The Nar Valley Mathematics Calculation Policy
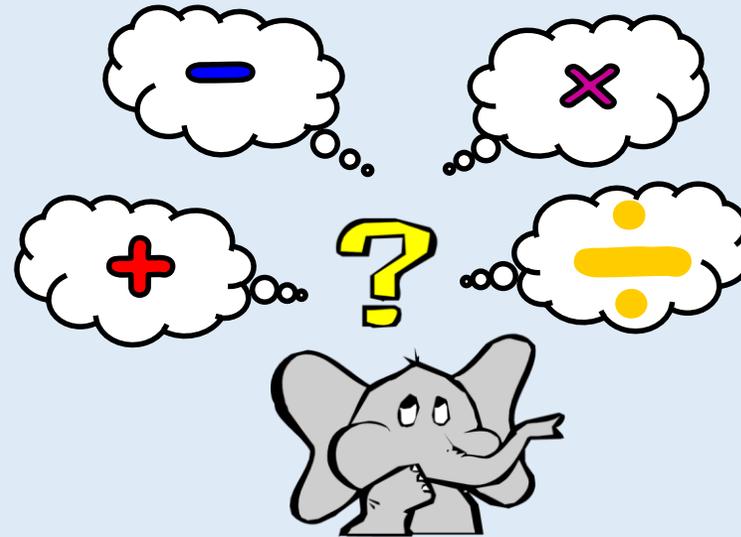
About Nar Valley's PiXL Calculation Policy

- The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.

- Age stage expectations:

  The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014 and the method(s) shown for each year group should be modelled to the vast majority of pupils. However, it is vital that pupils are taught according to the pathway that they are currently working at and are showing to have 'mastered' a pathway before moving on to the next one. Of course, pupils who are showing to be secure in a skill can be challenged to the next pathway as necessary.

- Choosing a calculation method:

  Before pupils opt for a written method they should first consider these steps:

Can I do it in my head using a mental strategy? → Could I use some jottings to help me? → Should I use a formal written method to work it out?

NCETM
Calculation Guidance Principles

- *Develop children's fluency with basic number facts*
- *Develop children's fluency in mental calculation*
- *Develop children's understanding of the = symbol*
- *Teach inequality alongside teaching equality*
- *Use empty box problems*
- *Use intelligent practice*
- *Expose mathematical structure and work systematically*
- *Move between the concrete and the abstract*
- *Contextualise the mathematics*

Addition

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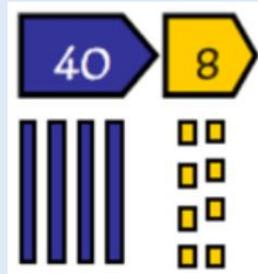
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

hundreds   tens   ones

2 + 5 = 7
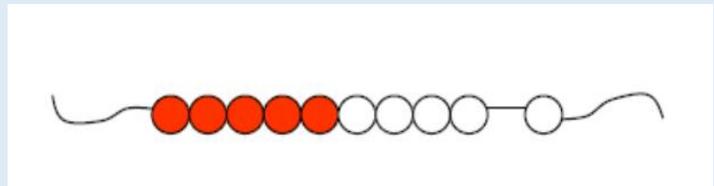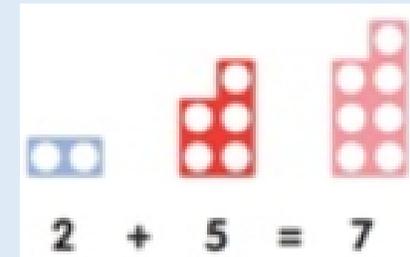
sum   addition   total
make   more
and   **+**
add   plus
altogether   increase

Addition: Reception

Early learning goals:
✓Count reliably with numbers from 1 to 20, place them in order.
✓Say which number is one more than a given number.
✓Using quantities and objects, they add two single-digit numbers and count on to find the answer.
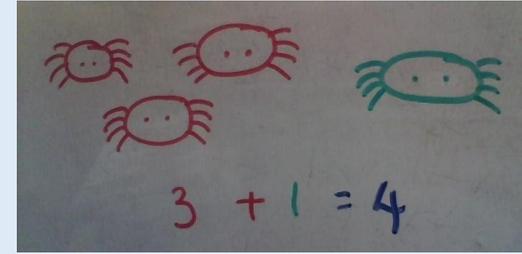
Recognise numbers up to 20 and understand the meaning of each number by recognising and knowing their clusters

Count on in ones and say which number is one more than a given number using a number line or number track to 20.

Begin to relate addition to combining two groups of objects using practical resources, role play, stories and songs.
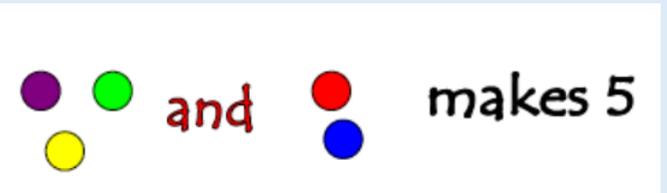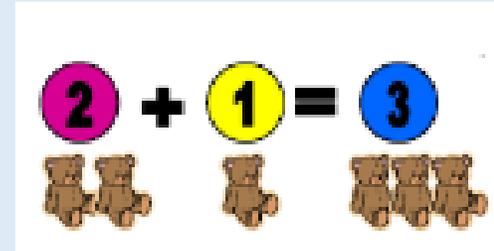
Know that counting on is a strategy for addition. Use numbered number lines to 20.
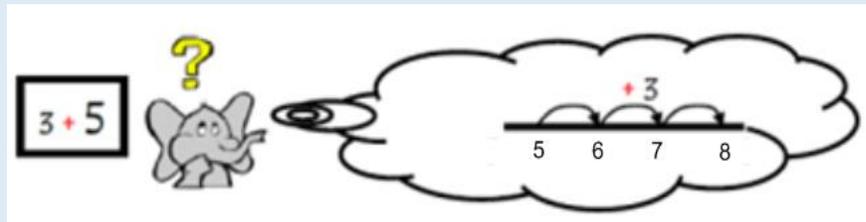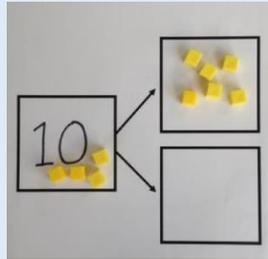
Addition: Year 1

Year 1 statutory requirements :
- ✓ Count to and across 100, forwards beginning with 0 or 1, or from any given number.
- ✓ Given a number, identify one more.
- ✓ Read, write and interpret mathematical statements involving addition (+), and equals (=) signs.
- ✓ Represent and use number bonds and related subtraction facts within 20
- ✓ Add one-digit and two-digit numbers to 20, including zero.
- ✓ Solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems.
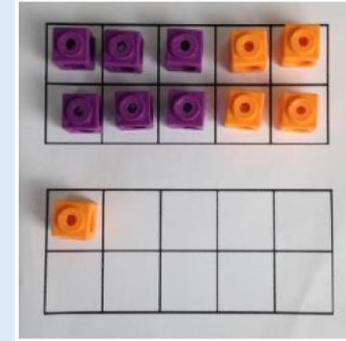
Identify and represent numbers using objects and pictorial representations (multiple representations)

Memorise and reason with number bonds to 10 and 20 in several forms.
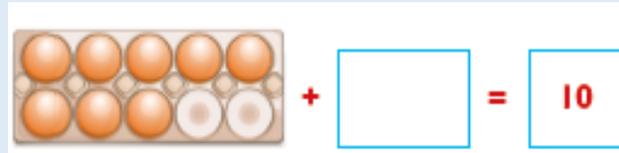
Count on in ones to and across 100 and find one more than a given number.

6 + 4 = 10
4 + 6 = 10
10 − 4 = 6
10 − 6 = 4

Tens Frame

6 + 4 = 10
4 + 6 = 10
10 − 4 = 6
10 − 6 = 4

Part Whole Model

10	
6	4

6 + 4 = 10
4 + 6 = 10
10 − 4 = 6
10 − 6 = 4

Bar Model

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

Addition: Year 1

Use concrete resources and a number line to support the addition of numbers. Know and use strategy of finding the larger number, and counting on in ones from this number.
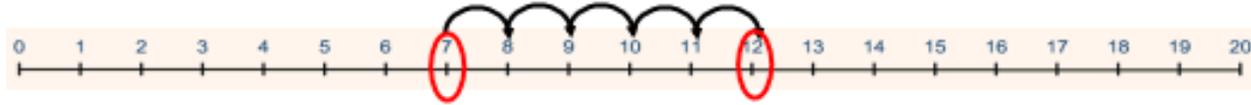
1 digit + 1 digit

7 + 5 = 12
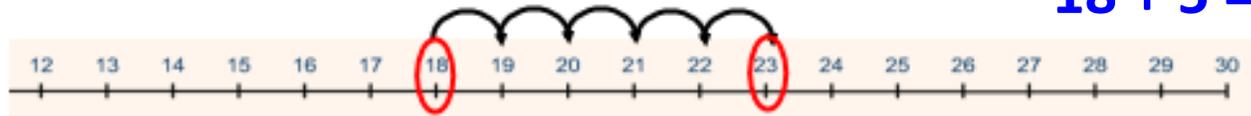
Begin to use the + and = signs to write calculations in a number sentence.

18 + 5 = 23

2 digit + 1 digit

Solve one-step problems using concrete objects and pictorial representations.

Tom picks 6 apples and Raj picks 2 apples. How many apples do they have altogether?

+   =

Addition: Year 2

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Maths
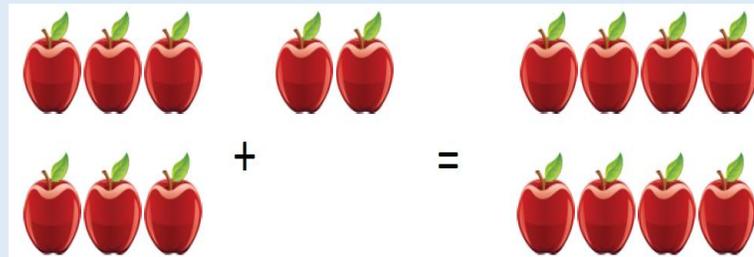
Year 2 statutory requirements :
✓ Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts to 100.
✓ Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
✓ Add numbers using concrete objects, pictorial representations, and mentally, including:
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers.
✓ Solve problems with addition including those involving numbers, quantities and measures.

23	25
?	
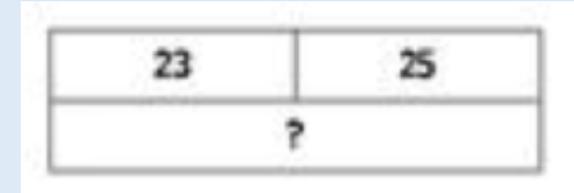
Partition two 2-digit numbers using a variety of models and images.

Memorise and reason with number facts to 20 in several forms.

8 + 12 = 20

12 + 8 = 20

20 − 12 = 8

20 − 8 = 12

20

12

40 8

42

10 1
10 1
10
10

53

50 3

8	12

20

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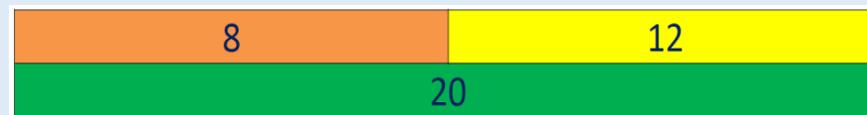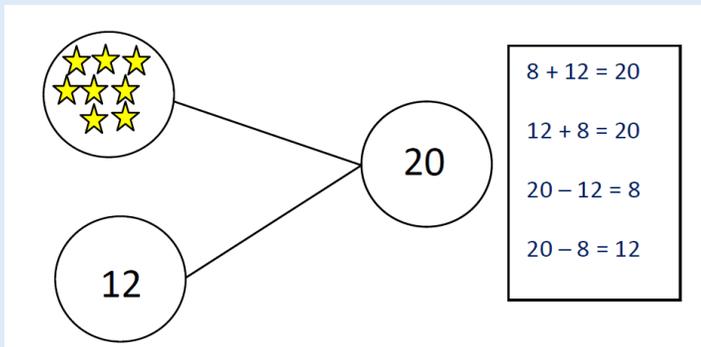
Addition: Year 2

Add 2 digit number and ones

Add 2 digit number and tens

16 + 7

+4   +3

16   20   23

27 + 30

+10 +10 +10

27   37   47   57
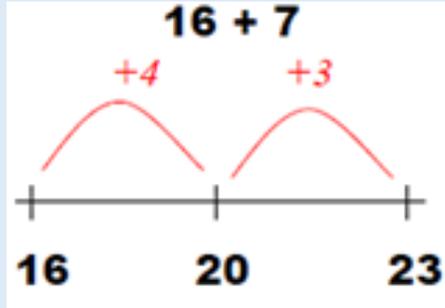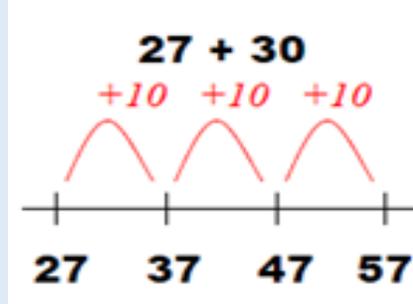
Use partitioning to add two 2-digit numbers using concrete resources and/or a numbered number line and then progressing to an empty number line.

T U
44 + 33 =

30   3

|||| .. + ||| ... = 77
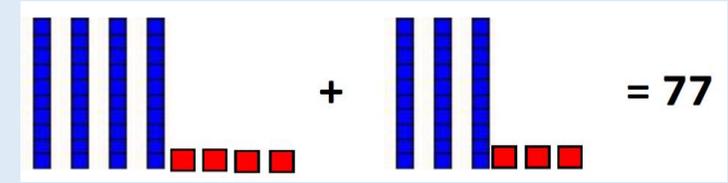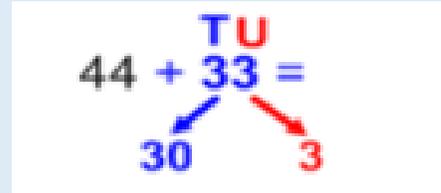
As children gain confidence with adding on tens and ones, they should be taught to combine the jumps on an empty number line. Add the tens first, then the ones. Taught with Dienes or place value counters alongside.

Jump of tens first   then jumps of units

+10   +10   +10   +1   +1   +1

44   54   64   74   75   76   77

This is your answer

5 8 + 2 1 =

+20
          +1
58   78 79

+30
                    +3

44   74   77

This is your answer

Addition: Year 3

3 5 8 + 7 3 = 4 3 1

+70
+3
358   428   431
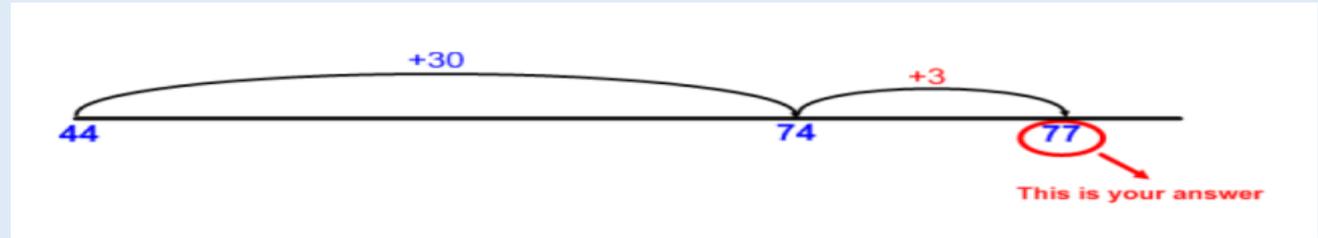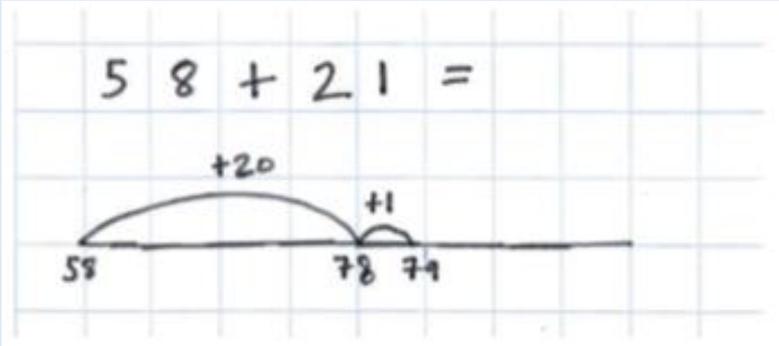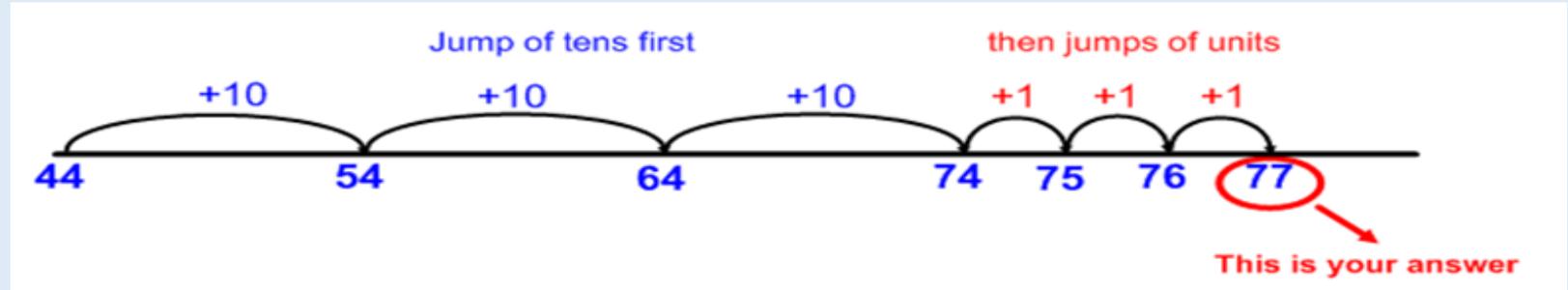
Continue to add using number lines.
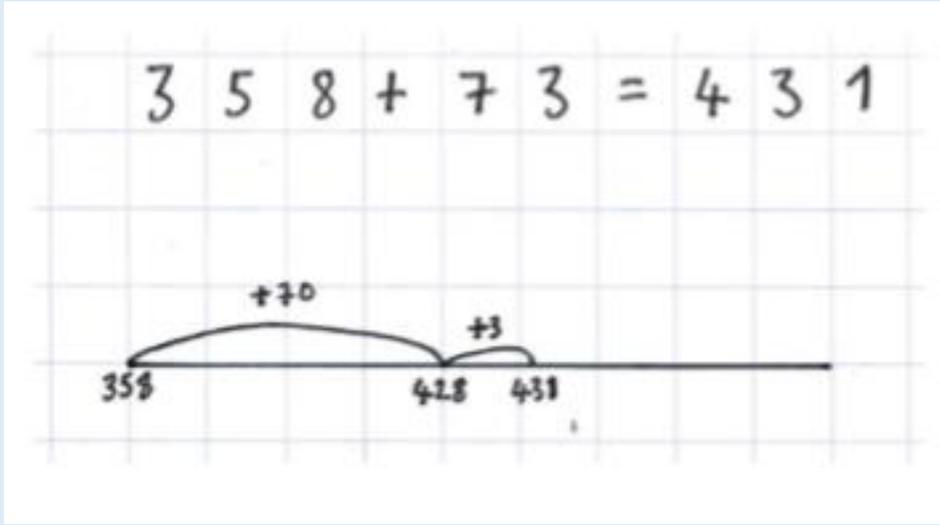
Year 3 statutory requirements :
- Find 10 or 100 more than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Add numbers with up to three digits, using formal written methods of columnar addition.

Use expanded column method with place value resources to support the conceptual understanding of adding numbers up to three digits **with no carrying**.

42 + 31 = 73

40 + 2
30 + 1
70 + 3

Tens	Ones
70	3

10   1   10   1
10   1   10
10   10
10

OR

Addition: Year 3

Progress to using the expanded column method with place value resources to support the conceptual understanding of adding numbers up to three digits **with carrying**.

47 + 36 = 83

40 + 7

30 + 6

80 + 3

10

OR

Tens	Ones
80	**3**

10
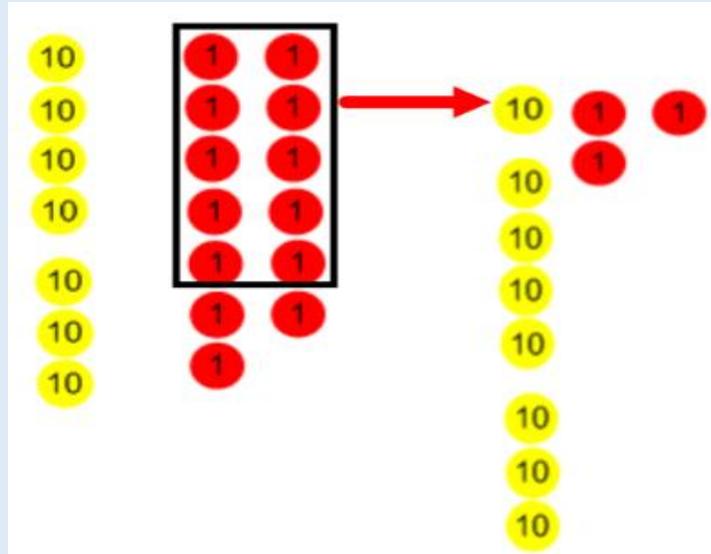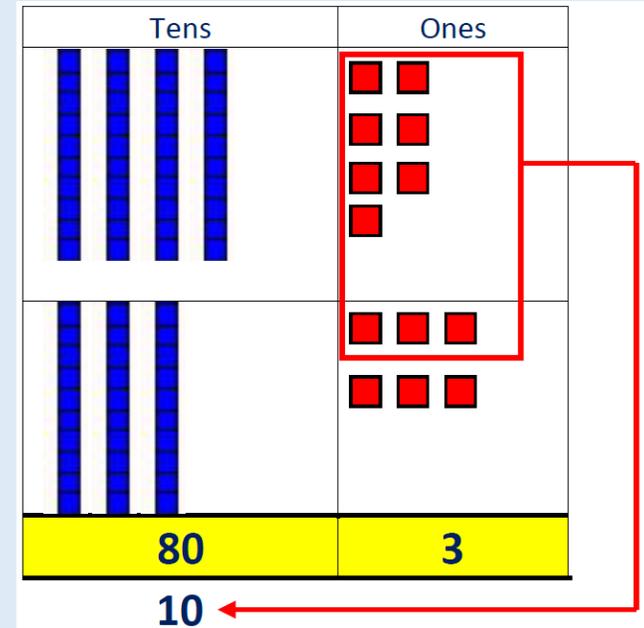
Extend to using the expanded column method to add three digit numbers + three digit numbers **with carrying**.

367 + 185 = 552

300 + 60 + 7

100 + 80 + 5

500 + 50 + 2

100   10

Note: The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

Addition: Year 4

Year 4 statutory requirements :
- Find 1000 more than a given number.
- Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate.
- Solve addition two-step problems in contexts, deciding which operations and methods to use and why,

Note: The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

Build on learning from Year 3 and model how expanded method links to compact column addition method.

$$
\begin{array}{r}
40 + 7 \\
30 + 6 \\
80 + 3 \\
\hline
10
\end{array}
\qquad
\begin{array}{r}
47 \\
+36 \\
\hline
83 \\
1
\end{array}
$$

$$
\begin{array}{r}
300 + 60 + 7 \\
100 + 80 + 5 \\
500 + 50 + 2 \\
\hline
100 \quad 10
\end{array}
\qquad
\begin{array}{r}
367 \\
+185 \\
\hline
552 \\
11
\end{array}
$$

By the end of year 4, pupils should be adding numbers up to 4 digits using the compact column addition method.

$$
\begin{array}{r}
5\ 2\ 7\ 1 \\
+\ 2\ 3\ 5\ 7 \\
\hline
7\ 6\ 2\ 8 \\
1
\end{array}
$$

Addition: Year 5 & 6

Year 5 statutory requirements :
- Add whole numbers with more than 4 digits using formal written methods of columnar addition.
- Add numbers mentally, with increasingly large numbers.
- Solve addition multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving numbers up to three decimal places

Year 6 statutory requirements :
- Pupils are expected to solve more complex addition and subtraction problems

In year 5 and 6 pupils should be adding numbers using compact column addition method. **Note:** The carried ten, hundred, thousand is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

$$
\begin{array}{r}
  46892 \\
+ 32758 \\
\hline
  79650 \\
\hline
  \;1\;1\;1\;\;
\end{array}
$$

When adding decimals, it is essential that the decimal point does not move and is kept in line.

Where necessary, a zero should be added as a *place holder*.

12.5 + 23.7

$$
\begin{array}{r}
  12.5 \\
+ 23.7 \\
\hline
  36.2 \\
\hline
  \;1\;\;
\end{array}
$$

34.5 + 27.43

$$
\begin{array}{r}
  34.50 \\
+ 27.43 \\
\hline
  61.93 \\
\hline
  \;1\;\;\;
\end{array}
$$

Subtraction

Concrete resources:
100 square
Number lines
Bead strings
Straws
Dienes
Counting stick
Place value dice
Place value cards
Place value counters

40   8

subtract
count on   count back
fewer   less
take away   minus
                difference

Subtraction: Reception

PiXL PRIMARY
**Maths**

The Nar Valley Federation of Church Academies

Early learning goals:
✓ Say which number is one less than a given number.
✓ Using quantities and objects, they subtract two single-digit numbers and count back to find the answer.

Say which number is one less than a given number using a number line or number track to 20.

1	2	3	4	5	6
					7
13	12	11	10	9	8
14					
15	16	17	18	19	20

Begin to count backwards in familiar contexts such as number rhymes or stories.
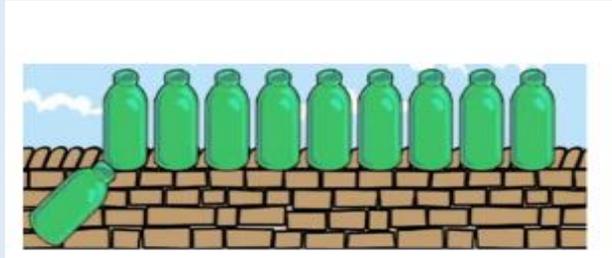
10 Green Bottles sitting on the wall ...
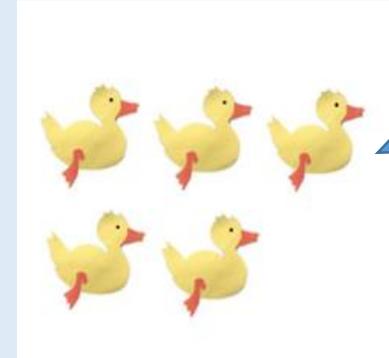
5 little ducks went swimming one day...

Begin to relate subtraction to 'taking away' using concrete objects and role play.

Three teddies take away two teddies leaves one teddy

If I take away four shells there are six left
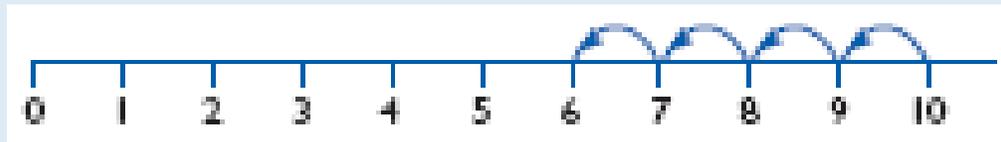
Count backwards along a number line to 'take away'

0 1 2 3 4 5 6 7 8 9 10

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Subtraction: Year 1

PiXL PRIMARY
Maths

Year 1 statutory requirements:
- ✓ Say which number is one less than a given number.
- ✓ Represent and use number bonds and related subtraction facts within 20.
- ✓ Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs.
- ✓ Subtract one-digit and two-digit numbers to 20, including zero.
- ✓ Solve one-step problems that involve subtraction using concrete objects and pictorial representations, and missing number problems.

$7 - 2 = 5$
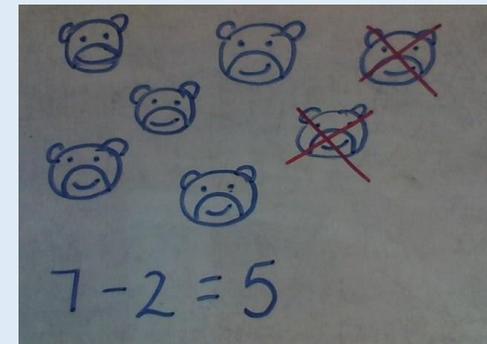
Understand subtraction as taking away. Use practical resources, pictorial representations, role play, stories and rhymes.

Use number bonds and related subtraction facts within 20.

Count back in ones and find one less than a given number.

FROMENTAL   JOLIVET
10
LITTLE PENGUINS
A POP-UP BOOK FROM THE BESTSELLING CREATORS OF 365 PENGUINS

$16 - \boxed{} = 10$

$20 - \boxed{} = 15$

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

$6 + 4 = 10$
$4 + 6 = 10$
$10 - 4 = 6$
$10 - 6 = 4$

Tens Frame

$6 + 4 = 10$
$4 + 6 = 10$
$10 - 4 = 6$
$10 - 6 = 4$

Part Whole Model

10	
6	4

$6 + 4 = 10$
$4 + 6 = 10$
$10 - 4 = 6$
$10 - 6 = 4$

Bar Model

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Subtraction: Year 1

Counting on should only be used when the language used is 'find the difference', 'difference between' and 'distance between'.
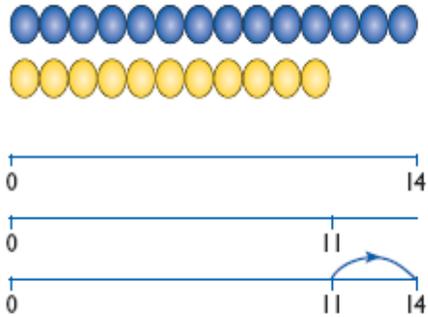
The difference between 11 and 14 is 3.

$14 - 11 = 3$

$11 + \square = 14$

Use number line to support the subtraction of numbers. Know and use strategy of **counting back** to subtract one-digit and two-digit numbers to 20.
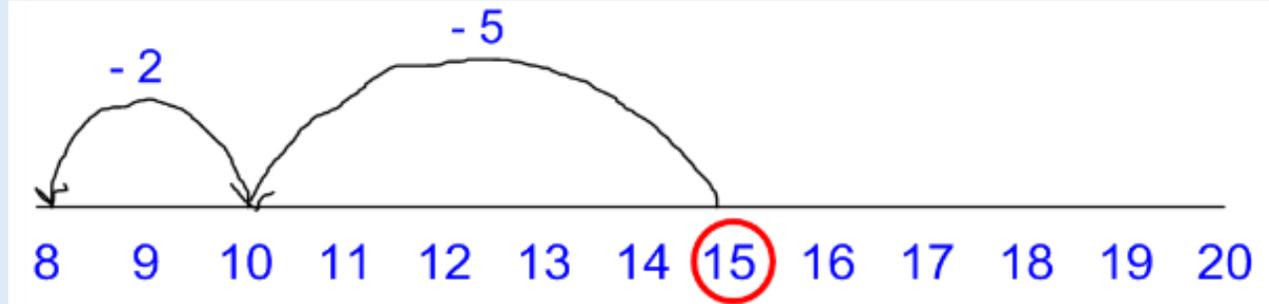
- 2   - 5

$15 - 7 = 8$

Solve one-step problems using concrete objects and pictorial representations.

Begin to use the - and = signs to write calculations in a number sentence.

Dan has 12 football stickers.

He gives 4 to Ben.

How many stickers does he have left?

Football Stickers   Football Stickers

12   - 4 =   8

Subtraction: Year 2

Year 2 statutory requirements:
- Recall and use subtraction facts to 20 fluently, and derive and use related facts to 100.
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
- Subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers.

Memorise and reason with number facts to 20 in several forms.

$8 + 12 = 20$

$12 + 8 = 20$

$20 - 12 = 8$

$20 - 8 = 12$

8	12
20	

$20 - 2 = 18$

$18 + 2 = 20$

Partition two 2-digit numbers using a variety of models and images.

40 8

42

10 1
10 1
10
10

5 3
50 3
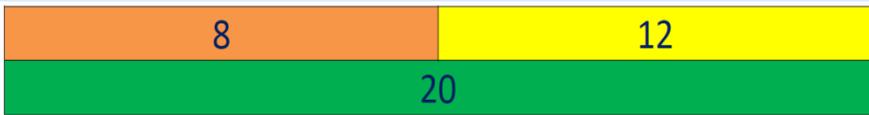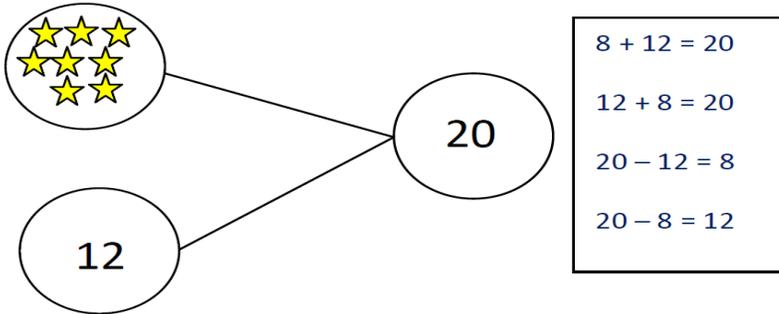
Subtract 2 digit and ones

$12 - 3$

-1 -1 -1

8 9 10 11 12 13

Subtract 2 digit and tens

$54 - 40$

-10 -10 -10 -10

14 24 34 44 54 64
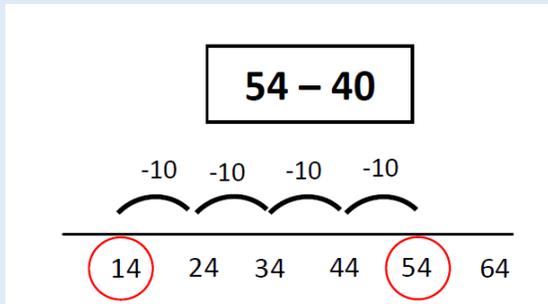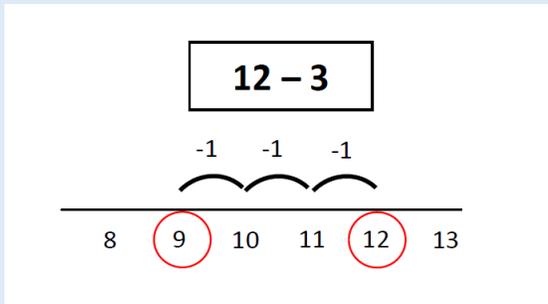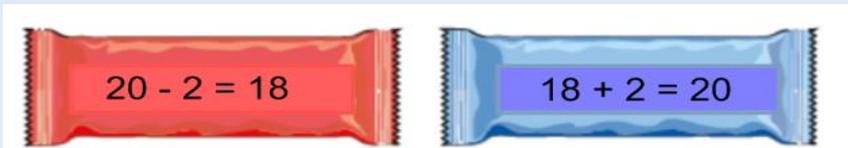
Subtraction: Year 2

Use partitioning to subtract two 2-digit numbers using concrete resources and/or a numbered number line and then progressing to an empty number line.

$36 - 12 = 24$

10   2

36 - 12 | **=** | **24**

OR

- 10   - 2

24   34   36

Subtraction: Year 3

PiXL PRIMARY
Maths
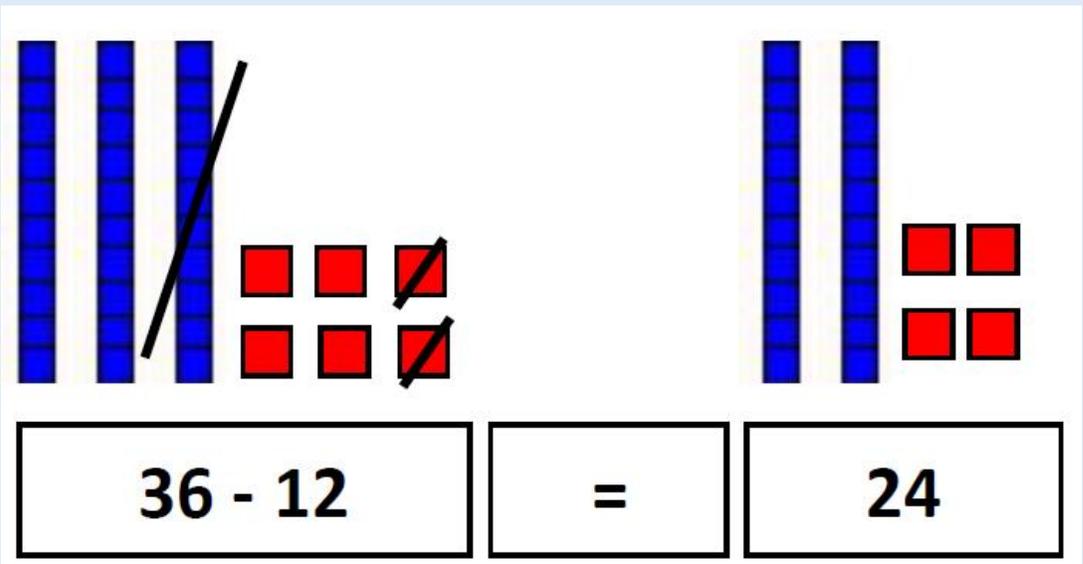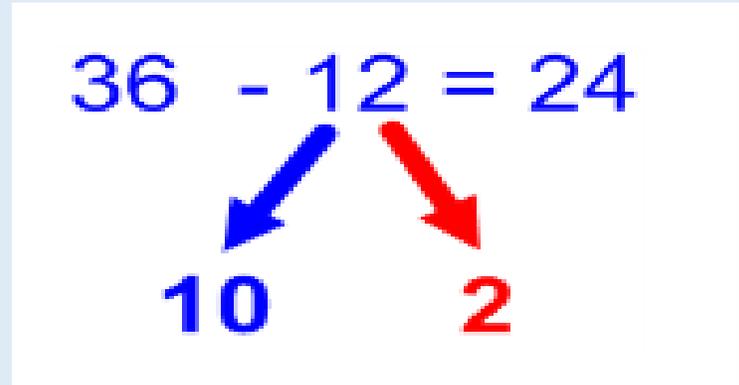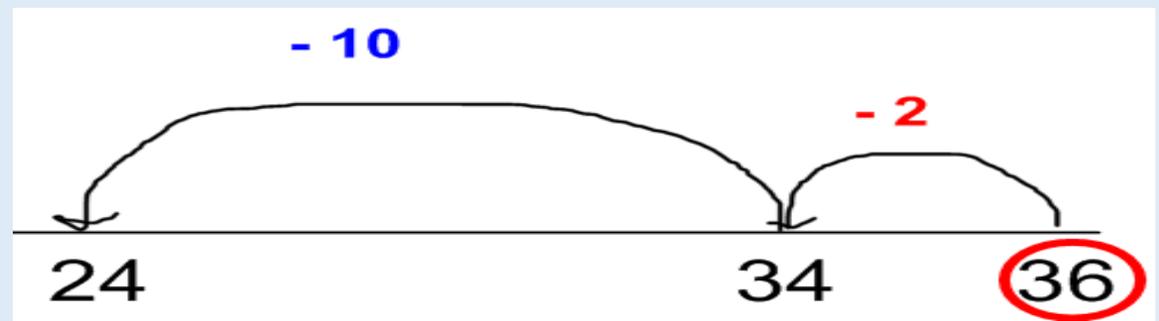
Year 3 statutory requirement:
- Find 10 or 100 less than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Subtract numbers with up to three digits, using formal written methods of column subtraction.
- Subtract numbers mentally, including: a 3-digit number & ones; a 3-digit number & tens; a 3-digit number & hundreds.
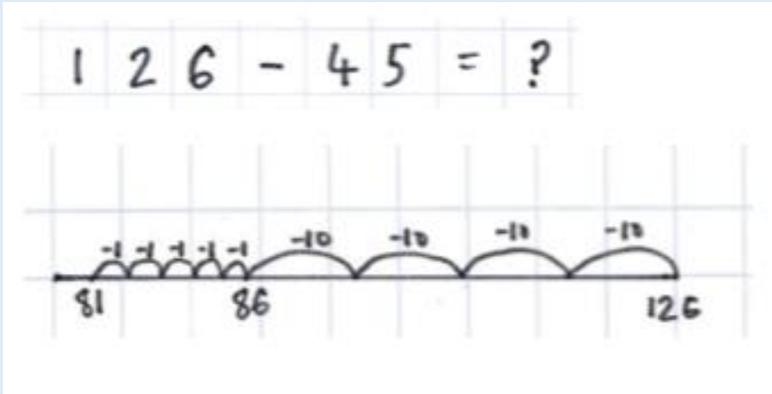
Counting back on a number line.
Counting back tens, then ones.
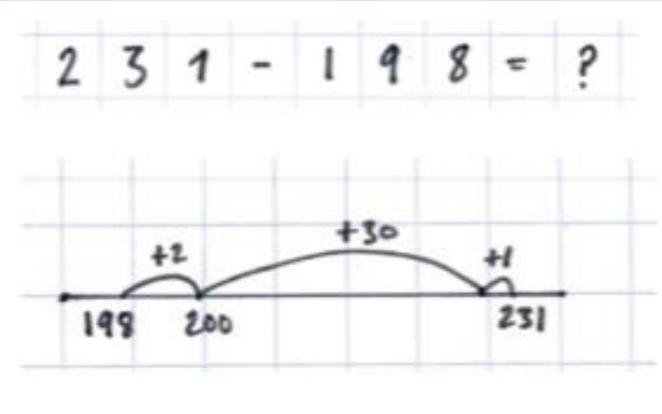
Finding a difference between two numbers by counting on.

Use expanded column method with place value resources to support the conceptual understanding of subtracting numbers with up to three digits **with no exchanging.**

42 - 11 = 31

```
   40 + 2
-  10 + 1
   30 + 1
```


OR

Tens	Ones
- 10	- 1
30	**1**

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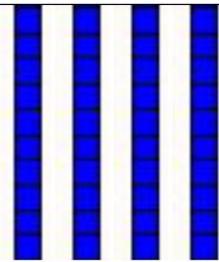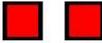
Subtraction: Year 3

Progress to using the expanded column method with place value resources to support the conceptual understanding of subtracting numbers with up to three digits **with exchanging tens and/or hundreds**.

74 - 27 = 47

$$
\begin{array}{r}
60 + 14 \\
\cancel{70} + \cancel{4} \\
- \quad 20 + 7 \\
\hline
40 + 7
\end{array}
$$

OR

Tens	Ones
- 20	- 7
40	7
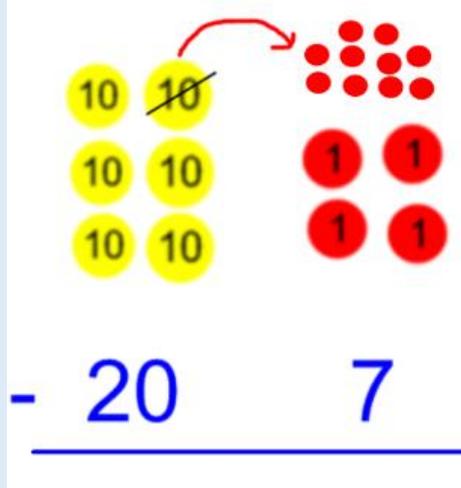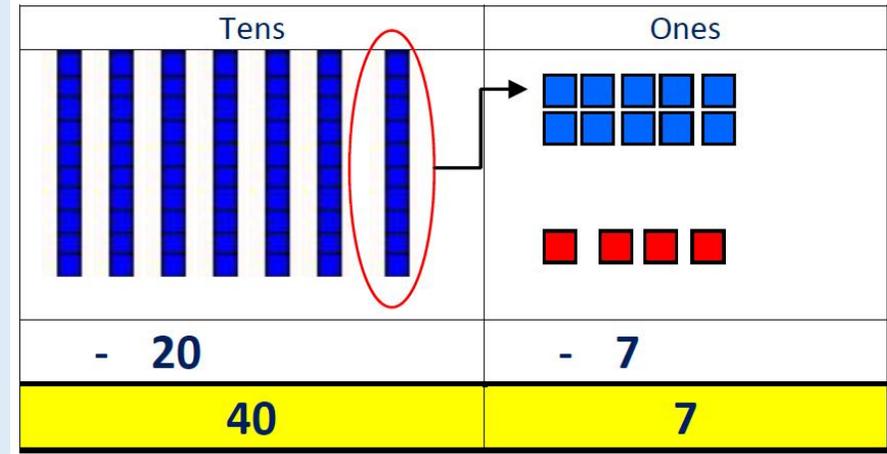
In this example to subtract 7 ones from 4 ones we need to **exchange** a ten for ten ones. We now can subtract 7 ones from 14 ones.

Extend to using the expanded column method to subtract three digit numbers from three digit numbers.

537 – 254 = 283

$$
\begin{array}{r}
400 + 130 \\
\cancel{500} + \cancel{30} + 7 \\
- \quad 200 + 50 + 4 \\
\hline
200 + 80 + 3
\end{array}
$$

Note: The exchanged ten or hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **top** of the column which has been adjusted.

Subtraction: Year 4

Build on learning from Year 3 and model how expanded method links to compact column subtraction method.

Year 4 statutory requirements:
- Find 1000 less than a given number.
- Subtract numbers with up to four digits, using formal written methods of columnar subtraction where appropriate.
- Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.

$$
\begin{array}{rcr}
60 & + & 14 \\
\cancel{70} & + & \cancel{4} \\
- \quad 20 & + & 7 \\
\hline
40 & + & 7
\end{array}
$$

$$
\begin{array}{r}
6 \\
\cancel{7}^{1}4 \\
- \quad 27 \\
\hline
47
\end{array}
$$

$$
\begin{array}{rcccr}
400 & + & 130 & & \\
\cancel{500} & + & \cancel{30} & + & 7 \\
- \quad 200 & + & 50 & + & 4 \\
\hline
200 & + & 80 & + & 3
\end{array}
$$

$$
\begin{array}{r}
4 \\
\cancel{5}^{1}\cancel{3}7 \\
- \quad 254 \\
\hline
283
\end{array}
$$

By the end of year 4, pupils should be subtracting numbers up to 4 digits using compact column subtraction method.

$$
\begin{array}{r}
3 \\
7\,8\,\cancel{4}^{1}2 \\
- \quad 1\,8\,2\,9 \\
\hline
6\,0\,1\,3
\end{array}
$$

Note: The exchanged ten or hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **top** of the column which has been adjusted.

Subtraction: Year 5 & 6

Year 5 statutory requirements **:**
- Subtract whole numbers with more than 4 digits using formal written methods of columnar subtraction.
- Subtract numbers mentally, with increasingly large numbers.
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving numbers up to three decimal places.

Year 6 statutory requirements**:** pupils are expected to solve more complex addition and subtraction problems

In year 5 and 6 pupils should be subtracting numbers using compact column subtraction method.

When subtracting decimals, it is essential that the decimal point does not move and kept in line.

Where necessary, a zero should be added as a *place holder*.
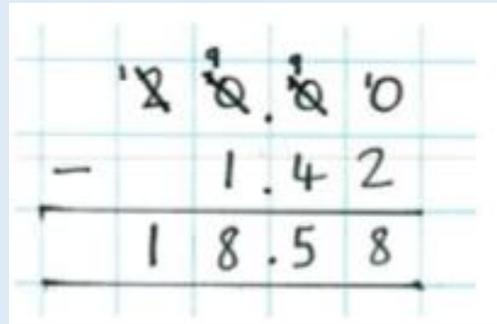
Multiplication

Concrete resources
Place value counters
Dienes
Place value charts
Arrays
Multiplication squares
100 square
Number lines
Blank number lines
Counting stick

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

$2 \times 3 = 6$

$4 \times 3 = 12$

$2 \times 4 = 8$

$6 \times 2 = 12$
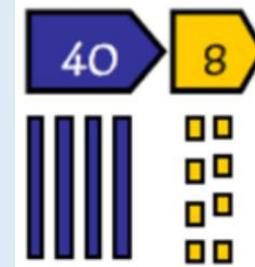
multiplication   product
once, twice, three times
double   groups of
repeated addition   lots of
array, row, column   multiply
times   multiple
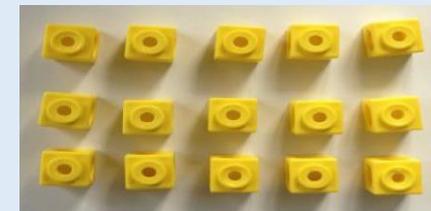
Multiplication: Reception

Early learning goal statutory requirement:
✓ They solve problems, including doubling, halving and sharing.

Use pictorial representations and concrete resources to double numbers to 10.

1 + 1 = 2   2 + 2 = 4   3 + 3 = 6   4 + 4 = 8

Use concrete sources, role play, stories and songs to begin counting in twos, fives and tens.

0 2 4 6 8 10

0 5 10 15 20 25 30

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Multiplication: Year 1

Year 1statutory requirement:
✓Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Count in twos, fives and tens using practical resources, role play, stories and songs.
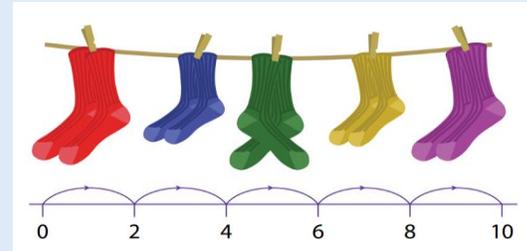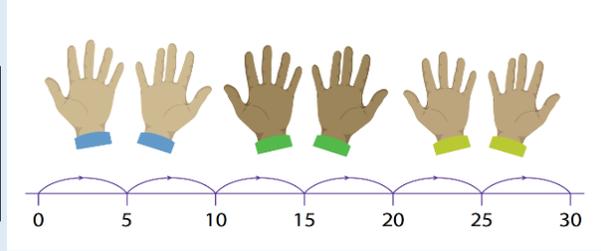
Use arrays

Understand multiplication as repeated addition – use concrete objects to support understanding.

2 + 2 + 2 + 2

5 + 5 + 5
or
3 x 5

Use pictorial representations

3 x 5
3 groups of 5

5
3 { }
15 apples

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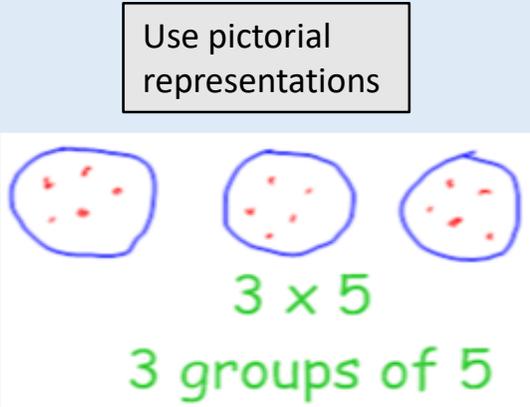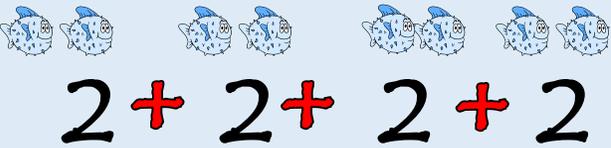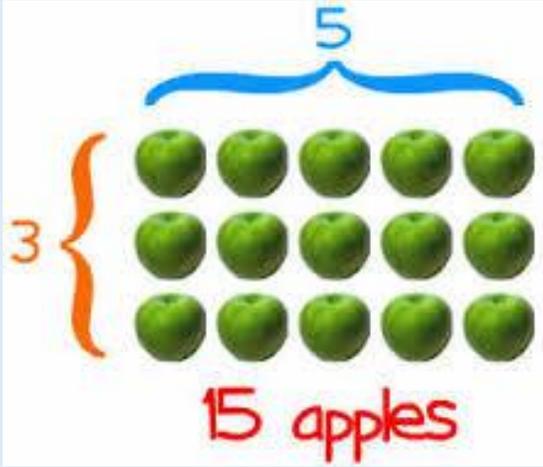
Multiplication: Year 2

Year 2 statutory requirement:

✓Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

✓Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.

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

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

Further develop understanding of multiplication as repeated addition.

Use pictorial representations

Use arrays

3 x 5

3 groups of 5

15 apples

5 + 5 + 5
or
5 x 3
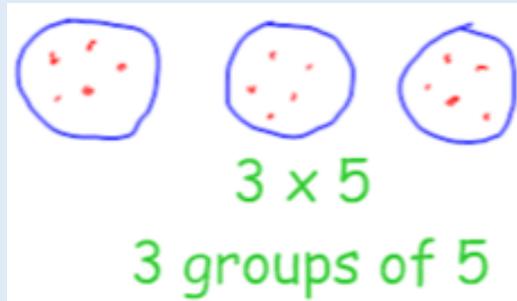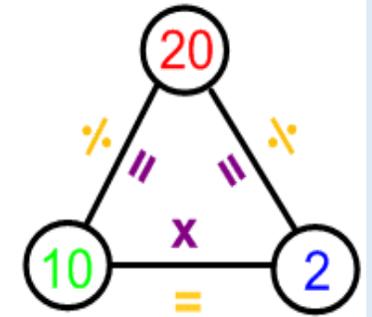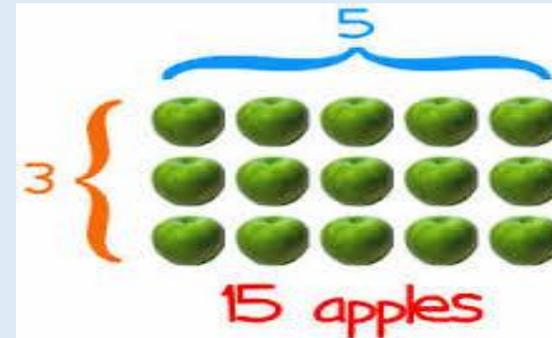
Recall multiplication and division facts for 2, 5, 10

Model and bridge link from repeated addition to solving multiplication problems using a number line.

9 groups of 2 = 18
9 jumps of 2 = 18
9 x 2 = 18

Multiplication: Year 3

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Maths
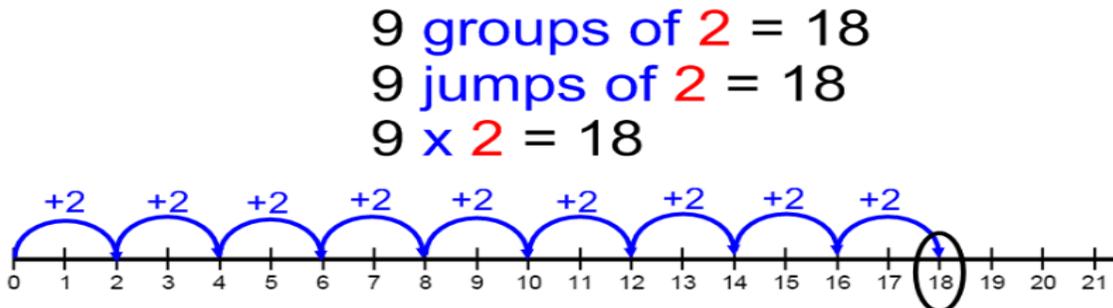
Develop recall of multiplication facts (alongside inverse of the corresponding division facts).
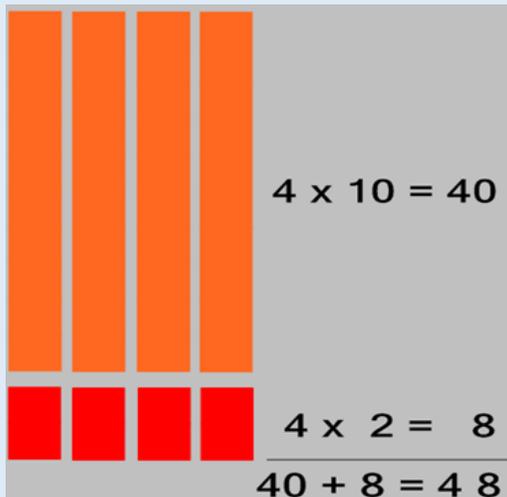
Year 3 statutory requirements:
- ✓ Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
- ✓ Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- ✓ Solve problems, including missing number problems, involving multiplication including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

x	3	4	8
5			
6			
4			

x	4	?	?
?	8	6	10
6	24	18	30
?	32	24	40

Use concrete resources and pictorial representations to develop conceptual understanding of the grid method of multiplication.

12 x 4 = 48

4 x 10 = 40

4 x 2 = 8

40 + 8 = 4 8

x	10	2
4		

OR

x	10	2
4	40	8

5cm

?cm

The yellow ribbon is 4 times as long as the red ribbon. What is it's length?

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Multiplication: Year 4

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Maths

Year 4 statutory requirement:
- ✓ Recall multiplication and division facts for multiplication tables up to 12 × 12
- ✓ Use place value, known and derived facts to multiply and divide mentally, including: multiply two-digit and three-digit numbers by a one-digit number using formal written layout.
- ✓ Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Develop recall of multiplication facts (alongside the inverse of the corresponding division facts).

Build on learning from Year 3, continue to use the grid method to multiply increasingly larger numbers.

$18 \times 3 = 54$

X	1 0	8
3	3 0	2 4

$135 \times 5 = 675$

X	1 0 0	3 0	5
5	5 0 0	1 5 0	2 5

$24 \times 16 = 384$

X	2 0	4
1 0	2 0 0	4 0
6	1 2 0	2 4

Use knowledge of times tables to solve scaling problems.

2 eggs
150g flour
180g sugar

Susie wants to bake 12 cupcakes people.
The ingredients given are for four cupcakes.
How much flour will she need?

x3

Cupcakes	Flour
4	150g
12	900g

x3

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Multiplication: Year 5

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Maths

To multiply by 10, 100, 1000 children should use place value charts to show that the digit moves a column (s) to the left .The value of the digit is increasing by 10, 100 or 1000 times.

Year 5 statutory requirements:
✓Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.
✓Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

Progressing from grid method to short multiplication The short multiplication method is introduced alongside the grid method and the expanded form to aid understanding.

24 x 6 =

x	20	4
6	120	24

24 x 6 =

```
    2 4
  x   6
    2 4  (4x6)
  1 2 0  (20x6)
  1 4 4
```

24 x 6 =

```
    2 4
  x   6
  1 ²4 4
```

124 x 5 =

```
    1 2 4
  x     5
      2 0  (4 x5)
    1 0 0  (20x 5)
    5 0 0  (100x5)
    6 2 0
```

124 x 5 =

```
    1 2 4
  x     5
  ³6 ²2 0
```

Th	H	T	U	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
		36	•42			

X 10

Th	H	T	U	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
	36	4	•2			

Year 5 statutory requirements:
✓Multiply numbers up to 4 digits by a 1- or 2-digit number using a formal written method, including long multiplication for two-digit numbers.
✓Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

Progressing from grid method to long multiplication. When long multiplication is first introduced, both equations should be presented so that the answers to the individual multiplication steps are on the same line. Children should be encouraged to discuss what is similar and what is different.

Multiplication: Year 6

Year 6 statutory requirements:
✓ Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.
✓ Multiply one-digit numbers with up to two decimal places by whole numbers.

Continue to use compact short multiplication to multiply by single digits

Multiplying a two digit number by a three or four digit number should be introduced through the grid method before moving to long multiplication to aid understanding. When long multiplication is first introduced, both equations should be presented so that the answers to the individual multiplication steps are on the same line. Children should be encouraged to discuss what is similar and what is different.

Division

Concrete resources:
Arrays
Multiplication squares
100 square
Number lines
Blank number lines
Counting stick
Place value apparatus

$18 \div 3 = 6$

5
3
15 apples
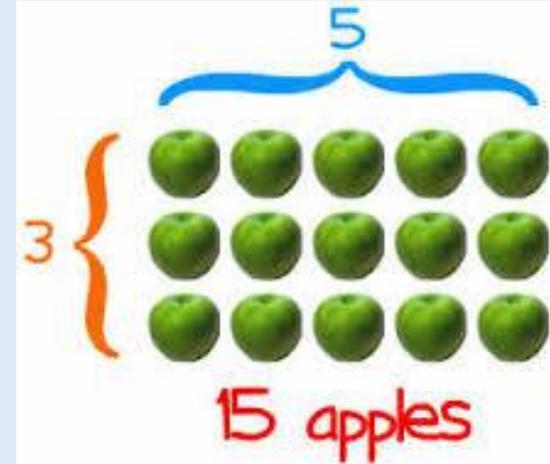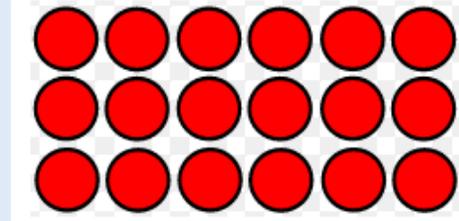
divided by
group
into groups of
into lots of
halve
divisible
remainder
half
factor

Division: Reception

Early learning goal statutory requirement:
✓They solve problems, including halving and sharing.

Use pictorial representations and concrete resources to halve numbers to 10.
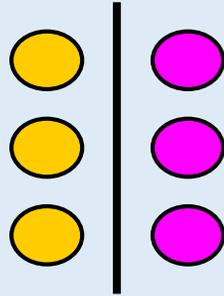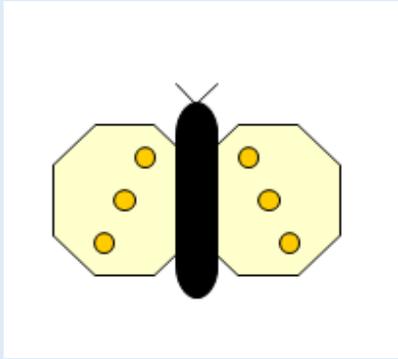
Begin to share quantities using practical resources, role play, stories and songs.

Role play example:
It is the end of the party and the final two teddies are waiting for their party bags. Provide empty party bags and a small collection of items such as gifts, balloons and slices of cake. Ask the children to share the objects between the two bags.

Division: Year 1

Year 1 statutory requirement:
- 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.

Understand division as **sharing** using concrete resources.

Pictorial representation of sharing **12 gold coins** between 2, 3 and 4 pirates!
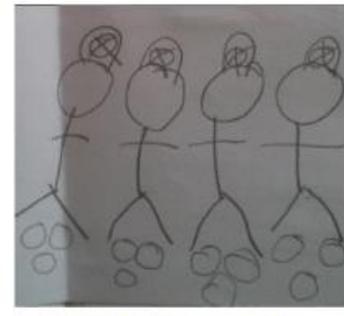
12 ÷ 2   12 ÷ 3   12 ÷ 4

Begin to understand division as **grouping** using concrete resources.

12 into groups of **2**
12 ÷ **2 = 6**

Division: Year 2

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Maths

Year 2 statutory requirement:
- ✓ Recall and use division facts for 2, 5 and 10 multiplication tables.
- ✓ Calculate mathematical statements for multiplication and division within the multiplication tables and write then using the multiplication (x), division ( ) and equals (=) signs.
- ✓ Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
- ✓ *Find 1/3; 1/4; 2/4; ¾ of a length, shape, set of objects or quantity*

Grouping using concrete resources
21 ÷ 3 = 7
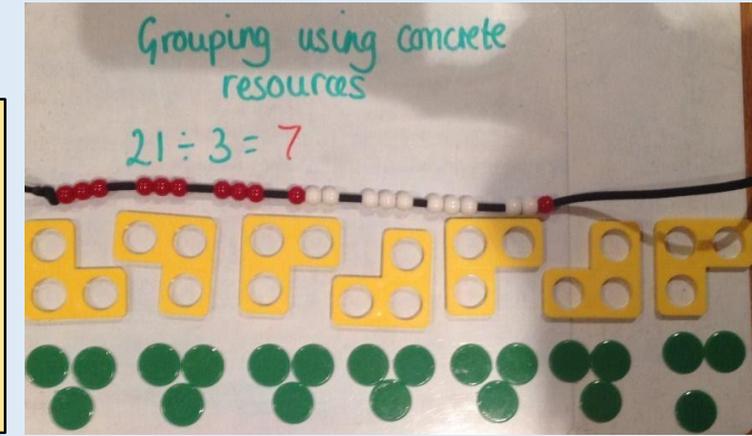
Further develop understanding of difference between **sharing and grouping** using concrete resources.
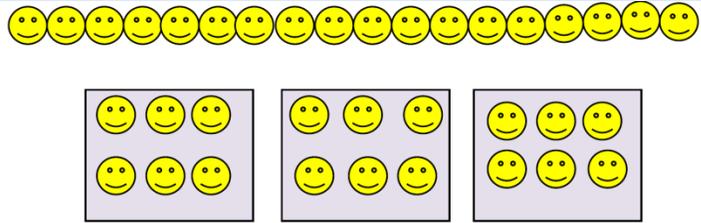
18 smiley faces shared between 3 classes.

18 into groups of 3
18 ÷ 3 = 6

Model division as grouping on a number line (ITP 'Grouping')
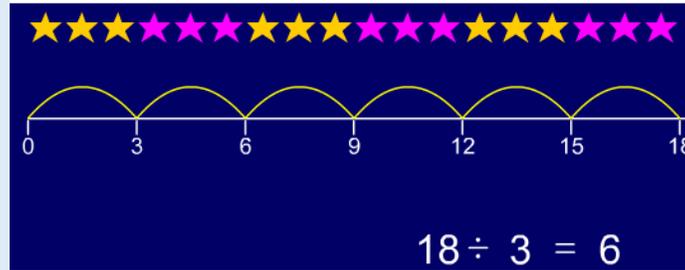
$18 \div 3 = 6$

Children use numbered number lines to divide using grouping.

18 into groups of 3 = 6 groups
18 into jumps of 3 = 6 jumps
18 ÷ 3 = 6

Reinforce division through the use of arrays.

$18 \div 3 = 6$

$18 \div 6 = 3$
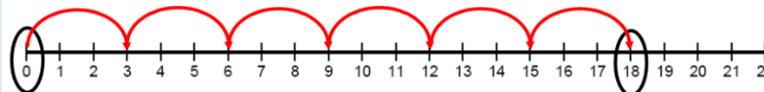
Remember to develop connections between fractions and division and rephrase this calculation as 1/3 of 18 is the same as 18 ÷ 3 = 6.

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Division: Year 3 & 4

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Maths

**Year 3 statutory requirement:**
✓Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
✓Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
✓ 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.

1. Grouping: A number line counting up from zero. This representation should be supported by grouping of concrete materials and other pictorial representations.

2. Grouping with remainders: Again using a number line counting up from zero. This should also be supported by grouping of concrete materials and other pictorial representations.

3. Efficient Grouping: Rather than counting individually, children now use groups for efficiency. The number of groups should be recorded above the jump.

$$30 \div 6 = 5$$

$$34 \div 6 = 5 \, r \, 4$$

$$48 \div 4 = 12$$
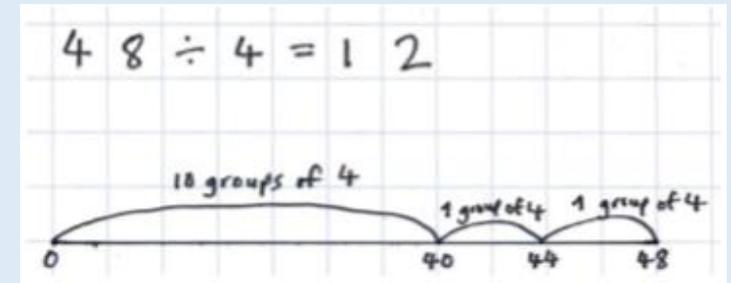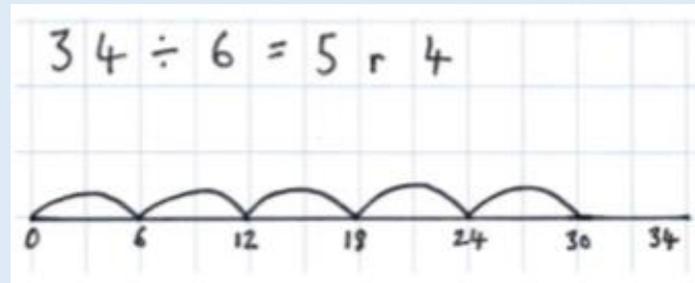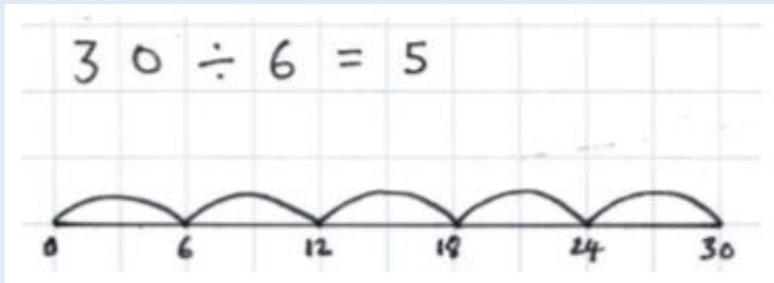
4. Efficient Grouping with remainders: The efficient grouping method now incorporates remainders

$$67 \div 4 = 16 \, r \, 3$$

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Division: Year 3 & 4*

Year 4 statutory requirement: Note - there isn't a statutory objective for division. However, Y4 statutory multiplication objectives are to (1) recall multiplication and division facts for multiplication tables up to 12 × 12 and (2) multiply two-digit and three-digit numbers by a one-digit number using formal written layout so we will build on the connections between multiplication and division.

In Year 4, continue to develop the use of informal number line methods taught in Year 3. Start to teach compact short division when children are secure with dividing on a number line. Teach compact short division using the following progression.

See video link in 'notes' to consider how to develop conceptual understanding of division using dienes.

Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).

Limit numbers to NO remainders in the final answer, but with remainders occurring within the calculation.

Extend to 3-digit number first where the divisor can go into the first number and then progress to when the divisor cannot go into the first number.

Remember to develop connections between fractions and division and rephrase these calculations as 1/3 of 96; ¼ of 72, ¼ of 872 and 1/5 of 185. Note: Year 3 fraction objective - *Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators;* Year 4 fraction objective: *solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number.*

Division: Year 5

Continue to use number lines to support the children's understanding of efficient grouping or the 'chunking' of multiples of the divisor.

Year 5 statutory requirement:
✓ divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

$432 \div 16 = 27$

+160 (10×6) +160 (10×6) +90 (5×18) +32 (2×16)

0   160   320   440   432

$327 \div 19 = 17 \ r \ 4$

+190 (10×19)   +95 (5×19)   +38 (2×19)

0   190   285   323   327
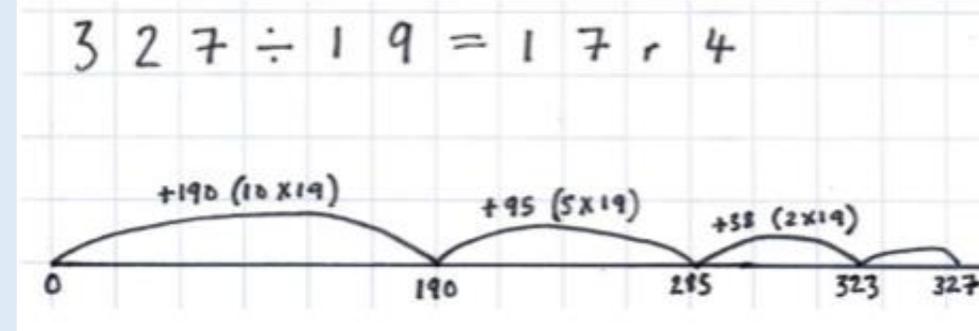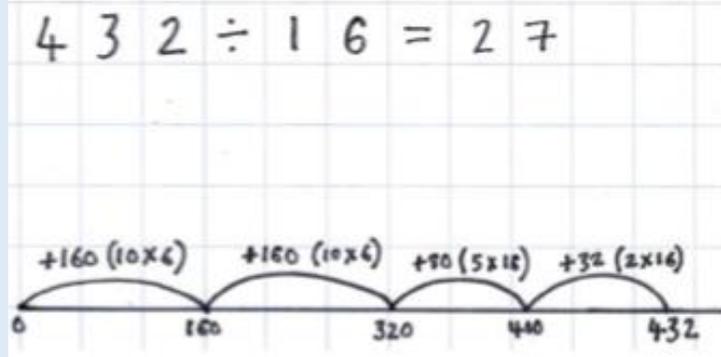
Further secure pupils' understanding of compact short division.

$218 \div 8 =$

$$8 \overline{) 2^2 1^5 8} \quad 2\ 7\ r\ 2$$

The vertical chunking method is introduced but only with a single digit divisor. The number of groups should be recorded alongside on the right with the answer written on top of the bus stop. When this is secure, the same layout is used with remainders.

$96 \div 4 = 24$

$$4 \overline{)96} \quad 24$$
-40 (10 × 4)
56
-40 (10 × 4)
16
-16 (4 × 4)
00

$43 \div 3 =$

$$3 \overline{)43} \quad 14\ r\ 1$$
-30 (10 × 3)
13
-12 (4 × 3)
01

Extend to expressing results in different ways according to the context, including with remainders as fractions, as decimals or by rounding. For example:

• Whole number remainder = **27 r 2**
• Fraction remainder = $27\frac{2}{8} = 27\frac{1}{4}$
• Decimal remainder = $27\frac{1}{4} = 27\frac{25}{100} = 27.25$

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Division: Year 6

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Maths

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Continue to use compact short division to divide numbers up to 4 digits by a 1-digit whole number.

Continue to develop the formal 'chunking' method to divide 3- or 4-digit numbers by a 2-digit whole number.

$218 \div 8 =$

- Whole number remainder $= 27 \text{ r } 2$
- Fraction remainder $= 27\frac{2}{8} = 27\frac{1}{4}$
- Decimal remainder $= 27\frac{1}{4} = 27\frac{25}{100} = 27.25$

If appropriate, the formal long division method can be introduced to divide numbers up to 4 digits by a 2-digit whole number.

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