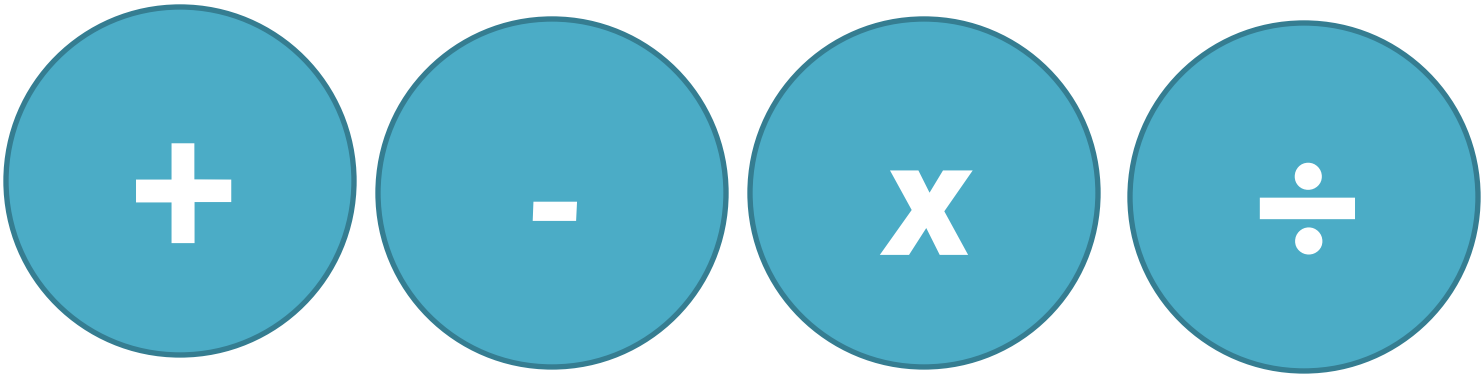
Mathematics Calculation Policy

Reviewed January 2024

St Mawes Primary School



Introduction

The purpose of this document is to create a personalised, updated policy reflecting the requirements of the National Curriculum (2014) and more importantly, the needs of our children.

This policy aims to develop, model and explain core understandings and mathematical principles and progression to ensure consistency in the teaching and learning of mathematics in our school.

The focus of this policy is the calculation of the four mathematical operations with an emphasis on written strategies to clarify processes and understanding and to make direct links to mental calculating. It is crucial that these mental strategies are discretely taught and linked to written strategies and not confined to starter activities in lessons.

The overall aims of this policy are that, when children leave primary school they:

- have a secure knowledge of number facts and a good understanding of the four operations supported by a fluency and understanding of the fundamentals of mathematics

- know the best strategy to use, estimate before calculating, systematically break problems down into a series of simpler steps with perseverance and use estimation and rounding to check that an answer is reasonable

- are able to use this knowledge and understanding to carry out calculations mentally, solve problems of increasing complexity and develop an ability to recall and apply knowledge rapidly

- make use of diagrams and informal notes and jottings to help record steps and partial answers when using mental methods

- have an efficient, reliable, compact written method of calculation for each operation, which they can apply with confidence when undertaking calculations

- be able to identify when a calculator is the best tool for the task and use this primarily as a way of checking rather than simply a way of calculating

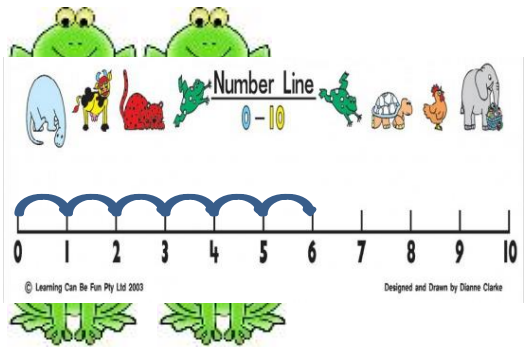
- be able to explain their strategies to calculate and, using spoken language, give mathematical justification, argument or proof

Foundation Stage Nursery - addition

Children will learn:

Develop fast recognition of up to 3 objects, without having to count them individually ('subitising').
Say one number for each item in order: 1,2,3,4,5.
Show 'finger numbers' up to 5.
Recite numbers past 5.
Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle').
Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5.
Compare quantities using language: 'more than', 'fewer than'
Explore the composition of numbers to 10.
Solve real-world mathematical problems with numbers up to 5

I can count six frogs.



Teaching Points

Use number lines 0-10

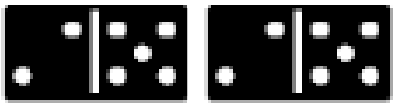
Numbers in the environment inside and outside

Pictorially presented in arrays

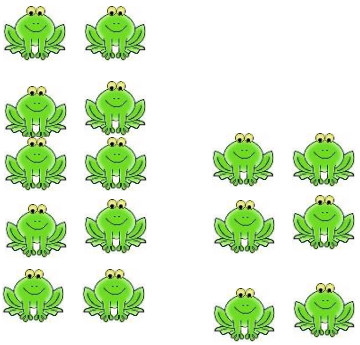
Foundation Stage Reception- addition

Children will learn to:

Count objects, actions and sounds.
Subitise.
Link the number symbol (numeral) with its cardinal number value.
Count beyond ten.
Compare numbers.
Understand the 'one more than/one less than' relationship between consecutive numbers.
Explore the composition of numbers to 10.
Automatically recall number bonds for numbers 0-5 and some to 10.
Select, rotate and manipulate shapes to develop spatial reasoning skills.
Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.
Continue, copy and create repeating patterns.
Compare length, weight and capacity



9 and 1 more is 10
9 add 1 equals 10
9 + 1 = 10



10 frogs and 6 more is 16
10 add 6 equals 16
10 + 6 = 16

Teaching Points

Counting and reading numbers to 20
Doubling using objects and numbers
Halving using objects
Sharing using objects
Adding and subtracting two single digit numbers referring to a numberline

Foundation Stage - addition

Key vocabulary	Key resources
add, more, and make, sum, total altogether score double one more, two more, ten more... how many more to make... ? how many more is... than...? is the same as **Solving problems** **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix Counters and containers Number fans Large class 100 square Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games Natural resources

Planning notes

Year 1 - addition

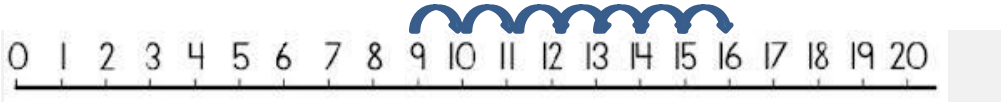
Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- read, write and interpret mathematical statements involving addition (+) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as 9 = ☐ + 7.

Using a marked number line with marked divisions to 20 to solve calculations such as:

9 + 7 = ☐



Appropriateness of number: choices of number here remain within 20 and build towards crossing 10.

Begin to introduce ☐ = 9 + 7 to show the symbolism of balanced calculations and commutative number sentences.

Teaching Points

Numbers to 20

Counting forward/up in jumps on top of the number line when adding.

Model the checking process as this is built upon throughout the strategies and policy.

Year 1 - addition

Key vocabulary	Key resources
+, add, more, plus make, sum, total altogether score double, near double one more, two more... ten more how many more to make...? how many more is... than...? how much more is...? =, equals, sign, is the same as **Solving problems** **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 2 - addition

Curriculum 2014 Statutory Requirements

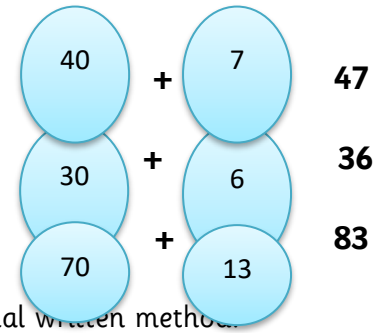
Pupils should be taught to:

- solve problems with addition:
- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods
- recall and use addition facts to 20 fluently, and derive and use related facts up to 100
- add numbers using concrete objects, pictorial representations, and mentally, including:
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Progressive strategies to solve calculations such as: **47 + 36 =**

47 + 36 = 83

Moving to 'petal method' introducing partitioning and applying addition mentally of partitioned numbers:



Progressing to formal written method:

	T	O
	4	7
+	3	6
	8	3
	1	

Teaching Points

Introduce the free-drawn, number line without marked divisions.

Counting forward in units then tens. When counting in units, suggesting 'number bonds' and related facts to make jumps.

Counting forward/up in jumps on top of the number line when adding.

Headings of columns are labelled.

Note how appropriateness of number ensures that these numbers do not require carrying at this stage.

Year 2 - addition

Key vocabulary	Key resources
+, add, addition, more, plus make, sum, total altogether score double, near double one more, two more... ten more... one hundred more how many more to make...? how many more is... than...? how much more is...? =, equals, sign, is the same as tens boundary **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

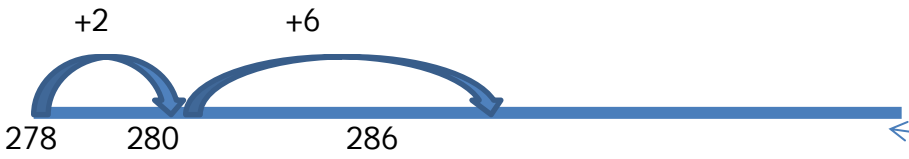
Year 3 - addition

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- add numbers mentally, including:
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds
- a three-digit number and thousands
- add numbers with up to three digits, using formal written methods of columnar addition
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition.

278 + 8 =

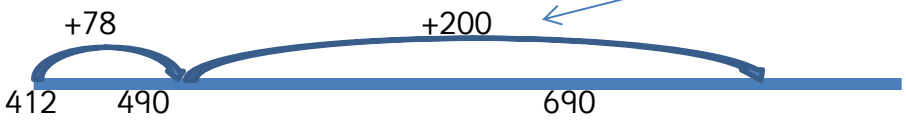


Moving to: (crossing hundreds boundary within 3 digits up to 1000).

278 + 82 =

Moving to: (crossing hundreds boundary within 3 digits up to 1000). Note how the numbers build to ensure application and consolidation of use of number line strategy building to numbers such as:

278 + 412 =



	H	T	O
	2	7	8
+		8	2
	3	6	0
	1	1	

Formal written strategy modelled with:

H T O labelled in columns.
One digit per square.
Calculate from units (least significant figure).

Teaching Points

Numbers initially crossing tens boundary within a three digit number, moving to crossing tens and hundreds in numbers up to 1000.

Pupils begin to use number lines without given divisions.

Starting with number at left hand side of number line. Jumping along the top of the line.

Add jumps (noted above or within the jumps).

Teaching point in example links to recognising number bonds and how smaller jumps, rather than jumping eight will help reinforce mental strategies.

Note that formal written example does not require carrying until confident with adding increasing numbers.

Year 3 - addition

Key vocabulary	Key resources
+, add, addition, more, plus make, sum, total altogether score double, near double one more, two more... ten more... one hundred more how many more to make ...? how many more is... than ...? how much more is...? =, equals, sign, is the same as tens boundary, hundreds boundary **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 4 - addition

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- add with up to 4 digits using the formal written methods of columnar addition where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition two-step problems in contexts, deciding which operations and methods to use and why.

Formal written strategy modelled with:

Th H T O labelled in columns.
One digit per square.
Calculate from units (least significant figure).

Th	H	T	O
4	6	2	7
3	9	1	4
8	5	4	1
~~1~~		~~1~~	

Teaching Points

Building on strategy from Year 3 moving to using numbers which, when added, remain within the 10,000 boundary.

Progressing to the use of formal, compact method (modelling alongside expanded method).

Model crossing out 'carried' digit when added in column.

Year 4 - addition

Key vocabulary	Key resources
Words new to Year 4 are in red add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…? how many more is… than…? how much more is…? is the same as, equals, sign tens boundary, hundreds boundary inverse **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 5 - addition

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- add whole numbers with more than 4 digits, including using formal written methods (columnar addition)
- add numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition multi-step problems in contexts, deciding which operations and methods to use and why.

Building on Y4 strategy and number choices moving to numbers, when added within 1 million.

	TTh	Th	H	T	O
	4	3	2	0	1
	2	2	1	2	4
+	3	1	3	2	1
	9	6	6	4	6

Progressing to addition of numbers to two decimal places in context (such as money £ including € and $ as appropriate)

£132.52 + £213.83

	H	T	O	•	t	h
	1	3	2	•	5	2
+	2	1	3	•	8	3
	3	4	6	•	3	5
			1			

Estimating answers:

Rounding this calculation to nearest ten:

£130 + £210 = £340

Note appropriateness of number above where there is only one 'carry' initially to ensure clarity and understanding of the layout and process.

Teaching Points

Note appropriateness of numbers: initially, when dealing with larger numbers, not requiring 'carrying' to ensure clarity and understanding of application of strategy moving swiftly to numbers requiring carrying.

Model when writing the answer, and when writing numbers such as that shown, the use of commas:
96,646

Use of rounding to check the relevance of numbers in answer.

When calculating using numbers involving decimals, a clear step to success must be the writing in of the decimal point in the answer area **first** to help when carrying past this boundary.

Year 5 - addition

Key vocabulary	Key resources
add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…? how many more is… than…? how much more is…? equals, sign, is the same as tens boundary, hundreds boundary units boundary, tenths boundary inverse **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 6 - addition

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

• solve addition multi-step problems in contexts, deciding which operations and methods to use and why

Building on Y5 strategy and number choices moving to numbers, when added within **10 million**.

Children secure strategies for addition when adding more than two numbers including numbers to three decimal places.

	1	2	0	5	3	7
	2	3	4	2	7	1
+	3	2	3	2	2	1
	6	7	8	0	2	9
			1	1		

Calculating decimal numbers to three decimal places:

	0	•	5	5	7
	1	•	2	1	1
+	0	•	2	0	2
	1	•	9	7	0
				1	

Teaching Points

Note appropriateness of numbers: initially, when dealing with this size of numbers, not requiring numerous 'carrying' to ensure clarity and understanding of application of strategy.

Model when writing the answer, and when writing numbers such as that shown, the use of commas: 678,029 and modelling reading the numbers within the separated groups of numbers.

Reinforce and reiterate the value of each digit when talking about the number.

Note in the example, the use of '0' as a place value holder here and as a digit within the decimal number itself: to reiterate the understanding of its importance and 'value'.

Year 6 - addition

Key vocabulary	Key resources
add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…? how many more is… than…? how much more less is…? is the same as, equals, sign tens boundary, hundreds boundary units boundary, tenths boundary inverse amount brackets calculator: clear, display, enter, key, memory, commutative complements (in 10, 100) currency exact, exactly exchange rate most significant digit **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

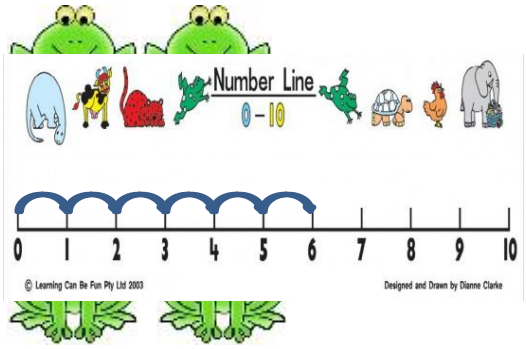
Planning notes

Foundation Stage Nursery- subtraction

Children will learn:

Develop fast recognition of up to 3 objects, without having to count them individually ('subitising').
Say one number for each item in order: 1,2,3,4,5.
Show 'finger numbers' up to 5.
Recite numbers past 5.
Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle').
Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5.
Compare quantities using language: 'more than', 'fewer than'
Explore the composition of numbers to 10.
Solve real-world mathematical problems with numbers up to 5

I can count six frogs.



Teaching Points

Use number lines 0-10

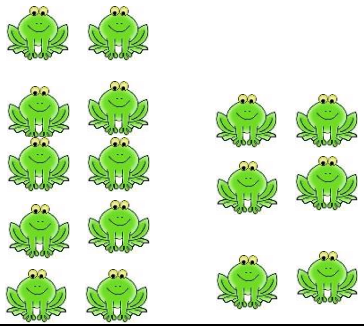
Numbers in the environment inside and outside

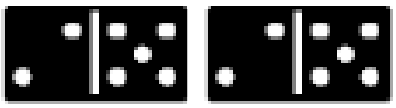
Foundation Stage Reception - subtraction

Children will learn to:

Count objects, actions and sounds.
Subitise. • Link the number symbol (numeral) with its cardinal number value.
Count beyond ten.
Compare numbers.
Understand the 'one more than/one less than' relationship between consecutive numbers.
Explore the composition of numbers to 10.
Automatically recall number bonds for numbers 0-5 and some to 10.
Select, rotate and manipulate shapes to develop spatial reasoning skills.
Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.
Continue, copy and create repeating patterns.
Compare length, weight and capacity

5 + ? = 10





9 and 1 more is 10
9 add 1 equals 10
9 + 1 = 10

10 frogs and 6 more is 16
10 add 6 equals 16
10 + 6 = 16

Teaching Points

Counting and reading numbers to 20
Doubling using objects and numbers
Halving using objects
Sharing using objects
Adding and subtracting two single digit numbers referring to a number line

Foundation Stage - subtraction

Key vocabulary	Key resources
take (away), leave how many are left/left over? how many have gone? one less, two less... ten less... how many fewer is... than...? difference between is the same as **Solving problems** **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Number fans Large class 100 square Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 1 - subtraction

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 9 = □ - 7.

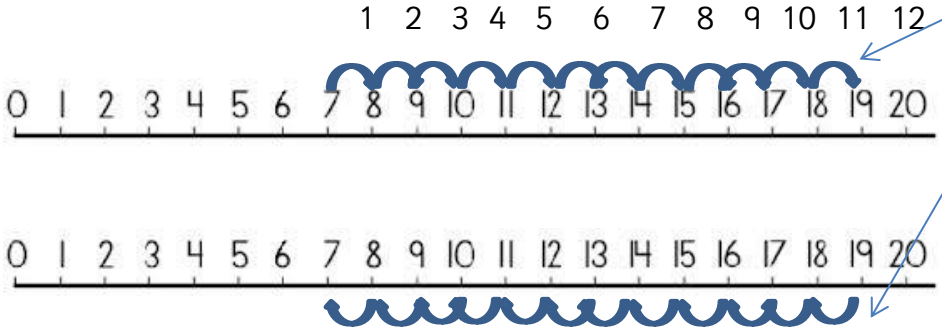
Sam spent 7p. What was his change from 20p?

Children use concrete, practical resources moving to images and physically 'cross off' or remove to ensure a real understanding of 'taking away'.

Pupils begin to explore missing number problems involving – and = notation.

7 - 3 = □	□ = 7 - 3
7 - □ = 4	4 = □ - 3
□ - 3 = 4	4 = 7 - □
□ - ∇ = 4	4 = □ - ∇

Solving a problem such as: 19 – 7 =
Using counting on to find the difference.



Teaching Points

When counting the remaining amount, and when checking that the correct number have been taken away, model efficient counting in twos where necessary or arrayed numbers of ten for example.

Model the checking process as this is built upon throughout the strategies and policy.

When solving missing number problems, ensure that there is a variety of layout where there is a modelling of 'balancing calculations.

Counting on (up) along the top of the number line.

Counting back along the top of the number line.

Year 1 - subtraction

Key vocabulary	Key resources
- subtract, take (away), minus leave how many are left/left over? how many are gone? one less, two less, ten less... how many fewer is... than...? how much less is...? difference between half, halve =, equals, sign, is the same as **Solving problems** **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix Counters and containers Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 2 - subtraction

Curriculum 2014 Statutory Requirements

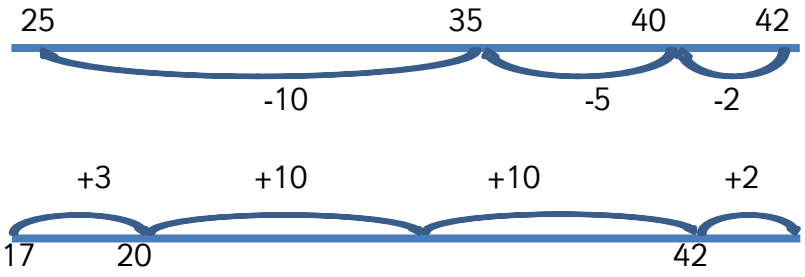
Pupils should be taught to:

- solve problems with subtraction:
- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods
- recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100
- subtract numbers using concrete objects, pictorial representations, and mentally, including:
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- subtracting three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Building on strategies from Y1: using a number line to 'take away' and 'find the difference' by counting under or on the line respectively.

Start initially with a calculation such as 39 – 7.

Moving to calculations such as: 42 - 17



Model when using the strategy above to find the difference to 'jump' to the next ten to help make jumps more straight forward.

Include number puzzles using missing numbers in different forms referring to missing numbers as shapes or letters to build on commutative facts:
70 + 30 = 100 100 - Δ = 30 30 + ☐ = 100

As pupils move towards formal, columnar written strategies, begin by modelling the value and layout practically

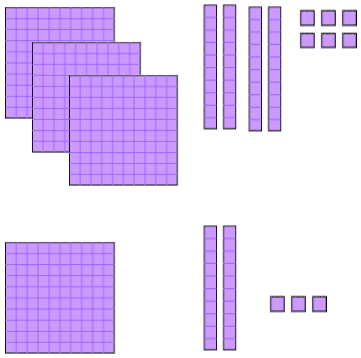
Teaching Points

This calculation does not cross into the previous tens boundary to ensure clarity on the strategy and ensures understanding through subtracting a 'units only' initially.

Move to modelling counting on top of the line to 'find the difference' or under to 'take away'.

Children use a number line without divisions.

Model breaking down the whole number through partitioning and also, using bonds of numbers such as 2 and 5 = 7 as shown



For example, model 346 – 123 using practical resources.

Note appropriateness of number here where 'exchanging' isn't required.

Practical resources to help promote abstract 'exchange' through concrete understanding of place value practically. Modelling practical alongside formal written initially.

Year 2 - subtraction

Key vocabulary	Key resources
Words new to Year 2 are in red -, subtract, take away, minus leave, how many are left/left over? one less, two less... ten less... one hundred less how many less is... than...? how much fewer is...? difference between half, halve =, equals, sign, is the same as tens boundary **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards **Number games**

Planning notes

Year 3 - subtraction

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- subtract numbers mentally, including:
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds
- a three-digit number and thousands
- subtract numbers with up to three digits, using formal written methods of columnar addition
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

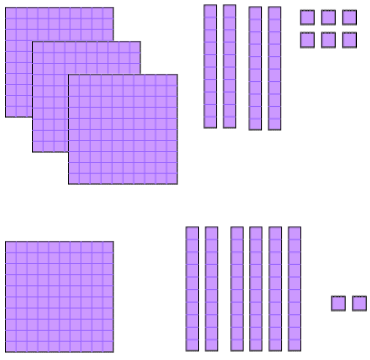
Calculating subtractions from numbers up to 1000.

Move to formal columnar strategy using labelled columns and starting with numbers not requiring exchange before strategy and understanding is secure.

	H	T	O
	3	4	6
-	1	2	3
	2	2	3

When teaching formal columnar strategy note that the integers chosen don't require 'exchange' at this stage.

Pupils use columnar written strategies to calculate building upon that from Year 3. As with Year 3, model layout and move to subtraction with the need for exchange using practical materials initially and progressing from 3-digit subtracting a 3-digit to 4-digit subtracting 3 and 4-digit integers.



Model exchange practically using physical resources and modelling exchanging a '100' for 10 tens and how this is placed within the 'tens' place value column.

Teaching Points

Ensure a discrete teaching of mental strategies building upon informal written strategies of number lines and partitioning numbers to subtract tens from tens and units from units modelling and promoting the use of jottings.

Model subtracting from least significant figure (units).

Note that when modelling practically, and until secure, only one exchange per calculation is required.

Note at the point of physical exchange that the value of the number remains the same (there is still 346, some are simply exchanged).

Modelling of formal written must, initially, occur alongside the practical examples.

Year 3 - subtraction

Key vocabulary	Key resources
-, subtract, take (away), minus leave, how many are left/left over? one less, two less... ten less... one hundred less how many fewer is... than ...? how much less is...? difference between half, halve =, equals, sign, is the same as tens boundary, hundreds boundary **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 4 - subtraction

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- subtract with up to 4 digits using the formal written methods of columnar subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Pupils calculate subtractions from numbers up to 10,000 and beginning to explore decimals in the context of currency (£).

	H	T	O
	~~2~~ 1	14	6
-	1	6	3
	1	8	3

Progressively move towards 4-digit subtract 3- and 4-digit where again, only one exchange is needed initially.

Progressing to subtraction of numbers to two decimal places in context (such as money £ including € and $ as appropriate)

£213.83 - £183.51

H	T	O	•	t	h
~~1~~ 2	11	3	•	8	3
1	8	3	•	5	1
0	3	0	•	3	2

Estimating answers:

Rounding this calculation to nearest ten:
£210 - £180 = £30

Teaching Points

When moving to formal columnar method, ensure a progressive learning sequence where only one exchange is required and move this along when secure.

When modelling formal written calculations, model placing a decimal point in the 'answer line' before commencing subtracting from the least significant figure.

Year 4 - subtraction

Key vocabulary	Key resources
subtract, subtraction, take away, minus, decrease leave, how many are left/left over? difference between half, halve how many more/fewer is... than...? how much more/less is...? is the same as, equals, sign tens boundary, hundreds boundary inverse **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards **Number games**

Planning notes

Year 5 - subtraction

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Strategies build on those of Year 4 and involve starting numbers of up to 100,000 and progressing to 1,000,000.

Formal Written:

Progressively, and before moving to larger numbers, begin to explore written strategies where '2 exchanges' are needed:

	Th	H	T	O
	7	~~8~~ 9	~~1~~ 10	16
-	2	5	9	8
	5	3	0	8

Estimating answers:

E: 7900 – 2600 = 5300

Progressively move to calculations such as:

14,067 – 11,850 =

Teaching Points

Discrete teaching of the notion of more than one exchange must be taught discretely, and does exchanging through a 0 as shown. Modelling here how an exchange is needed and is placed alongside a prior exchange.

Modelling and checking against estimates is a key part of the calculation process to ensure an understanding and automatic check of validity.

Note use of **,** to separate chunks of numbers in 'number sentences' but not in columnar strategy.

Note use of symbols and algebraic symbols such as x or y to find missing values.

Year 5 - subtraction

Key vocabulary	Key resources
subtract, subtraction, take (away), minus, decrease leave, how many are left over? difference between half, halve how many fewer is... than...? how much less is...? equals, sign, is the same as tens boundary, hundreds boundary units boundary, tenths boundary inverse **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 6 - subtraction

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

• solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Strategies build on those of Year 5 and involve starting numbers of up to 1,000,000 and progressing to 10,000,000.

Pupils apply their learning of subtraction strategies and combine these with other areas of learning to solve problems such as:

632,465 + **(745,676 – 325,534)** =

progressing to

8,675,509 – (9,645,253 – 2,867,675) =

Continue with formal written method from Year 5, use invers to check. Pupils apply written subtraction skills to numbers up to and including three decimal places (3dp). These are presented in contextual situations such as units of measure.

Calculations and ranges of numbers are applied through worded problems including units of measure.

Calculations to include examples such as:

12 – 2.736

35.712 – 8.653

Teaching Points

Model the use of brackets in multi-step problems identifying brackets as the initial step needed and combining this with an additional written strategy.

Refer at these stages, as taught in previous years to estimation recorded as E=.

Here, discrete and modelled teaching of 'selecting the appropriate strategy' must be taught.

For this example, counting on mentally, or with jottings referring back to knowledge of number lines would work best.

Here, a formal, columnar subtraction strategy will be more effective.

Year 6 - subtraction

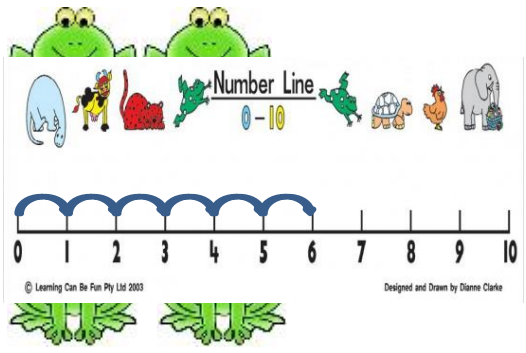
Key vocabulary	Key resources
Words new to Year 6 are in red subtract, subtraction, take (away), minus, decrease leave, how many are left/left over? difference between half, halve how many fewer is... than...? how much less is...? is the same as, equals, sign tens boundary, hundreds boundary units boundary, tenths boundary inverse amount brackets calculator: clear, display, enter, key, memory, change (money) commutative complements (in 10, 100) currency discount exact, exactly exchange rate most/least significant digit **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games
Planning notes	

Foundation Stage Nursery - multiplication

Children will learn:

Develop fast recognition of up to 3 objects, without having to count them individually ('subitising').
Say one number for each item in order: 1,2,3,4,5.
Show 'finger numbers' up to 5.
Recite numbers past 5.
Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle').
Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5.
Compare quantities using language: 'more than', 'fewer than'
Explore the composition of numbers to 10.
Solve real-world mathematical problems with numbers up to 5

I can count six frogs.



Teaching Points

Use number lines 0-10

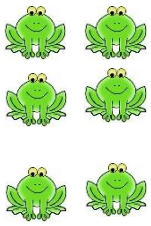
Numbers in the environment inside and outside

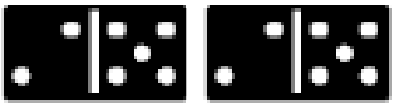
Foundation Stage Reception - multiplication

Children will learn to:

Count objects, actions and sounds.
Subitise. • Link the number symbol (numeral) with its cardinal number value.
Count beyond ten.
Compare numbers.
Understand the 'one more than/one less than' relationship between consecutive numbers.
Explore the composition of numbers to 10.
Automatically recall number bonds for numbers 0-5 and some to 10.
Select, rotate and manipulate shapes to develop spatial reasoning skills.
Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.
Continue, copy and create repeating patterns.
Compare length, weight and capacity

5 + ? = 10





9 and 1 more is 10
9 add 1 equals 10
9 + 1 = 10

10 frogs and 6 more is 16
10 add 6 equals 16
10 + 6 = 16

Teaching Points

Counting and reading numbers to 20
Doubling using objects and numbers
Halving using objects
Sharing using objects
Adding and subtracting two single digit numbers referring to a number line

Foundation stage - multiplication

Key vocabulary	Key resources
Solving problems **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Number fans Large class 100 square Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 1 - multiplication

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

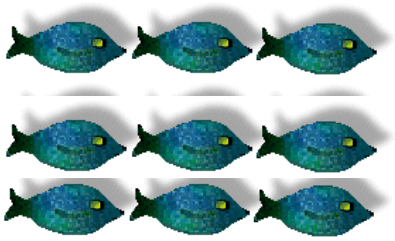
• solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Pupils build on learning in the Foundation Stage and ensure a clear understanding of the concept of doubling.

Using concrete objects, image representations and the use of physical or images of arrays, pupils solve problems such as:

There are three sweets in one bag. How many sweets are in five bags?

There are three fish in one tank. How many fish are in four tanks?



Ensure that pupils experience contextual links such as:

Teaching Points

Note that when using worded problems, the language aspect of this must be accessible – here, the use of talking tins or image based questioning might be needed to ensure equality of access to the mathematics aspect of the question.

Year 1 - multiplication

Key vocabulary	Key resources
lots of, groups of x, times, multiply, multiplied by once, twice, three times, four times, five times... ten times... times as (big, long, wide and so on) repeated addition array row, column ... tens equal groups of **Solving problems** **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 2 - multiplication

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

• recall and use multiplication facts for the 2, 3, 5 and 10 multiplication tables, including recognising odd and even numbers

• calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs

• show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Pupils recall and use **2x 5x 10x**

When solving a problem such as: 2 x 14 =

Progressively, pupils apply partitioning skills to understand the concept of multiplication of digits:

10 x 4

20 8 = 28

Moving to the use of a simple grid where numbers remain in 'teens' to enable discrete teaching of place value and the use of a 'slider' and the introduction to a grid:

X	10	4	
2	20	8	28

Pupils explore, practically, commutative multiplication facts showing that the same product is produced.

Teaching Points

Here, build upon partitioning skills to partition and then multiply to strengthen links between place value and partitioning.

Model practically with place value arrow cards to model multiplication steps.

When introducing grid method, referring to it as such, model initially alongside partitioning strategy.

Note appropriateness of number where numbers remain initially in 'teens' to strengthen ability to multiply a digit by 10.

Link directly and model alongside the use of a place value slider.

Year 2 - multiplication

Key vocabulary	Key resources
lots of, groups of x, times, multiply, multiplied by multiple of once, twice, three times, four times, five times... ten times... times as (big, long, wide and so on) repeated addition array row, column double, halve ... tens equal groups of **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arrays Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 3 - multiplication

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- recall and use multiplication facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to written methods
- solve problems involving missing number problems involving multiplication including positive number scaling problems and correspondence problems where n objects are connected to m objects.

Pupils recall and use **2x 5x 10x 3x 4x 8x 50x 100x**

Tables knowledge builds on using doubling skills of 2x to find 4x and then doubling 4x to find 8x emphasising efficiency and using known facts.

Pupils solve problems such as 34 x 3 using the grid method. Model calculating this, as in Year 2, alongside the partitioning of numbers and link this directly to mental strategies.

X	30	4	
3	90	12	102

When calculating a calculation such as **34 x 2**, model and discuss appropriateness of approach and referring to known skills: double. Progress and model to doubling and double again when finding **4x.**

Progress to simple formal written method.

```
  1 3
x   2
  2 6
```

Teaching Points

Note how digits in numbers are, initially, those that are being reinforced and taught through expected multiplication tables knowledge.

Year 3 - multiplication

Key vocabulary	Key resources
Words new to Year 3 are in red lots of, groups of x, times, multiplication, multiply, multiplied by multiple of, product once, twice, three times, four times, five times... ten times... times as (big, long, wide and so on) repeated addition array row, column double equal groups of **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arrays Multiplication grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 4 - multiplication

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- recall and use multiplication facts for multiplication tables up to 12 x 12
- use place value, known and derived facts to multiply mentally, including: x0 x1 and multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying, including the distributive law to multiply two-digit numbers by one-digit including positive number scaling problems and correspondence problems where n objects are connected to m objects.

Pupils recall and use tables facts ***up to 12 x 12***

Building on the strategies from Year 4, pupils move towards multiples of ten based on the known table facts from above such as 30x and 40x.

Calculations are completed using a grid progressing from 2-digit x 1-digit to 3-digit (1[] [] x []) x 1-digit.

143 x 6 =

X	100	40	3	
6	600	240	18	858

Calculations develop towards an formal written methods:

```
  1 4 3
x     6
-------
  8 5 8
-------
  2   1
```

Teaching Points

When adding the cells within the grid, model adding the numbers in rows starting from largest (most significant) to support mental strategies.

Where columnar addition is secure, progress to applying carrying here.

Year 4 - multiplication

Key vocabulary	Key resources
lots of, groups of times, multiplication, multiply, multiplied by multiple of, product once, twice, three times four times, five times... ten times times as (big, long, wide, and so on) repeated addition array row, column factor, quotient inverse **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arrays Multiplication grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 5 - multiplication

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- identify multiples and factors: all factor pairs of a number, common factors of two numbers, establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to four digits by a one- or two-digit number using a formal written method
- multiply whole numbers and those involving decimals by 10, 100 and 1000.

Using a long multiplication strategy, pupils multiply numbers such as:

37 x 29

```
   3 7
x  2 9
   3 3 3
 7 4 0
 1 0 7 3
```

Progress to 3-digit x 2-digit and TU.t x U using formal written method.
Move to Year 6 strategy when confident.

```
  36.2
  X 7
 253.4
  4 1
```

Teaching Points

Those pupils needing support here can revert to grid but progress to expanded formal as soon as is practicably possible.

Ensure children are taught to look at how many decimal places are in the question to be able to place the decimal point in the answer, having estimated the answer first to avoid unreasonable answers.

Year 5 - multiplication

Key vocabulary	Key resources
lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times four times, five times... ten times times as (big, long, wide, and so on) repeated addition array row, column inverse long multiplication short multiplication **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 6 - multiplication

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- identify multi-digit numbers up to 4 digits by a two-digit number using formal, long multiplication
- identify common factors, common multiples and common prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations

Pupils progress towards multiplying Th H T U x T U
and H T U . t h x T using formal written method of long multiplication:

2 3 1 4 x 2 3 =

	2	3	1	4
	X		2	3
	6	9	4	2
			1	
4	6	2	8	0
5	3	2	2	2
1	1	1		

Progress to multiplication of decimals, in the context of money is recommended to ensure a concrete understanding of the concept and value of digits: **£36.21 x 17**

	3	6	•	2	1
x				1	7
2	5	3	•	4	7
	4	1			
3	6	2	•	1	0
6	1	5	•	5	7
1					

Teaching Points

Build here from 'teens' to 20s and reinforce efficiency where this number could apply x10 and doubling knowledge.

Note layout, here, ensuring only digit per square, layout in columns to support calculating noting place value of digits and use of 0 place value holder. Ensure children are taught to look at how many decimal places are in the question to be able to place the decimal point in the answer, having estimated the answer first to avoid unreasonable answers.

&

Year 6 - multiplication

Key vocabulary	Key resources
lots of, groups of times, multiplication, multiply, multiplied by multiple of, product once, twice, three times four times, five times... ten times times as (big, long, wide, and so on) repeated addition array, row, column double factor, quotient, divisible by inverse long multiplication short multiplication **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

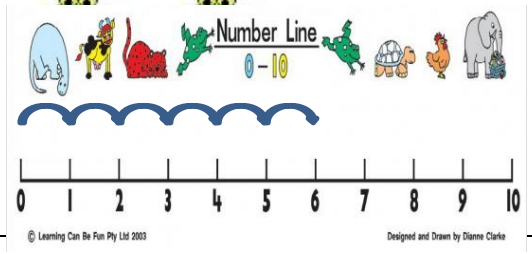
Planning notes

Foundation Stage Nursery- division

Children will learn:

Develop fast recognition of up to 3 objects, without having to count them individually ('subitising').
Say one number for each item in order: 1,2,3,4,5.
Show 'finger numbers' up to 5.
Recite numbers past 5.
Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle').
Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5.
Compare quantities using language: 'more than', 'fewer than'
Explore the composition of numbers to 10.
Solve real-world mathematical problems with numbers up to 5

I can count six frogs.



Teaching Points

Use number lines 0-10

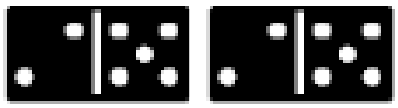
Numbers in the environment inside and outside

Foundation Stage Reception - division

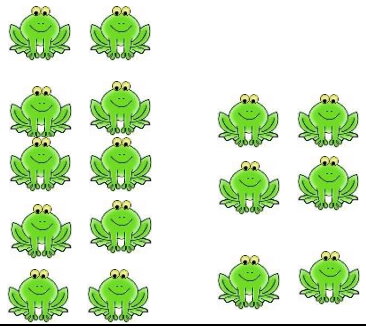
Children will learn to:

Count objects, actions and sounds.
Subitise. • Link the number symbol (numeral) with its cardinal number value.
Count beyond ten.
Compare numbers.
Understand the 'one more than/one less than' relationship between consecutive numbers.
Explore the composition of numbers to 10.
Automatically recall number bonds for numbers 0-5 and some to 10.
Select, rotate and manipulate shapes to develop spatial reasoning skills.
Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.
Continue, copy and create repeating patterns.
Compare length, weight and capacity

5 + ? = 10



9 and 1 more is 10
9 add 1 equals 10
9 + 1 = 10



10 frogs and 6 more is 16
10 add 6 equals 16
10 + 6 = 16

Teaching Points

Counting and reading numbers to 20
Doubling using objects and numbers
Halving using objects
Sharing using objects
Adding and subtracting two single digit numbers referring to a number line

Foundation Stage – division

Key vocabulary	Key resources
Solving problems **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix Counters and containers Number fans Large class 100 square Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards **Number games**

Planning notes

Year 1 - division

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

• solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Pupils begin by reinforcing prior learning where division is understood by grouping and sharing:

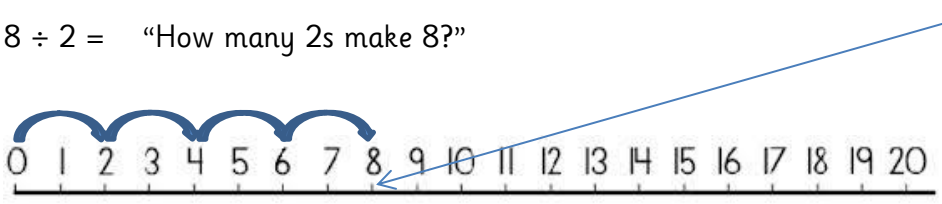
12 girls play a game in groups of 4. How many are in each group?

Pupils begin to explore related division facts and linking these directly to inverse, commutative facts:

6 ÷ 2 = □	□ = 6 ÷ 2
6 ÷ □ = 3	3 = 6 ÷ □
□ ÷ 2 = 3	3 = □ ÷ 2
□ ÷ ∇ = 3	3 = □ ÷ ∇

Sharing of 'chunks' begins to be modelled physically on a number line:

8 ÷ 2 = "How many 2s make 8?"



Teaching Points

Children physically group items and count in groups. Model forming arrays to be organised and systematic to aid counting when this develops into counting in multiples.

Use of a numbered number line and counting jumps and 'chunks' of 2 to begin to introduce chunking on a number line.

Year 1 – division

Key vocabulary	Key resources
array row, column halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of ÷, divide, divided by, divided into, left, left over **Solving problems** **Making decisions and reasoning** pattern puzzle answer right, wrong what could we try next? how did you work it out? count out, share out, left, left over number sentence sign, operation	Digit cards 0-10/0-20 Number track/number line/bead string Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 2 - division

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for division within the multiplication tables and write them using the signs ÷ and =
- show that multiplication of two numbers is commutative but division is not
- solve problems involving division using materials, arrays, repeated addition, mental methods and division facts, including problems in contexts.

Calculations here build on expected known multiplication facts where division is by a divisor or 2, 5 and 10 initially progressing to Y3 multiplication facts of 3, 4 and 8 also.

Pupils continue to explore division as grouping:

How many 3's make 18?

Teaching Points

Note the appropriateness of number: these calculations do not leave a reminder and build upon multiplication facts that are expected to be fluent.

Year 2 – division

Key vocabulary	Key resources
array row, column halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of ÷, divide, divided by, divided into, left, left over **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arrays Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 3 - division

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

• recall and use multiplication and division facts for the 3, 4 and 8 x tables

• write and calculate mathematical statements for division using the multiplication tables they know, including 2-digit divided by 1-digit using mental and progressing to formal written methods

• solve problems, involving missing number problems, involving division, including positive number scaling problems and correspondence problems where n objects are connected to m objects.

Using the simple formal method, pupils begin to divide 2-digit numbers by multiplication facts (one-digit).

53 ÷ 4 =

1 3 r 1

4 ⟌5 13

Teaching Points

First five tables facts to build on recall and also, to promote a habit to be referred to later on in the progressive division strategies.

Year 3 – division

Key vocabulary	Key resources
array row, column halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of ÷, divide, division, divided by, divided into left, left over, remainder **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Coat hangers and pegs Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arrays Multiplication grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 4 - division

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- recall multiplication and division facts up to 12 x 12
- use place value, known and derived facts to divide mentally, including dividing by 1
- solve problems involving dividing a three-digit number by one-digit and number using a formal layout

Ensuring an understanding of the relationship between ÷ and X, pupils build on chunking from Year 3 to use this strategy to divide 3-digit numbers by 1- and 2-digit numbers:

432 ÷ 5 =

```
   0  8  6 r 2
5 ⟌4  43  32
```

Teaching Points

Build here from numbers without a remainder using this strategy progressing to a single digit remainder.

Here, remainders can begin to be expressed as a fraction. Here, appropriateness of number enables this to be expressed as a decimal with ease. 2/5 = 0.4

Year 4 – division

Key vocabulary	Key resources
array row, column halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of divide, division, divided by, divided into, divisible by remainder factor, quotient inverse **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Blank grids of varying sizes Increasing/decreasing number grids Arrays Multiplication grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 5 - division

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, common factors of two numbers, know and use the vocabulary of prime numbers and establish whether a number up to 100 is prime
- multiply and divide numbers mentally drawing on known facts
- divide numbers up to 4 digits by a one-digit number using a written method and interpret remainders appropriately for the context
- divide whole numbers and those involving decimals by 10, 100 and 1000.

Pupils build on the written strategy from Year 4 and apply the 'noted tables facts' to apply place value and subtract decimals from remainders:

$432 \div 5 =$

```
    0  8  6 . 4
5 ) 4  43  32
```

Or could be shown as 86 2/5

Teaching Points

Here, remainders are removed by applying place value knowledge to the noted tables facts (0.4 x 5).

Note appropriateness of number: numbers here have remainders that can be divided and shown as a decimal remainder to one decimal place progressing to a maximum of two decimal places.

Year 5 – division

Key vocabulary	Key resources
array row, column halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of divide, divided by, divided into, divisible by, divisor remainder factor, quotient, divisible by inverse long division short division **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 6 - division

Curriculum 2014 Statutory Requirements

Pupils should be taught to:

• divide numbers up to 4 digits by a two-digit number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding as appropriate for the context.

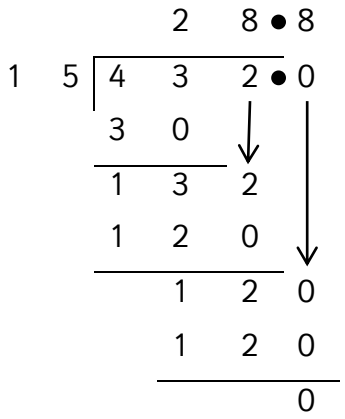
• divide numbers up to 4 digits by a two-digit number using the formal written method of short division as appropriate.

Pupils use long division to calculate:

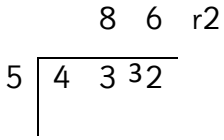
432 ÷ 15 =

This answer can be shown as a quotient (rather than an integer remainder):
28 12/15 = 28 4/5

Progressing to long multiplication to find a decimal remainder:



Considering the appropriateness of number, pupils apply short division strategy to solve questions such as: 432 ÷ 5 =



Teaching Points

Model selection of an appropriate division format – dependent on size of number, efficient ability to apply larger 'tables facts' such as 15x as shown.

Here, depending on understanding of this strategy, pupils can refer this calculation to previously taught 'chunking'.

Year 6 – division

Key vocabulary	Key resources
array row, column halve share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of divide, division, divided by, divided into remainder factor, quotient, divisible by inverse divisible by, divisor remainder long division short division **Solving problems** **Making decisions and reasoning** pattern, puzzle calculate, calculation mental calculation method, strategy jotting answer right, correct, wrong what could we try next? how did you work it out? number sentence sign, operation, symbol, equation	Digit cards 0-10/0-20 Number track/number line/bead string/blank number lines/decimal Counting sticks (Teacher one and small group pack) Unifix/lego Counters and containers Dominoes Number fans Large class 100 square and smaller individual versions Place value cards Place value grids TH/H/T/U and decimals Decimal/fraction equivalence grids Calculators Blank grids of varying sizes Increasing/decreasing number grids Arts straws (bundles of 1's and 10's) Large laminated coins and smaller coins Individual white boards Number games

Planning notes

Year 1 - Fractions

Pupils should be taught to:

- Recognise, find and name a half as one of two equal parts of an object, shape or quantity.
- Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Year 2 - Fractions

Pupils should be taught to:

- Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
- Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.

Year 3 - Fractions

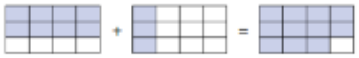
Pupils should be taught to:

- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- Recognise and show, using diagrams, equivalent fractions with small denominators

Add and subtract fractions with the same denominator within one whole :

Eg: 8/12 + 3/12 = 11/12 Teaching point – add numerator - ensure children recognise what a whole looks like.

Compare and order unit fractions, and fractions with the same denominators



Year 4 - Fractions

Pupils should be taught to:

- Recognise and show, using diagrams, families of common equivalent fractions
- Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.

Add and subtract fractions with the same denominator

3/8 + 5/8 = 8/8 same as 1 whole

6/7 – 4/7 = 2/7 Teaching point is subtracting the numerator

Year 5 - Fractions

Pupils should be taught to:

- Compare and order fractions whose denominators are all multiples of the same number
- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number

Add and subtract fractions with the same denominator and denominators that are multiples of the same number

Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements as a mixed number

For example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$

1/8 + 1/8 = 2/8 = 1/4

¼ + 1/8 = 3/8 – ¼ =2/8 + 1/8 = 3/8

Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

1/5 x 3 = 3/5

2/5 x 4 = 8/5

Year 6 - Fractions

Pupils should be taught to:

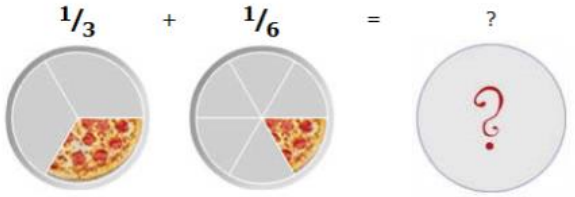
• Use common factors to simplify fractions; use common multiples to express fractions in the same denomination

• Compare and order fractions, including fractions G 1

Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

$$\frac{1}{3} + \frac{1}{6}$$

Step 1: The bottom numbers are different. See how the slices are different sizes?



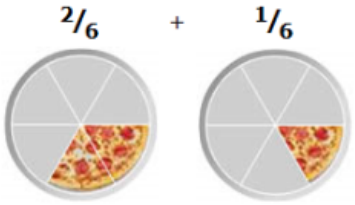
We need to make them the same before we can continue, because we **can't** add them like that.

The number "6" is twice as big as "3", so to make the bottom numbers the same we can multiply the top and bottom of the first fraction by **2**, like this:

$$\frac{1}{3} \overset{\times 2}{=} \frac{2}{6}$$

Important: you multiply **both top and bottom** by the same amount,
to keep the value of the fraction the same

Now the fractions have the same bottom number ("6"), and our question looks like this:



The bottom numbers are now the same, so we can go to step 2.

Step 2: Add the top numbers and put them over the same denominator:

$$\frac{2}{6} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6}$$

Example:

$$\frac{1}{2} \times \frac{2}{5}$$

Step 1. Multiply the top numbers:

$$\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{} = \frac{2}{}$$

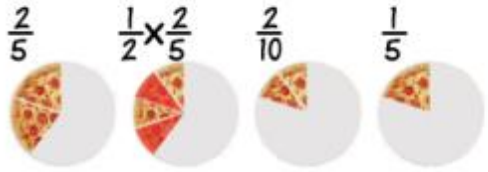
Step 2. Multiply the bottom numbers:

$$\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{2 \times 5} = \frac{2}{10}$$

Step 3. Simplify the fraction:

$$\frac{2}{10} = \frac{1}{5}$$

Here you can see it with pizza ...



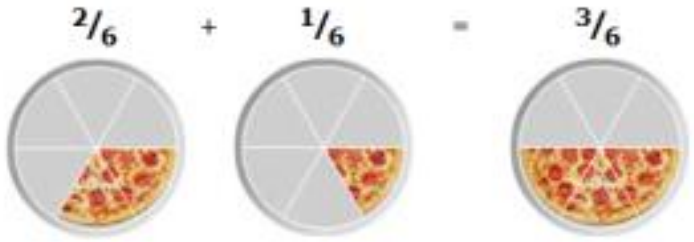
... and do you see how two-tenths is simpler as one-fifth?

Multiply simple pairs of proper fractions, writing the answer in its simplest form for example, 1/2 x 2/5

Divide proper fractions by whole numbers for example, $\frac{1}{3} \div 2 = \frac{1}{6}$

½ divided by 3 = __1__ = _1_

In picture form it looks like this:



2 x 3 6

When half a pizza is divided into 3 equal parts. Each person gets one sixth of a whole pizza.