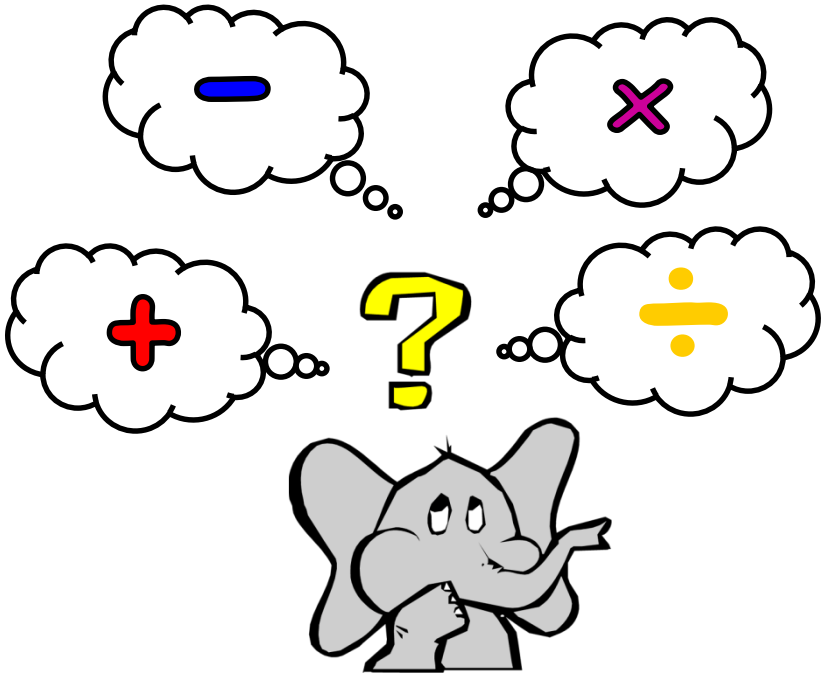
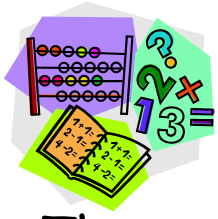
Progression in Calculations

Informal Curriculum 4 - 8

Formal Curriculum 8 - 15



Two Rivers Primary School

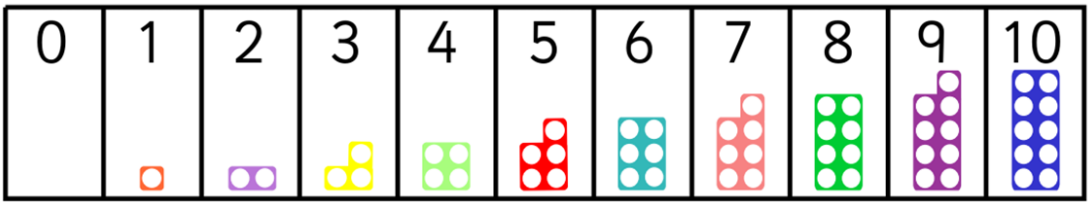


Introduction

The maths work your child is doing at school initially starts with practical applications to develop a good basis of mental maths skills – these skills are learnt through, actions, songs, repetition and the use of equipment. At Two Rivers School we ensure that these skills are learnt and developed on a daily basis in real life and practical situations.

This booklet is designed to inform you about the progression in calculation methods that we use at Two Rivers Primary for addition, subtraction, multiplication and division.

Later when children are taught more formal written methods they are encouraged to use these methods for calculations they cannot solve in their heads. We use Numicon to support our access and learning across the whole school.

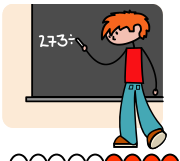


Written methods of calculations are based on mental strategies. Each of the four operations builds on mental skills which provide the foundation for jottings and informal written methods of recording. Skills need to be taught, practised and reviewed constantly. These skills lead on to more formal written methods of calculation when the children are ready for them. For many children this will be in the later years of primary school or into secondary school.

Strategies for calculation need to be supported by familiar models and images to reinforce understanding. When teaching a new strategy it is important to start with numbers that the child can easily manipulate so that they can understand the concept.

The transition between stages should not be hurried as not all children will be ready to move on to the next stage at the same time, therefore the progression in this document is outlined in stages. Previous stages may need to be revisited to consolidate understanding when introducing a new strategy.

A sound understanding of the number system is essential for children to carry out calculations efficiently and accurately.



By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved. Discussing the efficiency and suitability of different strategies is important.

Remember that the expanded methods are perfectly good ways of working out an answer if the children feel more comfortable and therefore find it easier. They give the same answer and it can often be quicker if they are confident about what they are doing.

These methods are very useful when children are extending their work, for example to numbers involving decimals.

Children should not be made to go onto the next stage if:

- they are not ready.
- they are not confident.

Mental calculation

Developing confidence and efficiency in mental calculations is a vital part of Maths teaching throughout Key Stage 2.

Regular practice of number facts is important both at school and at home. Any opportunities to practise are very useful, for example through **real life situations** such as shopping as well as activities such as games.

The children would greatly benefit from knowing key number facts by heart and recalling them instantly *(e.g. number bonds to 10, tables).*

There are many useful games on the internet which give children chance to practise number facts and mental calculations.

For example, Hit the Button is good for practising number bonds and tables facts.

Children can access Education City at home which has a selection of basic number facts games to explore.

Multiplication Facts

Remember that truly **knowing** tables is not the same as just being able to count up in steps of a given number or being able to recite the table.

Really knowing a table means that the children can instantly tell you any fact up to 10x. It also means knowing the corresponding division facts.

For example, a child who knows the 3x table well would be able to answer questions like these with very little hesitation:

9x3, 7 lots of 3, 3x4, 18÷3, how many 3s in 24?

As the children get more confident they should also have strategies for using known facts to help them work out other facts and also to work with larger numbers or decimals.

e.g. I know 5x3 is 15, so I can work out 50x3, 5x30, 150 ÷5, 500x3, 50x30, 5x0.3, 150 ÷30…

A suggested order for learning tables:

2x, 10x, 5x, 4x *(double 2x)*, 3x, 6x (double 3x), 9x, 8x, 7x

At Two Rivers this becomes part of our 20:20 sessions.

Just a few minutes a day could make a real difference to your child's confidence with number.

ICT links

There are many useful games on the internet which give children chance to practise number facts and mental calculations.

For example, **Hit the Button** is good for practising number bonds and tables facts.

You can also access a selection of basic number facts games on **Education City**.

Other useful sites include:

www.topmarks.co.uk select Games, 7-11 then category e.g. addition and subtraction

www.bbc.co.uk/schools/ks2bitesize/maths *(particularly useful for Y6)*

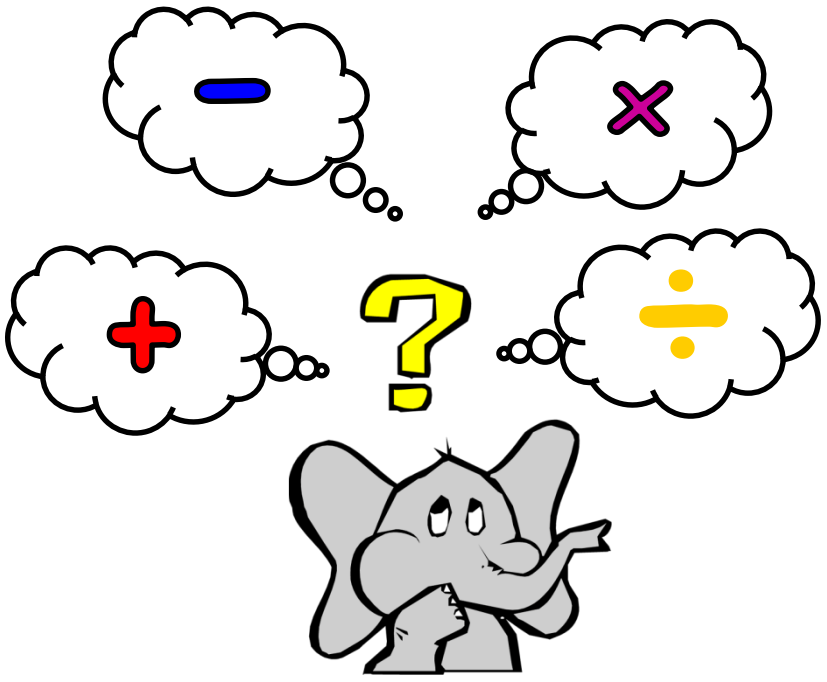
www.ictgames.com *(select numeracy - designed for infants but some useful games to practise basic number facts)*

mathsframe.co.uk/en/resources/category/22/most-popular

Numberblocks - CBeebies – BBC

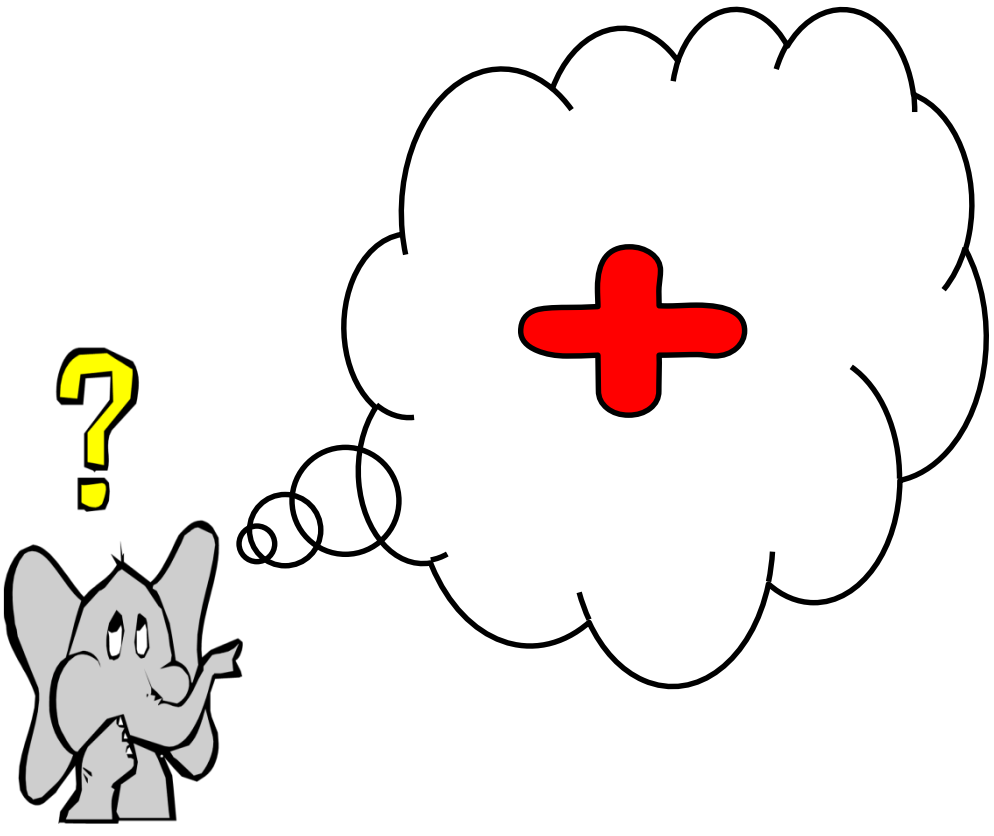
Progression in Calculations

Informal Curriculum 4 - 8



Two Rivers Primary School

Addition



add and count on
addition plus
more sum total
altogether increase

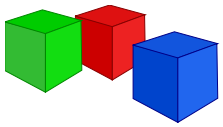
Recognise numbers 0 to 10

0 1 2 3 4 5 6 7 8 9 10

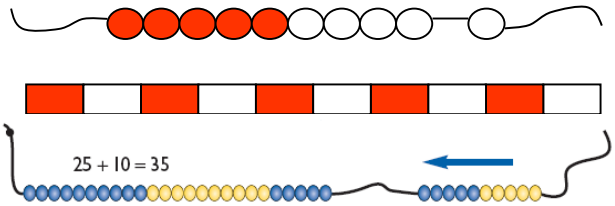
1, 2, 3, 4, 5, 6 … there are 6 teddies

Count reliably up to 10 everyday objects

Find one more than a number



One more than three is four



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

Count in ones and tens

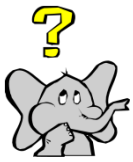
Begin to relate addition to combining two groups of objects

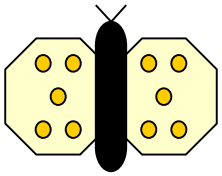
3 + 2 = 5

Count along a number line to add numbers together

Begin to use the + and = signs to record mental calculations in a number sentence

6 + 4 = 10

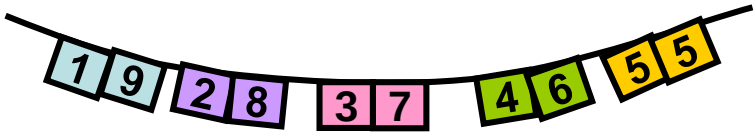


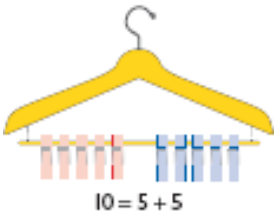


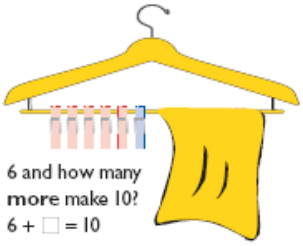
5 + 5 = 10

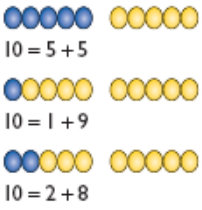
Know doubles of numbers

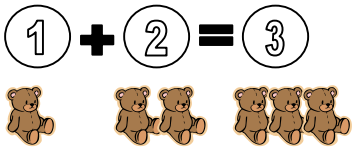
Know by heart all pairs of numbers with a total of 10

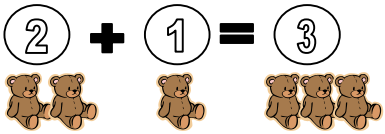


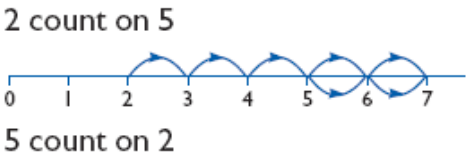






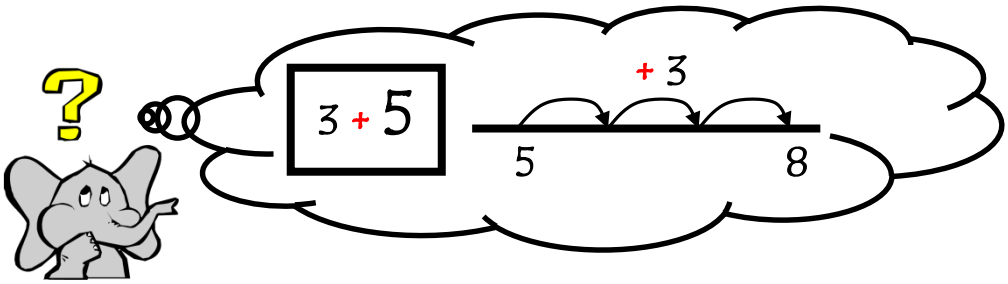




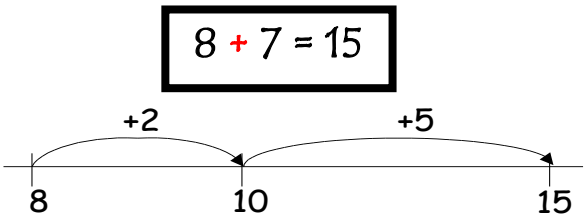


Know that addition can be done in any order

Put the biggest number first and count on

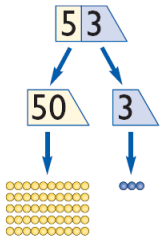


Next Steps…

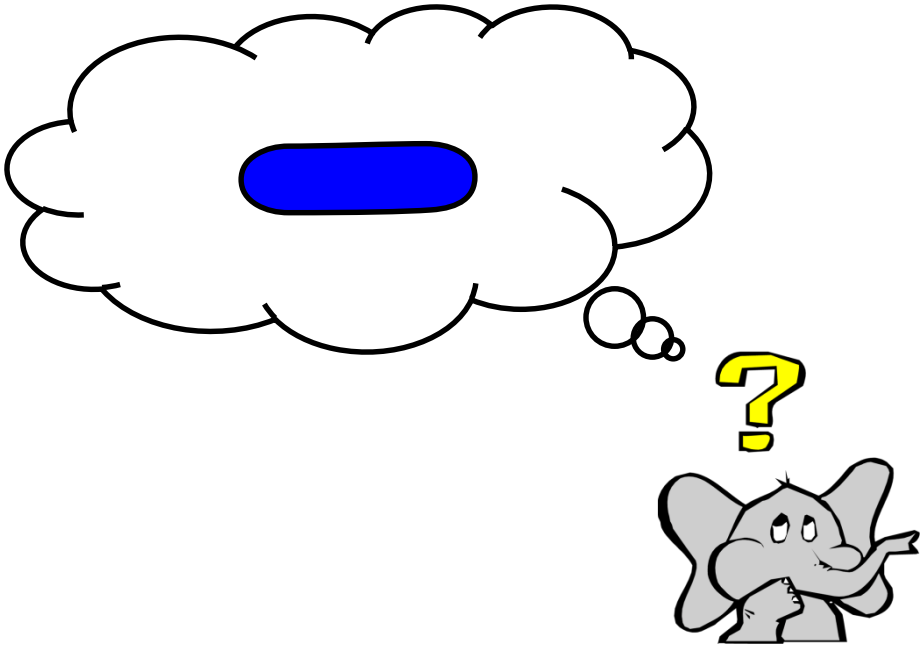


Add two single-digit numbers that bridge 10

Begin to partition numbers in order to add



Subtraction



count back

take away

fewer

subtract

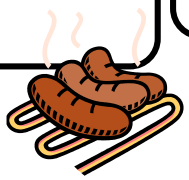
minus

less

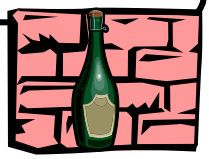
difference between

Begin to count backwards in familiar contexts such as number rhymes or stories

Five fat sausages frying in a pan …



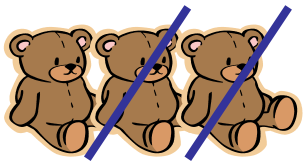
Ten green bottles hanging on the wall …



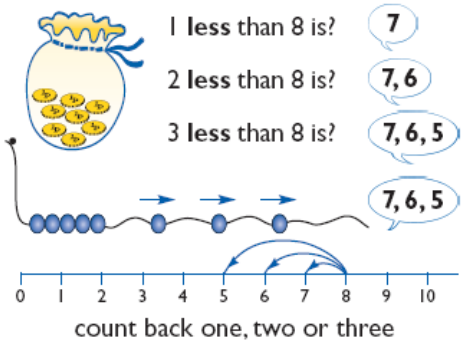
10, 9, 8, 7 . . .

Continue the count back in ones from any given number

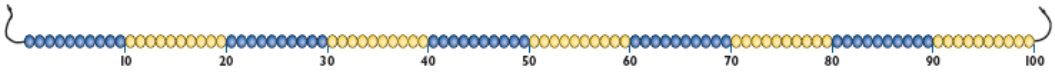
Begin to relate subtraction to ' taking away '

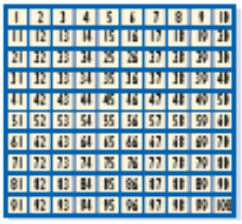


Three teddies take away two teddies leaves one teddy

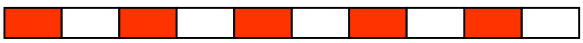


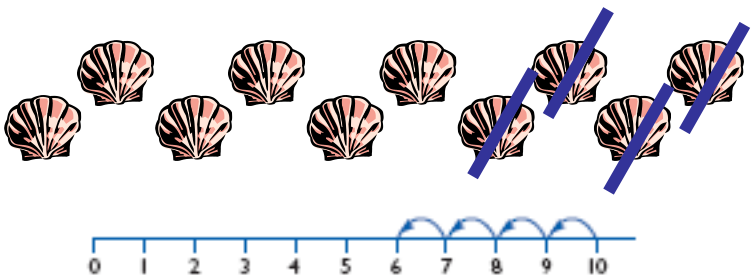
Find one less than a number





Count back in tens





If I take away four shells there are six left

Count backwards along a number line to ' take away

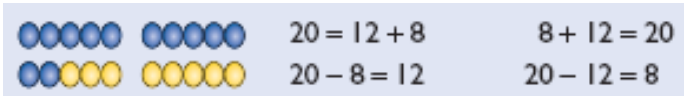
Begin to use the – and = signs to record mental calculations in a number sentence

Maria had six sweets and she ate four. How many did she have left?

6 – 4 = 2

6 + ? = 10
10 – 6 = ?

? + 6 = 10
10 – 4 = 6

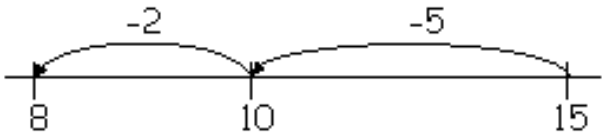


Know by heart subtraction facts for numbers up to 10 and 20

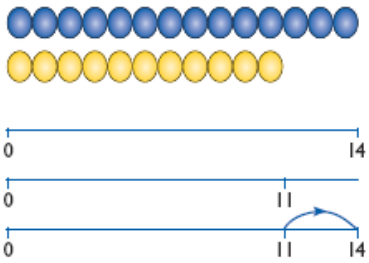
Next Steps…

Subtract single digit numbers often bridging through 10

15 – 7 = 8



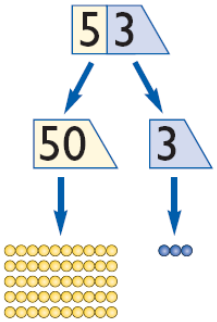
The difference is?



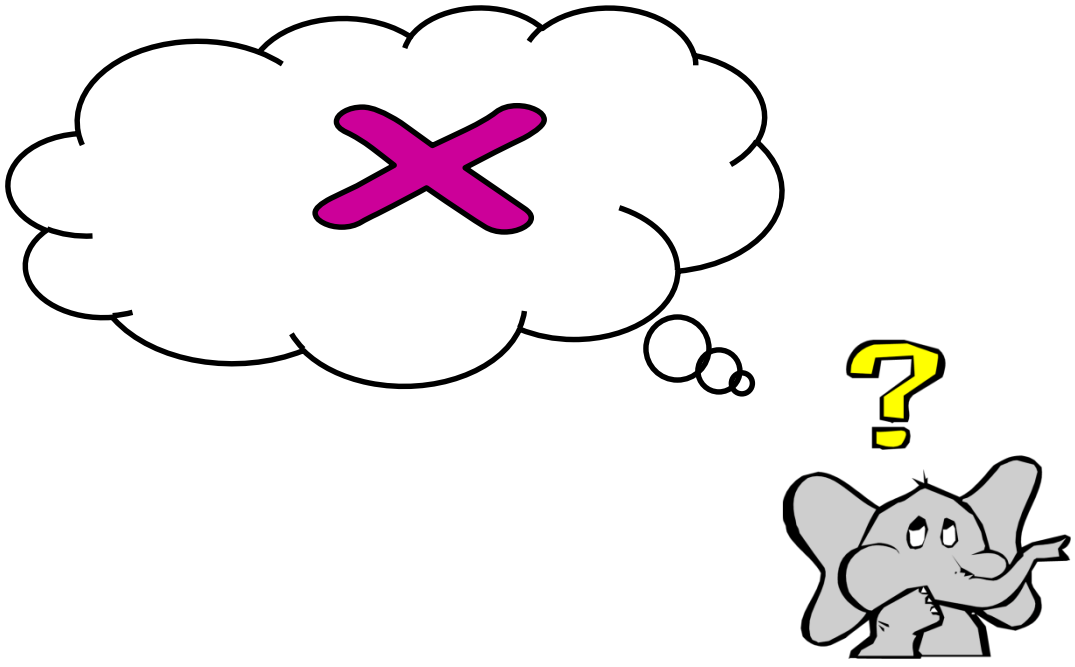
The difference between 11 and 14 is 3.
14 – 11 = 3
11 + ☐ = 14

Begin to find the difference by counting up from the smallest number

Begin to partition numbers in order to take away



Multiplication



multiplication product

once, twice, three times

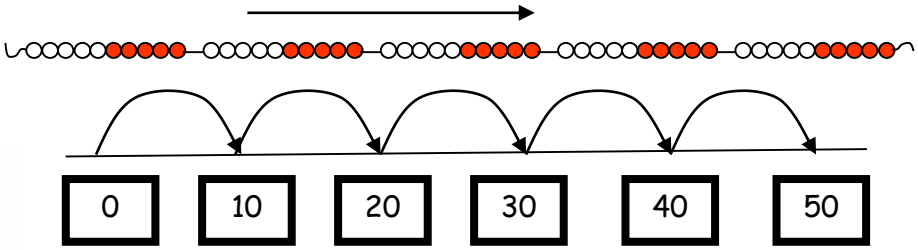
double groups of

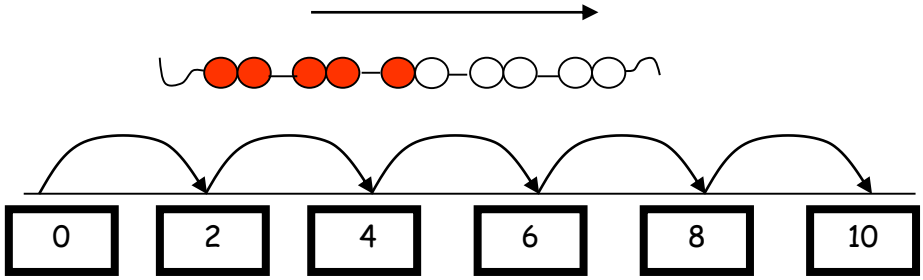
repeated addition lots of

array, row, column multiply

times multiple

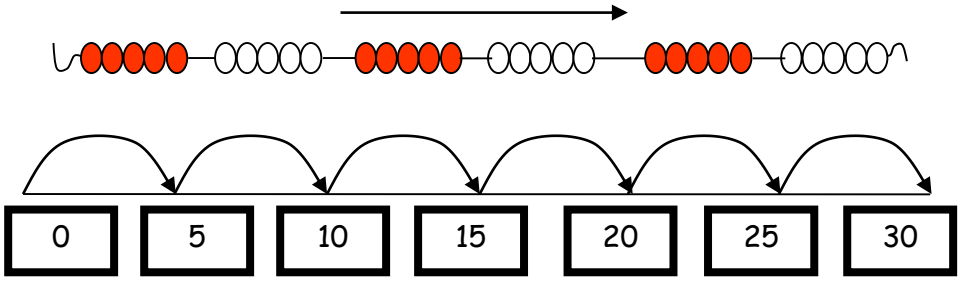
Count in tens from zero

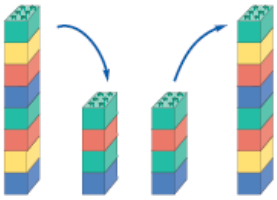




Count in twos from zero

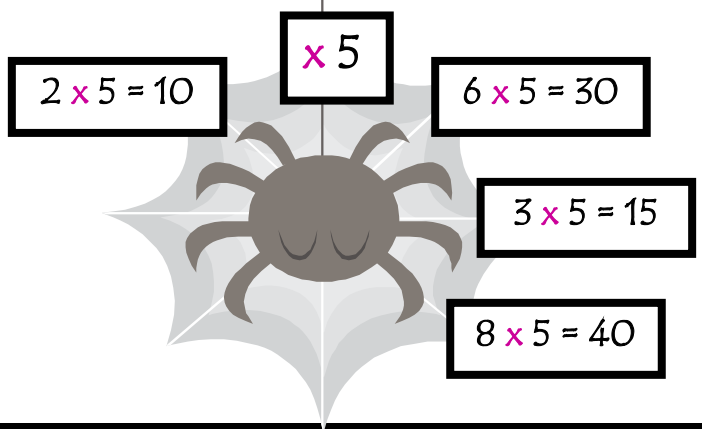
Count in fives from zero

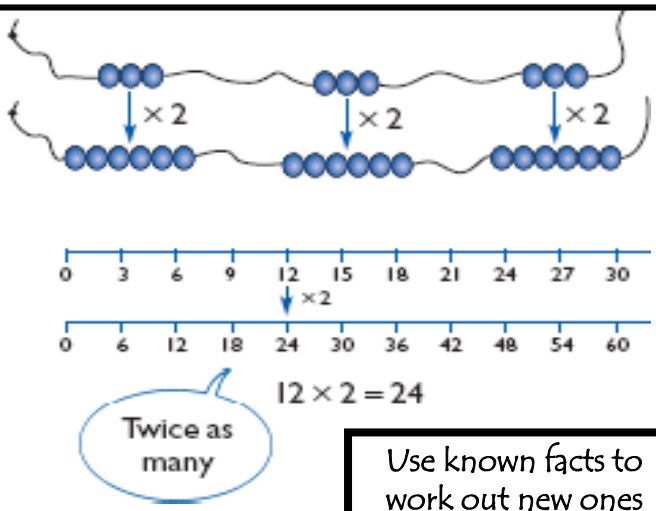




Know doubles and corresponding halves

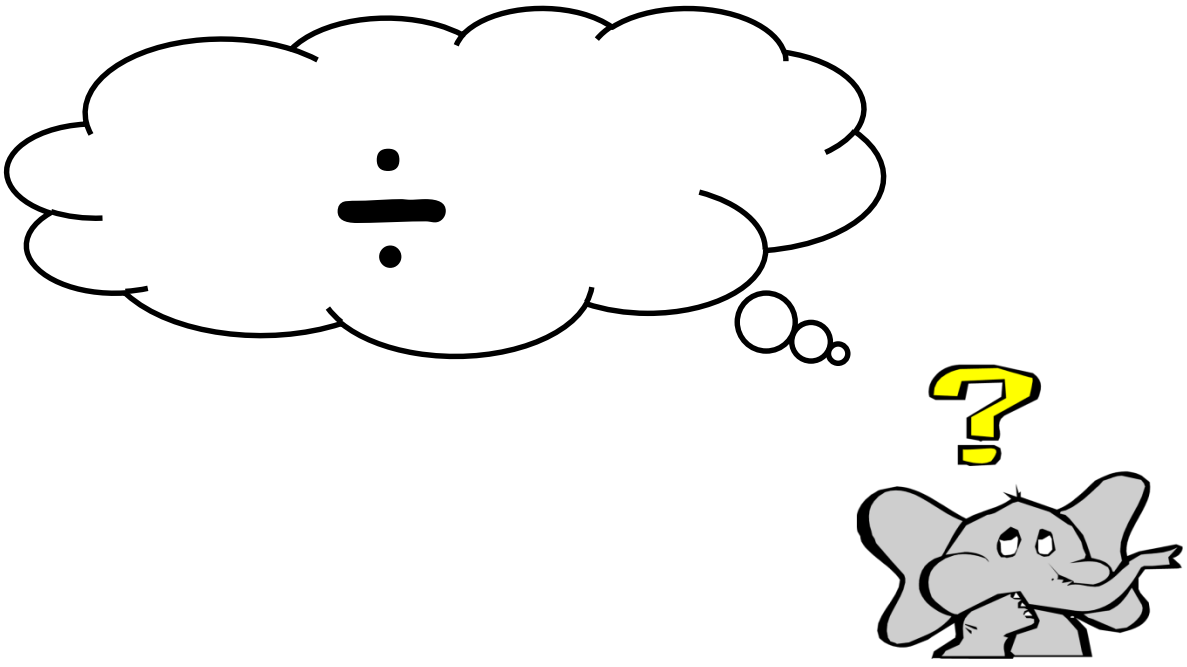
Know multiplication tables to 10 x 10





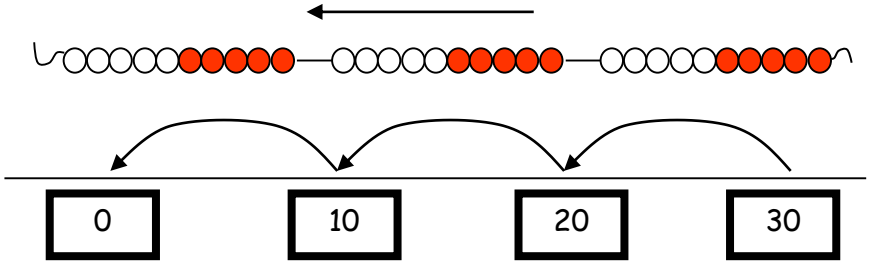
Use known facts to work out new ones

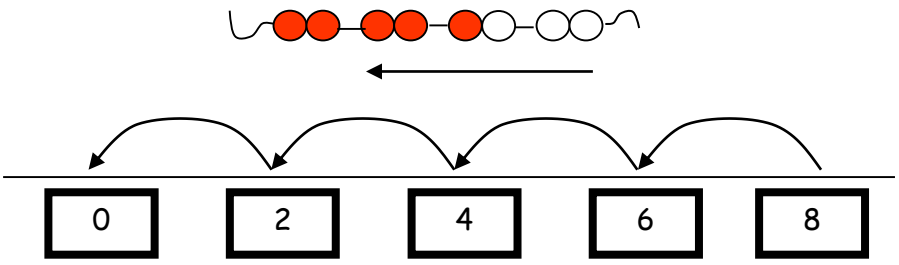
Division



group
groups of
lots of
divide
divided by
quotient
division
factor
remainder
divisible
share
half
halve

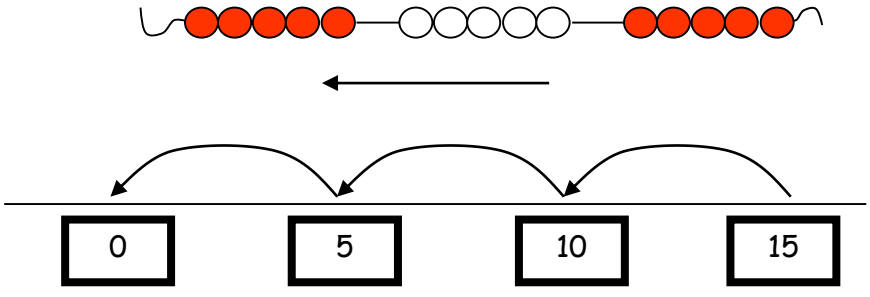
Count back in tens

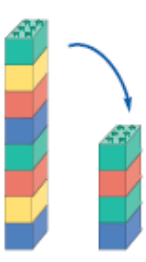




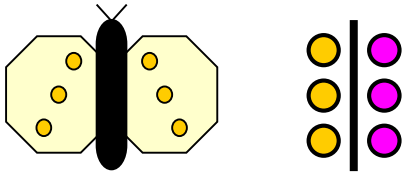
Count back in twos

Count back in fives





half of 8 is 4
8 ÷ 2 = 4



Half of 6 is 3
½ of 6 = 3

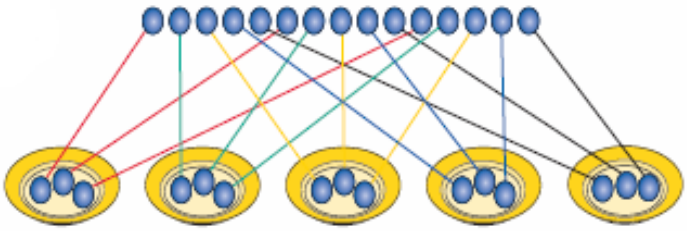
Know halves

Use known multiplication facts to work out corresponding division facts

If 2 x 10 = 20
then
20 ÷ 10 = 2
20 ÷ 2 = 10

15 ÷ 5 = 3

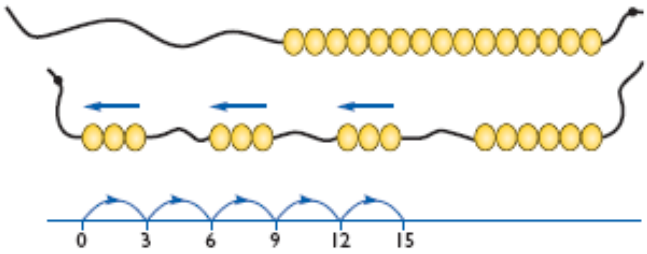
15 shared between 5

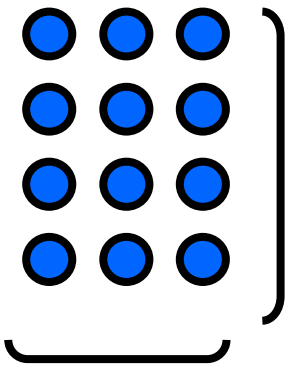


Understand division as sharing

Next Steps…

Understand division as grouping





12 divided into groups of 3 gives 4 groups

12 ÷ 3 = 4

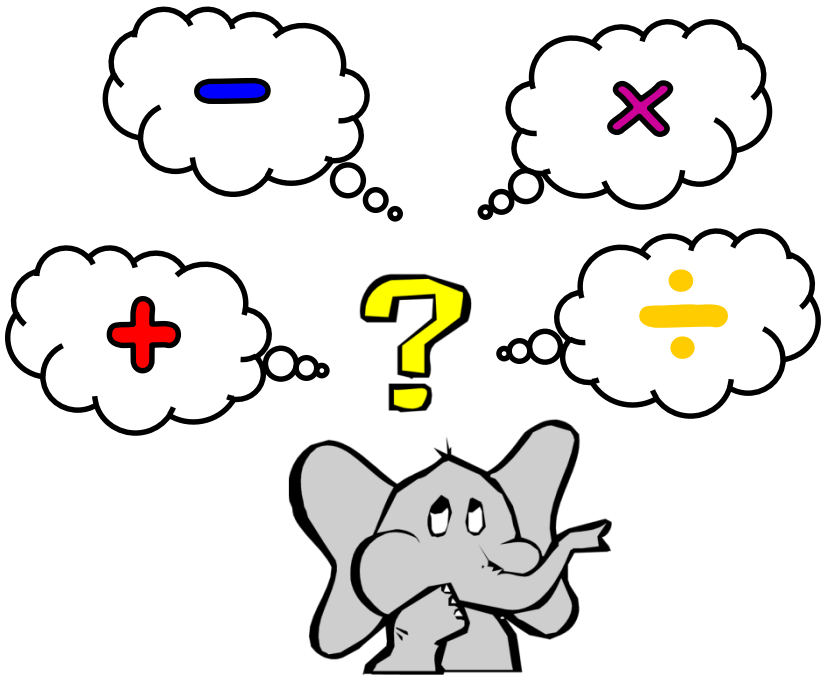
12 divided into groups of 4 gives 3 groups

12 ÷ 4 = 3

Reinforce division as grouping through the use of arrays

Progression in Calculations

Formal Curriculum 8 - 15



Two Rivers Primary School

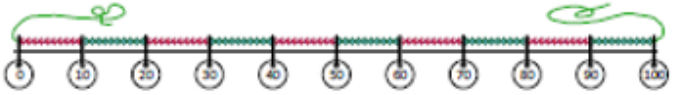
Addition and subtraction are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using + and two using -) which can be written to express the relationship between 4 and 6 and 10. It is key to a good understanding of addition and subtraction that 6 + [] = 10 and 10 - 6 = [] are seen as ways of expressing the same question.

P8 /P9

+ Addition

Using place value

Count on in ones/counting in tens, *e.g. knowing 45 + 1 or 45 + 10 without counting on in ones.*



45 + ☐ = 50 65 + ☐ = 70

85 + ☐ = 90

Bead strings and 1-100 number grid help counting on/back in tens.

Counting on

Count on in ones, *e.g. 11 + 2 =* and *7 + 4 =*

Count on in tens, *e.g. 45 + 20 as 45, 55, 65*

Using number facts

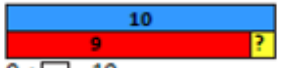
'Story' of 4, 5, 6, 7, 8 and 9, *e.g. 7 = 7 + 0 or 6 + 1 or 5 + 2 or 4 + 3.*

Number bonds to 10, *e.g. 5 + 5 , 6 + 4, 7 + 3, 8 + 2, 9 + 1, 10 + 0.*

6 + ☐ = 10

7 + ☐ = 10

5 + ☐ = 10



9 + ☐ = 10

Patterns using known facts, e.g. 4 + 3 = 7 so we know 24 + 3, 44 + 3, 74 + 3, etc.

- Subtraction

Using place value

Count back in 1s/Count back in 10s.

Say one less than any number to 100.

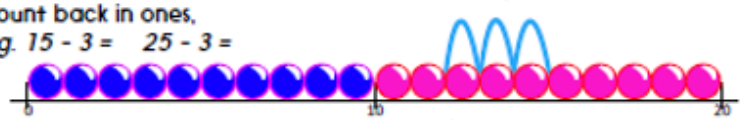
Say 10 less without counting back in ones.

33 - 10 = 23

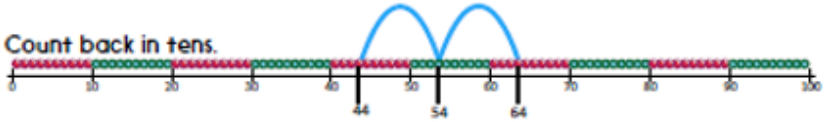
Subtracting by taking away

Count back in ones,

e.g. 15 - 3 = 25 - 3 =



Count back in tens.



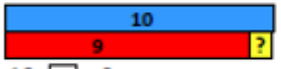
Using number facts

'Story' of 4, 5, 6, 7, 8 and 9, *e.g. 7 - 1 = 6, 7 - 2 = 5, 7 - 3 = 4, etc.*

Number bonds to 10, *e.g. 10 - 1 = 0, 10 - 2 = 8, 10 - 3 = 7, etc.*

Missing number sentences, 3 + [] = 7, link addition and subtraction.

10 - ☐ = 7



10 - ☐ = 9

Patterns using known facts, *e.g. 10 - 7 = 3 so we know 30 - 7 = ?*

Addition and subtraction are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using + and two using -) which can be written to express the relationship between 4 and 6 and 10. It is key to a good understanding of addition and subtraction that 6 + [] = 10 and 10 - 6 = [] are seen as ways of expressing the same question.

P9/P10/P11

+ Addition

Using place value

Know 1 more or 10 more than any number, e.g. 1 more than 67 or 10 more than 85.

Partitioning, e.g. 55 + 37 as 50 + 30 and 5 + 7 finally combining the two totals: 80 + 12.

50 + 30 = 80

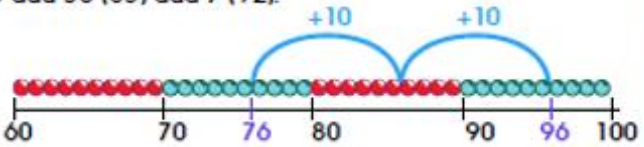
5 + 7 = 12

80 + 12 = 92

Bead strings and 1-100 number grid help counting on/back in tens.

Counting on

Add ten and mupltiples of ten, e.g. 76 + 20 as 76 , 86, 96 or in one hop 76 + 20. Add two 2-digit numbers by counting on in tens and then in ones, e.g. 55 + 37 as 55 add 30 (85) add 7 (92).



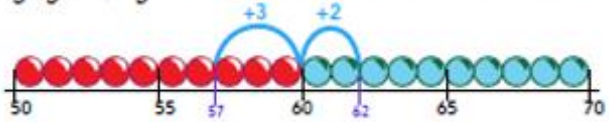
Add near multiples, e.g. 46 + 19 or 63 + 21.

Using number facts

Know pairs of numbers which make the numbers up to and including 10, e.g. *8 = 4&4, 3&5, 2&6, 1&7 and 10 = 5&5, 4&6, 3&7, 2&8, 1&9, 0&10.*

Patterns of known facts, e.g. *6 + 3 = 9, so we know 36 + 3 = 39, 66 + 3 = 69, 53 + 6 = 59.*

Bridging ten, e.g. *57 + 5 as 57 add 3 then add 2 more.*



Missing number sentences, 3 + [] = 7, link addition and subtraction.

Adding three or more single-digit numbers, spotting bonds to 10 or doubles, e.g. *6 + 7 + 4 + 2 as 10 + 7 + 2.*

- Subtraction

Using place value

Know 1 less or 10 less than any number, e.g. 1 less than 74 or 10 less than 82.

Partitioning, e.g. 55 - 32 as 50 - 30 and 5 - 2 combining the answers: 20 + 3.

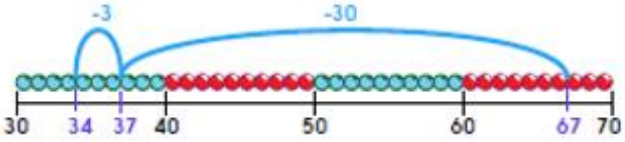
50 - 30 = 20

5 - 2 = 3

55 - 32 = 23

Taking away

Subtract ten and multiples of ten, e.g. *76 - 20 as 76, 66, 56 or in one hop 76 - 20 = 56.* Subtract two 2-digit numbers by counting back in tens then in ones, e.g. *67 - 33 as 67 subtract 30 (37) then count back 3 (34).*



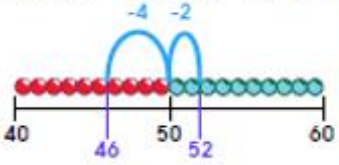
Subtracting near multiples, e.g. *74 - 21 or 57 - 19.*

Using number facts

Know pairs of numbers which make the numbers up to and including 10, e.g. *10 - 6 = 4, 8 - 3 = 5, 5 - 2 = 3, etc.*

Patterns of known facts, e.g. *9 - 6 = 3, so we know 39 - 6 = 33, 69 - 6 = 63, 89 - 6 = 83.*

Bridge ten, e.g. *52 - 6 as 52 subtract 2 then subtract 4 more.*



Counting up

Find a difference between two numbers on a line, e.g. *51 - 47.*

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P10/P11/P12

+ Addition

Using place value

Count in hundreds, e.g. knowing 475 + 200 as 475, 575, 675.

Add multiples of 10, 100 and £1,
e.g. 746 + 200 or 746 + 40 or
£6.34 + £5 as £6 + £5 and 34p.

Partitioning, e.g. 68 + 74 as 60 + 70 and 8 + 4 and combine the totals: 130 + 12 = 142
Or £8.50 + £3.70 as £8 + £3 and 50p + 70p and combine: £11 + £1.20.

Counting on

Add 2-digit numbers by adding the multiple of ten then the ones, e.g. 67 + 55 as 67 add 50 (117) add 5 (122).
Add near multiples of 10 and 100, e.g. 67 + 39 or 364 + 199.

Count on from 3-digit nos, e.g. 247 + 34 as 247 + 30 (277) then 277 + 4 = 281.

Using number facts:

Number bonds to 100, e.g. 35 + 65, 46 + 54, 73 + 27, etc.

100	
65	35

Add to next ten and next hundred, e.g. 176 + 4 = 180, 435 + 65 = 500, etc.

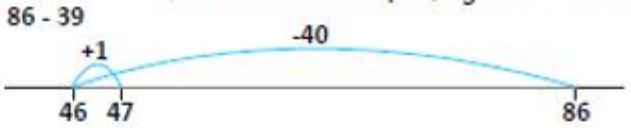
Subtraction is both taking away and - importantly - difference.

We no longer count in 1s but use PV and number facts.

- Subtraction

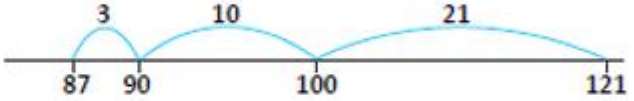
Taking away

Use place value to subtract, e.g. 358 – 300 or 348 – 40 or 348 – 8.
Taking away multiples of 10, 100 and £1, e.g. 476 – 40 = 436, 476 – 300 = 176, £4.76 - £2 = £2.76.
Partitioning, e.g. 68 – 42 as 60 – 40 and 8 – 2 or £6.84 - £2.40 as £6 - £2 and 80p – 40p.
Count back in hundreds, tens and then ones, e.g. 763 – 121 as 763 – 100 (663) then subtract 20 (643) then subtract 1 (642).
Subtract near multiples, e.g. 648 – 199 or 86 – 39.



Counting up

Find a difference between two numbers by counting up from the smaller to the larger, e.g. 121 – 87.



Using number facts:

Number bonds to 100, e.g. 100 – 35 = 65, 100 – 48 = 52, etc.

100	
48	?

Addition and subtraction are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using + and two using -) which can be written to express the relationship between 4 and 6 and 10. It is key to a good understanding of addition and subtraction that 6 + [] = 10 and 10 - 6 = [] are seen as ways of expressing the same question.

P10/P11/P12

+ Written Addition

Written method:

Build on partitioning to develop expanded column addition with two 3-digit numbers.

	400	60	6
+	300	50	8
	700	110	14

Expanded column addition with 'carrying'.

	400	60	6
+	300	50	8
	100	10	
	800	20	4

Compact column addition with two or more 3-digit numbers or towers of 2-digit numbers.

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

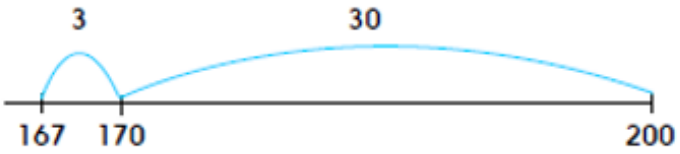
Compact column addition with 3-digit numbers

Recognise fractions which add to 1, e.g. ¼ + ¾ or ⅖ + ⅗.

Counting up subtraction is a crucial mental strategy.

- Written Subtraction

Develop counting up subtraction.



Use counting up subtraction to find change from £1 and £10.

£3 + 16p = £3.16

Recognise complements of any fraction to 1, e.g. 1 – ¼ = ¾ or 1 - ⅔ = ⅓.

Important to see the visual image of fractions totalling one whole.

Addition and subtraction are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using + and two using -) which can be written to express the relationship between 4 and 6 and 10. It is key to a good understanding of addition and subtraction that 6 + [] = 10 and 10 - 6 = [] are seen as ways of expressing the same question.

P12/P13/P14

+ Addition

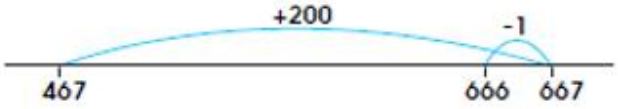
Using place value

Count in thousands, e.g. knowing 475 + 200 as 475, 575, 675.
Partitioning, e.g. 746 + 203 as 700 + 200 and 46 + 3
or 134 + 707 as 130 + 700 and 4 + 7.

PV and number facts are central to mental strategies.

Counting on

Add 2-digit numbers by adding the multiple of ten then the ones, e.g. 67 + 55 as 67 add 50 (117) add 5 (122).
Add near multiples of 10, 100 and 1000, e.g. 467 + 199 or 3462 + 2999.



Count on to add 3-digit numbers and money, e.g. 463 + 124 as
463 + 100 (563) + 20 (583) + 4 = 587 or £4.67 + £5.30 as £9.67 add 30p.

Using number facts

Number bonds to 100 and to next multiple of 100,
e.g. 463 + 37, 1353 + 47.

Number bonds to £1 and to the next whole pound,
e.g. £3.45 + 55p.
Add to the next whole number, e.g. 4.6 + 0.4 or 7.2 + 0.8.

Counting up is essential for money calculations and, later, decimals.

- Subtraction

Taking away

Use place value to subtract, e.g. 4748 - 4000 or 4748 - 8, etc.

Take away multiples of 10, 100, 1000, £1, 10p or 0.1, e.g. 8392 - 50 or 6723 - 3000 or £3.74 - 30p or 5.6 - 0.2.

Partioning, e.g. £5.87 - £3.04 as £5 - £3 and 7p - 4p or 7493 - 2020 as 7000 - 2000 and 90 - 20.

Count back, e.g. 6482 - 1301 as 6482 - 1000, then - 300, then -1 (5181).
Subtract near multiples, e.g. 3522 - 1999 or £34.86 - £19.99.

Counting up

Find a difference between two numbers by counting up from the smaller to the larger, e.g. 506 - 387.

100 + 10 + 6 + 3 = **119**

Using number facts

Number bonds to 10, 100 and derived facts,
e.g. 100 - 76 = 24, 1.0 - 0.6 = 0.4.

100	
76	24

Number bonds to £1 and £10,
e.g. £1.00 - 86p = 14p or £10 - £3.40 = £6.60.

P12/P13/P14

Addition and subtraction are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using + and two using -) which can be written to express the relationship between 4 and 6 and 10. It is key to a good understanding of addition and subtraction that 6 + [] = 10 and 10 - 6 = [] are seen as ways of expressing the same question.

+ Written Addition

Build on expanded column addition to develop compact column addition with larger numbers.

	1000	400	60	8
+	4000	800	60	6
	1000	100	10	
	6000	300	30	4

Expanded methods firm up a robust understanding of place value.

Compact column addition with larger numbers.

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

Use expanded and compact column addition to add amounts of money, e.g. £3.24 + £2.58.

£3	20p	4p	
£2	50p	8p	
£5	70p	12p	£5.82

	£3.24
+	£2.58
	1
	£5.82

Stress that decimals and fractions are parts of a whole.

Add like fractions, e.g. $\frac{3}{8} + \frac{1}{8} + \frac{1}{8}$.

- Written Subtraction

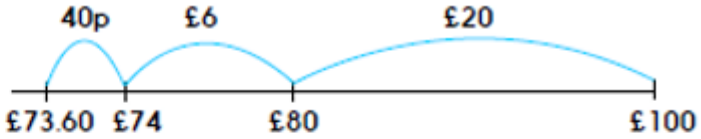
Expanded column subtraction.

	600	110	16
	~~700~~	~~20~~	~~6~~
-	300	50	8
	300	60	8

Begin to use column subtraction.

	6	11	16
	~~7~~	~~2~~	~~6~~
-	3	5	8
	3	6	8

Use counting up subtraction to find change from £10, £20, £50 and £100, e.g. £100 - £73.60.



£20 + £6 + 40p = £26.40

Subtract like fractions, e.g. $\frac{3}{8} - \frac{1}{8} = \frac{2}{8}$.

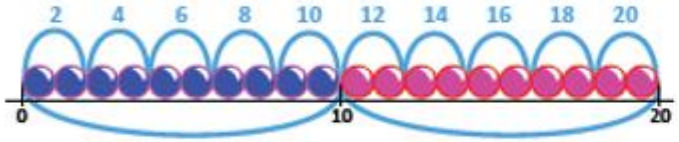
Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using x and two using ÷ which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that [] x 5 = 45 and 45 ÷ 5 = [] are seen as ways of expressing the same question.

P8 /P9

x Multiplication

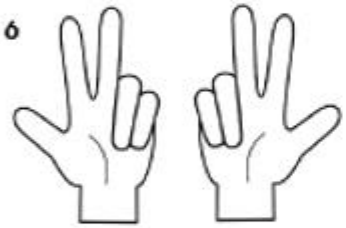
Counting in steps ('Clever' counting)

Count in 2s and 10s.



Doubling and halving

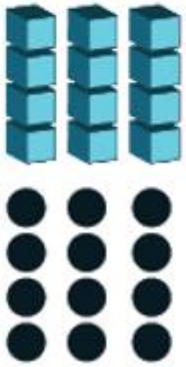
Find doubles to double 6 using fingers.



'Clever' counting is an excellent basis for multiplication and division.

Grouping

Begin to use visual and concrete arrays and 'sets of' objects to find the answers to '3 lots of 4' or '2 lots of 5', etc.

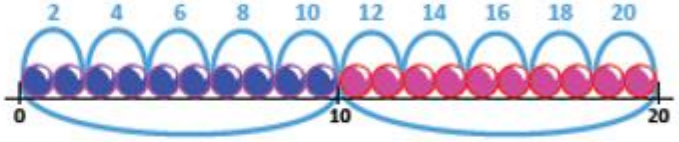


Division must be presented as the inverse of multiplication (grouping).

÷ Division

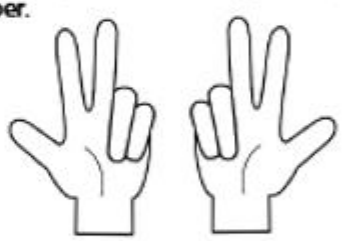
Couting in steps ('Clever' counting)

Count in 2s, and 10s.



Doubling and halving

Find half of even numbers up to 12 including realising that it is hard to halve an odd number.

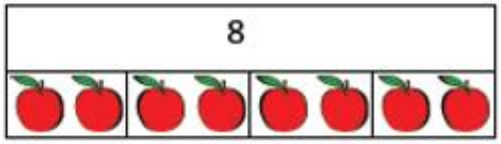


Grouping

Begin to use visual and concrete arrays and 'sets of' objects to find the answers to *'how many towers of 3 can I make with 12 cubes?'*

Sharing

Begin to find half of a quantity using sharing, *e.g half of 16 cubes by giving one each repeatedly to two children.*



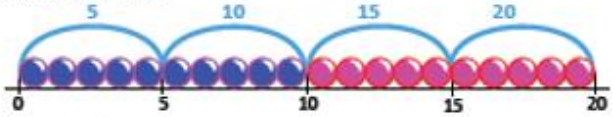
Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using x and two using ÷ which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that [] x 5 = 45 and 45 ÷ 5 = [] are seen as ways of expressing the same question.

P9/P10/P11

x Multiplication

Counting in steps ('Clever' counting)

Count in 2s, 5s and 10s.



Begin to count in 3s.

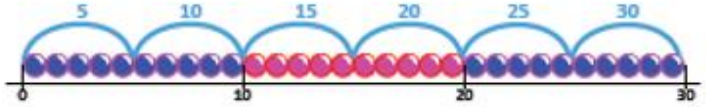
'Clever' counting is an excellent basis for multiplication and division.

Doubling and halving

Begin to know doubles of multiples of 5 to 100, *e.g. double 35 is 70.*

Grouping

Use arrays to find answers to multiplication and relate to 'clever' counting, *e.g. 3 x 4 as three lots of four things and 6 x 5 as six steps in the 5s count as well as six lots of five.*



Understand that 5 x 3 can be worked out as three 5s or five 3s.

Use number facts

Know doubles to double 20

Double 7 = 14

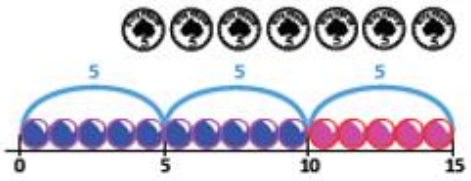
Division, grouping, is the inverse of multiplication.

Start learning 2x, 5x, 10x tables, relating these to 'Clever counting' in 2s, 5s, and 10s, *e.g. 5 x 10 = 50, and 10, 20, 30, 40, 50 is five steps in the tens count.*

÷ Division

Counting in steps ('Clever' counting)

Count in 2s, 5s and 10s



Doubling and halving

Find half of numbers up to 40, including realising that half of an odd number gives a remainder of 1 or an answer containing a ½.

Begin to know half of multiples of 10 to 100, *e.g. half of 70 is 35.*

Grouping

Relate division to multiplication by using arrays of towers of cubes to find anwers to division, *e.g. how many towers of five cubes can I make from 20 cubes as ☐ x 5 = 20 and also as 20 ÷ 5 = ?*

Relate division to 'clever' counting and hence to multiplication, e.g. *how many 5s do I count to get to 20?*

Sharing

Begin to find half or a quarter of a quantity using sharing, e.g. ¼ of 16 cubes by sorting the subes into four piles.

Find ¼, ½, ¾ of small quantities.

half of 20 is...

20	
?	?

Using number facts

Know halves of even numbers to 24.

Know 2x, 5x and 10x division facts.

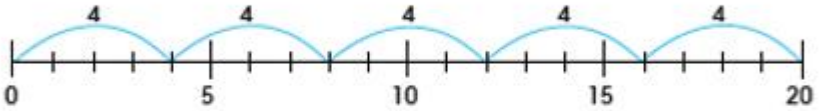
Begin to know 3x division facts.

Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using x and two using ÷ which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that [] x 5 = 45 and 45 ÷ 5 = [] are seen as ways of expressing the same question.

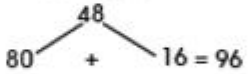
P10/P11/P12

x Multiplication

Counting in steps ('Clever' counting)
Count in 2s, 3s, 4s, 5s, 8s and 10s, e.g. colour the multiples on a 1-100 grid or use hops along a landmarked line.



Doubling and halving
Find doubles to double 50 using partitioning.
Use doubling as a strategy in multiplying by 2,
e.g. 18 x 2 is double 18 (36).



Grouping
Recognise that multiplication is commutative, e.g. 4 x 8 = 8 x 4.
Multiply multiples of 10 by single-digit numbers, e.g. 30 x 8 = 240.
Multiply friendly 2-digit numbers by single-digit numbers, e.g. 13 x 4.

Using number facts
Know doubles to 20 and doubles of multiples of 5 to 100, e.g. double 45 is 90.
Know doubles of multiples of 5 to 100, e.g. double 85 is 170.
Know 2x, 3x, 4x, 5x, 8x, 10x tables facts.

Doubling and halving form the basis of mental x & ÷ strategies.

Number facts must be memorised and used on a daily basis.

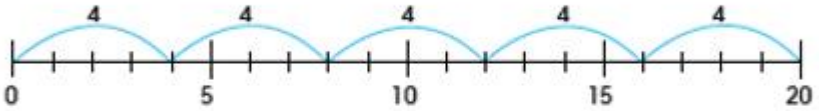
x Written Multiplication

Build on partitioning to develop grid multiplication.

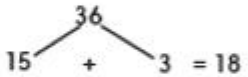
x	20	3	=
4	80	12	92

÷ Division

Counting in steps ('Clever' counting)
Count in 2s, 3s, 4s, 5s, 9s and 10s by colouring numbers on the 1-100 grid or using a landmarked line.



Doubling and halving
Find half of even numbers to 100 using partitioning.
Use halving as a strategy in dividing by 2,
e.g. 36 ÷ 2 is half of 36.



Grouping
Recognise that division is not commutative, e.g. 16 ÷ 8 does not equal 8 ÷ 16.
Relate division to multiplications 'with holes in', e.g. ☐ x 5 = 30 is the same calculation as 30 ÷ 5 = ? thus we can count in in 5s to find the answer.
Divide multiples of 10 by single-digit numbers, e.g. 240 ÷ 8 = 30.

Using number facts
Know halves of even numbers to 40.

28	
?	?

Know halves of multiples of 10 to 200, e.g. half of 170 is 85.
Know 2x, 3x, 4x, 5x, 8x, 10x division facts.
Use divison facts to find unit and simple non-unit fractions of amounts within the times tables, e.g. ¾ of 48 is 3 x (48 ÷ 4).

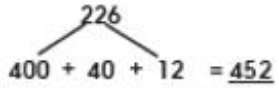
Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using x and two using ÷ which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that [] x 5 = 45 and 45 ÷ 5 = [] are seen as ways of expressing the same question.

P12/P13/P14

x Multiplication

Counting in steps (sequences)
Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s.

Doubling and halving
Find doubles to double 100 and beyond using partitioning, e.g. double 226.



Facility in doubling and halving is key for mental x and ÷ strategies.

Begin to double amounts of money, e.g. £3.50 doubled is £7.
Use doubling as a strategy in multiplying by 2, 4 and 8, e.g. 34 x 4 = double 34 (68) doubled again (136).

Grouping
Use partitioning to multiply 2-digit numbers by single-digit numbers.
Multiply multiples of 100 by single-digit numbers using tables facts, e.g. 400 x 8 = 3200.
Multiply using near multiples by rounding, e.g. 24 x 19 as (24 x 20) - 24.

Using number facts
Know times tables up to 12 x 12.

Stress that division is multiplication with 'holes' in.

÷ Division

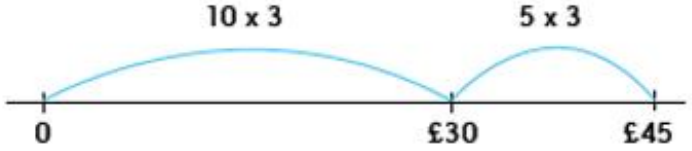
Counting in steps (sequences)
Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s.

Doubling and halving
Find halves of even numbers to 200 and beyond using partitioning.

344	
172	172

Begin to half amounts of money, e.g. £9 halved is £4.50.
Use halving as a strategy in dividing by 2, 4 and 8, e.g. 164 ÷ 4 is half of 164 (82) halved again (41).

Grouping
Use multiples of 10 times the divisor to divide by numbers <9 above the tables facts, e.g. 45 ÷ 3.



Divide multiples of 100 by single-digit numbers using division facts, e.g. 3200 ÷ 8 = 4000.

Using number facts
Know times tables up to 12 x 12 and all related division facts.
Use division facts to find unit and non-unit fractions of amounts within the times tables, e.g. ⅞ of 56 is 7 x (56 ÷ 8).

Multiplication and division are inverse operations. Right from the start children should be taught these as related operations. There are four number sentences (two using x and two using ÷ which can be written to express the relationship between 5 and 9 and 45. It is key to a good understanding of division that [] x 5 = 45 and 45 ÷ 5 = [] are seen as ways of expressing the same question.

P12/P13/P14

x Written Multiplication

Use grid multiplication to multipy 3-digit by 1-digit numbers.

x	200	50	3
6	1200	300	18

= 1518

If children understand place value they can develop fluency.

Use a vertical written algorithm (ladder) to multiply 3-digit numbers by 1-digit numbers.

```
  253
x   6
 1200
  300
   18
 1518
```

÷ Written Division

Written version of a mental method:

□ x 3 = 86

20 x 3 = 60

26

8 x 3 = 24

2

86 ÷ 3 = 28 r 2

When faced with a calculation problem, encourage children to ask…

- Can I do this in my head?
- Could I do this in my head using drawings or jottings to help me?
- Do I need to use a written method?
- Should I use a calculator? *(only if is necessary with the numbers involved)*

Also help children to estimate and then check the answer.
Encourage them to ask…

Is the answer sensible?