counting on

$$33.24 - 8.70 = 24.54$$



Number lines should still be used as a method for subtraction.

Other Jottings

Partitioning

$$\begin{aligned} 324.91 - 7.25 &= 324.91 - 7 - 0.25 \\ &= 317.91 - 0.25 \\ &= 317.66 \end{aligned}$$

Explaining in writing and speaking

- Tariq had saved £54.00 in his money box. He bought a pair of trainers for £37.42. How much money did he have left?

'He paid with £40.00 and received £2.58 change. Therefore, $54.75 - 40.00 = 14.75$, $£14.00 + £2.58 = £16.58$ left.'

Pencil and Paper Procedures

$$\begin{array}{r} 14.22 \\ - 8.70 \\ \hline 5.52 \end{array}$$

$$\begin{array}{r} 78162 \\ - 3421 \\ \hline 74741 \end{array}$$

Some groups of children may not do subtraction with decimal numbers.

Multiplication and Division

Practical activities using objects and discussion.
Demonstrating / Modelling with apparatus and equipment.

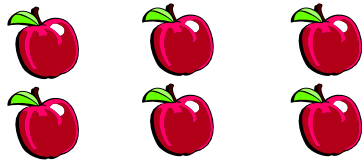
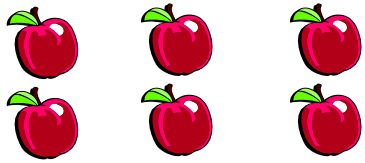
Year Group: Reception

Pictures / Marks

Do these practically or in 'simple problems'.

Repeated addition

Neil has 3 apples. Sita has 3 apples. How many apples are there altogether?



Grouping

We've got 8 wheels. How many cars can we make?



Sharing

There are 10 biscuits on a plate. If we have 5 people, how many biscuits do they each have?



Signs and Symbols

Not appropriate for this year group.

Number Lines

Not appropriate for this year group.

Other Jottings

Not appropriate for this year group.

Explaining in Writing

Not appropriate for this year group.

Pencil and paper procedures

Not appropriate for this year group.

Multiplication and Division

Children's recordings are the expectations for the end of Year 1

Year Group: 1

Pictures / Marks

Repeated addition

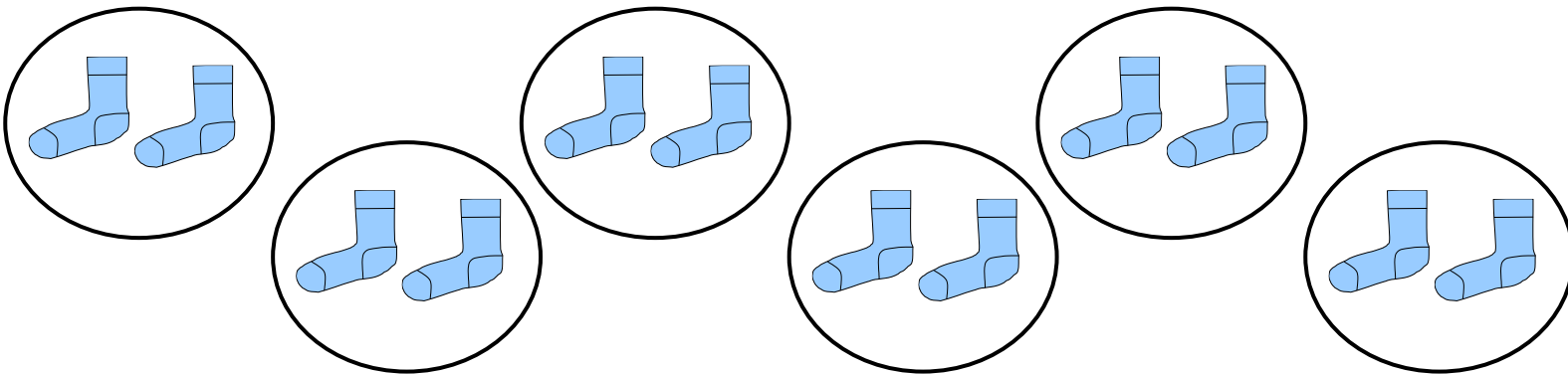
- Six cats. How many eyes are there altogether?



'12 eyes.'

Grouping

- Here are 12 socks: how many pairs are there? Model by drawing sets of or practically pairing them.

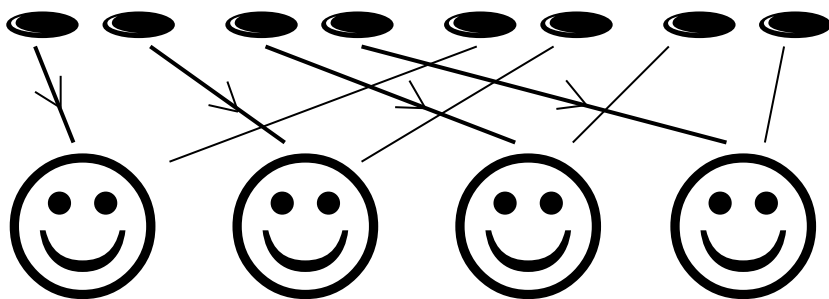


'6 pairs.'

Sharing

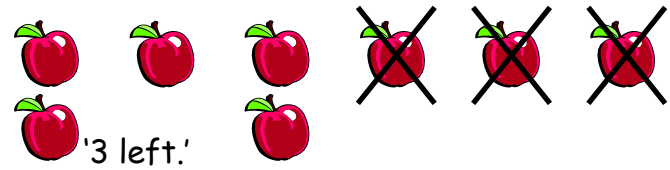
Use vocabulary of share, group, left over, how many times?
ie 8 biscuits, 4 people, how many each?

- There are 8 biscuits to be shared between 4 people. How many do they get each?



'8 shared between 4 is 2 each.'

- Pierre ate half of the 6 apples.



'3 left.'

Signs and Symbols

Not appropriate for this year group.

Number Lines

Not appropriate for this year group.

Other Jottings

Not appropriate for this year group.

Explaining in writing

Not appropriate for this year group.

Pencil and paper procedures

Not appropriate for this year group.

Multiplication

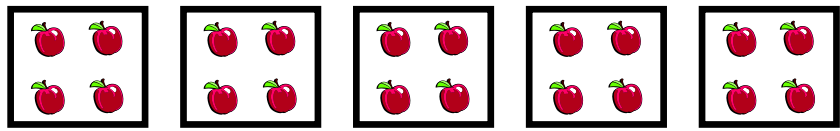
Children's recordings are the expectations for the end of Year 2

Year Group: 2

Pictures / Marks

Repeated addition

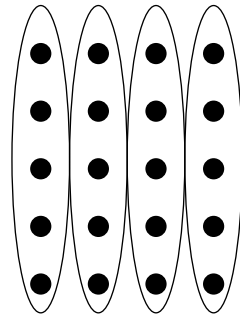
There are 4 apples in one box. How many apples in 5 boxes?



↓ leading to

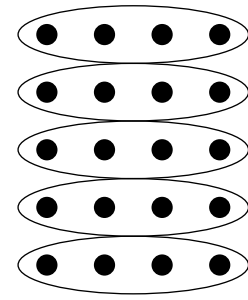


Array



$$5 \times 4 = 20$$

or



$$4 \times 5 = 20$$

Begin to make links with arrays in every day life.
See collaboration zone for examples.
Make links with square numbers and area.

Signs and Symbols

Know 2 and 10 times multiplication facts

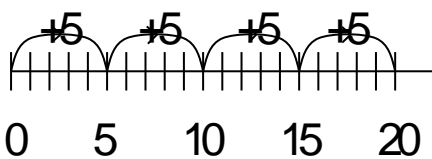
$$\begin{array}{ll} \square \times 2 = 12 & 12 = 2 \times \square \\ 7 \times 2 = \square & \square = 2 \times 7 \\ 9 \times \square = 90 & 90 = \square \times 9 \end{array}$$

Number Lines

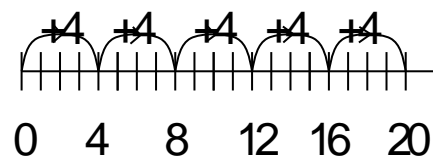
Use numicon rods on number tracks to support.

Prepared numbered lines

$$5 \times 4 = 20$$



$$4 \times 5 = 20$$

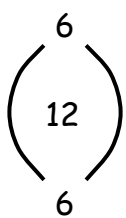


Other Jottings

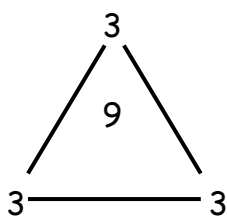
Repeated addition

4 groups of 5

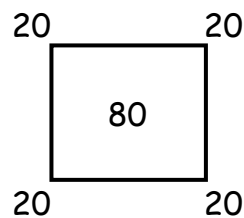
$$5 \times 4 = 5 + 5 + 5 + 5$$



$$\begin{array}{l} 12 = 6 + 6 \\ 12 = 2 \times 6 \end{array}$$



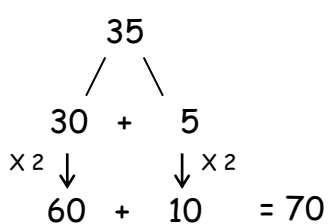
$$\begin{array}{l} 9 = 3 + 3 + 3 \\ 9 = 3 \times 3 \end{array}$$



$$\begin{array}{l} 80 = 20 + 20 + 20 + 20 \\ 80 = 4 \times 20 \end{array}$$

Partitioning

$$35 \times 2 = 70$$



Pencil and paper procedures
Not appropriate for this year group.

Multiplication

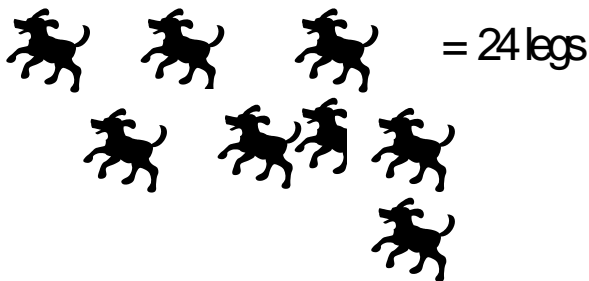
Children's recordings are the expectations for the end of Year 3

Year Group: 3

Pictures / Marks

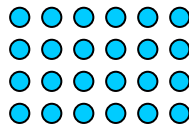
Repeated Addition

A dog has 4 legs. How many legs do 6 dogs have?



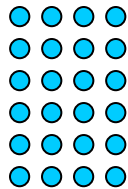
Arrays

4×6



or

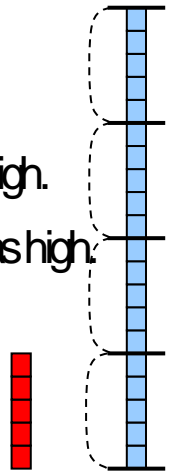
6×4



Scaling

Make a red tower 5 cubes high.

Make a blue tower 4 times as high.



Lots of practical resources to support. Link to arrays in every day life, look on collaboration zone for examples. Link and embed arrays across the curriculum, for example, PE sessions.

Signs and Symbols

Know 2, 5, 10 times tables

$$6 \times 5 = \triangle$$

$$6 \times \triangle = 30$$

$$\triangle \times 5 = 30$$

$$\square \times \triangle = 30$$

$$\square = 5 \times 6$$

$$30 = \square \times 6$$

$$30 = 5 \times \square$$

$$30 = \triangle \times \square$$

Extend to

$$4 \times 3 = \square \times 2$$

Understand x can be done in any order

$$5 \times 8 = 8 \times 5$$

$$5 \times 7 = \square \times 5$$

Recognise that x is INVERSE of \div

$$4 \times 3 = 12$$

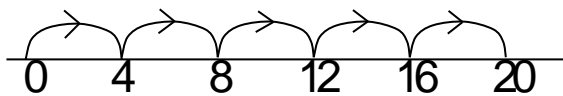
$$3 \times 4 = 12$$

$$12 \div 3 = 4$$

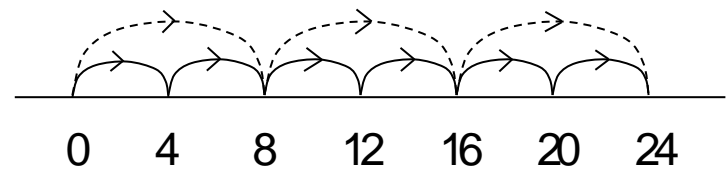
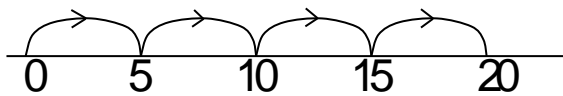
$$12 \div 4 = 3$$

Number Lines

$$4 \times 5 = 20$$



$$5 \times 4 = 20$$



6 groups of 4 is the same as 3 groups of 8

Use numicon rods on the number tracks to support.

Other Jottings

Repeated addition

$$4 \times 7 = 28$$

$$4 + 4 + 4 + 4 + 4 + 4 + 4 = 28$$

- Combining pairs of numbers using facts they already know

$$\begin{array}{ccccccc} 4 & + & 4 & + & 4 & + & 4 & + & 4 & + & 4 & = & 24 \\ \swarrow & & \searrow & & \swarrow & & \searrow & & \swarrow & & \searrow & & \\ & & 8 & & 8 & & 8 & & & & & & \end{array}$$

$$4 \times 6 = 8 \times 3$$

Partitioning

Double 17

$$\begin{array}{ccc} & 17 & \\ \swarrow & & \searrow \\ 20 & + & 14 & = & 34 \end{array}$$

Explaining in writing and speaking

' 25 plus 25 equals 50 so 25 multiplied by 2 is 50.'

Pencil and paper procedures

Not appropriate for this year group.

Multiplication

Children's recordings are the expectations for the end of Year 4

Year Group: 4

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

Know all multiplication facts to 10x10

$3 \times 7 = 21$

$8 \times 15 = 15 \times \triangle$

$90 \times 6 = \square$

$8 \times \square = 560$

$\square \times 90 = 720$

$\triangle \times 7 = 21$

$4 \times \square + 8 = 24$

$\square \times \triangle = 21$

Extend to

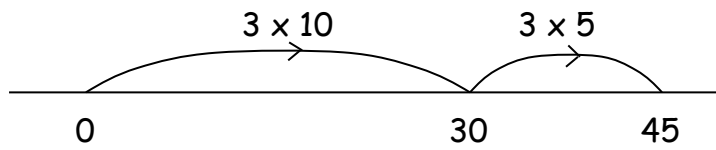
$121 = 60 \times \square + 1$

$22 = 5 \times \square + 2$

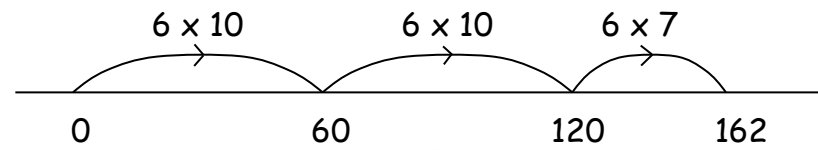
Number Lines

Open number lines

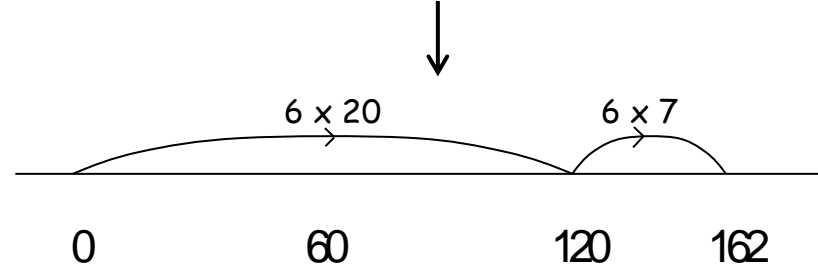
$3 \times 15 = 45$



$6 \times 27 = 162$



Use number line for small numbers.
Make progress to the grid method quickly.



Other Jottings

Partitioning

$15 \times 3 = 45$

$15 \times 3 = (10 \times 3) + (5 \times 3) = 45$

$$\begin{array}{r} 10 \times 3 = 30 \\ 5 \times 3 = 15 \\ \hline 45 \end{array}$$

Look at this briefly, but
can move onto grid method
quickly.

$13 \times 11 = 143$

$$\begin{aligned} 13 \times 11 &= (13 \times 10) + 13 \\ 13 \times 9 &= (13 \times 10) - 13 \end{aligned}$$

Factorising

$$\begin{aligned} 14 \times 20 &= 14 \times 10 \times 2 \\ &= 140 \times 2 \\ &= 280 \end{aligned}$$

Explaining in writing and speaking

▪ 24×2

' 24×2 is $24 + 24 = 20 + 20 + 4 + 4 = 40 + 8 = 48$.'

▪ 15×3

' 15×3 is 3 lots of 10 and 3 lots of 5 which is $30 + 15 = 45$.'

Pencil and Paper Procedures

GRIDMETHOD

23×7

$$\begin{array}{r|rr} \times & 20 & 3 \\ 7 & 140 & 21 \\ \hline & & = 161 \end{array}$$

Multiplication

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 5

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

- Know by heart all the multiplication facts to 10x10

Working rapidly using known facts:

$70 \times 6 = \square \quad 11 \times \square = 88 \quad \square \times 9 = 0.36$

$80 \times 9 = \square \quad 6 \times \square = 48 \quad \square \times 7 = 0.49$

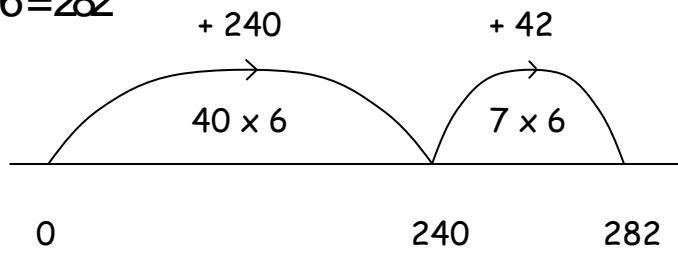
$\triangle \times \triangle = 21$

$72 \times 6 = \square \quad 180 \times \square = 540 \quad \square \times 9 = 189$

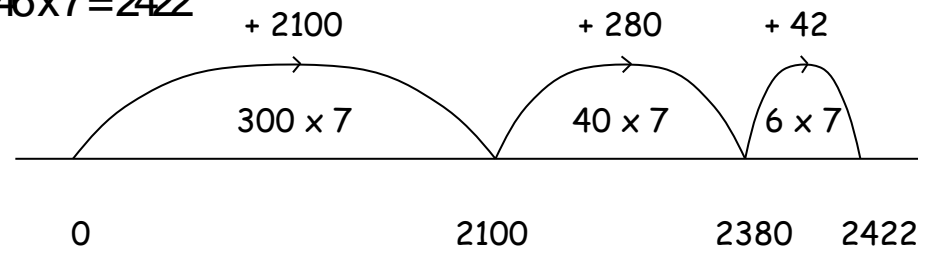
$(14 \times \square) + 8 = 50 \quad 46 \times 28 = \square$

Number Lines
Good to use with smaller numbers.

$47 \times 6 = 282$



$346 \times 7 = 2422$



Other Jottings

Partitioning

$$\begin{aligned} 47 \times 6 &= (40 \times 6) + (7 \times 6) \\ &= 240 + 42 \\ &= 282 \end{aligned}$$

Factorising

$$\begin{aligned} 12 \times 80 &= 12 \times 8 \times 10 \\ &= 96 \times 10 \\ &= 960 \end{aligned}$$

Briefly look at this but can move onto the grid method quickly.

Explaining in writing and speaking

- 49×30 '50 x 30 = 1500, subtract 30 is 1470'.
- 15×12 'This is 15 x 4 x 3 = 60 x 3 = 180.'
- 400×80 'This is the same as 4000 x 8 = 32000'

Pencil and Paper Procedures

Grid Method (TuxTu)

72×38

| | | |
|----|------|----|
| x | 70 | 2 |
| 30 | 2100 | 60 |
| 8 | 560 | 16 |

$$\begin{array}{r} 2160 \\ + 576 \\ \hline 2736 \end{array}$$

Grid Method (HTuxu)

346×7

| | | | |
|---|------|-----|----|
| x | 300 | 40 | 6 |
| 7 | 2100 | 280 | 42 |

$$\begin{array}{r} 2100 \\ + 280 \\ + 42 \\ \hline 2422 \end{array}$$

When individuals are extremely confident, they can move to decimal numbers.

Multiplication

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 6

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

- Consolidate knowing by heart multiplication facts to 10x10

Working rapidly using known facts:

$0.7 \times 20 = \square \quad 20 \times \square = 8000 \quad \square \times 5 = 3.5$

$4 \times 0.9 = \square \quad 0.3 \times \square = 24 \quad \square \times 0.4 = 2$

$132 \times 46 = \square \quad \square \times 9 = 18.9$

$(24 \times \square) + 8 = 3008 \quad 38 \times \square = 190$

Number Lines

- For those children that still require it please refer to Year 5.

Other Jottings

Partitioning

$$\begin{aligned} 4346 \times 7 &= (4000 \times 7) + (300 \times 7) + (40 \times 7) + (6 \times 7) \\ &= 28000 + 2100 + 280 + 42 \\ &= 30422 \end{aligned}$$

$$\begin{aligned} 4.92 \times 3 &= 4.00 \times 3 = 12.00 \\ &= 0.90 \times 3 = 2.70 \\ &= 0.02 \times 3 = \underline{0.06} \\ &14.76 \end{aligned}$$

Factorising

$$\begin{aligned} 35 \times 18 &= 35 \times 2 = 70 \\ &= 70 \times 3 = 210 \\ &= 210 \times 3 = \underline{630} \end{aligned}$$

Explaining in writing and speaking

$$\begin{aligned} 42 \times 15 &= 42 \times 10 = 420 \\ &= 42 \times 5 = 210 \\ &= 42 \times 15 = 630 \end{aligned}$$

Pencil and Paper Procedures

Grid Method: THHTuxTu - also HTuxTu

| | | | | |
|-------|------|-----|----|-------|
| 4 | 3 | 4 | 6 | |
| 7 | 2 | 1 | 0 | 0 |
| x | 7 | 0 | 0 | 0 |
| 28000 | 2100 | 280 | 42 | 30422 |

| | | | |
|----|----|-----|-------|
| 4 | 9 | 2 | |
| x | 3 | 0 | 0 |
| 12 | 27 | 006 | 14.76 |

Only look at decimal numbers with more able children.

Division

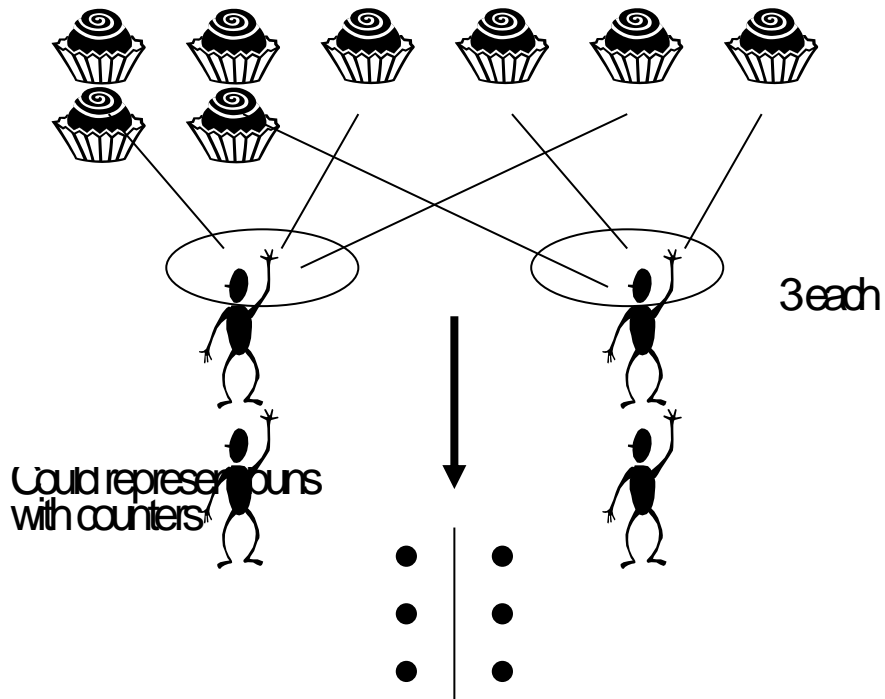
Children's recordings are the expectations for the end of Year 2

Year Group: 2

Pictures / Marks

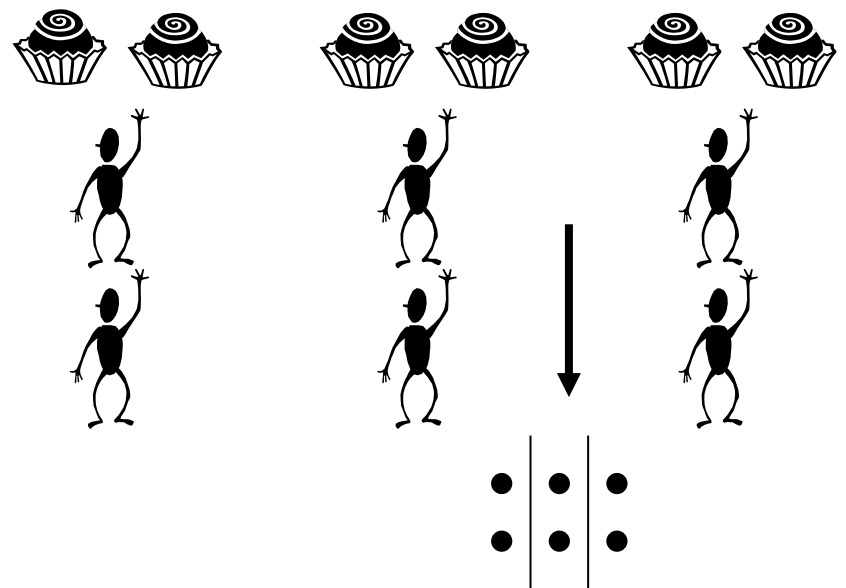
Sharing

6 buns shared equally between 2 people.



Grouping

There are 6 buns. How many people can have 2 each? (how many 2s make 6?)



Signs and Symbols

$$6 \div 2 = \square$$

$$\square = 6 \div 2$$

$$20 \div \square = 2$$

$$2 = 20 \div \square$$

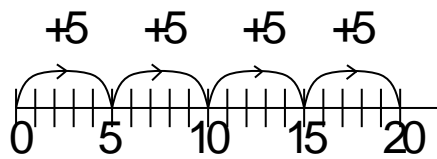
$$\square \div 10 = 3$$

$$3 = \square \div 10$$

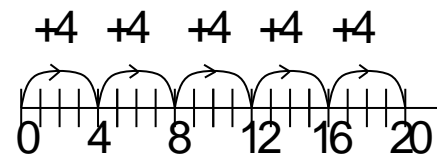
Number Lines

Prepared numbered lines

$$20 \div 5 = 4$$



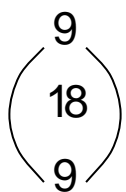
$$20 \div 4 = 5$$



Other Jottings

Partitioning

$$18 \div 2 = 9$$



or

$$\begin{array}{r}
 18 \div 2 = 9 \\
 \begin{array}{c}
 18 \\
 \swarrow \quad \searrow \\
 10 \quad + \quad 8 \\
 \downarrow \div 2 \quad \downarrow \div 2 \\
 5 \quad + \quad 4 = 9
 \end{array}
 \end{array}$$

Explaining in writing

Not appropriate for this year group.

Pencil and paper procedures

Not appropriate for this year group.

Division

Children's recordings are the expectations for the end of Year 3

Year Group: 3

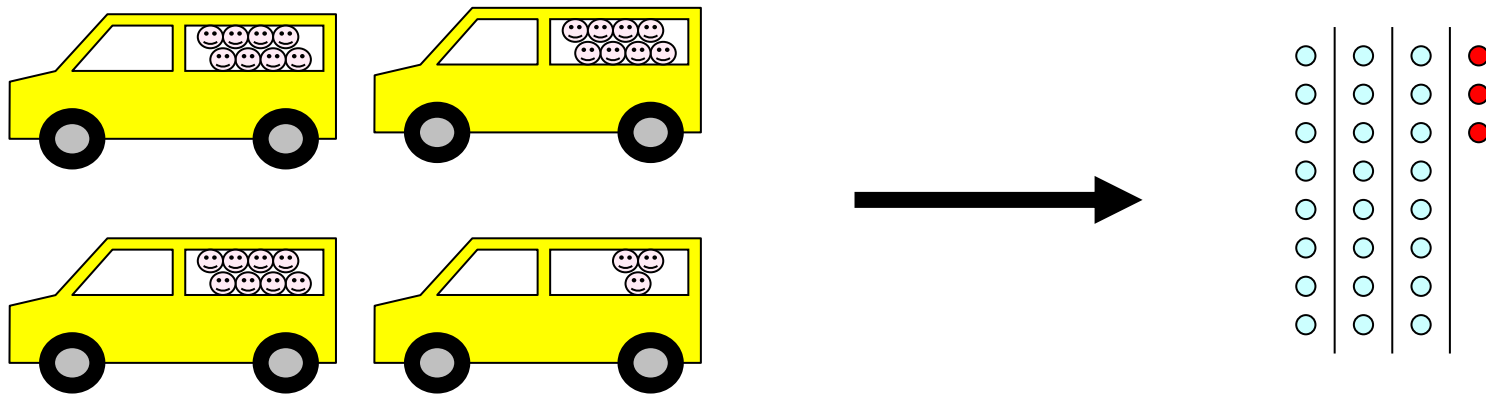
Pictures / Marks

Sharing

Children need to be aware of sharing in the context of word problems but more emphasis needs to be placed on **GROUPING** as this progresses into **CHUNKING** later in KS2

Grouping

8 children can travel in a minibus. How many minibuses would you need to take 27 children to a football match?



'4 mini-buses are needed.'

Signs and Symbols

Know 2, 5, 10 times tables

Recognise that \times is **INVERSE** of \div

$$30 \div 5 = \square$$

$$\square = 30 \div 5$$

$$4 \times 3 = 12$$

$$30 \div \square = 6$$

$$6 = \square \div 5$$

$$3 \times 4 = 12$$

$$\square \div 5 = 6$$

$$6 = 30 \div \square$$

$$12 \div 3 = 4$$

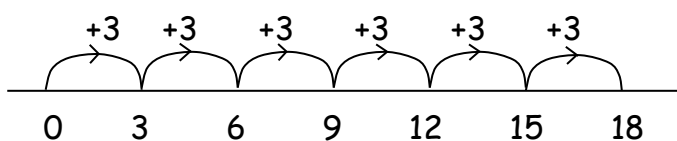
$$\square \div \square = 6$$

$$6 = \square \div \square$$

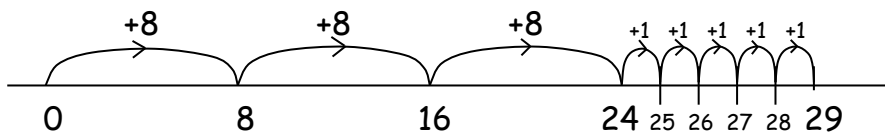
$$12 \div 4 = 3$$

Number Lines

$$18 \div 3 = 6$$



$$29 \div 8 = 3 \text{ remainder } 5$$



Single step jumps on the number line. Numicon rods would be good to support. More able children can move onto chunks, see year 4 number line guidance.

Other Jottings

Halving by Partitioning

$$36 \div 2 = 6$$

$$\begin{array}{r} 36 \\ / \quad \backslash \\ 15 \quad + \quad 3 = 18 \end{array}$$

$$130 \div 2$$

$$\begin{array}{r} 130 \\ / \quad \backslash \\ 100 \quad + \quad 30 \\ | \quad \quad | \\ 50 \quad + \quad 15 = 65 \end{array}$$

Explaining in writing and speaking

$$46 \div 2$$

'I know double 23 is 46, so half of 46 is 23.'

Pencil and paper procedures
Not appropriate for this year group.

Division

Children's recordings are the expectations for the end of Year 4

Year Group: 4

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

Know 2, 3, 4, 5 and 10 times table and derive related division facts

$$36 \div 4 = \square \quad 60 \div \square = 6 \quad \square \div 3 = 7$$

$$320 \div 4 = \square \quad 240 \div \square = 60 \quad \square \div 30 = 8 \quad (25 \div \square) + 2 = 7 \quad (\square \div 5) - 2 = 3$$

Progressing to:

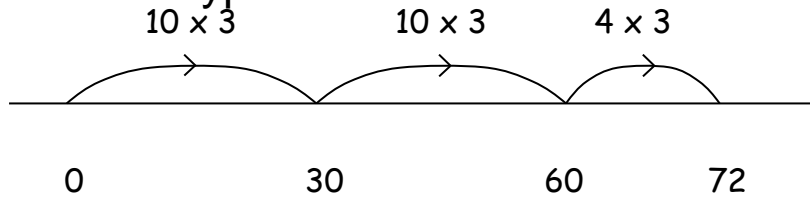
$$1456 \div 4 = \square \quad 64 \div 4 = 8 \times \square$$

Number Lines

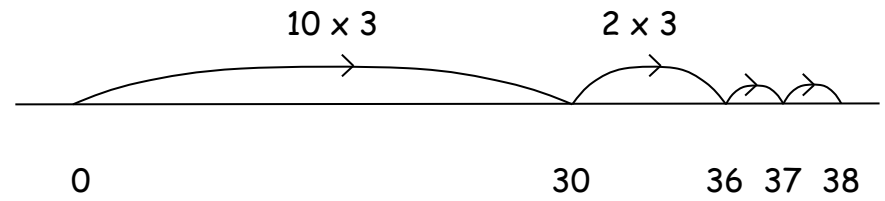
Use 'chunks' with the more able children.

Open number lines

72 pens are sold in packets of 3's.
How many packets will there be?



$$38 \div 3 = 12 \text{ r } 2$$



Other Jottings

1/2 of 720

$$\begin{array}{r} 720 \\ \swarrow \quad \searrow \\ 700 \quad + \quad 20 \\ \downarrow \quad \downarrow \\ 350 \quad + \quad 10 = 360 \end{array}$$

1/4 of 64

$$\begin{array}{r} 64 \\ | \\ 32 \\ | \\ 16 \end{array}$$

$$72 \div 5 = (50 + 22) \div 5$$

$$= 10 + 4 \text{ r } 2$$

or 14 r 2

$$96 \div 4 = (40 + 40 + 16) \div 4$$

$$= 10 + 10 + 4$$

$$= 24$$

Explaining in writing and speaking

▪ $87 \div 2$

'Half of 80 is 40 and half of 7 is 3.5 so it was 43.5.'

Rounding Down

▪ I have £33. Tickets cost £4. How many tickets can I buy?

Answer: 'I can buy only 8 tickets because $\pounds 4 \times 8 = \pounds 32$.'

Rounding Up

▪ I have 33 cakes. 1 box holds 4 cakes. How many boxes will I need?

Answer: '9 because 8×4 is 32 and I need another box.'

Pencil and Paper Procedures

Column Chunking (using multiples of the divisor)

$Tu \div u$

$$72 \div 5 \quad \begin{array}{r} 72 \\ - 50 \text{ (5 x 10)} \\ \hline 22 \\ - 20 \text{ (5 x 4)} \\ \hline 2 \end{array}$$

Answer: 14 remainder 2

Number line chunks are equally valid.
Do not rush onto column chunks if the children don't appear ready.

$$96 \div 4$$

$$\begin{array}{r} 96 \\ - 40 \text{ (4 x 10)} \\ \hline 56 \\ - 40 \text{ (4 x 10)} \\ \hline 16 \\ - 16 \text{ (4 x 4)} \\ \hline 0 \end{array}$$

Answer: 24

Division

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 5

Pictures / Marks
Not appropriate for this year group.

Signs and Symbols

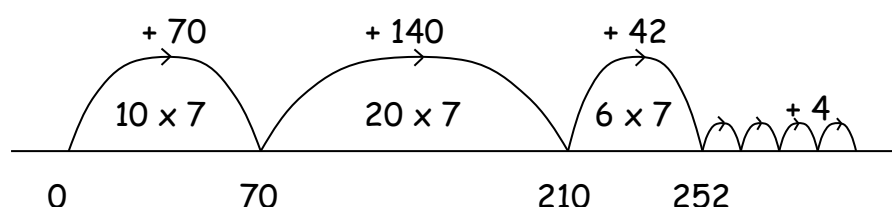
Know all multiplication facts to 10x10 and related division facts

$$\frac{63}{7} = \square \quad 56 \div 8 = \square \quad \square \div 9 = 8$$

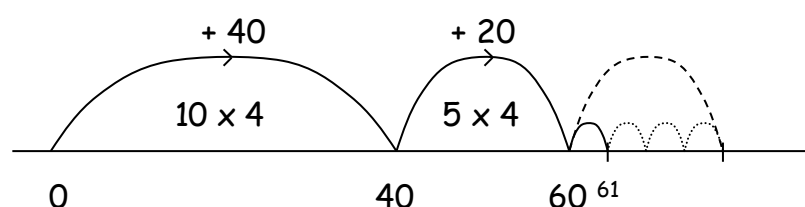
$$172 \div 4 = \square \quad \frac{54}{\square} = 18 \quad \square \div 21 = 90$$

Number Lines

$$256 \div 7 = 36 \text{ r } 4$$



Remainder: Quotients to be expressed as fractions or decimal fractions
 $61 \div 4$ $61 \div 4 = 15\frac{1}{4}$ or 15.25



Partitioning

$$\begin{aligned} 256 \div 7 &= (210 + 42 + 4) \div 7 \\ &= 30 + 6 + \frac{4}{7} \\ &= 36\frac{4}{7} \end{aligned}$$

This method isn't necessary. See year 4 jottings to see how this could be used.

Other Jottings

Explaining in writing and speaking

109 ÷ 21

$21 \times 5 = 105$, plus 4 more is 109. Answer = $5\frac{4}{21}$

Show on a calculator too.

Example of rounding down

'I have saved £240. A train ticket to Durham is £52. $240 \div 52 = 4.615384$ on my calculator. I can buy only 4 tickets.'

1/8 of 424

' $\frac{1}{2}$ of 424 is 212, and $\frac{1}{2}$ of 212 is 106, and $\frac{1}{2}$ of 106 is 53, so $\frac{1}{8}$ of 424 is 53.'

Example of rounding up

'There are 240 people. One bus holds 52 people. 5 buses are needed to hold them all.'

Pencil and Paper Procedures

Column Chunking (using multiples of the divisor)

H Tu ÷ u

$$\begin{array}{r} 256 \div 7 \quad 256 \\ - 70 \quad (10 \times 7) \\ \hline 186 \\ - 140 \quad (20 \times 7) \\ \hline 46 \\ - 42 \quad (6 \times 7) \\ \hline 4 \end{array}$$

Answer: 36 remainder 4

Number line chunks are equally valid.

Do not rush onto column chunks if the children don't appear ready.

Division

Children may need to refer 'back' to previous years' recording at any time, particularly when decimals or largers numbers are introduced.

Year Group: 6

Pictures / Marks
Not appropriate for this year group.

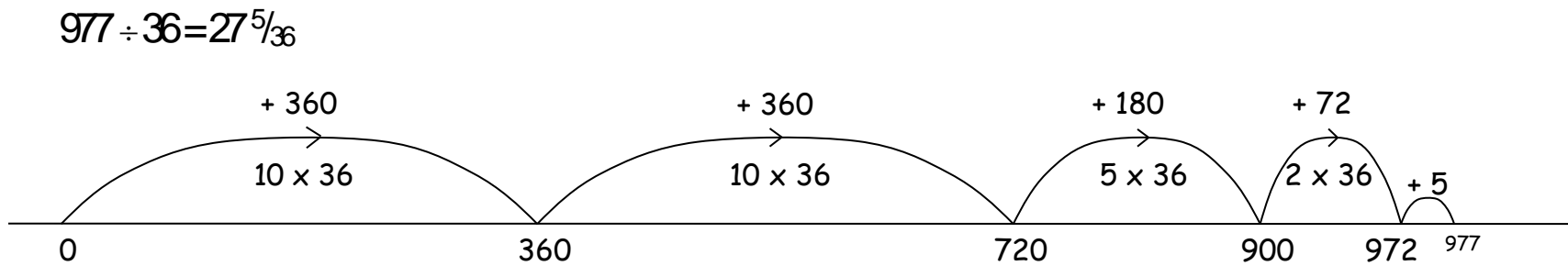
Signs and Symbols

$$63 \div 7 = \square \quad 99 \div \square = 1.1 \quad \square \div 5 = 0.8$$

$$172 \div 4 = \square \quad \frac{\square}{25} = 39$$

Number Lines

Introduce 'coin facts' here.



Other Jottings

Partitioning

$$725 \div 36 = (720 + 5) \div 36$$

$$= (360 + 360 + 5) \div 36$$

$$= 10 + 10 + \frac{5}{36} = 20 \frac{5}{36}$$

This is very complicated. Look at year 4 jottings to see how far you could go with this method.

Explaining in writing and speaking

387 ÷ 9

$$387 \div 3 = 129$$

$$129 \div 3 = 43$$

17.5% of £30,000

| | |
|-------|-----------|
| 10% | = £ 3,000 |
| 5% | = £ 1,500 |
| 2.5% | = £ 750 |
| 17.5% | = £ 5,250 |

$\frac{1}{20}$ of 400

$\frac{1}{10}$ of 400 = 40, and $\frac{1}{2}$ of 40 = 20, so $\frac{1}{20}$ of 400 = 20

Example of rounding down

'I have 5 metres of rope. I need length of 86.5 cm. I can cut off 5 lengths.'

Example of rounding up

'I have 5000 sheets of paper. A box holds 865 sheets. I will need 6 boxes to hold all 5000 sheets.'

Pencil and Paper Procedures

Chunking (using multiples of the divisor)

$$977 \div 36$$

| | |
|-------|-----------|
| 977 | |
| - 360 | (36 x 10) |
| 617 | |
| - 360 | (36 x 10) |
| 257 | |
| - 180 | (36 x 5) |
| 77 | |
| - 72 | (36 x 2) |
| 5 | |

Answer: $27 \frac{5}{36}$

Use coin facts

1x
2x
5x
10x
20x

The more able won't need this when they become confident.

$875 \div 7$

$$87.5$$

| | |
|--------|-----------|
| - 70.0 | (7 x 10) |
| 17.5 | |
| - 14.0 | (7 x 2) |
| 3.5 | |
| - 3.5 | (7 x 0.5) |
| 0.0 | |

Answer: 12.5