Mathematics Written Calculation Policy

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Created in Partnership with

Falmouth Primary School

Falmouth School

King Charles C of E Primary School

St Francis C of E Primary School

St Mary's RC School

Introduction

Welcome to the West CAST Network Calculation Policy – devised by the Falmouth School's Network and adapted by the West CAST Subject Leads. The purpose of this document is to offer guidance to all the West CAST schools in the delivery of the 2014 National Curriculum. It is not intended to be directive but is a shared document with guidance that can be adapted to the needs of each school's priorities. It's in Word format so each school can adapt it as they need.

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 schools.

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 policy shows clear steps towards achieving the end of year expectation as outlined by the National Curriculum in a progressive and scaffolded way by moving from concrete models and images to a final, perhaps more abstract representation of a mathematical calculation.

The overall aims of this policy are that, when children leave our primary schools 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 practical resources, 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.

YEAR 1 ADDITION

Step 1	Step 2	Step 3	End of year expectation
* I am beginning to know that addition is the combining of two groups of objects * I can recall addition facts to 10 * I can add two 1-digit numbers * I can record my work using + and =	* I know that addition is the total of two sets * I can use addition facts to 10 to determine related subtraction facts * I am beginning to work out the value of a missing number	* I can use the vocabulary related to addition * I can recall addition facts to 20 * I am beginning to add 1-digit and 2-digit numbers to 20, including zero * I can work out the value of a missing number, e.g. 30 - ? = 24	* **I can read, write and interpret mathematical statements involving addition (+) and equals (=) signs** * **I can represent and use number bonds within 20** * **I can add 1-digit and 2-digit numbers to 20, including zero** * **I can solve missing number problems such as 7 = ? – 9**

Count reliably up to 20 objects

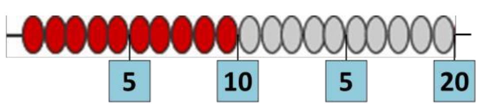
- Say the numbers from 1 to 20 in order pointing to numbers on the washing line as you do so.
- Match written to spoken numbers.

- Count objects, pointing to each object as you do so. Move them into a line and re-count from the children's left to right. Point out that there is the same number even though they are rearranged.

Counting on (on fingers or using sets of objects

Landmarked washing lines/ bead bars

- Use the landmarks of 5s to help place other numbers on a washing line or bead bar.
  E.g. Hang the 10 tag after the 10th bead. *Where do I hang 11? **How did you work that out?***

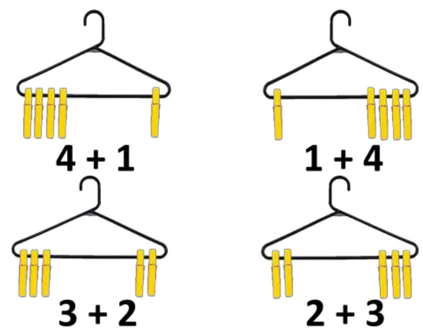


Make 'teen' numbers by counting on

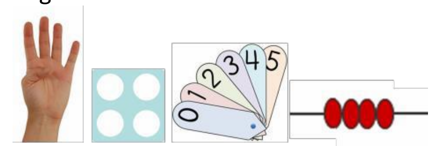
- Count from 1 to 20 pointing to numbers on a washing line as you do so.
- Call out '**teens**' numbers, showing the corresponding numbers card and ask children to show the correct numbers of beads on their 20-bead strings. *How*

Using number facts

- Investigate the story of 4, 5, 6, 7, 8 and 9.
  E.g. Partition 5 into **pairs** and record the related additions.



- Investigate **number bonds to 10**.
- Identify patterns e.g. 1 + 9 = 10, 2 + 8 = 10, 3 + 7 = 10 etc
- Show the missing number bond,
  e.g. 6 + ☐ = 10

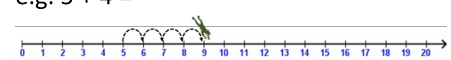


Order of calculation

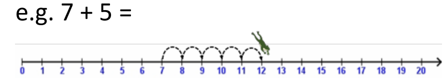
2 + 7 =

Counting on using a marked number line with marked divisions to 20

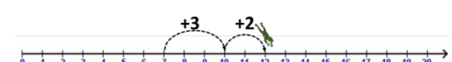
- Start on the **largest number**,
- **Count forward/up** in jumps on top of the **number line** when adding,
- Ensure to count the jumps,
- Demonstrate with frogs jumping along the line.
  e.g. 5 + 4 =



- Progress to numbers crossing 10.
  e.g. 7 + 5 =



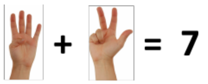
- Extend to bridging ten, by using number bonds to 10.
  e.g. 7 + 5 =



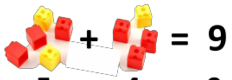
Adding to the next ten

- Identifying **number bonds for 10** to help,

- Confirm the amount in each set by counting the objects,
- **Count on** from largest number to find the **total**.



4 + 3 = 7

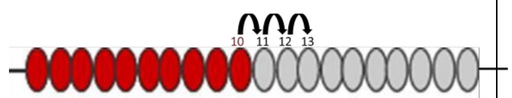


5 + 4 = 9

- Bar modelling

are you finding the right number of beads so quickly?

- **Count on** from 10 to make 'teen' numbers e.g. on bead bar/strings.



10 + 3 = ☐

- **Counting on** from other 2-digit numbers to make 'teen' numbers.
- Begin to introduce ☐ = 9 + 7 to show the symbolism of balanced calculations and commutative number sentences.

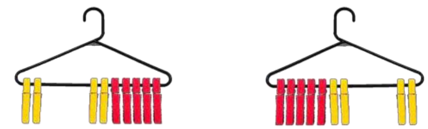
1 – 100

- **Counting up** to 100 using a 1 – 100 number grid,

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24		26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47		49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72		74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Snakes and ladders a good game to support this too.

- Show children a coat hanger with 2 pegs at one end and 7 pegs at the other. Count on from 2 saying 3, 4, 5, … 9.
- Turn the coat hanger round to show 7 and 2. Instead of starting with 2 and counting on 7, start with 7 and count on 2!
- It's easier to put the larger numbers 1st.

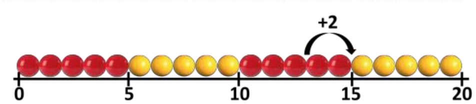


2 + 7 = 7 + 2

Counting on

- Start/make on the **largest number**,
- **Count forward/up** in jumps on top of the **number track/line** when adding,
- Ensure to count the jumps.

13 + 2 =



Bar modelling

e.g. 36 + 4 =
45 + 5 =
23 + 7 =

- **Counting on** using a 1 – 100 number grid.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Adding ten

- **Counting on** using a 1 – 100 number grid.

e.g. 23 + 10 =

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Variation ideas

7 + 2 =	**17 + 2 =**	**7 + 12 =**	
9 + 6 =	**10 + 6 =**	**11 + 6 =**	**13 + 6 =**
8 + 3 =	**10 + 3 =**		

Using and applying: Problem solving:	* I can solve one-step problems that can involve addition and subtraction, using concrete objects and pictorial representations * I can compare, describe and solve practical problems for: – Lengths and heights (e.g. long/short, longer/ shorter, tall/ short, double/half) – Mass or weight (e.g. heavy/light, heavier than, lighter than) – Capacity/ volume (full/empty, more than, less than, quarter) – Time (quicker, slower, earlier, later)
New key vocabulary:	**number bonds, number line** **add, more, plus, make, sum, total, altogether** **inverse** **double, near double** **half, halve** **equals, is the same as (including equals sign)**

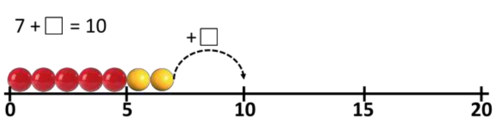
YEAR 2 ADDITION

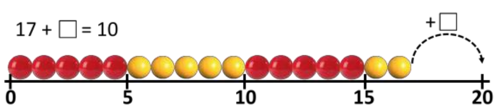
Step 1	Step 2	Step 3	End of year expectation
* am beginning to recall and use addition facts to 20 * I can add numbers using concrete objects, including: – A 2-digit number and ones – A 2-digit number and tens – Two 2-digit numbers – Adding three 1-digit numbers	* I can recall and use addition facts to 20 fluently * I can add numbers using pictorial representations, including: – A 2-digit number and ones – A 2-digit number and tens – Two 2-digit numbers – Adding three 1-digit numbers	* I am beginning to derive and use related facts up to 100 * I am beginning to add numbers mentally, including: – A 2-digit number and ones – A 2-digit number and tens – Two 2-digit numbers – Adding three 1-digit numbers	* **can recall and use addition facts to 20 fluently, and derive and use related facts up to 100** * **I can add numbers using concrete objects, pictorial representations, and mentally, including:** – **A 2-digit number and ones** – **A 2-digit number and tens** – **Two 2-digit numbers** – **Adding three 1-digit numbers**

Number facts

- Building on work done in Year 1, **revise number bonds to ten/ the next ten etc**:

  Show 7 beads at the start of the 100 bead bar. ***How many more** do we need to make 10?* Show 17 beads. ***How many more** to make 20?* Point out the pair to 10, the 7 and 3?
  Show 27 beads. Ask what is the next multiple of 10 after 27? ***How many more** to make 30? etc.*
  Record matching number sentences, e.g. 47 + 3 = 50.





- **Use pairs to 10 to find the next ten:**

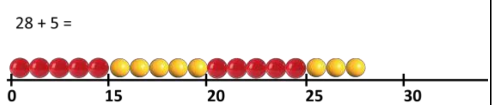
  36 + ? = 40

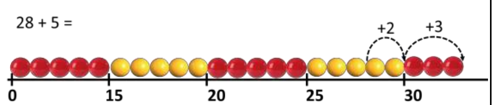
  1. Show the 1-100 grid, ring 36. *What do we need to add to 36 to make 40?*
  2. Use grid to demonstrate counting on from 36 to 40, saying one, two,

Adding a single digit to a 2-digit number by bridging multiples of ten using knowledge of pairs to ten and place value

28 + 5 =

1. Show 28 beads on the bead bar. *We're going to add 5 beads.*
2. Slowly slide a group of 5 beads along to join them.
3. Point out the next multiple of 10 after 28 and ask children to watch the 2 beads going with 28 to make 30. ***How many more** were then added?*
4. Point out that now 30 add 3 is easy.



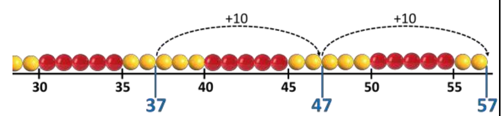


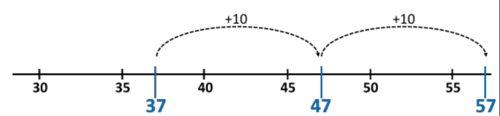
- Progress to demonstrating on a number line, marking the starting number and counting on as before (in jumps marked on top of the number line).

Adding multiples of 10 using a beaded or landmarked number line

37 + 20 =

1. Label 37 on the number line,
2. Draw two jumps of 10, labelling the jumps as you go.
3. *What number have we finished on?*





Adding near multiples of 10 using a beaded or landmarked number line

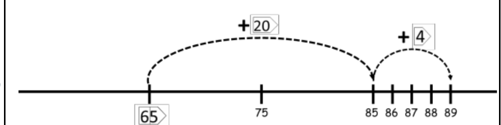
37 + 21 =

1. Label 37 on number line,
2. Draw two jumps of 10, labelling the jumps as you go,
3. But we wanted to add 21, what can we do?
4. Agree that you need to add 1 more and draw and label the jump to 58.

Counting on using a number line and partitioning the second number only

65 + 24 =

1. Discuss how we can also count up in 10s and 1s (so add 20 then 4) – introducing the concept of partitioning.
2. Draft on a number line jotting to work this out (Introduce the free-drawn, number line, marking and labelling divisions as required).



Adding 2-digit numbers by partitioning

65 + 24 =

1. **Partition** each number (Use place value cards to help partition, move the 10s together, move the 1s together),
2. **Add the 10s and 1s** (replace place value cards of the correct values),
3. **Recombine** the answers to find the total (using place value cards to help).

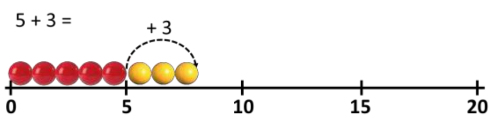
three, four as you move to 37, 38, 39, 40.

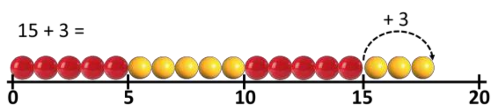
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

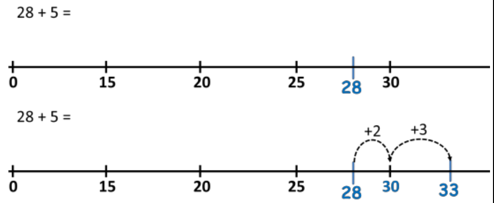
Adding single digit numbers, not crossing 10s, using number facts & patterns

5 + 3 = / 15 + 3 =

- Show 5 beads and 3 more on 100 bead bar. *What is 5* ***and*** *3?*
  Show 15 & 3 more. *15* ***and*** *3 is?* Point out the 5 + 3 beads in one colour.
  Repeat for 25 + 3, 35 + 3… 95 + 3. *These are really easy as we know 5 add 3! We don't need to count on.*







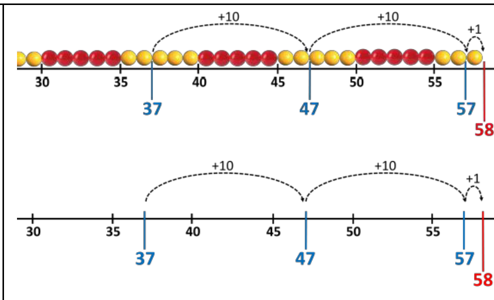
Adding 20, 30, 40, 50 to two-digit numbers using the 1-100 grid

43 + 20 =

1. Place counter on 43,
2. Move down two squares.
3. *What has just been done?* (counted on two tens) *How much has been added?* (20).
4. Record 43 + 20 = 63 on the board.

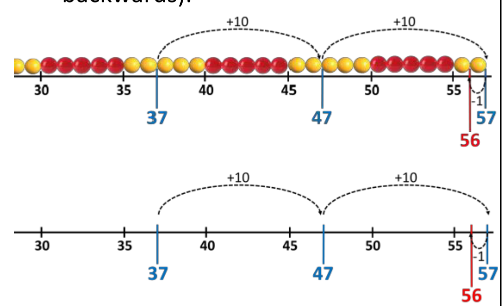
Repeat, to show other calculations, e.g. 26 + 30 and 52 + 40 and 47 + 50.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



37 + 19 =

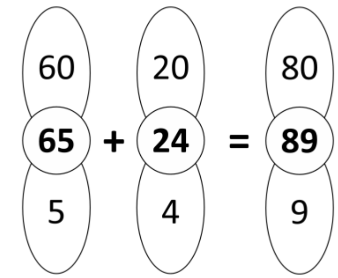
1. Label 37 on number line,
2. Draw two jumps of 10, labelling the jumps as you go,
3. But we wanted to add 19, what can we do?
4. Agree that you need to subtract 1 to find 1 less,
5. Draw and label the jump to 56 (underneath the number line to count backwards).



4. Where the units total more than 10, further partitioning and adding may be required before recombining.

65 + 24 = 60 + 20 + 5 + 4
= 80 + 9
= 89

Petal method **(an alternative method to demonstrate partitioning):**



Variation ideas:

- Work out what numbers symbols stand for using addition facts
  E.g. ■ + ▲ = **10** *What could the mystery numbers be? If the square is 8, what could the triangle be? What if square was 1?* Etc.
  10 + ■ + ▲ = 16. *What could the mystery numbers be now? How much has been added on to 10 to make 16*
- If **8 + 2 = 10**
  then **80 + 20 =100** and **800 + 200 = 1000**
- **? = 8 + 2**
  10 = ? + 2

Using and applying: **Problem solving:**	* **I can use place value and number facts to solve problems** * I can solve problems with addition and subtraction: – using concrete objects and pictorial representations, including those involving numbers, quantities and measures – applying my increasing knowledge of mental and written methods * **Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change**
New key vocabulary:	***numbers to one hundred*** ***hundreds*** ***partition, recombine*** ***hundred more/less***

YEAR 3 ADDITION

Step 1	Step 2	Step 3	End of year expectation
* I can add a three-digit number and 1s (HTU+U) mentally. * I can add up to 3 digit numbers informally * I can begin to estimate the answer to a calculation	* I can add a three-digit number and 10s (HTU+TU) mentally. * I can add numbers with up to 3 digits, using formal written methods of columnar addition without bridging 10 * I can estimate the answer to a calculation and say whether my answer is likely. * I can solve simple addition and problems	* I can add a three-digit number and 100s (HTU+HTU) mentally * I can add numbers with up to 3 digits, using formal written methods of columnar addition * I can make all related number sequences (e.g. 6+8=14, 8+6=14, 14-6=8, 14-8=6) * I can solve one step problems in context, deciding which operations and methods to use and why	* **I can add numbers mentally.** * **I can add numbers with up to 3 digits, using formal written methods of columnar addition** * **I can estimate the answer to a calculation and use inverse operations to check answers** * **I can solve problems, including missing number problems, using number facts, place value and more complex addition**

Add 2-digit numbers by partitioning

65 + 24 =

1. **Partition** each number (Use place value cards to help partition, move the 10s together, move the 1s together),
2. Add the **10s** and **1s** (replace place value cards of the correct values),
3. **Recombine** the answers to find the total (using place value cards to help).

65 + 24 = 60 + 20 + 5 + 4
= 80 + 9
= 89

Expanded column addition (without bridging 10)

243 + 725 =

1. **Partition** each number (Use place value cards to help partition and use a place value grid to help record),
2. Model adding the **O**(**1s**), **T**(**10s**) and **H**(**100s**) in that order (recording in the correct column and emphasising the value of the numbers being added),
3. **Recombine** the answers to find the total (using place value cards to help).

	H	T	O
	200	40	3
+	700	20	5
	900	60	8

= 968

Expanded column addition (bridging 10/100)

427 + 345 =

1. **Partition** each number (Use place value cards to help partition and use a place value grid to help record),
2. Model adding the **O**(**1s**), **T**(**10s**) and **H**(**100s**)in that order (recording in the correct column and emphasising the value of the numbers being added),

	H	T	O
	400	20	7
+	300	40	5
	700	60	12

3. Once adding each column we need to do a little more thinking before **recombining**, as the 1s column has a 10 that needs adding to the other 10s.
4. **Recombine** the answers to find the total (using place value cards to help).

Moving from expanded to compact column addition

654 + 567 =

1. **Partition** each number (Use place value cards to help partition and use a place value grid to help record),
2. Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s.
3. Model adding the **O**(**1s**), **T**(**10s**) and **H**(**100s**) in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10/100 WHEN ADDING THE RELEVANT COLUMN,**
4. **Recombine** the answers to find the total (using place value cards to help).

4. Where the units total more than 10, further partitioning and adding may be required before recombining.

57 + 25 = 50 + 20 + 7 + 5
= 70 + 12
= 70 + 10 + 2
= 82

5. Extend to adding 3-digit numbers.

	H	T	O	
	200	40	3	
+	700	20	5	
	900	60	8	= 968

	H	T	O	
	400	20	7	
+	300	40	5	
	700	60	12	
		10		
	700	70	2	= 772

	H	T	O	
	400	20	7	
+	300	40	5	
	700	60	12	
		10		
	700	70	2	= 772

(Use alongside the use of dienes to support the carrying of ten).

5. Extend by **bridging 100**.

362 + 483 =

	H	T	O	
	300	60	2	
+	400	80	3	
	700	140	5	
	100			
	800	40	5	= 845

	H	T	O	
	600	50	4	
+	500	60	7	
	100	10		
	1200	20	1	= 1221

1. Introducing **compact column addition**: Use a place value grid to help record calculations in the correct columns (place one digit in one square),
2. Leave a line for '**carrying**' when bridging 10,
3. Model adding the **U**(**1s**), **T**(**10s**) and **H**(**100s**) in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10/100 WHEN ADDING THE RELEVANT COLUMN.**

	H	T	O	
	6	5	4	
+	5	6	7	
	1	1		
	12	2	1	= 1221

4. If bridging 100, identify the 1000s digit and its value.

Using and applying: **Problem solving:**	* I can solve number problems and practical problems involving these ideas
New key vocabulary:	**column addition**

YEAR 4 ADDITION

Step 1	Step 2	Step 3	End of year expectation
* I can add 3 digit numbers using columnar addition (including bridging 10) * I can solve simple addition problems	* I can add 3 digit numbers using columnar addition (including bridging 10) * I can find fact families for an addition fact * I am beginning to estimate the answer to a calculation * I can solve one-step problems in contexts, deciding which operations to use and why	* I can add 3 digit numbers using columnar addition (including bridging 100) * I can use inverses in number problems (e.g. I think of a number and add 3) * I can estimate the answer to a calculation and say whether my answer is likely * I can solve more complex one-step problems in contexts, deciding which operations to use and why	* **I can add numbers up to 4 digits using columnar methods** * **I can estimate and use inverse operations to check answers to a calculation** * **I can solve addition and subtraction two-step problems in contexts, deciding which operations to use and why**

Compact column addition (including bridging 10/100)	**Expanded and compact column addition of money (including bridging 10p)**	**Expanded and compact column addition of money (including bridging £1)**	**Compact column addition (including bridging 10/100/1000)**
324 + 439 = 5. Building on strategy from Year 3, use a place value grid to help record calculations in the correct columns (place one digit in one square), 6. Leave a line for '**carrying**' when **bridging 10,** **7.** Model adding the **U(1s)**, **T(10s)** and **H(100s)** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10/100.**	**£3.24 + £2.58 =** **1. Use expanded column addition to confirm that the method is the same as when adding 3-digit numbers;** 2. **Partition** each number (Use a place value grid with £ . p labelled to help record), 3. Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s. **4.** Model adding the **1ps**, **10ps** and **£1s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10p,** 5. **Recombine** the answers to find the total (using place value cards to help).	**£3.74 + 32.83 =** **1. Use expanded column addition to confirm that the method is the same as when adding 3-digit numbers;** **2.** **Partition** each number (Use a place value grid with £ . p labelled to help record. 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), **3.** Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s. **4.** Model adding the **1ps**, **10ps** and **£1s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER**	**2458 + 1377 =** **1. Use expanded column addition to confirm that the method is the same as when adding 3-digit numbers;** **2.** **Partition** each number (Use a place value grid to help record), **3.** Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s. **4.** Model adding the **O(1s)**, **T(10s)**, **H(100s)** and **Th(1000s)** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10/100/1000,** **5.** **Recombine** the answers to find the total (using place value cards to help).

	H	T	O
	3	2	4
+	4	3	9
		1	
	7	6	3

8. Some children may need to use the expanded method, with support:

	H	T	O	
	300	20	4	
+	400	30	9	
		10		
	700	60	3	= 763

9. Extend by adding three 3-digit numbers.

	H	T	O
	1	2	3
+	4	7	4
	3	3	2
		1	
	7	6	3

	£1s	.	10p	1p	
	3	.	20	4	
+	2	.	50	8	
		.	10		
	5	.	80	2	= £5.82

1. **Demonstrate compact column addition and confirm that the method is the same as when adding 3-digit numbers;**
2. For compact addition, use a place value grid with £ . p labelled to help record calculations in the correct columns (place one digit in one square),
3. Leave a line for '**carrying**' when **bridging 10p**,
4. Model adding the **1ps**, **10ps** and **£1s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10p.**

	£1s	.	10p	1p
	3	.	2	4
+	2	.	5	8
		.	1	
	5	.	8	2

TO ADD THE VALUE 'CARRIED' WHEN BRIDGING £1,

5. **Recombine** the answers to find the total (using place value cards to help).

	£1s	.	10p	1p	
	3	.	70	4	
+	2	.	80	3	
	1	.			
	6	.	50	7	= £6.57

1. **Demonstrate compact column addition and confirm that the method is the same as when adding 3-digit numbers;**
2. For compact addition, use a place value grid with £ . p labelled to help record calculations in the correct columns (place one digit in one square and 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),
3. Leave a line for '**carrying**' when **bridging 10p/£1**,
4. Model adding the **1ps**, **10ps** and **£1s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING £1.**

	£1s	.	10p	1p
	3	.	7	4
+	2	.	8	3
	1	.		
	6	.	5	7

	Th	H	T	O
	2000	400	50	8
+	1000	300	70	7
		100	10	
	3000	800	30	5

1. **Demonstrate compact column addition and confirm that the method is the same as when adding 3-digit numbers;**
2. For compact addition, use a place value grid to help record calculations in the correct columns (place one digit in one square),
3. Leave a line for '**carrying**' when **bridging 10/100/1000**,
4. Model adding the **O(1s)**, **T(10s)**, **H(100s)** and **Th(1000s)** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10/100/1000.**

	Th	H	T	O
	2	4	5	8
+	1	3	7	7
		1	1	
	3	8	3	5

Using and applying:	* I can solve number and practical problems using all of my number skills.
New key vocabulary:	tenths, hundredths decimal (places) thousand more/less than count through zero

YEAR 5	ADDITION

Step 1	Step 2	Step 3	End of year expectation
* I can add and subtract 4 digit numbers using columnar addition (including bridging 10/100/1000) * I can add mentally a three digit number and a single digit number * I can solve one-step problems in contexts, deciding which operations to use and why	* I can add and subtract 4 digit numbers using columnar addition (including bridging 10/100/1000) * I can add mentally a three digit number and a multiple of 10 * I am beginning to use rounding to +estimate the answer to a calculation * I can solve more complex one-step problems in contexts, deciding which operations to use and why	* I can add and subtract 4 digit numbers using columnar addition (including bridging 10/100/1000) * I can add mentally a three digit number and a multiple of a hundred * I can estimate the answer to a calculation using rounding and say whether my answer is likely * I can solve addition and subtraction two-step problems in contexts, deciding which operations to use and why	*** I can add and subtract whole numbers with more than 4 digits using formal columnar addition** *** I can add and subtract numbers mentally with increasingly large numbers** *** I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy** *** I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.**

Compact column addition (including bridging 10/100/1000) **3478 + 2827 =** 5. **Building on strategy from Year 4,** use a place value grid to help record calculations in the correct columns if necessary (place one digit in one square), 6. Leave a line for ‘carrying’ when bridging 10/100/1000, 7. Model adding the **O**(1s), **T**(10s), **H**(100s) and **Th**(1000s) in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE ‘CARRIED’ WHEN BRIDGING 10/100/1000,**	**Expanded and compact column addition of money (including bridging 10p and £10)** **£14.29 + £17.49 =** 6. **Use expanded addition to confirm that the method is the same as when adding 4-digit numbers;** 7. Partition each number (Use a place value grid with £ . p labelled to help record if necessary), 8. Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s. 9. Model adding the **1p, 10p, £1** and **£10** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE ‘CARRIED’ WHEN BRIDGING 10p/£1,** 10. Recombine the answers to find the total (using place value cards to help).	**Expanded and compact column addition of money (including bridging £1)** **£15.73 + £12.46 =** 1. **Use expanded addition to confirm that the method is the same as when adding 4-digit numbers;** 2. Partition each number (Use a place value grid with £ . p labelled to help record if necessary. 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), 3. Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s. 4. Model adding the 1s, 10s and 100s in that order (recording in the correct column and emphasising the value of	**Compact addition (including bridging 10/100/1000/10,000)** **35,272 + 28,345 =** **Expanded addition** 6. **Use expanded addition to confirm that the method is the same as when adding 4-digit numbers;** 7. Partition each number (Use a place value grid to help record if necessary), 8. Emphasise leaving a space ABOVE the line in case we have to write 10s digits when adding the 1s or 100s digits when adding the 10s, so that we remember to add these when adding the 10s or 100s. 9. Model adding the 1s, 10s and 100s in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE ‘CARRIED’ WHEN BRIDGING 10/100/1000/10,000,** 10. Recombine the answers to find the total (using place value cards to help).

	Th	H	T	O
	3	4	7	8
+	2	8	2	7
	1	1	1	
	6	3	0	5

8. Use rounding to check the answer. E.g. rounding to the nearest 100 then calculating to find approximate answer.

	Th	H	T	O
	3	5	0	0
+	2	8	0	0
	1			
	6	3	0	0

9. Some children may need to use the expanded method, with support:

	Th	H	T	O
	3000	400	70	8
+	2000	800	20	7
	1000	100	10	
	6	3	0	5

	£10	£1	.	10p	1p	
	10	4	.	20	9	
+	10	7	.	40	9	
	10		.	10		
	30	1	.	70	8	= £31.78

5. **Demonstrate compact addition and confirm that the method is the same as when adding 3-digit numbers;**
6. For compact addition, use a place value grid with £ . p labelled to help record calculations in the correct columns (place one digit in one square),
7. Leave a line for '**carrying**' when bridging 10,
8. Model adding **1p, 10p, £1** and **£10** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10p/£10,**
9. Use rounding to check the answer.

	£10	£1	.	10p	1p
	1	4	.	2	9
+	1	7	.	4	9
	1		.	1	
	3	1	.	7	8

the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING £1,**

5. **Recombine** the answers to find the total (using place value cards to help).

	£10	£1	.	10p	1p	
	10	5	.	70	3	
+	10	2	.	40	6	
		1	.			
	20	8	.	10	9	= £28.19

1. **Demonstrate compact addition and confirm that the method is the same as when adding 3-digit numbers;**
2. For compact addition, use a place value grid with £ . p labelled to help record calculations in the correct columns (place one digit in one square and 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),
3. Leave a line for '**carrying**' when bridging 10,
4. Model adding the **1s**, **10s** and **100s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING £1,**
5. Use rounding to check the answer.

	£10	£1	.	10p	1p
	1	5	.	7	3
+	1	2	.	4	6
		1	.		
	2	8	.	1	9

	TTh	Th	H	T	O
	30 000	5000	200	70	2
+	20 000	8000	300	40	5
	10 000		100		
	60 000	3000	600	10	7

__Compact addition__

1. **Demonstrate compact addition and confirm that the method is the same as when adding 3-digit numbers;**
2. For compact addition, use a place value grid to help record calculations in the correct columns (place one digit in one square),
3. Leave a line for '**carrying**' when bridging 10,
4. Model adding the **1s**, **10s** and **100s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 10/100/1000,**
5. Use rounding to check the answer.

	TTh	Th	H	T	O
	3	5	2	7	2
+	2	8	3	4	5
	1		1		
	6	3	6	1	7

Using and applying: **Problem solving:**	* I can solve number and practical problems using all of my number skills
New key vocabulary:	**efficient written method**

YEAR 6	ADDITION

Step 1	Step 2	Step 3	End of year expectation
* **I can add** and subtract **5 digit numbers using columnar addition (including bridging 10/100/1000/10000)**(4c)	* **I can add** and subtract **5 digit numbers with decimals using columnar addition (including bridging 10/100/1000/10000)** * I can add and subtract multiples of 10 and 100 to three and four digit numbers mentally * I can use brackets in simple calculations (4a) * I can solve more complex one step problems in context deciding which operations to use and why (3c) * I can check whether my answer is likely	* **I can add** and subtract **numbers of different lengths with decimals using columnar addition (including bridging where necessary)** * Add and subtract numbers mentally with increasingly large numbers * I can use brackets and inverses effectively e.g. (24+P) x 6 = 150 * I can solve addition and subtraction two-step problems in context deciding which operations and methods to use and why(3b) * I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy (Yr 5)	* **I can perform mental calculations, including with mixed operations and large numbers** * **I can use my knowledge of the order of operations to carry out calculations involving the 4 operations** * **I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why** * **I can use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy**

Compact addition (including bridging 10/100/1000/10,000)	Compact addition (including bridging 10/100/1000/10,000)	Compact addition (including bridging where needed
35,272 + 28,345 = 6. **Use compact addition and confirm that the method is the same as when adding 5-digit numbers;** 7. For compact addition, use a place value grid to help record calculations in the correct columns (place one digit in one square), 8. Leave a line for '**carrying**' when bridging 10, 9. Model adding the **1s**, **10s, 100s** and **1000s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE**	**4,365.52 + 2542.76 =** 1. **Use compact addition and confirm that the method is the same as when adding 5-digit numbers;** 2. For compact addition, use a place value grid to help record calculations in the correct columns (place one digit in one square), 3. Leave a line for '**carrying**' when bridging 10, 4. Model adding the **1/100s**, 1/**10s, 1, 10, 100 and 100s** and **1000s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE**	**455.52 + 20,528.2 =** 1. **Use compact addition and confirm that the method is the same as when adding 5-digit numbers;** 2. For compact addition, use a place value grid to help record calculations in the correct columns (place one digit in one square), 3. Leave a line for '**carrying**' when bridging 10, 4. Model adding the **1/100s**, 1/**10s, 1, 10, 100 and 100s** and **1000s** in that order (recording in the correct column and emphasising the value of the numbers being added). **REMEMBER TO ADD THE VALUE 'CARRIED' WHEN BRIDGING 1/100s, 1/10s 10/100/1000/ 10000** 5. Use rounding to check the answer.

'CARRIED' WHEN BRIDGING 10/100/1000,/10000

10. Use rounding to check the answer.

	TTh	Th	H	T	O
	3	5	2	7	2
+	2	8	3	4	5
	1		1		
	6	3	6	1	7

VALUE 'CARRIED' WHEN BRIDGING 1/100s, 1/10s 10/100/1000/10000

5. Use rounding to check the answer.

	Th	H	T	O	.	t	h
	4	3	6	5	.	5	2
+	2	5	4	2	.	7	6
		1		1			
	6	9	0	8	.	2	8

	TTh	Th	H	T	O	.	t	h
			4	5	5	.	5	2
+	2	0	5	2	8	.	2	0
				1				
	2	0	9	8	3	.	7	2

Use 0 as placeholder to take the hundredths to the same number of places.

Using and applying: **Problem solving:**	* I can solve number and practical problems using all of my number skills.
New key vocabulary:	Order of operations

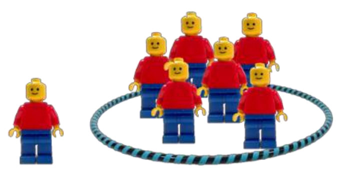
YEAR 1	SUBTRACTION

Step 1	Step 2	Step 3	End of year expectation
* I am beginning to know that subtraction is taking away. * I can recall subtraction facts to 10 * I can subtract two 1-digit numbers * I can record my work using - and =	* I know that subtraction is taking away and finding out how many are left * I can use addition facts to 10 to determine related subtraction facts * I can subtract two 1-digit numbers * I am beginning to work out the value of a missing number	* I can use the vocabulary related to subtraction * I can recall subtraction facts to 20 * I am beginning to subtract 1-digit and 2-digit numbers to 20, including zero * I can work out the value of a missing number e.g. 30 - ? = 24	* **I can read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs** * **I can represent and use number bonds and related subtraction facts within 20** * **I can subtract 1-digit and 2-digit numbers to 20, including zero** * **I can solve missing number problems such as 7 = ? – 9**

<u>Understand subtraction as 'take away'</u>

7 people are on the bus. 1 is getting off at the next stop. How many will be left on the bus then?

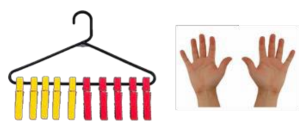
1. Use practical resources to remove what is being 'taken away'.



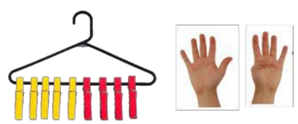
2. Use/Draw images and physically 'cross off' what is being 'taken away'.

<u>Begin to count back to subtract</u>

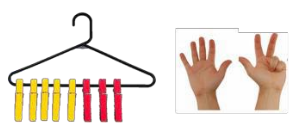
1. Show 5 red pegs and 5 yellow pegs on a coat hanger. How many pegs are there?
2. Chn put up 10 fingers.
3. Take off the last peg. Ask chn to fold down one finger. How many pegs are left?
4. What number sentence can we write?
5. Repeat with other examples. What number sentences can we write?



10



10 – 1 = 9



9 – 1 = 8

<u>See how subtraction 'undoes' addition</u>

1. Show 5 beads on a bead bar.
2. Count on 2, saying 6, 7 as you slide

<u>Recall subtraction facts to 20</u>

e.g. **19 – 4 =**

16 – 2 =

<u>See how subtraction 'undoes' addition</u>

1. Show 13 cubes.
2. Add 2 more cubes, counting on 14, 15 as the extra cubes are added.

3. Show what this will look like on a number line.

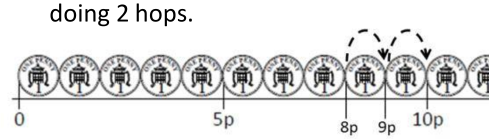
4. What number sentence can we write?

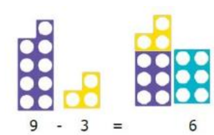
13 + 2 = □

5. How many cubes will we have if we took those cubes away again? Use cubes as a basic introduction to the Bar Model.

<u>Find change by counting on</u>

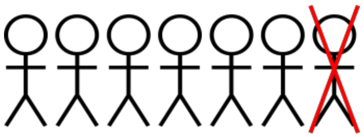
1. Demonstrate by choosing a child to role-play with.
2. Give the child a pencil labelled 8p and a 10 pence coin.
3. Take on the role of the shopkeeper and talk through the process, e.g. Thank you, that pencil is 8 pence please, you have given me 10p. How much change do I need to give you?
4. Tell chn that you are going to start at the 8 pence and count up until you reach 10p. Count on pennies, saying 9p, 10p as you hold up a finger for each penny. The number of pennies I have counted is how much change I need to give!
5. Demonstrate using the money line and doing 2 hops.





<u>Numicon</u>

For 9-6, take the 9 Numicon, place 6 on top then calculate the difference.



3. Model how to record 7 – 1 = 6 saying *7* ***take away*** *1 equals 6.*

Recall subtraction facts to 10

e.g.

9 – 4 = 5 

6 – 2 = 4 

8 – 3 = 5 

7 – 5 = 2 

beads across one at a time.
3. Check there are 7 beads afterwards.
4. What number sentence can we write?

5 + 2 = □

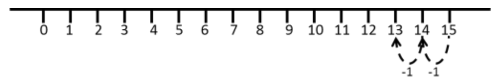
5. How many beads would we have if we took the beads away again?
6. Slide the 2 beads back, and ask chn to fold down 2 fingers. What do you notice? We're back where we started!
7. What number sentence could we write?

□ – 2 = 5

Missing numbers

7 - 3 = □	**□ = 7 - 3**
7 - □ = 4	**4 = 7 - □**
□ - 3 = 4	**4 = □ - 3**
□ - □ = 4	**4 = □ - □**

6. Show what this will look like on a number line.



7. What number sentence can we write

□ - 2 = 13

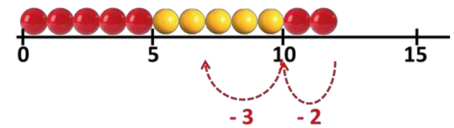
Subtracting tens from a 2-digit number

1. Place a counter on 78.
2. Demo counting back in tens using a 1 – 100 grid.
3. Record the subtraction. 78 – 20 = 58.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Subtracting bridging ten

1. Show 12 beads.
2. We could work this out by counting back in ones, we can target 10 (this way of taking away when we cross ten).
3. How many do we need to take away to reach 10? And **how many more** do we still need to take away? And what is 10 **take away** 3?
4. Show chn how this can be recorded on the 0–20 beaded line.



Using and applying: **Problem solving:**	* I can solve one-step problems that can involve subtraction, using concrete objects and pictorial representations * I can compare, describe and solve practical problems for: – Lengths and heights (e.g. long/short, longer/ shorter, tall/ short, double/half) – Mass or weight (e.g. heavy/light, heavier than, lighter than) – Capacity/ volume (full/empty, more than, less than, quarter) – Time (quicker, slower, earlier, later)
New key vocabulary:	**number bonds, number line** **inverse** **half, halve** **equals, is the same as (including equals sign)** **difference between** **how many more to make..?, how many more is…than..?, how much more is..?** **subtract, take away, minus** **how many fewer is…than..?, how much less is..?**

YEAR 2 **SUBTRACTION**

Step 1	Step 2	Step 3	End of year expectation
* I am beginning to recall and use subtraction facts to 20 * I can subtract numbers using concrete objects, including: – A 2-digit number and ones – A 2-digit number and tens – Two 2-digit numbers * I know that addition / subtraction are inverse operations	* I can recall and use subtraction facts to 20 fluently * I can subtract numbers using pictorial representations, including: – A 2-digit number and ones – A 2-digit number and tens – Two 2-digit numbers * I can make all related number statements (e.g. 6+8=14, 8+6=14, 14-8 =6,14-6=8)	* I am beginning to derive and use related facts up to 100 * I am beginning to subtract numbers mentally, including: – A 2-digit number and ones – A 2-digit number and tens – Two 2-digit numbers * I am beginning to show that subtraction of one number from another cannot be done in any order * I can work out the value of a missing number	* **I can recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100** * **I can subtract numbers using concrete objects, pictorial representations, and mentally, including:** – **A 2-digit number and ones** – **A 2-digit number and tens** – **Two 2-digit numbers** * **I can show that subtraction of one number from another cannot be done in any order** * **I can recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems**

Find change by counting on

Laura has 20p. She spends 15p on an apple in the school tuck shop. How much does she have left?

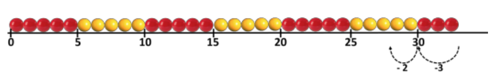
1. Agree that we can count up from 15 to 20p.
2. So, 15p + ☐ = 20p.
3. Count out the change.

4. Demonstrate how this can be done using a money line.

Subtract a single digit from a 2-digit number by bridging multiples of ten using knowledge of pairs to ten and place value (using a beaded or landmarked number line)

33 – 5 =

1. Show 33 beads on the bead bar. Slide a group of 3 beads away.
2. *What multiple of ten do we reach when we have taken away the 3 beads?*
3. Record the subtraction: 33 – 3 = 30.
4. Now write 30 – 2 = ? *What number fact will help us take 2 beads from 30?* (2 + 8 = 10)
5. Take 2 from 30 to leave 28.
6. Record the subtraction. 30 – 2 = 28.



Subtract 20, 30, 40, 50 from two-digit

Subtract 2-digit numbers using 1-100 grid

54 - 23 =

1. Mark 54 on the 1-100 grid.
2. Tell chn that first we need to subtract 20 by jumping back ten to 44 and then another 10 to 34 (explain that they can do this in one big step if they feel confident).
3. Then to finish the subtraction we need to subtract 3 by jumping back one to 33, another one to 32 and a final one to 31.
4. Write the answer to complete the subtraction. 54 – 23 = 31.

Find change from 50p using pairs to ten

This pen costs 45p. I've got a 50p coin. How much change would I get?

1. Show chn a 0-50 beaded line and mark on 45.
2. I've spent 45p (cross out/circle section from 0 to 45), and this is the amount of change I will get, five pence.
3. What subtraction can I write? 50p - 45p = 5p
4. If I'd only spent 5p, how much change would I get? 50p - 5p = 45p (Remind chn that 45p + 5p = 50p).

Find change by counting up to find a difference

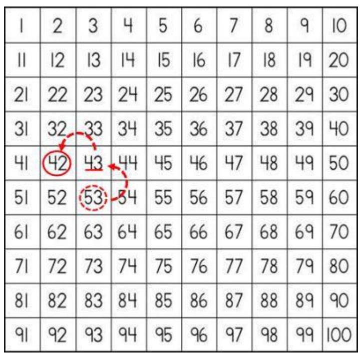
Matthew had £17 birthday money. He spent £15 on an art set. How could we work out how much money

Subtracting 11, 21, 31, from two-digit numbers using the 1-100 grid:

53 - 11 =

5. Place counter on 53,
6. Move up one square.
7. *What has just been done?* (counted back one ten) *How much has been subtracted?* (10). How much more do we need to subtract? (1).
8. Move left one square.
9. *What has just been done?* (counted back 1 more) *How much more has been subtracted?* (1). *How much has been subtracted altogether?* (11).
10. Record 53 – 11 = 42 on the board.

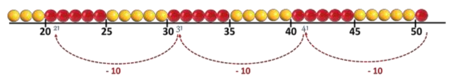
Repeat, to show other calculations, e.g. 76 - 21 and 62 - 41 and 47 – 31.



numbers (using a beaded or landmarked number line)

51 – 30 =

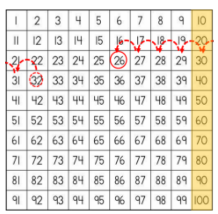
1. Show 51 beads on the bead bar.
2. Demo how we can subtract 30 by counting back in 10s.
3. Record the subtraction. 51 – 30 = 21.

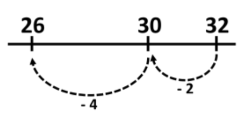


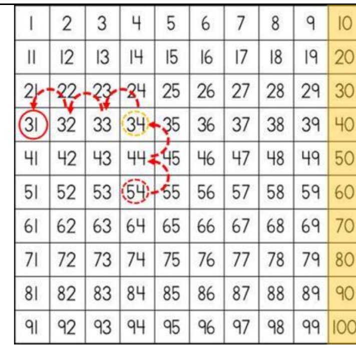
Subtract a single-digit number from a two-digit number, bridging ten.

32 - 6 =

1. Show a 1-100 number grid with multiples of ten coloured. Remind chn that these are special numbers.
2. Place a counter on 32. If we count back 6, we will cross a multiple of ten (30).
3. Count back two (to 30) and then four more (to 26) on the grid. (Model on a number line alongside where appropriate.)
4. Write the answer to complete the subtraction. 32 - 6 = 26.



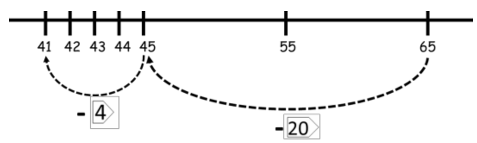




Subtract 2-digit numbers using a landmarked line.

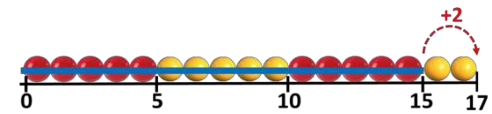
65 – 24 =

1. *How could we work out 65 subtract 24? Do we need to count back in ones?*
2. Partition 24.
3. Draw out that we can count back 20, and then subtract 4.
4. What number fact can we use to help? We know 5 - 4 is one, so 45 - 4 is 41. So we still don't need to count back in ones!
5. Write the answer to complete the subtraction. 65 – 24 = 41.



he has left?

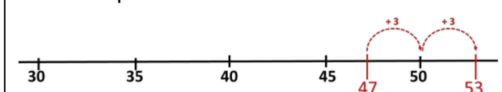
1. Mark 17 on a 0-20 beaded line. We could count back 15 to find how much he had left, but that would take a long time and we might make a mistake.
2. Instead we count up from 15 to 17 to find the change.
3. Cross out the section of line from 0 to 15. He's spent £15, how much is left?
4. Draw a hop from 15 to 17 labelling it '2'.
5. What number sentence can we write?
6. What if he'd only spent £2? How could we work that out? 2 is an easy number to count back, and in any case we can see it here.



Use Frog on a landmarked line to subtract (counting up)

53 - 47 =

1. Mark 53 and 47 on a landmarked line and cross out the section up to 47.
2. Place Frog on 47. What hop does Frog need to make to get to the next 10s number (50)?
3. Then how far does he need to hop to reach 53?
4. Draw and label the two hops.
5. Complete the number sentence.



Using and applying: **Problem solving:**	* I can use place value and number facts to solve problems * I can solve problems with addition and subtraction: – using concrete objects and pictorial representations, including those involving numbers, quantities and measures – applying my increasing knowledge of mental and written methods * Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
New key vocabulary:	**Numbers to one hundred** **Hundreds** **Partition, recombine** **Hundred more/less**

YEAR 3 SUBTRACTION

Step 1	Step 2	Step 3	End of year expectation
* I can subtract up to 3 digit numbers informally * I can begin to estimate the answer to a calculation	* I can subtract numbers with 2 digits, using formal written method of columnar subtraction without bridging 10 * I can estimate the answer to a calculation and say whether my answer is likely * I can solve simple subtraction problems	* I can subtract numbers with 2 digits, using the formal written method of columnar subtraction * I can make all related number sequences (e.g. 14 – 6 = 8, 14 – 8 = 6, 6+8=14, 8+6=14) (3a) * Solve one step problems in context, deciding which operations and methods to use and why	* **I can subtract numbers mentally.** * **I can subtract numbers with up to 3 digits, using formal written methods of columnar subtraction** * **I can estimate the answer to a calculation and use inverse operations to check answers** * **I can solve problems, including missing number problems, using number facts, place value, and more complex subtraction**

Subtract by counting up (answers less than 20)

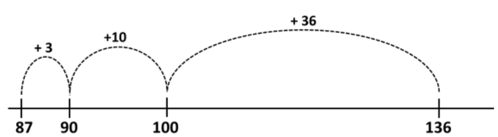
70 – 56 =

1. Model drawing an empty number line to help Maths Frog to find the difference between the numbers.
2. Explain that Frog knows he starts on the 'baby' number and hops to the bigger number. This means that he needs to start at 56 and finish at 70.
3. Mark 56 at the start of the line and 70 at the end.
4. Frog starts on 56. Where does Frog hop? Frog hops to the next 10. How far is that? Draw a jump and label it 4.
5. Show how the amount that Frog is jumping is written above the line, the numbers he jumps to are written below the line. Mark 60 below the line.
6. Then show how Frog hops to 70. Mark the hop, labelling it 10.
7. Ask the chn how to add the two jumps: 4 + 10 = 14 so 70 – 56 = 14.

Subtract a 2-digit number from a 3-digit number using counting up (Frog)

136 – 87 =

1. Draw a number line and mark the starting number and finishing number.
2. Suggest counting up to the next whole ten, then counting on in 10s to the hundred before finally counting on to the finishing number.
3. Add together the jumps to find the difference. 3 + 10 + 36 = 49 so, 136 – 87 = 49.



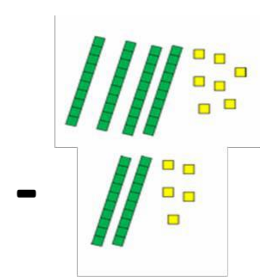
Find a difference between pairs of numbers within the same century

Column subtraction using Place Value and number facts (without any exchanging)

346 – 123 =

Practically:

1. Using dienes/ Numicon/Place Value counters (or other practical materials) to represent each number in the calculation.
2. Remove the relevant dienes to demonstrate the number being subtracted.

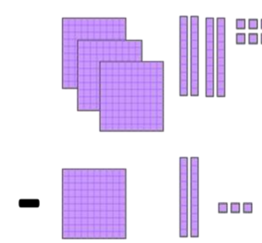


Column subtraction using Place Value and number facts (without any exchanging)

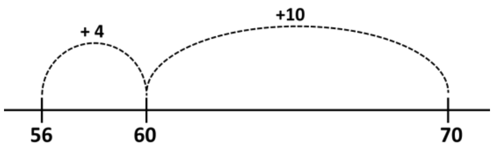
346 – 123 =

Practically:

3. Using dienes (or other practical materials) to represent each number in the calculation.
4. Remove the relevant dienes to demonstrate the number being subtracted.



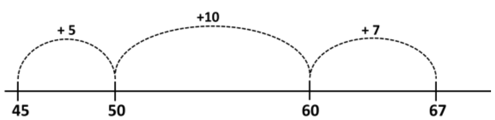
Written:



Subtract by counting up (answers more than 20)

67 – 45 =

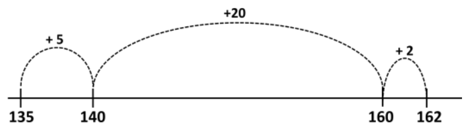
1. How can Maths Frog help find the difference? Emphasise that Maths Frog always knows where he is starting (on the baby number) and finishing (on the bigger number). He always jumps to the next 10, that the amount he jumps is written at the top and the numbers he is jumping to on the line are written underneath the line.
2. Suggest counting on 5 first, to land on the next whole ten, then counting on 10 (to 60) and finally counting on 7 (to 67).
3. Add together the jumps to find the difference. 5 + 10 + 7 = 22 so, 67 – 45 = 22.



4. Extend to subtracting by counting up to include numbers on either side of 100.

162 – 135

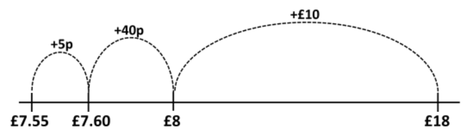
1. Draw a number line and mark the starting number and finishing number.
2. Use frog to work out the subtraction, modelling how to draw the steps on an empty number line.
3. Add together the jumps to find the difference. 5 + 20 + 2 = 27 so, 162 – 135 = 27.



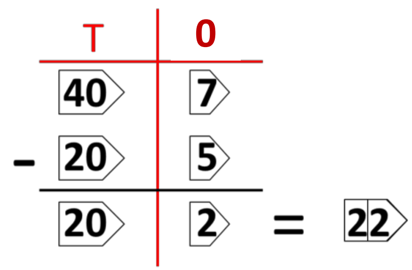
Use frog to find the difference between amounts of money

A computer game costs £18. So far Katie has saved up £7.55. How much more does she need to save to be able to buy the game?

1. Sketch a line from £7.55 to £18.
2. Where will Frog hop to first? Label where he will hop to (£7.60), the hop and its label. And next? (£8) And then? (£18).
3. So how much does Katie need to save? Ensure chn add the hops accurately. £10.45.



1. Partition each number (use place value cards to help partition and use a place value grid to help record).
2. Model subtracting the O(1s), T(10s) and H(100s) in that order (recording in the correct column and emphasising the value of the numbers being subtracted).
3. Recombine the answers to find the calculated difference (using place value cards to help).

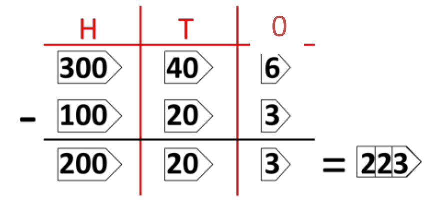


* Modelling practical alongside formal written initially.

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

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

4. Partition each number (use place value cards to help partition and use a place value grid to help record).
5. Model subtracting the O (1s), T(10s) and H(100s) in that order (recording in the correct column and emphasising the value of the numbers being subtracted).
6. Recombine the answers to find the calculated difference (using place value cards to help).



* Using practical materials to begin talking about exchange – when the number is too large to take away.

* Practical resources to help promote abstract 'exchange' through concrete understanding of place value practically.

Using and applying: **Problem solving:**	* I can solve number problems and practical problems involving these ideas
New key vocabulary:	Column subtraction

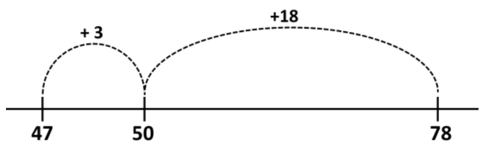
YEAR 4 SUBTRACTION

Step 1	Step 2	Step 3	End of year expectation
* I can subtract 3-digit numbers using columnar subtraction without bridging 10. * I can solve simple subtraction problems.	* I can subtract 3-digit numbers using columnar methods. * I can find fact families for subtraction facts. * I am beginning to estimate the answer to a calculation. * I can solve one-step problems in contexts, deciding which operations to use and why.	* I can subtract 3-digit numbers using columnar methods. * I can use inverses in number problems (e.g. I think of a number and add 3). * I can estimate the answer to a calculation and say whether my answer is likely. * I can solve more complex one-step problems in contexts, deciding which operations to use and why.	* **I can subtract numbers up to 4-digits using columnar methods.** * **I can estimate and use inverse operations to check answers to a calculation.** * **I can solve subtraction two-step problems in contexts, deciding which operations to use and why.**

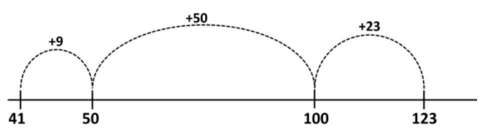
Find a difference by counting up

1. Ask children what they can remember about Maths Frog.
2. He helps us to subtract numbers by counting up from the smaller number to the larger number; he finds a difference between two numbers.
3. Frog always jumps along the number line and he always jumps to the next 10. or 100.
4. Add together the jumps to find the difference.

e.g. 78 – 47 =



123 – 41 =



402 – 356 =

Column subtraction of money using place value and number facts (without any exchanging)

I have £99.99. and a pair of shoes costs £35.42. How much change will I need?

1. Partition each number (use coins/notes or place value cards to help partition the £ and p. and use a place value grid to help record).
2. Model subtracting the 1p, 10p, £1 and £10s in that order (recording in the correct column and emphasising the value of the numbers being subtracted).
3. Recombine the answers to find the calculated difference (adding the value of coins/notes or using place value cards to help).

	£10	£1	.	10p	1p	
	90	9	.	90	9	
–	30	5	.	40	2	
	40	4	.	50	7	= £44.57

4. Once you have worked out how much

3-digit expanded decomposition with one exchange (hundreds)

725 – 462 =

1. How would we work this out?
2. Draw out partitioning into 100s, 10s and 1s.
3. Begin by subtracting the **O**(1s), **T**(10s) then **H**(100s) in that order.
4. Discuss the problem with 20 – 60. We can take a hundred off the hundreds column and exchange it for 10 tens before adding it to the tens column to make 120.
5. Record and discuss each stage.

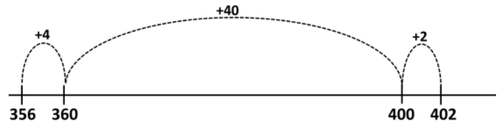
	H	T	O	
	600	120		
	~~700~~	~~20~~	5	
–	400	60	2	
	200	60	3	= 263

3-digit compact decomposition with two exchanges

643– 357 =

Use expanded decomposition to work out 632 – 357 alongside:

1. How do you think this is done?
2. Begin by subtracting the U(1s), T(10s) then H(100s) in that order.
3. Discuss the problem with 3 – 7. We can exchange a ten for 10 ones before adding it to the number in the units column to make 13 units.
4. Discuss the problem with 3 tens – 5 tens. We can exchange 1 hundred for 10 tens before adding to the tens column to make 14 tens. (Modelling here how an exchange is needed and is placed alongside a prior exchange.)
5. Record and discuss each stage.



Column subtraction using Place Value and number facts (without any exchanging)

765 – 342 =

7. Partition each number (use place value cards to help partition and use a place value grid to help record).
8. Model subtracting the O(1s), T(10s) and H(100s) in that order (recording in the correct column and emphasising the value of the numbers being subtracted).
9. Recombine the answers to find the calculated difference (using place value cards to help).

	H	T	O	
	700	60	5	
–	300	40	2	
	400	20	3	= 423

change from £99.99, discuss how much change they would get from £100. (1p more.) Point out that this is quite a neat way of working out the change from £100.

3-digit expanded decomposition with one exchange (tens)

651 – 324 =

1. How would we work this out?
2. Draw out partitioning into 100s, 10s and 1s.
3. Begin by subtracting the **O**(1s), **T**(10s) then **H**(100s) in that order.
4. Discuss the problem with 1 – 4. We can take a ten off the tens column 50 and exchange it for 10 ones before adding it to the number in the units column to make 11. (600, 40 and 11 is still 651; we're just moving the parts of the number around a bit).
5. Record and discuss each stage.

	H	T	O	
		40	11	
	600	~~50~~	~~1~~	
–	300	20	4	
	300	20	7	= 327

* Where necessary, use practical materials to begin talking about to help promote abstract 'exchange' through concrete understanding of place value practically.

3-digit compact decomposition with one exchange (tens)

652 – 327 =

Use expanded decomposition to work out 652 – 327 alongside:

1. How do you think this is done?
2. Begin by subtracting the **O**(1s), **T**(10s) then **H**(100s) in that order.
3. Discuss the problem with 2 – 7. Exchange a ten from the tens column and exchange it for 10 ones before adding it to the number in the units column to make 12 units. This is quicker to write than the expanded way but is still the same method.
4. Record and discuss each stage.

	H	T	O
		4	12
	6	~~5~~	~~2~~
–	3	2	7
	3	2	5

	H	T	O
		13	
	5	~~3~~	13
	~~6~~	~~4~~	~~3~~
–	3	5	7
	2	9	6

4-digit compact decomposition with one exchange

5927 – 3456 =

Use expanded decomposition to work out 5927 - 3456 alongside:

1. **How do you think this is done?**
2. **Begin by subtracting the 0(1s), T(10s), H(100s) then TH(1000s) in that order.**
3. **Discuss the problem with 2 tens – 5 tens. We can exchange a hundred for 10 tens before adding it to the number in the tens column to make 17 tens.**
4. **Record and discuss each stage.**

	Th	H	T	O
		8	12	
	5	~~9~~	~~2~~	7
–	3	4	5	6
	2	4	7	1

Using and applying: **Problem solving:**	* I can solve number problems and practical problems involving these ideas
New key vocabulary:	thousand more/less than Count through zero

YEAR 5 SUBTRACTION

Step 1	Step 2	Step 3	End of year expectation
* I can add and subtract 3 digit numbers using columnar subtraction without bridging 10 * I can solve one-step problems in contexts, deciding which operations to use and why	* I can subtract 3 digit numbers using columnar addition * I am beginning to use rounding to estimate the answer to a calculation * I can solve more complex one-step problems in contexts, deciding which operations to use and why	* I can add and subtract numbers up to 4 digits using columnar addition * I can estimate the answer to a calculation using rounding and say whether my answer is likely * I can solve addition and subtraction two-step problems in contexts, deciding which operations to use and why (3b)	* **I can add and subtract whole numbers with more than 4 digits using formal columnar addition** * **I can add and subtract numbers mentally with increasingly large numbers** * **I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy** * **I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.**

Use column subtraction (decomposition) to subtract pairs of four-digit numbers

A plane is flying at 9240 metres above sea-level. It descends 1425 metres. What height is it flying at now?

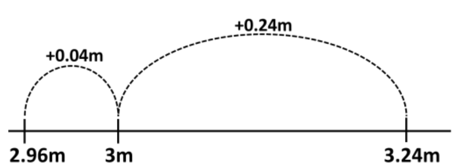
Alongside, show how to use compact decomposition.

1. How do you think this is done?
2. Begin by subtracting the 0(1s), T(10s), H(100s) then TH(1000s) in that order.
3. Take time to discuss how 1000 needs to be given to the 100s in order to subtract 400m. (Modelling here how an exchange is needed and is placed alongside a prior exchange.)
4. Record and discuss each stage.

Subtract pairs of numbers with two decimal places using counting up (Frog)

Cindy's best long jump this year was 2.96 metres, but today she has jumped a huge 3.24 metres! How much further has she jumped?

1. How could we work it out? Draw an empty number line recording to keep track of the steps.
2. Discuss how chn can use their pairs to 100 to find out what needs to be added to 2.96 metres to jump to 3 metres, and the decimal place value (and knowledge of cm and m) to find the difference between 3 metres and 3.24 metres.
3. Add up the jumps on the number line to find the answer.



Column subtraction (decomposition) of four-digit and five-digit numbers

34,782 – 18,346 =

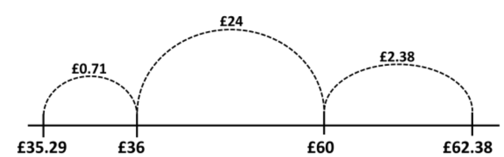
1. Write as a compact vertical subtraction.
2. Work through each subtraction. Begin by subtracting the 0(1s), T(10s), H(100s), Th(1000s) then TTh(10,000s) in that order.
3. Take time to discuss how 10,000 needs to be given to the 1,000s in order to subtract 8,000.
4. Add together the jumps to find the solution.

TTh	Th	H	T	0
2	14		7	12
~~3~~	~~4~~	7	~~8~~	~~2~~
– 1	8	3	4	6
1	6,	4	3	6

Use counting up to find change and differences between prices

£62.38 - £35.29 =

1. Sketch a line from £35.29 to £62.38.
2. How can we use Frog to find the difference between these two numbers? Remind children how Frog can hop from £35.29 to £36, then £36 to £60, then £62.38.
3. Add the hops and jumps, to find the difference.



4. Model this calculation as a compact column subtraction (with decomposition).

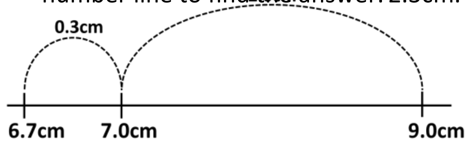
	Th	H	T	O	
	8000	1200	30	10	
	~~9000~~	~~200~~	~~40~~	~~0~~	
−	1000	400	20	5	
	7000	800	10	5	= 7263

	Th	H	T	O
	8	12	3	10
	~~9~~	~~2~~	~~4~~	~~0~~
−	1	4	2	5
	7	8	1	5

Subtract pairs of numbers with one decimal place

The average length of a mouse is 9cm. Say that a young mouse is 6.7cm long. How much more is it likely to grow?

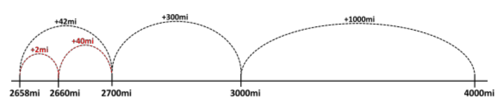
1. We can use Maths Frog to help! Draw an empty number line jotting from 6.7cm to 9cm.
2. Where do you think Maths Frog will jump to first? Label 7cm and draw a hop labelled 0.3cm (we can use our bonds to 10!), then a jump from 7cm to 9cm labelled 2cm.
3. So how much more might the mouse grow? Add up the jumps on the number line to find the answer. 2.3cm.



Use counting up (Frog) to subtract four digit-numbers from multiples of 1000.

A group of people are cycling 4000 miles. So far they have Travelled 2658 miles, so over half way. How much further have they got to go?

1. We can use Maths Frog!
2. Using an empty number line, hop from 2658 to 2660 or to 2700. Jump from 2700 to 3000 or to 4000 depending on how many steps they want to take.
3. Add the hops and jumps to find out how much further the cyclists have to go.

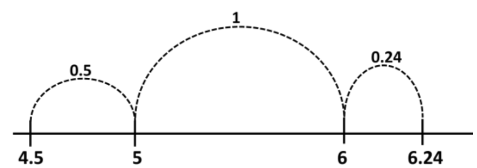


5. Write as an expanded vertical subtraction where support is needed.

Revise using counting up (Frog) to subtract numbers with different numbers of decimal places (1 or 2)

6.24 – 4.5 =

1. Sketch a line from 4.5 to 6.24.
2. How can we use Frog to find the difference between these two numbers? Remind children how Frog can hop from 4.5 to 5, then 5 to 6 (or 6.24), then 6.24.
3. Add the hops and jumps, remembering to add tenths to tenths. Agree the answer as 1.74 and not 1.29!



	£10	£1	.	10p	1p
	5	12		2	18
	~~6~~	~~2~~	.	~~3~~	~~8~~
−	3	5	.	2	9
	2	7	.	0	9

* Revise column subtraction of whole numbers and counting up (Frog) developing pupils understanding and recognition for choosing the **most efficient method** for different calculations.

* Use the modelling and checking against estimates as a key part of the calculation process to ensure an understanding and automatic check of validity.

Estimating answers:

E: 7900 – 2600 = 5300

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

Using and applying:	* I can solve number and practical problems using all of my number skills.
New key vocabulary:	**efficient written method** **estimating**

YEAR 6 **SUBTRACTION**

Step 1	Step 2	Step 3	End of year expectation
* I can solve subtraction problems	* I can subtract multiples of 10 and 100 to three and four digit numbers mentally * I can use brackets in simple calculations * I can solve more complex one step problems in context deciding which operations to use and why * I can check whether my answer is likely	* Subtract numbers mentally with increasingly large numbers * I can use brackets and inverses effectively e.g. (24+P) x 6 = 150 * I can solve addition and subtraction two-step problems in context deciding which operations and methods to use and why * I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy (Yr 5)	* **I can perform mental calculations, including with mixed operations and large numbers** * **I can use my knowledge of the order of operations to carry out calculations involving the 4 operations** * **I can solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why** * **I can use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy**

Use Frog to subtract amounts of money

I went shopping and to start with I had £137.28 in my bank account. I spent £78.98. How much did I have left?

1. Write the two amounts on the board and how to work out the answer. Draw out using Maths Frog.
2. Draw a line from £78.98 to £137.28. The first hop Frog is going to make is tiny! Draw a hop from £78.98 to £79 (or straight to £80.
3. Where should Frog jump to next? Draw a jump to £100.
4. Where might Frog jump to next? (Either £137.28, or £137, then £137.28.)
5. What do we do next? Add the hops and jump! Does that answer seem about right?

Use column subtraction (decomposition) to subtract 3-digit numbers and 4-digit numbers from 5-digit numbers

34,782 – 7257 =

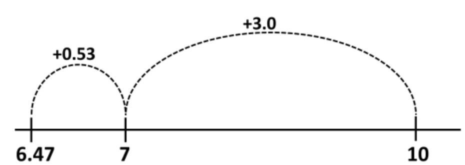
1. Write out as a column subtraction ensuring that 1s are under 1s, 10s under 10s, 100s under 100s and so on
2. Ask chn to estimate the answer before calculating.
3. Compare with estimates.

	TTh	Th	H	T	0
	2	14		7	12
	~~3~~	~~4~~	7	~~8~~	~~2~~
–		7	2	5	7
	1	7,	5	2	5

Subtract pairs of numbers with two decimal places using counting up (Frog)

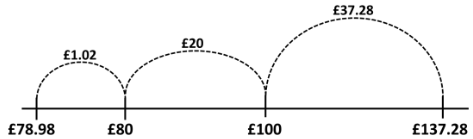
10 – 6.47 =

1. How will Maths Frog work out this subtraction?
2. Draft an empty number line jotting to show a hop from 6.47 to 6.5 then to 7 or one hop straight from 6.47 to 7. Then show a hop from 7 to 10.



Count on and back in steps of 0.001 and 0.01

1. Show chn a partially completed 0.001 to 0.1 grid.
2. Count in steps of 0.001 along the top row to 0.01.
3. What will the first number on the next row? Together complete this row.
4. What are we adding when we move down a square on this grid? Together fill in one column, e.g. 0.003, 0.013, 0.023…



<u>Revise using column subtraction (decomposition) to subtract pairs of 5-digit numbers</u>

4,562 – 2,638 =

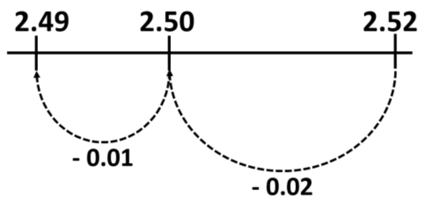
1. Draw 4,562 – 2,638 on the board as a compact decomposition.
2. Carefully talk though each stage. If we look at the 1s digits we can see that we are going to have to exchange a 10 from the 10s to the 1s. Do this, crossing out 6, writing 5 above, and crossing out 2 and writing 12 above.
3. Will we need any other moves?
4. Work through calculation discussing each stage and any exchanges needed.

	Th	H	T	0
	3	**15**	**5**	**12**
	~~4~~	~~5~~	~~6~~	~~2~~
–	**2**	**6**	**3**	**8**
	1	**9**	**2**	**4**

<u>Subtract multiples of 0.01 from numbers with two decimal places, crossing multiples of 0.1</u>

2.52 – 0.03 =

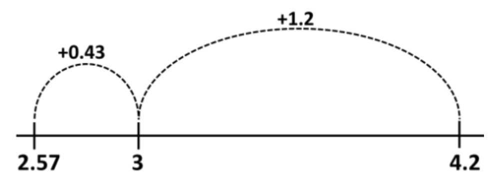
1. Count back from 2.52 to 2.49 to find the answer.
2. Sketch a jotting on the board to show how we can 'bridge' 2.5.



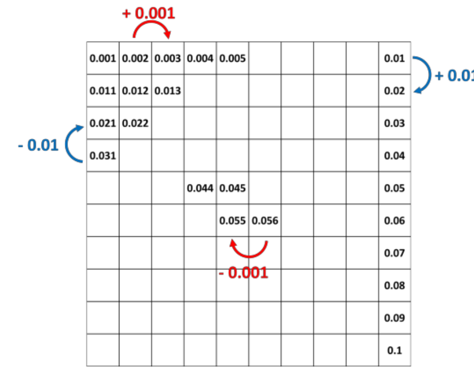
<u>Subtract numbers with one or two decimal places by counting up from the smaller to the larger number (Frog)</u>

4.2 – 2.57 =

1. Draw a line from 2.57 to 4.2.
2. Where will Frog jump to first? Mark 3, and then draw a hop from 2.57 to 3 and label it 0.43. Then draw a jump from 3 to 4.2 labelling it 1.2.
3. Discuss how to add 0.43 and 1.2, making sure that chn add the correct digits to give 1.63.



	0	.	t	h
	0	.	4	3
	1	.	2	
+				
	1	.	6	3



<u>Subtract multiples of 0.1, 0.01 or 0.001 using place value</u>

Write 34.567

1. If we add 0.1, which digit will change? If we subtract 0.01 which digit will change? Which digit will change if we add or subtract 0.001?
2. Repeat, adding and subtracting multiples of 10, 1, 0.1 and 0.01, and 0.001, but making sure that the additions or subtractions do not mean counting through a multiple of 0.1 or 1, e.g. not 34.67 + 0.05 or 34.23 – 0.4. Are chn changing the correct digit each time?
3. Write 34.567 again. Subtract 0.008 by counting back in steps of 0.001 taking care when crossing 34.56.

Using and applying: **Problem solving:**	* I can solve number and practical problems using all of my number skills.
New key vocabulary:	Order of operations

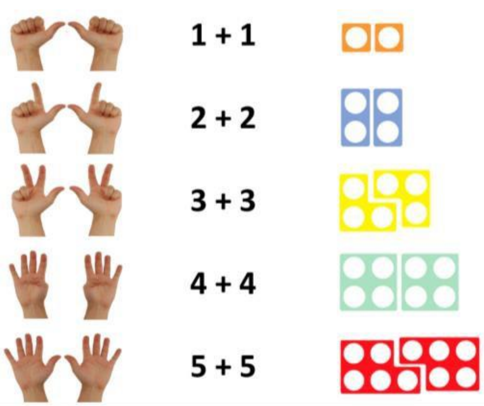
YEAR 1 MULTIPLICATION

Step 1	Step 2	Step 3	End of year expectation
* I can solve one-step problems involving multiplication and division, by calculating the answer using concrete objects	* I can solve one-step problems involving multiplication and division, by calculating the answer using pictorial representations	* I am beginning to solve one-step problems involving multiplication and division, by calculating the answer using arrays with the support of the teacher	* **I can solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher**

Double numbers 1 to 5

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:



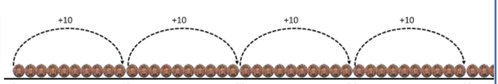
Learn to count in 2s from 0

Learn to count in 5s and 10s

Multiplication using a penny number line (repeated addition)

How much would 4 toy cars cost?

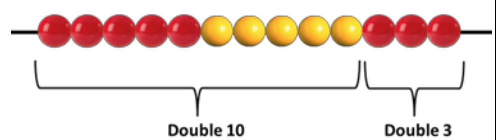
1. Demonstrate by counting in tens holding up a toy car as you do so, e.g. 10p … 20p … 30p … 40p.
2. Emphasise that this is called repeated addition.
3. Record this as 4 lots of 10 pennies on a penny number line.
4. Draw jumps along the penny line to show of the lots of 10p.
5. Begin to write this as 4 x 10 = 40.



Find doubles to double 20

Double 13

1. Show 13 on a 100 bead string. How many beads altogether?
2. Explain how double 10 is 20, jot down 20, and double 3 is 6, jot down 6, so 20 and 6 is 26.
3. Record 'double 13 is 26'.



10 + 10 = 20
3 + 3 = 6

20 + 6 =

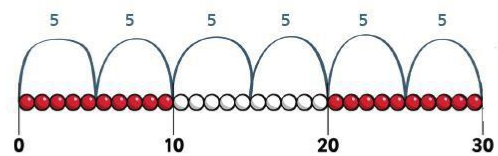
Record multiplication facts for the 2, 5 and 10 times tables

E.g.

1. How much money have I got here? How can I find out?

Using repeated addition to solve word problems

I have 6, 5p coins. How much do I have altogether?



Note how the use of two resources alongside here can support counting in 5s and 10s.

* 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.

* Make links with repeated addition and encourage the use of a range of equipment used alongside each other such as beads, coins and Numicon.

Double numbers up to 12

1. Explain that when we double a number we add that amount again e.g. 2 doubled is 2+2=4, 3 doubled is 3+3=6 etc.
2. Repeat with other numbers e.g. 6, 7, 10 etc using a variety of concrete objects alongside the written calculation.

3. Introduce the use of arrays to demonstrate doubling of any given number.

3 + 3 

6 + 6 

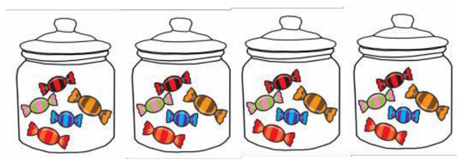
7 + 7 

10 +10 

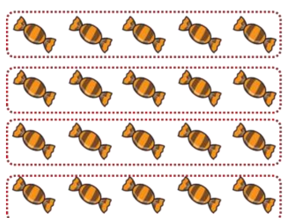
Multiplication using 'sets of'

I have got 4 sets of 5 sweets.
How many sweets have I got all together?

1. Demonstrate that we can count in 5s 4 times, e.g. 5, 10, 15, 20! (i.e. repeated addition)
2. Write the number sentence 4 x 5 = 20 and talk it through, e.g. 4 is the number of sets and 5 is the number of buttons in each set.



3. Demonstrate how this can also be recorded as an array.



4 rows of 5

4 lots of 5

4 x 5

5 + 5 + 5 + 5

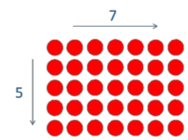
2. Count in 5s to find total.

3. What number sentence can we write?
5p + 5p + 5p + 5p + 5p + 5p + 5p = 35p

4. There is a quicker way to write this:

7 x 5p = 35p

5. Read this as seven lots of 5p or seven 5s. Point out that we can also say, 7 times 5. This means we had seven 5p coins, which is 35p altogether. Record 7 lots of 5p = 35p.
6. It can also be written as an array of 7 x 5.



Using and applying: **Problem solving:**	* I can solve one-step problems that can involve addition and subtraction, using concrete objects and pictorial representations * I can compare, describe and solve practical problems for: – Lengths and heights (e.g. long/short, longer/ shorter, tall/ short, double/half) – Mass or weight (e.g. heavy/light, heavier than, lighter than) – Capacity/ volume (full/empty, more than, less than, quarter) – Time (quicker, slower, earlier, later)
New key vocabulary:	**odd, even** **count in twos, threes, fives** **count in tens (forwards from/backwards from)** **how many times?** **lots of, groups of** **once, twice, three times, five times** **multiple of, times, multiply, multiply by** **repeated addition**

YEAR 2 MULTIPLICATION

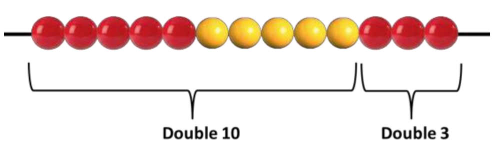
Step 1	Step 2	Step 3	End of year expectation
* I can recall and use multiplication and division facts for the 10 times tables * I can record my work in a written form using mathematical symbols .	* I can recall and use multiplication and division facts for the 5 times tables, including recognising odd and even numbers. * I can record my work in a written form using mathematical symbols. * I am beginning to recognise that multiplication of two numbers can be done in any order and division of one number by another cannot	* I can multiply and divide by 2, 5 and 10 using number lines and by counting in jumps of. * I recognise that multiplication of two numbers can be done in any order and division of one number by another cannot	*** I can recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers** *** I can calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs** *** I can show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot**

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

Find doubles to double 20

Double 13

4. Show 13 on a 100 bead string. How many beads altogether?
5. Explain how double 10 is 20, jot down 20, and double 3 is 6, jot down 6, so 20 and 6 is 26.
6. Record ‘double 13 is 26’.



10 + 10 = 20
3 + 3 = 6

20 + 6 =

Recognise multiples of 2, 5 and 10

Record multiplication facts for the 2, 5 and 10 times tables

E.g.

7. How much money have I got here? How can I find out?
8. Count in 5s to find total.

9. What number sentence can we write?
   5p + 5p + 5p + 5p + 5p + 5p + 5p = 35p
10. There is a quicker way to write this:
    7 x 5p = 35p
11. Read this as seven lots of 5p or seven 5s. Point out that we can also say, 7 times 5. This means we had seven 5p coins, which is 35p altogether. Record 7 lots of 5p = 35p.
12. It can also be written as an array of 7 x

Work out multiplication/division using beaded lines and drawing hops

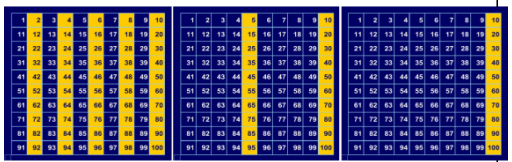
1. Show an array of 6 rows of 3 counters. Write the associated multiplication e.g. 6 x 3 = 18.
2. Mark 18 on a 0-20 beaded line.
3. Draw 6 hops of 3, labelling where they land. How many 3s are in 18? 6!
4. Rotate the array so that it has 3 rows of 6. What can you see now? What number sentences can we write?
5. Record 3 × 6 = 18 How many 6s are in 18? Using the same number line underneath the original hops, draw 3 hops of 6, again labelling where they land
6. How many hops have we done altogether? What does this tell us?

Begin to use the grid method to multiply 2-digit numbers (teens) by 1-digit numbers

14 x 2 =

1. Draw a simple grid and label (X, 2).
2. Partition 2-digit number and write in grid (10, 4).
3. Multiply each part by 3 emphasising each calculation (e.g. 2 x 10 = 20; 2 x 4 = 8) and write answers in the grid.
4. Use column addition to add these answers to find the solution (it is therefore important to demonstrate the importance of aligning the columns carefully to add correctly).

and describe patterns

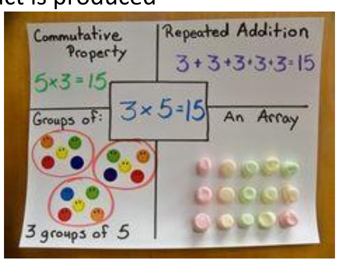


1. What do you notice about the multiples of 2, 5, 10?

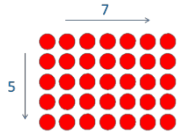
24, 85, 60, 125, 346, 910, 2870

2. Which of these are multiples of 5? How do you know?
3. Which of these are multiples of 10? How can you tell?

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

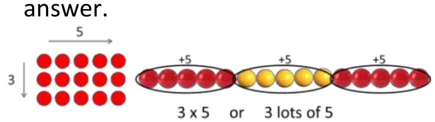


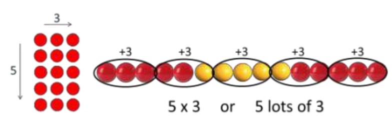
5.

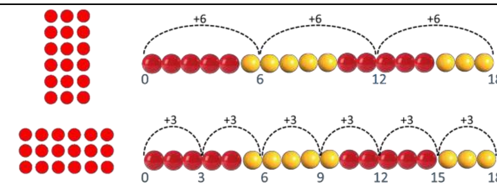


Begin to relate multiplication with division

1. Show a variety of arrays.
2. Ask a range of questions: What can you see? How many rows? In each row? Altogether? What number sentence could we write?
3. E.g. Record 3 × 5 = 15. We can read this as 3 lots of 5, or 3 times 5. How many lots of 5s are in 15?
4. Write ☐ x 5 = 15 Mark 15 on a beaded line and draw 3 lots of 5, labelling where they land.
5. Rotate array so that it has 5 rows of 3. Ask what we see. How many lots of 3 in 15? What number sentences can we write?
6. Record 5 × 3 = 15 and write ☐ x 5 = 15. Draw 5 lots of 3 under the original 3 lots of 5 on the beaded line to show that 3 × 5 and 5 × 3 give the same answer.



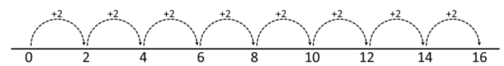




Multiply by 2, 5 and 10 using number lines

8 x 2 =

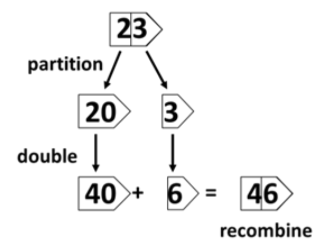
1. On a number line, draw 8 hops of 2, labelling where they land.
2. What number sentence can we write?
3. Record 8 × 2 = 18



Double 2-digit numbers using partitioning up to 30

Double 23

1. Model partitioning
2. Doubling the partitioned numbers.
3. Recombine to find the final answer.



X	2
10	20
4	8
	28

***** 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.

Variation ideas

A multiplication grid with missing integers are used to reinforce the relationship between multiplication and division and to increase agility of taught and known tables facts.

X		5	
10	100		
		25	
2			4

Using and applying: Problem solving:	* I can solve problems involving multiplication using: materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts	
New key vocabulary:	odd, even count in twos, threes, fives count in tens (forwards from/backwards from)	lots of, groups of once, twice, three times, five times multiple of, times, multiply, multiply by repeated addition

YEAR 3 MULTIPLICATION

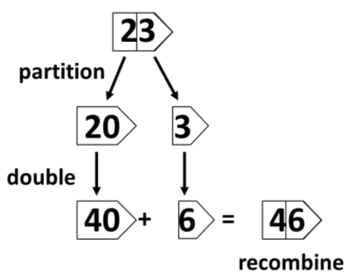
Step 1	Step 2	Step 3	End of year expectation
* I can count in 2s and then double these facts to find multiples of 4. * I can relate times table facts to multiples of 10, e.g. 2x3=6 so 2x30=60; 6÷2=3 so 60÷2=30 * I can find a division fact from a multiplication fact	* I know my 5 x table and can count in 10s knowing that these are double 5x facts. * I can mentally calculate TU x U and TU ÷ U using my times table facts using jottings to support * I can find the associated number statements for a given number fact.	* I can use my 2 and 4 times tables to find 8x * I can mentally calculate TU x U and TU ÷ U using my times table facts * I can use inverses in number problems E.g. I think of a number, double it and add 5. The answer is 35. What was my number?	* **I can recall and use multiplication and division for the 3,4 and 8 times tables** * **I can write and calculate mathematical statements for multiplication and division using the multiplication facts that they know including TU x U, using mental and then progressing to formal written methods.** * **I can solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects**

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

Double 2-digit numbers using partitioning up to 50

Double 23

1. Model partitioning
2. Doubling the partitioned numbers.
3. Recombine to find the final answer.



Know multiplication and division facts for the 3s and 4s

Begin to use the grid method to multiply 2-digit numbers (teens) by 1-digit numbers

14 x 2 =

1. Draw a simple grid and label (X, 2).
2. Partition 2-digit number and write in grid (10, 4).
3. Multiply each part by 3 emphasising each calculation (e.g. 2 x 10 = 20; 2 x 4 = 8) and write answers in the grid.
4. Use column addition to add these answers to find the solution (it is therefore important to demonstrate the importance of aligning the columns carefully to add correctly).

Use partitioning to multiply a 2-digit number by a 1-digit number (grid method)

24 x 3 =

1. Draw a simple grid and label (X, 3).
2. Partition 2-digit number and write in grid (20, 4).
3. Multiply each part by 3 emphasising each calculation (e.g. 3 x 20 = 60; 3 x 2 = 6) and write answers in the grid.
4. Use column addition to add these answers to find the solution (it is therefore important to demonstrate the importance of aligning the columns carefully to add correctly).

* Building on the strategies from Year 3, pupils move towards multiplying multiples of ten and a hundred based on the known

Teaching points:

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

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.**

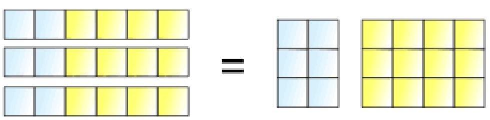
Variation ideas

9 x 8 =
9 x 80 =
9 x 800 =
90 x 8 =
900 x 8 =
? = 900 x 8

Strategy: Double the 4 times tables to calculate the 8 times tables

* 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.

* When teaching tables and revisiting known facts, **commutative law** is explicitly covered to deepen understanding and provide variation,



So, 3 x (2 + 4) = (3 x 2) + (3 x 4)

X	2
10	20
4	8
	28

table facts from above such as 30x and 40x.

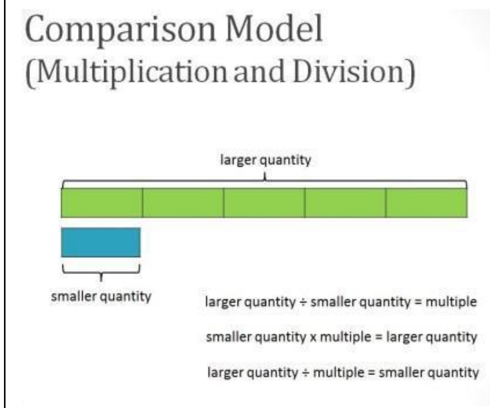
X	3
20	60
4	12
	72

Linking multiplication and division facts

To strengthen the link between division and multiplication, and to present a varied form, the use of blank number grids is used to increase speed and mental agility whilst referring to the grid format.

×		9	3	
		54	18	
5		45		
	16			20
				5

72 = ? x 8



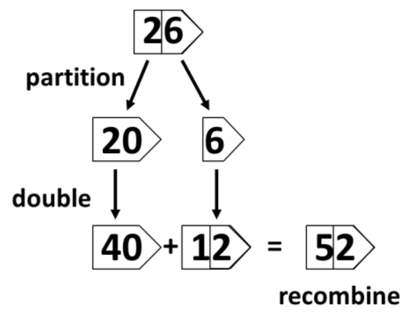
Using and applying: **Problem solving:**	* I can solve number problems and practical problems involving these ideas: – Balancing calculations (represented by scales) to show commutative law.
New key vocabulary:	product multiples of four, eight, fifty and one hundred scale up leap

YEAR 4 **MULTIPLICATION**

Step 1	Step 2	Step 3	End of year expectation
* I can recall multiplication and division facts for the 2, 5 and 10 x table * I can multiply and divide using practical resources	* I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table * I can find factors for numbers to 20 (investigated using factor trees) * I can multiply and divide a two-digit number by a one digit number using an informal method (e.g. number line) * I can multiply a whole number by 10	* I can recall multiplication and division facts for the 7, 8 and 9 x table * I can use my multiplication tables knowledge to calculate with multiples of ten * I can find factors for numbers to 50 * I can multiply and divide a two-digit number by a one-digit number using a formal layout	* **I can recall multiplication and division facts up to 12x12** * **I can use place value, known and derived facts to multiply and divide mentally, including multiplying and dividing by 0 and 1; dividing by 1; multiplying together three numbers** * **I can recognise and use factor pairs and commutativity in mental calculations** * **I can multiply two-digit and three-digit numbers by a one-digit number using a formal layout** * **I can solve problems involving multiplying and adding, including integer scaling problems and harder correspondence problems such as n objects are connected to m objects**

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

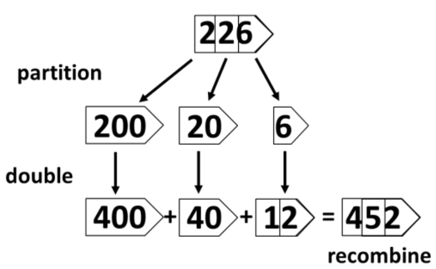
<u>Double 2-digit numbers using partitioning, including odd numbers</u> ***Double 26*** 4. Model partitioning 5. Doubling the partitioned numbers. 6. Recombine to find the final answer.	**<u>Use partitioning to multiply a 2-digit number by a 1-digit number (grid method)</u>** **24 x 3 =** 5. Draw a simple grid and label (X, 3). 6. Partition 2-digit number and write in grid (20, 4). 7. Multiply each part by 3 emphasising each calculation (e.g. 3 x 20 = 60; 3 x 2 = 6) and write answers in the grid. 8. Use column addition to add these answers to find the solution (it is therefore important to demonstrate the importance of aligning the columns carefully to add correctly). * Building on the strategies from Year 3,	Begin to know multiplication and division facts for the 7s **<u>Use partitioning to multiply 3-digit numbers by 1-digit numbers (grid method)</u>** **3 × 134 =** 1. Draw a simple grid and label. 2. Partition 3-digit number and write in grid. 3. Multiply each part by 3 emphasising each calculation (e.g. 3 x 100 = 300; 3 x 30 = 90 and 3 x 4 = 12) and write answers in the grid. 4. Use column addition to add these	**<u>Use partitioning to multiply 3-digit numbers by 1-digit numbers (ladder method)</u>** **423 × 6 =** 1. **Use** a place value grid to help record calculations in the correct columns if necessary (place one digit in one square). 2. Model multiplying the **0(1s), T(10s)** and **H(100s)** in that order (recording in the correct columns and emphasising the value of the numbers being added). Draw out how 2400 is the answer to 6 × 400, 120 the answer to 6 × 20 and 18 the answer to 6 × 3. 3. Finally, add the products using column



Double 3-digit numbers using partitioning, including odd numbers

Double 226

1. Model partitioning
2. Doubling the partitioned numbers.
3. Recombine to find the final answer.



Strategy: Double the 3 times tables to calculate the 6 times tables

pupils move towards multiplying multiples of ten and a hundred based on the known table facts from above such as 30x and 40x.

X	3
20	60
4	12
	72

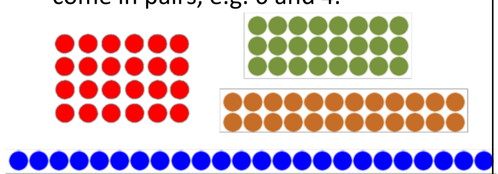
Know multiplication and division facts for the 9s

Find factors of numbers up to 40

How many factors does 24 have?

When sketching arrays – be consistent across your school. Agree your representation.

1. Sketch a 6 by 4 array. Say that 24 counters can be arranged in a 6 by 4 array.
2. Sharing ideas, draw out 8 by 3, 12 by 2, 24 by 1 are other possible arrays for 24.
3. Explain that 24 is therefore a multiple of 1, 2, 3, 4, 6, 8, 12 and 24 and these numbers are called its factors. They are numbers that will go into 24 without leaving a remainder, and they come in pairs, e.g. 6 and 4.



answers to find the solution (it is therefore important to demonstrate the importance of aligning the columns carefully to add correctly).

X	3
100	300
30	90
4	12
	402

* As pupils move towards numbers involving multiplication of HTU x U, the grid can be used in tandem with a formal written method (expanded) where pupils explore 'What's the same and what's different'?

addition to find the solution.

	Th	H	T	O
		4	2	3
×				6
			1	8
		1	2	0
	2	4	0	0
	3	5	3	8

* Note here that number choice ensures that columnar addition is supported in this example where 'carrying' of numbers is not required for the strategy to work.

* Where columnar addition is secure, progress to applying carrying here. Pupils reinforce x10 and x100 through conversions of units of measure in contextual situations.

Know the multiplication and division facts for the 11s and 12s

Variation ideas

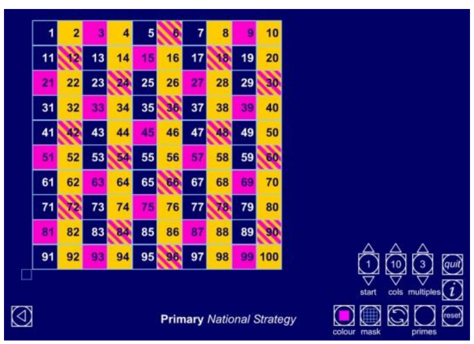
6 x 7 =	60 x 7 =
6 x 70 =	? = 600 x 7
6 x 700 =	0.6 x 7 =

Using and applying: Problem solving:	* I can solve number problems and practical problems involving these ideas
New key vocabulary:	**Multiplication facts (up to 12x12) Division facts Inverse Derive**

YEAR 5 MULTIPLICATION

Step 1	Step 2	Step 3	End of year expectation
* I can find factors for numbers to 20 * I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table * I can solve one-step problems in contexts, deciding which operations to use and why	* I can find factors for numbers to 50 * I can recall multiplication and division facts for the 7, 8 and 9 x table * I can solve more complex one-step problems in contexts, deciding which operations to use and why	* I can recognise and use factor pairs and commutativity in mental calculations * I can recall multiplication and division facts up to 12x12 * I can solve multiplication and division two-step problems in contexts, deciding which operations to use and why * I can solve problems involving multiplying and adding, including integer scaling problems	* **I can identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers** * **I can multiply and divide numbers mentally using known facts** * **I can solve problems using multiplication and division and a combination of these, including understanding the equals sign** * **I can solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple ratios** * **I know and use the words prime number, prime factors and composite numbers** * **I can tell whether a number up to 100 is a prime number and recall prime numbers up to 19** * **I can recognise and use square numbers and cube numbers and their notation** * **I can solve problems using multiplication and division using my knowledge of factors and multiples, squares and cubes**

Use times table knowledge to find **common multiples**



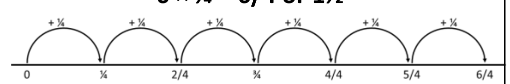
Use partitioning to multiply 3-digit numbers by 1-digit numbers (ladder method)

326 × 3 =

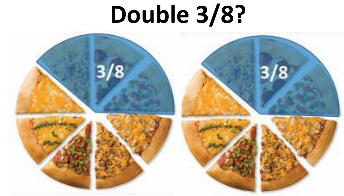
4. **Use** a place value grid to help record calculations in the correct columns if necessary (place one digit in one square).
5. Model multiplying the **O(1s), T(10s)** and **H(100s)** in that order (recording in the correct columns and emphasising the value of the numbers being multiplied).
6. Finally, add the products using column

Use times table knowledge to multiply **unit fractions/non-unit fraction by whole numbers**

6 × ¼ = 6/4 or 1½



Double 3/8?

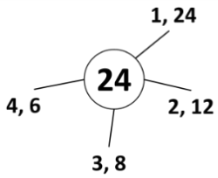


Use long multiplication to multiply pairs of 2-digit numbers (one number less than 20)

48 16 =

1. Use a place value grid to help record calculations in the correct columns if necessary (place one digit in one square).
2. Model multiplying the **O(1s), T(10s)** and **H(100s)** by the 6 from 16, in that order (recording in the correct columns and emphasising the value of the numbers being multiplied and the

Use times table knowledge to find factor pairs for 2-digit numbers



Revise using the grid method to multiply 3-digit numbers by single-digit numbers

3 × 234 =

1. Draw a simple grid and label.
2. Partition 3-digit number and write in grid.
3. Multiply each part by 3 emphasising each calculation (e.g. 3 x 200 = 600; 3 x 30 = 90 and 3 x 4 = 12) and write answers in the grid.
4. Use column addition to add these answers to find the solution (it is therefore important to demonstrate the importance of aligning the columns carefully to add correctly).

X	3
200	6 0 0
30	9 0
4	1 2
	1 7 0 2

```
H T O
3 2 6
×   3
  1 8
  6 0
9 0 0
9 7 8
```

Short multiplication to multiply 3-digit numbers by single-digit numbers

3 × 326 =

Model short multiplication alongside ladder method, talk through each step making the place value clear:

1. 3 times 6 is 18, we write the 8 in the 1s column and the 1 ten in the 10s column above the line like we do for addition.
2. Next we work out 3 × 20, 2 tens, that's 6 tens, plus the 1 ten we had from multiplying the 1s, so that's 7 tens, so we write 7 in the 10s column.
3. Then we work out 3 × 300, 3 100s, that's 9 100s and we write this in the 100s column.

```
  3 2 6
x   1 3
  9 7 8
```

4. Extend short multiplication to multiplying 4-digit numbers by single digit numbers.

Use times table knowledge to find prime numbers less than 50

Use grid method to multiply 2-digit numbers by 2-digit numbers

23 × 34

1. Draw a simple grid and label.
2. This time it would be helpful to partition and write in grid.
3. Multiply. (e.g. On the 1st row we are working out 20 lots of 34 by finding 20 lots of 30 and 20 lots of 4 and adding the 2 together.)
4. Use column addition to add the answers to 20 lots of 34 and 3 lots of 34 to find 23 lots of 34. (Demonstrate the importance of aligning the columns carefully to add correctly).

×	30	4	
20	600	80	680
3	90	12	102
			782

Use grid method to multiply 3-digit numbers by 2-digit numbers

365 x 24 =

1. Draw a simple grid and label.
2. Partition both numbers and write in grid.
3. Multiply the respective numbers.
4. Use column addition to add the answers to 20 lots of 365 and 4 lots of 365 to find 24 lots of 365. (Demonstrate the importance of aligning the columns carefully to add correctly).

×	300	60	5	
20	6000	1200	100	7300
4	1200	240	20	1460
				8760

carried).

3. Explain when multiplying by tens, the numbers will be 10 times bigger, digits move to the left on one place as a result. 0 is a place holder.
4. Finally, add the products using column addition to find the solution.

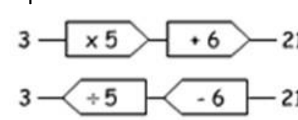
```
    4 8
x   1 6
    4
  2 8 8
+ 4 8 0
  1
  7 6 8
```

* Note here that this strategy and number choices rely on an ability to use columnar addition efficiently and accurately. Those pupils needing support here can revert to grid but progress to expanded formal as soon as is practicably possible.
* Note appropriateness of number where only one instance of carrying is needed per row.

Variation Ideas

Note here now the reference to the bar model supports problem solving approach, reinforces repeated addition and encourages links to this process.

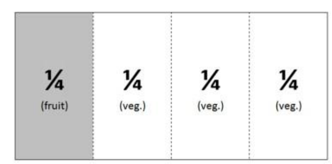
Reference here is to a function machine where known times tables facts are used and it is incorporating a second step using another operation.



Using and applying:	* I can solve number problems and practical problems involving these ideas
New key vocabulary:	factor pairs composite numbers, prime number, prime factors, square number, cubed number formal written method

YEAR 6			MULTIPLICATION

Step 1	Step 2	Step 3	End of year expectation
* I can recall all times tables up to 12 x 12 and know related division facts. * Recall and use multiplication and division facts up to 12 x 12 * I can use knowledge of times tables and place value to multiply U.t by U e.g. 0.6 x 4 = 2.4	* I can multiply larger numbers (<10,000) by single-digit numbers using short multiplication * Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 1 and 0; dividing by 1; multiplying together three numbers. * I know multiples, factors, square numbers prime numbers * I can use brackets in simple calculations * I can use knowledge of times tables and place value to multiply TU.t by U e.g. 0.06 x 4 = 0.24 * I can check whether my answer is likely	* I can multiply decimals by a single-digit number using short multiplication * I can multiply and divide numbers mentally drawing on known facts. * I can identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. * I can use brackets and inverses effectively e.g. (24+P) x 6 = 150 * Multiply one-digit numbers with one decimal place by whole numbers * I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	* **I can multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.** * **I can perform mental calculations, including with mixed operations and large numbers** * **I can identify common factors, common multiples and prime numbers.** * **I can use my knowledge of the order of operations to carry out calculations involving the 4 operations** * **I can multiply one-digit numbers with up to 2 decimal places by whole numbers** * **I can solve problems which require answers to be rounded to specified degrees of accuracy** * **I can solve problems involving multiplication and division** * **I can use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy**

Use times table knowledge to find **common multiples** and **factors** Use times table knowledge to identify **prime numbers and recognise their properties** Simplify fractions using **multiples** and **factors**	**Revise using short multiplication to multiply 4-digit amounts of money by single-digit numbers** ***Granny is buying presents for her three grandchildren. She wants to buy them a set of headphones each, costing £23.67.How much would it costto buy three of these?*** 1. Model using both the grid method and short multiplication to work out 3 ×	**Use long multiplication to multiply 3-digit then 4-digit numbers by numbers between 10 and 35; Use rounding to approximate** **23 × 367** 1. Revise using long multiplication to work this out. 2. What's a good way to multiply by 20? (Double, then multiply by 10.) Write this in the multiplication, and then work out the next row.	**Multiply pairs of fractions**  ***¼ of the plot is for fruit and ¾ of the plot is for vegetables. If ½ of the fruit area is for growing strawberries, what fraction of the whole plot is that?*** 1. Draw a line to divide the ¼ into ½s and record ½ × ¼ = 1/8. 2. ¼ of fruit areas is for raspberries, the

Revise using short multiplication to multiply 4-digit numbers by single-digit numbers; Round to approximate answers

326 x 3

Start with the least significant figure, ensuring clear layout of one digit per square and crossing out carried digits once added to the cumulative product:

5. 3 times 6 is 18, we write the 8 in the 1s column and the 1 ten in the 10s column above the line like we do for addition.
6. Next we work out 3 × 20, 2 tens, that's 6 tens, plus the 1 ten we had from multiplying the 1s, so that's 7 tens, so we write 7 in the 10s column.
7. Then we work out 3 × 300, 3 100s, that's 9 100s and we write this in the 100s column.

$$\begin{array}{rccc} & 3 & 2 & 6 \\ \times & & {}_1 & 3 \\ \hline & 9 & 7 & 8 \end{array}$$

2. Carefully talk through 3 × 60p, to give £1.80, writing £1.80 in the grid, or £1 under the £1s in short multiplication.
3. Suggest children add the pounds and pennies separately when finding the total in the grid.

×	£20	£3		60p	7p	
3	£60	£9	£1.80		21p	= £71.01

$$\begin{array}{rcccccc} & £ & 2 & 3 & . & 6 & 7 \\ \times & & & & & & 3 \\ & & 1 & 2 & & 2 & \\ \hline & £ & 7 & 1 & . & 0 & 1 \end{array}$$

3. Then add the two rows to get a total.

$$\begin{array}{lrrrrr} & & & 3 & 6 & 7 \\ & \times & & & 3 & 4 \\ & & & {}^2 & {}^2 & \\ \hline \text{(Times 4)} & & 1 & 4 & 6 & 8 \\ & & {}^2 & {}^2 & & \\ \text{(Times by 30)} & 1 & 1 & 0 & 1 & 0 \\ \hline & 1 & 2 & 4 & 7 & 8 \end{array}$$

4. Does this answer look about right? Discuss that 20 × 400 is 8000, so an answer of 8441 seems reasonable.

Use long multiplication to multiply 3-digit then 4-digit numbers with decimals by numbers between 10 and 35; Use rounding to approximate

£36.21 x 17

1. Following the same order for calculating, in the context of money is recommended to ensure a concrete understanding of the concept and value of digits:

$$\begin{array}{rrrrrrr} & & 3 & 6 & . & 2 & 1 \\ \times & & 1 & 7 & & & \\ & & 4 & 1 & & & \\ \hline & 2 & 5 & 3 & . & 4 & 7 \\ & 3 & 6 & 2 & . & 1 & 0 \\ & 1 & & & & & \\ \hline & 6 & 1 & 5 & . & 5 & 7 \end{array}$$

other ¼ for rhubarb. *What fraction of the whole plot are each of these?*

3. Draw lines to show this.

4. Record the calculation to show this. ¼× ¼ = 1/16.

Extend to multiplying non unit fractions:

5. ½ of the vegetable area is to be given over for potatoes.
6. Draw a horizontal line to divide this area in 2.
7. What is ½ of ¾? Record ½ × ¾ = 3/8.
8. Ask children what they notice happens when we multiply fractions together.
9. Discuss how we multiply the numerators together and the denominators together to give us the answer!

Variation

Be aware of how calculations may be in a different order or presented differently.
What do you notice is the same/different?

Long multiplication

24 × 16 becomes

$$\begin{array}{rrrr} & & {}^2 & \\ & & 2 & 4 \\ \times & & 1 & 6 \\ \hline & 2 & 4 & 0 \\ & 1 & 4 & 4 \\ \hline & 3 & 8 & 4 \\ \hline \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{rrrrr} & & {}^1 & {}^2 & \\ & & 1 & 2 & 4 \\ \times & & & 2 & 6 \\ \hline & 2 & 4 & 8 & 0 \\ & & 7 & 4 & 4 \\ \hline & 3 & 2 & 2 & 4 \\ \hline & {}_1 & {}_1 & & \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{rrrrr} & & {}^1 & {}^2 & \\ & & 1 & 2 & 4 \\ \times & & & 2 & 6 \\ \hline & & 7 & 4 & 4 \\ & 2 & 4 & 8 & 0 \\ \hline & 3 & 2 & 2 & 4 \\ \hline & {}_1 & {}_1 & & \end{array}$$

Answer: 3224

Short multiplication

24 × 6 becomes

$$\begin{array}{rrrr} & & 2 & 4 \\ \times & & & 6 \\ \hline & 1 & 4 & 4 \\ \hline & & {}_2 & \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{rrrrr} & & 3 & 4 & 2 \\ \times & & & & 7 \\ \hline & 2 & 3 & 9 & 4 \\ \hline & & {}_2 & {}_1 & \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{rrrrrr} & & 2 & 7 & 4 & 1 \\ \times & & & & & 6 \\ \hline & 1 & 6 & 4 & 4 & 6 \\ \hline & & {}_4 & {}_2 & & \end{array}$$

Answer: 16 446

Using and applying: **Problem solving:**	* I can solve number problems and practical problems involving these ideas
Key vocabulary:	Order of operations Common factors, common multiples

YEAR 1 **DIVISION**

Step 1	Step 2	Step 3	End of year expectation
* I can solve one-step problems involving division, by calculating the answer using concrete objects to group and share	* I can solve one-step problems involving division, by calculating the answer using pictorial representations to group and share	* I am beginning to solve one-step problems division, by calculating the answer using arrays with the support of the teacher to group	* **I can solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher**

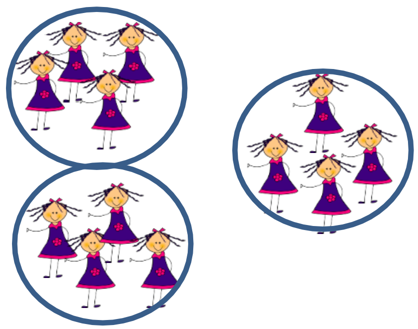
Physically group items and count in groups.

- Use practical resources to **group** items into hoops or drawn circles etc. and into visual arrays.
- Distribute objects into groups using '**bars**'.
- Group items and count how many are in each group, how many **'groups of'** there are and how many **altogether**.

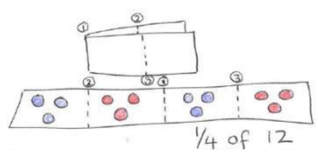
- Using questioning and verbal explanations, pupils explain what the items represent. "There are x groups." "There are x in each group." "There are x altogether."

Using pictorial representations

- Reinforce 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?

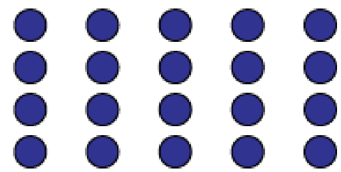


- Share into groups using circles, hoops or boxes. Distribute into a divided bar.
- Using a bar, pupils begin to explore **halving** and then subsequent **quarter**ing as a way of sharing and using a bar (piece of paper) folder in half to create two groups onto which items can be drawn or placed. This extends to quarters and sharing this into 4 groups.



Using arrays and understanding the symbols of written division.

- Build visual **arrays** of numbers to show groups of numbers and their totals which are explained and explored using discussion and verbal feedback.



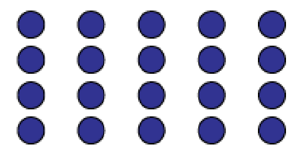
- Use arrays and visual representations to reinforce counting in 2s 5s and 10s.
- Explore related division facts and linking these directly to inverse, commutative facts:

$6 \div 2 = \square$	$\square = 6 \div 2$
$6 \div \square = 3$	$3 = 6 \div \square$
$\square \div 2 = 3$	$3 = \square \div 2$
$\square \div \nabla = 3$	$3 = \square \div \nabla$

One Step Problems

- Use practical resources, visual representations or an array to solve a 'worded' problem or, a simple division calculation presented using simple symbols.

20 fish are shared between 5 bowls..
How many fish are in each bowl?
$20 \div 5 = \square$



- Children begin to explore using a prepared bar to represent the array above.

Using and applying: **Problem solving:**	* I can solve one-step problems that can involve division, using concrete objects and pictorial representations * I can compare, describe and solve practical problems for: – Lengths and heights – Mass or weight – Capacity/ volume – Time
New key vocabulary:	**group, groups of** **bar** **altogether** **array** **half** **quarter** **divide, share, split**

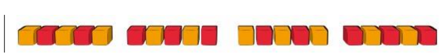
YEAR 2 DIVISION

Step 1	Step 2	Step 3	End of year expectation
* I can recall and use division facts for the 10 times tables.	* I can recall and use division facts for the 5 times tables, including recognising odd and even numbers * I can record my work in a written form using mathematical symbols (÷ =) * I am beginning to recognise that division of one number by another cannot be done in any order	* I can recall division facts for the 2 times tables, including recognising odd and even numbers * I can use number facts from the 2 times table to double and halve numbers * I can record my work in a written form using mathematical symbols (÷ =) * I can show that division of one number by another cannot be done in any order	* **I can recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables fluently, and connect them to each other** * **I can calculate mathematical statements for multiplication and division within the 2, 5 and 10 multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs** * **I can begin to use other multiplication tables and recall multiplication facts and related division facts to perform mental and written calculations** * **I can show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot**

Grouping and Sharing

- Use practical resources to represent worded/verbalised problems involving division for example, relating division to multiplication by using **arrays** or towers of cubes to find answers to division:

  e.g. 'How many towers of five cubes can I make from twenty cubes?'
  Begin to represent the problem as _ × 5 = 20 and also as 20 ÷ 5 = _



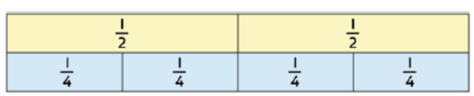
Counting in steps

- Explore **division** as **sharing** and grouping with a range of materials and contexts and move towards showing this as a number line:

Doubling and Halving

Using Known Number Facts

- Share a quantity into **half** and **quarter**s by using a visual representation of a bar or part of a fraction wall to represent the number of groups to share into (2 = half).



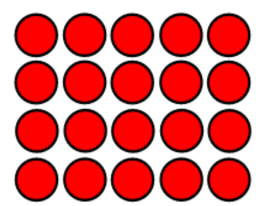
- Relate fractions to measures (for example, 40 ÷ 2 = 20, 20 is half of 40) and use the vocabulary of half and groups of 2 when explaining.

- Pupils begin to explore a deeper

Making Links

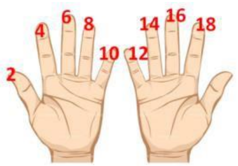
- Identify and explain links between the ways in which they have represented divisions:

  – Pupils can explain 'what's the same and what's different' here.



- Pupils find half of any number up to 40 and through practical sharing through arrays, number lines, groups and bars.
- Pupils show that when halving an **odd** number, a remainder of one is left.

*18 ÷ 2 can be modelled as sharing: 18 shared between 2 or modelling jumping back in twos to share in '**chunks**' of 2 ('clever counting') as referred to in Hamilton.*



- Use fingers or along a number line to count in 2s

1. Count in **multiples** on your fingers
2. Stop at the large number
3. How many fingers is the answer?

0 2 4 6 8 10 12 14 16 18

- Using a number line with marked divisions, count back under the number line to show the groups of 2.

0 2 4 6 8 10 12 14 16 18

- Using a number line with marked divisions, count on (on top) in jumps of two and show the number of jumps.
- Using the jumps on a number line begin to represent this using written symbols and begin to show this as a written calculation: 2 x 9 = 18 18 ÷ 2 = 9.

understanding of commutative law and inverse operations using a known fact and explain what it tells them:

– Investigate that while multiplication problems are commutative: 4 x 2 is the same as 2 x 4; division problems are not and explore whether these **statements** are true through practical sharing and grouping.

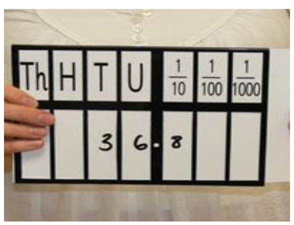
Using and applying: **Problem solving:**	* I can solve problems involving division using materials, arrays, repeated subtraction, mental methods, and division facts, including problems in contexts * Solve simple problems in a practical context involving division	
New key vocabulary:	**array** **sharing, chunks, multiples** **odd, even**	**division** **half, quarter, fraction**

YEAR 3 **DIVISION**

Step 1	Step 2	Step 3	End of year expectation
* I know my 2, 5 and 10 times tables and related division facts and use these to solve problems. * I can find half of a given number using partitioning. * I can relate multiplication/ division facts to multiples of 10, e.g. 2x3=6 so 2x30=60; 6÷2=3 so 60÷2=30 * I can find a division fact from a multiplication fact	* I can count in 3, 4 and 8 * I can mentally calculate TU ÷ U using my times table facts using jottings to support and using my knowledge of 10x to support me.	* I know my 3, 4 and 8 times tables and related division facts * I can mentally calculate TU ÷ U using my times table facts * I can use inverses in number problems e.g. I think of a number, double it and add 5. The answer is 35. What was my number? * Solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	* **Recall and use multiplication and division for the 3,4 and 8 times tables** * **I can write and calculate mathematical statements for multiplication and division using the multiplication facts that they know including TU x U, using mental and then progressing to formal written methods.** * **I can solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects**

Division by 10

- Using a place value slider, pupils begin to explore how the **values of digits** change when dividing by 10.



Finding half of a given number

Using **partitioning** and **recombining**, pupils find half of a number:

1. Show the whole number to be halved.
2. Show the halves of each number below (using numbers which divide by 2 equally)
3. Recombine numbers

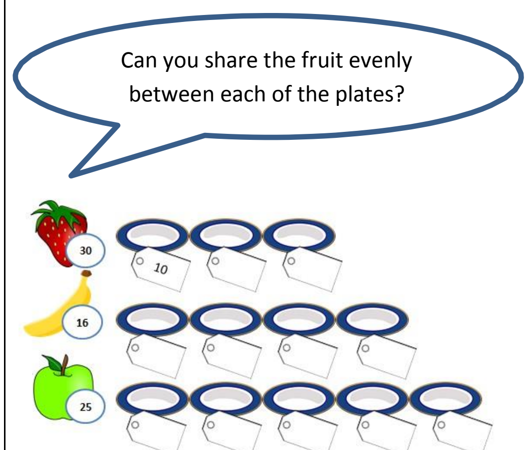
Division on a Number Line

- On a vertical number line:
  1. Show the number to be divided (**dividend**) at the top of the number line.
  2. Find 10x the number to take a known and 'easy' chunk to subtract.
  3. Subtract chunks of numbers (making single jumps is acceptable here).
  4. Show each chunk as an **inverse** calculation and when reaching '0', circle the number of chunks and add these together.

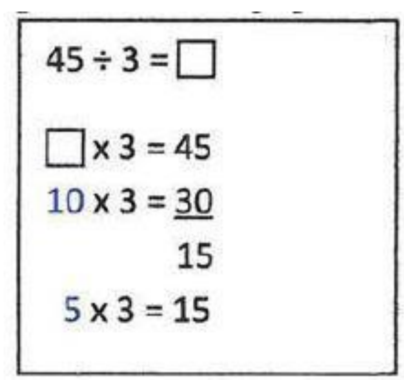
(At this point, **dividends** would be able to be divided by ten (as shown) and continue to be divided without leaving a remainder)

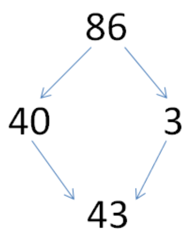
Correspondence Problems

Correspondence problems where 'n is related to m' can be explained using the examples below. Here, the task uses links to the inverse operation and

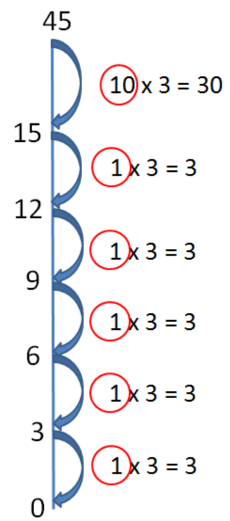


Formalising 'chunks' of numbers





Pupils see this presented as 86 ÷ 2 = and ½ of 86 =.

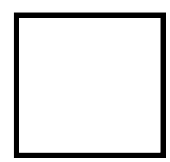


How many pieces of fruit were shared between these plates?

<u>Positive Integer Scaling</u>

An example of a concrete problem here is where a simple drawing or amount can be 'scaled up' or 'scaled down' using an integer.

Here is a square. Its sides are 12cm in length. Draw this shape 3 times smaller.



12cm

I have four £1 coins. How many do I have if I have eight times more?

- Using an increasingly **formal** written method:
  1. Show the written calculation as a missing number (**quotient** missing)
  2. Show the inverse calculation below as a missing number (multiple missing)
  3. Subtract a multiple of ten.
  4. Subtract a known multiple.
  5. Keep subtracting until at '0' or a number smaller than the **divisor**.

Using and applying: **Problem solving:**	* I can solve simple problems in contexts, deciding which of the four operations to use and why. * I can solve problems involving measuring and scaling and correspondence problems in which m objects are connected to n objects (for example, 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children)
New key vocabulary:	**partitioning, recombining** **divisor** **dividend** **quotient**

YEAR 4 DIVISION

Step 1	Step 2	Step 3	End of year expectation
* I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table * I can use place value to divide by 1 and 10. * I can divide a two-digit number by a one digit number using an informal method	* I can recall multiplication and division facts for the 7, 8 and 9 x table * I can find factors for numbers to 20 * I can divide two- and three-digit numbers by one-digit number using a formal layout.	* I can recall multiplication and division facts for multiplication tables up to 12 x 12 * I can find factors for numbers to 50 * I can divide a three-digit number by a one-digit number using a formal layout (short division) * I can divide a whole number by 10 and 100 with a whole number answer, explaining what is happening and why	* **I can recall multiplication and division facts up to 12x12** * **I can use place value, known and derived facts to multiply and divide mentally, including multiplying and dividing by 0 and 1; dividing by 1; multiplying together three numbers** * **I can find the effect of dividing a one- or two- digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths**

Dividing one- and two-digit numbers by 10 and 100

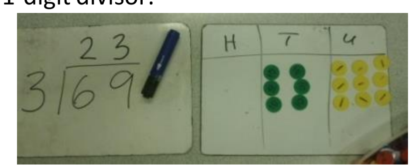
- Continue to practise recalling and using multiplication tables and related **division** facts to aid fluency.
- Use a place value slider to explore how the values of digits change when dividing by 10 and 100.
- Confidently divide by 10 and 100 (using resources to support where necessary) and can explain the value of each digit.
- Divide numbers up to three digits by a 1-digit **divisor** using short division.
- Use **short division** to divide 3-digit numbers using a single-digit divisor without exchange.

Beginning to explore an algorithm using place value counters

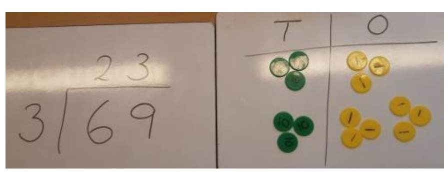
See videos at NCETM for support:
https://www.ncetm.org.uk/resources/40529

Developing the use of Place Value Counters

- Develop the use of place value counters to solve **divisions** of 2 digit numbers using a 1-digit divisor moving to 3-digit numbers with a 1-digit divisor.



1. With a learning partner, pupils begin to use place value counters alongside a written **algorithm**.
2. One pupil shows the calculation in the written form whilst the finds groups of 3 using place value counters

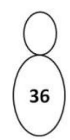


Here, there are no exchanges and the

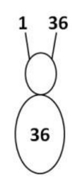
Finding Factors – Factor Bugs

Finding factor pairs of numbers is reinforced through the use of 'Factor Bugs'.
Example: Find the factors of 36.

1. Start by drawing a **factor** bug with its body and head and the product in its body.



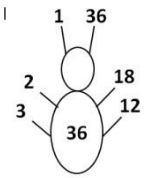
2. Next, to reinforce the factors of 1 and itself, these are shown using antennae – where no other factors can be found, this is a **prime number**.

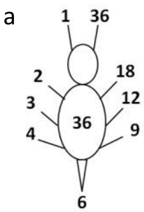


Using Short Division to divide 2-digit number using a 1-digit divisor

- Alongside a worked example using place value counters, pupils begin to identify what's the same and what's different when comparing to a written form.
- Using the example opposite, supported by teacher discussion and modelling, pupils identify the link between the place value and multiplication/division facts.

$$\begin{array}{r|ll} & T & O \\ & 2 & 3 \\ \hline 3 & 6 & 9 \end{array}$$

<table>
<tr>
<td></td>
<td>counters initially divide equally into groups.</td>
<td>3. Now, begin adding ‘legs’ in pairs focusing here on a sequential way deciding whether the number is odd or even and therefo factor?


4. Continue adding ‘legs’ systematically in pairs. On the example below, 4 is a factor, not five and when arriving at 6, this is 6 x 6 and therefore square.
This is shown as a


5. This bug is now complete as, by working systematically, the next factor is ‘9’ and this is already on the bug. Therefore, we stop.</td>
<td>• Pupils begin to show the calculation in a formal written appearance with the dividend in the ‘bus stop’. Using a single digit divisor, divide numbers up to three digits where there are no remainders building to those with a remainder:

1. Present the calculation in the ‘bus stop’ and with this, show tens and ones.
2. Model using the divisor to divide into 60 (see example)
3. Place 2 digit above the 6 tens to represent 20 3s.
4. Divide 3s into 9 and place the quotient above the 9 digit in the dividend.
• It is important to start here (when not using place values in tandem) to use numbers that divide equally.

• Move to examples where a

2 2 r1
3 | 6 7

remainder is left (below) when dividing (note that at this point, carrying of digits within the dividend is not used).</td>
</tr>
<tr>
<td>Using and applying
Problem solving</td>
<td colspan="3">* I can solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers (should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children)
* (should also include integer scaling problems and harder correspondence problems such as n objects are connected to m objects)</td>
</tr>
<tr>
<td>New key vocabulary:</td>
<td colspan="3">divisor, dividend, quotient
short-division long-division
algorithm prime number, factor pairs, odd or even, square.</td>
</tr>
</table>

YEAR 5 DIVISION

Step 1	Step 2	Step 3	End of year expectation
* I can find factors for numbers to 20 * I can recall multiplication and division facts for the 2, 3, 4, 5, 6, and 10 x table * I can divide using an informal method such as chunking * I can solve one-step problems in contexts, deciding which operations to use and why	* I can find factors for numbers to 50 * I can recall multiplication and division facts for the 7, 8 and 9 x table * I can divide a two-digit number by a one-digit number using short division * I can solve more complex one-step problems in contexts, deciding which operations to use and why	* I can recognise and use factor pairs and commutativity in mental calculations * I can recall multiplication and division facts up to 12x12 * I can divide a three-digit number by a one-digit number using short division * I can solve multiplication and division two-step problems in contexts, deciding which operations to use and why * Solve problems involving multiplying and adding, including integer scaling problems	* **I can divide numbers up to four-digits by a one-digit number using the formal written method of short division and interpret remainders appropriately according to context** * **I can solve problems using multiplication and division and a combination of these, including understanding the equals sign** * **I can solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple ratios** * **I can tell whether a number up to 100 is a prime number and recall prime numbers up to 19** * **I can solve problems using multiplication and division using my knowledge of factors and multiples, squares and cubes**

Division using Place Value Counters

Using place value counters, pupils calculate a **division** where exchange is needed within the dividend.

They progress to using a standard written method alongside to show **exchange**.

4 | 1 3 2

1. Show the calculation as a 'bus stop' and alongside this, partitioned into a place value grid.

Developing Short Division

- Short division is continued and pupils begin to show remainders as integers. This can be supported with place value counters alongside as necessary to support.

Short division

98 ÷ 7 becomes

$$\begin{array}{r|l} & 1\ \ 4 \\ \hline 7 & 9\ {}^{2}8 \end{array}$$

Short Division with an Integer Remainder

Short division continues to be used and quotients move to those with a whole number remainder.

Questions here require the remainders to be interpreted. Here, this answer could simply be one left over, or, another '3' is required to accommodate the remainder such as in the context of 637 being shared into packs that hold 3.

$$\begin{array}{r|l} & 2\ \ 1\ \ 2\ r\ 1 \\ \hline 3 & 6\ \ 3\ \ 7 \end{array}$$

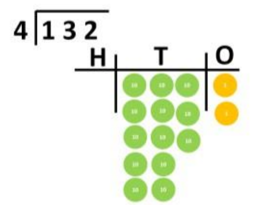
Short Division with decimal remainders

- Begin by finding quotients to 1 decimal place:

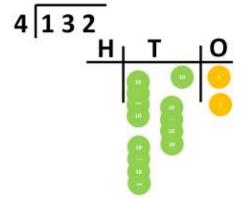
  1. Divide as previous step until reaching the point below.

$$\begin{array}{r|l} & 0\ \ 2\ \ 6 \\ \hline 5 & 1\ {}^{1}3\ {}^{3}2\ {}^{2} \end{array}$$

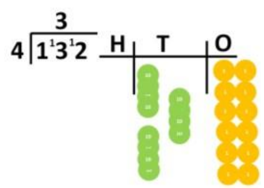
  2. Now, where there is a remaining



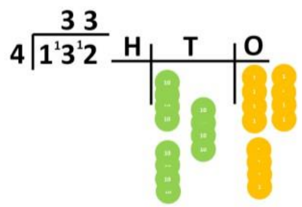
2. Demonstrate that the '100' will need to be exchanged into 10s before being able to place into groups of 4 (using the **divisor**)



3. Group the 10s into groups of 4 until all shared equally or a remainder is left. Show these groupings in the **algorithm** with the number of groups and the remainder.



4. Exchange the 10 for 10 'ones' and now, group these.



5. Show the number of groups of ones (groups of 4) in the algorithm.

1. Start by presenting the calculation as a 'bus stop'
2. Using the **divisor**, divide into tens – with (as per example) 7 into 90. This divides once equally with 20 (2 tens) remaining.
3. The **remaining** is placed in the **dividend** area alongside the next digit (8 in the example).
4. Divide into ones – 7 ones into 28 ones is 4.
5. Show the **quotient** in the answer area.

- Move to dividing a three-digit number by one digit where only one **remainder** carry is needed following steps above.

$$\begin{array}{r|l} & 2\ \ 2\ \ 4 \\ \hline 4 & 8\ \ 9\ ^{1}6 \end{array}$$

Short Division with a fraction Remainder

$$\begin{array}{r|l} & 2\ \ 1\ \ 2\ r\ 1 \\ \hline 3 & 6\ \ 3\ \ 7 \end{array}$$

Using the example from above, this 'remainder' could move from being an **integer** to where this can be shown as a remainder.

Here, the same process would apply to arrive at the remainder and then, with this **remainder** of '1', this can be shown as ⅓ where the **divisor**, is the **denominator**.

$$\begin{array}{r|l} & 2\ \ 1\ \ 2\ \frac{1}{3} \\ \hline 3 & 6\ \ 3\ \ 7 \end{array}$$

'2', this is placed into the dividend area along with a '0' **place value holder** rather than stopping and showing a remainder.

3. Place a decimal point into the **quotient** (answer) area.

4. Continue to divide as before (20 divided by 5).

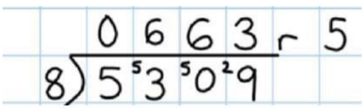
$$\begin{array}{r|l} & 0\ \ 2\ \ 6\cdot 4 \\ \hline 5 & 1\ ^{1}3\ ^{3}2\ ^{2}0 \end{array}$$

Using and applying: **Problem solving:**	* I can solve problems involving addition, subtraction, multiplication and division and a combination of these. * I can solve problems involving scaling by simple fractions and problems involving simple rates.
New key vocabulary:	**divisor, dividend, quotient** **short-division** **long-division** **algorithm** **place value holder**

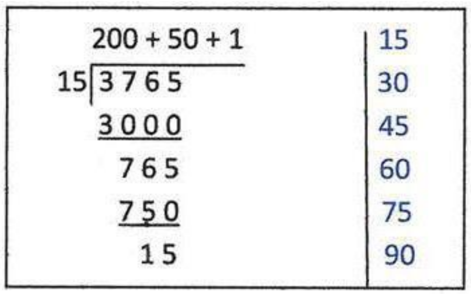
YEAR 6 DIVISION

Step 1	Step 2	Step 3	End of year expectation
* I can recall all times tables up to 12 x 12 and know related division facts. * Recall and use multiplication and division facts up to 12 x 12 * I can use knowledge of times tables and place value to divide * I divide HTU by U where there is a remainder.	* I can recall all division facts related to times tables up to 12 x 12 * Use place value, known and derived facts to divide mentally, including dividing by 1 * I know multiples, factors and prime numbers * I can use brackets in simple calculations * I can use knowledge of times tables and place value to divide e.g. 480 ÷ 4 = 120 so 48 ÷ 4 = 12 * I can check whether my answer is likely * I divide HTU by U where the remainder is recorded as a fraction.	* I can divide a two digit number by 2,3,4,5,and 10 with whole number answers and remainders * I can divide numbers mentally drawing on known facts to maintain fluency * I can identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers * I can use brackets and inverses effectively e.g. (24+P) x 6 = 150 * I can use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy * Pupils explore the order of operations using brackets * I divide HTU by U where the remainder is recorded as a decimal.	* **I can divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.** * **I can divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context** * **I can identify common factors, common multiples and prime numbers.** * **I can use written division methods in cases where the answer has up to 2 decimal places** * **I can solve problems which require answers to be rounded to specified degrees of accuracy** * **I can solve problems involving multiplication and division**

Short Division with remainders



Long Division using partitioning



- Use **long division** to divide a **dividend** with a 2-digit divisor.

1. Starting by noting the first 5 or 6 multiplication facts to which place value skills can be applied.
2. Note that in the **quotient** area, the separate steps are noted – similar to how chunking would be but more closely linked to the standard 'look' of this formal written strategy. This allows pupils to understand the value of the digits in the answer as they move through the calculation.

Long Division with an Integer Remainder

Pupils use long division to calculate:

432 ÷ 15 =

This answer can be shown as a whole number (not partitioned) with an **integer** remainder before moving to a fraction remainder.

432 ÷ 15 becomes

			2	8	r 12
1	5	4	3	2	
		3	0	0	
		1	3	2	
		1	2	0	
			1	2	

Long Division with a Fraction Remainder

Progressing to showing remainders as a fraction:

432 ÷ 15 becomes

			2	8	
1	5	4	3	2	
		3	0	0	15×20
		1	3	2	
		1	2	0	15×8
			1	2	

$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

Long Division with a Decimal Remainder

For this strategy to be applied, there will be a sound understanding of the written strategy for short division. Here, pupils apply the mastered skills of short division to making long division more efficient and time effective.

432 ÷ 15 becomes

			2	8 ·	8
1	5	4	3	2 ·	0
		3	0		
		1	3	2	
		1	2	0	
			1	2	0
			1	2	0
					0

Answer: 28·8

Using and applying Problem solving	* I can solve problems involving addition, subtraction, multiplication and division.
New key vocabulary:	**long-division** **dividend, quotient, divisor** **remainder** **integer**