Wootton Bassett Infants' School

Policy Name: Calculations Policy

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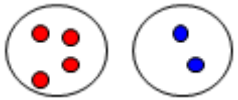
EYFS

Number – addition and subtraction

add two single digit numbers

aggregation

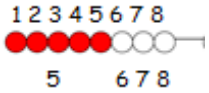
Counters on plates



1, 2, 3, 4, 5, 6.

Bead strings or bead bars can be used to illustrate addition including bridging ten by counting on 2 then 3.

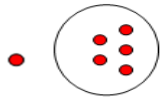
5 + 3 = 8



subtract two single digit numbers

reduction

Counters on plates



6 take away 1 leaves

1, 2, 3, 4, 5.

Cross out drawn objects to represent what has been taken away:

3 take away 2 is 1



Start with 3 … 2, 1.

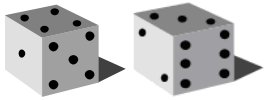
Count on to find the answer

augmentation

Practically with objects, fingers etc.

5 + 2 "Put 5 in your head, 6, 7."

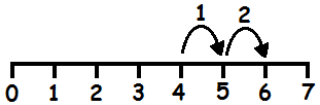
Dice… 4 + 3 = 7



4, 5, 6, 7.

On a prepared number line (start with the bigger number)…

2 + 4 = 6



Count on or back to find the answer

Practically, for example:

Group objects on a table then cover some to visualize the calculation:

2 less than 4 is 2



Start with 2… 3, 4.

Coins



I had 10 pennies. I spent 4 pence. How much do I have left? Start with 10… 9, 8, 7, 6.

understand and use vocabulary for addition

add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more… how many more to make… ? how many more is… than…?

is the same as

understand and use vocabulary for subtraction

take (away), leave, how many are left/left over? how many have gone? one less, two less… ten less… how many fewer is… than…? difference between

is the same as

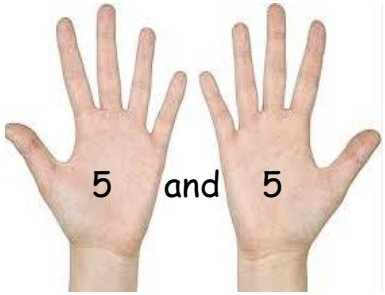
Number – multiplication and division

solve problems including doubling

Practically double a group of objects to find double of a number by combining then counting the two groups:



Double 4 is 8.



is 10

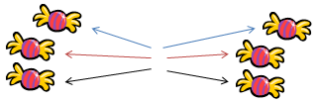
understand and use vocabulary for multiplication

count on (from, to), count back (from, to), count in ones, twos… tens…

is the same as

solve problems including halving and sharing

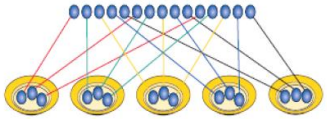
Sharing objects



One for you. One for me…

Is it fair? How many do we each have?

15 shared between 5 is 3.



Grouping objects

Put groups of objects on plates.

How many groups of 4 are there in 12 stars?



understand and use vocabulary for division

half, halve, count out, share out, left, left over

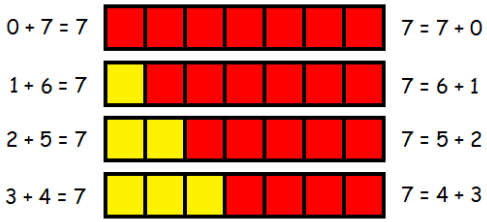
is the same as

Year 1

Number – addition and subtraction

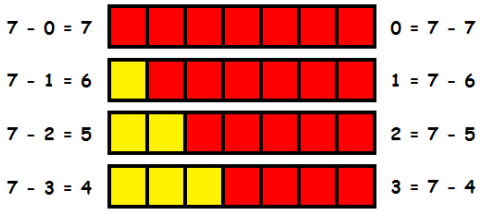
represent and use number bonds up to 20

Start with number bonds to 10 then build. Use a wide range of objects (including fingers!) and images to model the bonds, e.g. interlocking cubes.



represent and use number bond facts related subtraction up to 20

Start with number bonds to 10 then build. Use a wide range of objects (including fingers!) and images to model the bonds, e.g. interlocking cubes.



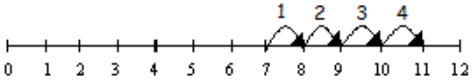
add one-digit and two-digit numbers to 20, including zero

Bead strings or bead bars can be used to illustrate addition including bridging ten by counting on 2 then 3.

8 + 5



On a prepared number line… 7 + 4 = 11



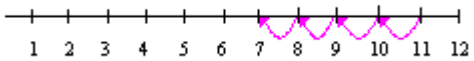
On a hundred square… 3 + 4



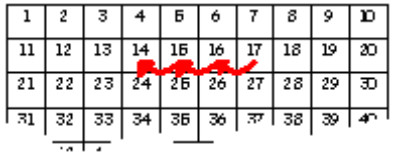
subtract one-digit and two-digit numbers to 20, including zero

Practically with objects, fingers etc.
5 - 2 "Put 5 in your head, 4, 3."

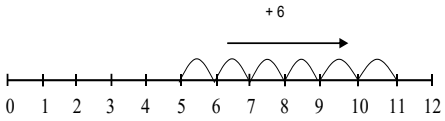
Taking away
Number lines (numbered and unnumbered, prepared and child constructed)



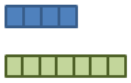
Hundred Square
17 - 3



Finding the difference
Number lines (numbered and unnumbered, prepared and child constructed)



Use practical equipment (such as numicon or cuisenaire) to identify the 'difference':



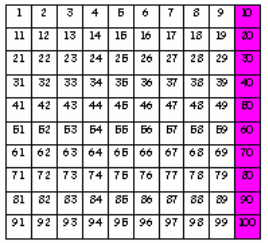
'The difference between 7 and 4 is 3' or 'Seven is 3 more than four'.

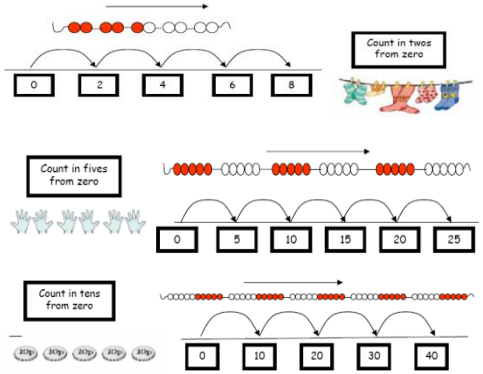
Number – multiplication and division

count in multiples of twos, fives and tens (from number and place value)

Counting using a variety of practical resources
Counting in 2s e.g. counting socks, shoes, animals in the ark…
Counting in 10s e.g. hundred square, towers of cubes…







Use rhymes, songs and stories involving counting on and counting back in ones, twos, fives and tens.
Use 2p, 5p and 10p coins.

group and share small quantities

Practical activities involving sharing,
Distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.

Grouping
Sorting objects into 2s / 3s/ 4s etc
How many pairs of socks are there?



There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there?
Jo has 12 Lego wheels. How many cars can she make?

Sharing pictures /objects
12 children get into teams of 4 to play a game. How many teams are there?



Sweets are shared between 2 people. How many do they have each?

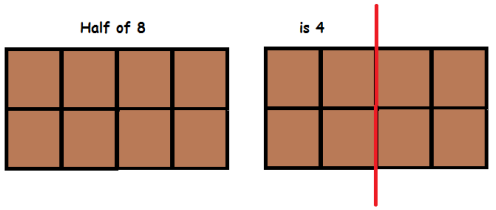
double numbers and quantities

Practically double a group of objects and/or quantities to find double of a number by combining then counting the two groups.
Progress onto using known facts and counting (in 1s, 2s, 5s and 10s) to double more efficiently.



half numbers and quantities

Practically halve objects and/or qualities by sharing them out into two piles and then counting the number of objects in each pile, or cutting/folding pictures of objects in half.
Progress onto using known facts and counting (in 1s, 2s, 5s and 10s) to halve more efficiently.



read, write and interpret mathematical statements involving addition (+) and equals (=) signs

It is important to that children have a clear understanding of the concept of equality, before using the '=' sign. Calculations should be on either side of the '=' to that children don't misunderstand '=' as to mean 'the answer'.

15 + 2 = 17
15 = 3 + 12

read, write and interpret mathematical statements involving and subtraction (–) equals (=) signs

It is important to that children have a clear understanding of the concept of equality, before using the '=' sign. Calculations should be on either side of the '=' to that children don't misunderstand '=' as to mean 'the answer'.

15 - 2 = 13
15 = 18 - 3

make connections between arrays and number patterns

Arrays



Looking at columns
2 + 2 + 2
3 groups of 2

Looking at rows
3 + 3
2 groups of 3

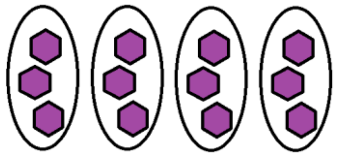
Arrays and repeated addition



4 x 2 or 4 + 4

2 x 4
or 2 + 2 + 2 + 2

make connections between arrays and number patterns



There are 4 groups of 3 in 12.
12 shared between 4 is 3.

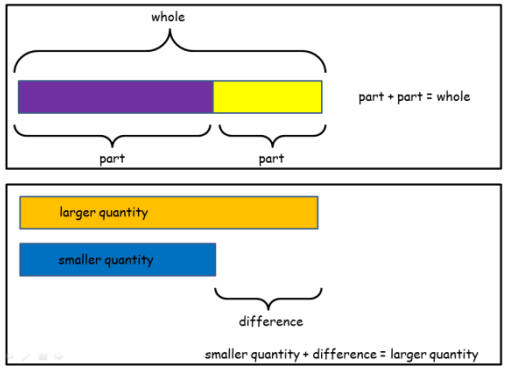
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = [] + 4

To support this, when solving calculations, missing numbers should be placed in all possible places:

3 + 4 = □ □ = 4 + 3
3 + □ = 7 7 = □ + 4
4 + □ = 7 7 = 3 + □
□ + ∇ = 7 7 = □ + ∇

Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method



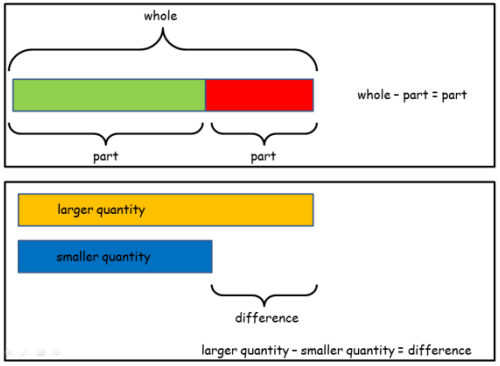
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = [] – 9

To support this, when solving calculations, missing numbers should be placed in all possible places:

16 - 9 = □ □ = 16 - 9
16 - □ = 7 7 = □ - 9
□ - 9 = 7 7 = 16 - □
□ - ∇ = 7 7 = □ - ∇

Use all the models and images mentioned above. Discuss which is most effective and why.

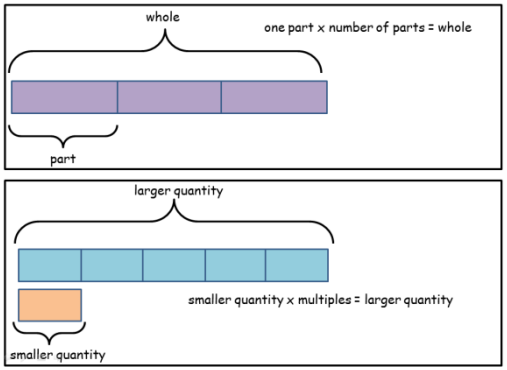
Singapore Bar Method



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

Use all the models and images mentioned above. Discuss which is most effective and why.

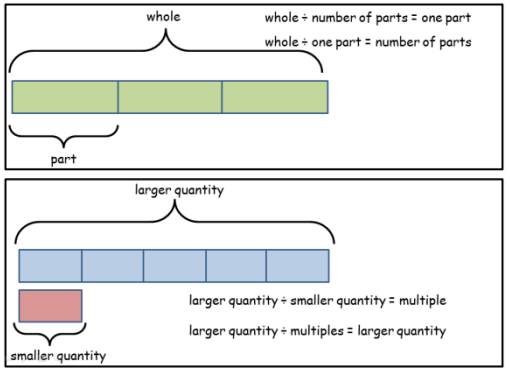
Singapore Bar Method



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

Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method



understand and use vocabulary for addition, e.g. put together, add, altogether, total and more than

+, add, more, plus, make, total, altogether, score, double, near double, one more, two more… ten more,

= equals, sign, is the same as

How many more to make…? How many more is… than…? How much more is…?
Repetition of facts with different vocabulary:
"What is 2 add 5?" "What is 2 more than 5?"
"What is 2 plus 5?" What is the total of 2 and 5?" etc

understand and use vocabulary for addition and subtraction, e.g. take away, distance between, difference between and less than

- subtract, take (away), minus, leave, how many are left/left over? how many have gone? one less, two less, ten less… how many fewer is… than…? how much less is…? difference between, half, halve, counting up/back…

= equals, sign, is the same as

Repetition of facts with different vocabulary:
"What is 7 take away 3?" "What is 3 less than 7?"
"What is 7 subtract 3?"
"What is the difference between 3 and 7?" etc

use a variety of language to describe multiplication

count on (from, to), count back (from, to), count in ones, twos, threes, fours, fives… count in tens, lots of, groups of, x, times, multiply, multiplied by, multiple of, once, twice, three times… ten times… times as (big, long, wide… and so on), repeated addition, array, row, column, double, halve

= equals, sign, is the same as

use a variety of language to describe division

Array, row, column, halve, share, share equally, one each, two each, three each… group in pairs, threes… tens, equal groups of
÷, divide, divided by, divided into, left, left over

= equals, sign, is the same as

Year 2

Number – addition and subtraction

recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

Play games, chant, test etc to increase speed of recalling facts to 20.
Make models and images to display facts.
Investigate related facts to 100 and repeat above.

add numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones or tens

Counting on
15 + 2 "Put 15 in your head, 16, 17."

Partition number and recombine

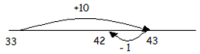
27 + 9 = 20 + 7 + 9
= 20 + 16
= 36

Count on by splitting units to make next multiple of ten

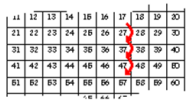
36 + 8 = 36 + 4 + 4
= 40 + 4
= 44

Adding near numbers and adjusting

33 + 9 = 33 +10 -1



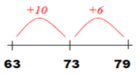
Hundred Square
17 + 30



- two two-digit numbers

Use empty number lines to add two 2 digits numbers, by counting on in multiples of ten then multiples of one.

63 + 16 = 79



Hundred Square
32 + 23

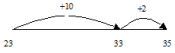


Partition into tens and ones and recombine

12 + 23 = 10 + 2 + 20 + 3
= 10 + 20 + 2 + 3
= 30 + 5
= 35

Refine to partitioning the second number only:

23 + 12 = 23 + 10 + 2
= 33 + 2
= 35



- adding three one-digit numbers

Use knowledge of adding, for example number bonds first or largest numbers first.

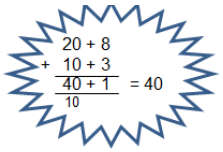
3 + 9 + 7 = (3 +7) + 9
= 10 + 9
= 19

record addition and subtraction in columns

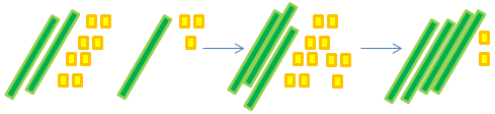
Use partitioned column method.

Solve calculations that do not cross the tens boundary, until they are secure with the method. Then solve calculations that do cross the tens boundary. Use base 10 (diennes) to support the understanding of 'carrying' and the value of 'digits'.

	20	+ 3
+	30	+ 4
	50	+ 7
=	57	



28 + 13



recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

Play games, chant, test etc to increase speed of recalling facts to 20.
Make models and images to display facts.
Investigate related facts to 100 and repeat above.

subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones or tens

Counting back

63 - 20 "Put 63 in your head, 53, 43."

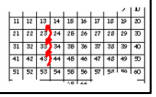
Use unprepared numbered lines to subtract, by counting back in units:

16 – 4 = 12



Hundred Square

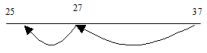
43 - 30



- two two-digit numbers

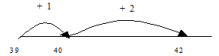
Use known number facts and place value to subtract (partition second number only)

37 – 12 = 37 – 10 – 2
= 27 – 2
= 25



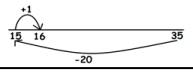
Find a small difference by counting up

42 – 39 = 3



Subtract mentally a number near 10 to or from a two-digit number

35 – 19 = 35 – 20 + 1



record subtraction in columns

Introduce partitioned column method where no exchanging is required:

46 – 22 = 24

40	+ 6
- 20	+ 2
20	+ 4

use base 10 (diennes) to support understanding



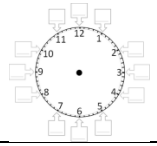
Number – multiplication and division

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

Play games, chant, test etc to increase speed of recalling facts to 20.
Make models and images to display facts.
Investigate related facts to 100 and repeat above.

connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face

H	T	U
	1	0
	2	0
	3	0
	4	0



relate multiplication to arrays and to repeated addition using a range of materials and contexts

Practically combine groups of objects (2s, 5s and 10s) and verbalise (then record) what has been found out: There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2 add 2 add 2 equals 6



Mum washed 5 pairs of socks, how many socks did she get out of the washing machine? 2 + 2 + 2 + 2 + 2 = 10



Use arrays for repeated addition and relate this to the x calculation: (Use counters or objects as well as visual representations to support understanding)

5 + 5 + 5 = 15

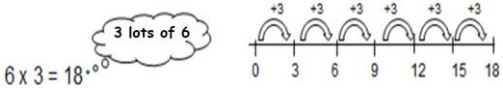
5 x 3 = 15



3 + 3 + 3 + 3 + 3 = 15

3 x 5 = 15

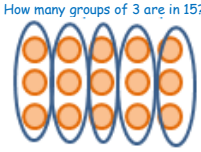
Use a number line for repeated addition:



relate division to grouping and sharing discrete and continuous quantities, to arrays and to repeated subtraction using a range of materials and contexts

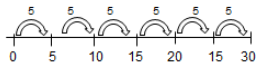
Initially, pupils to practically 'share' and 'group' using practical equipment and pictorial representation. Move on to using arrays to identify groups, use physical counters before pictorial representations:

How many groups of 3 are in 15?

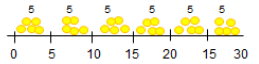


Grouping using a number line:

There are 30 children in the class, how many groups of 5 can we get into?



Use counters to support pupils understanding:



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

3 x 4 = 12

Repetition of sentence with different vocabulary:

"3 times 4 equals 12"

"3 lots of 4 are 12"

"3 multiplied by 4 equals 12"

"The product of 3 and 4 is 12"

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

12 ÷ 4 = 3

Repetition of sentence with different vocabulary:

"12 divided by 4 equals 3"

"12 shared by 4 is 3"

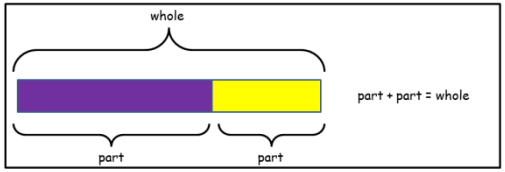
"12 grouped into 4s is 3"

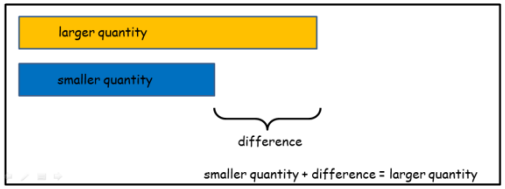
solve problems with addition:

- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying increasing knowledge of mental and written methods

Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method



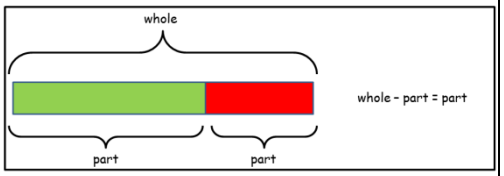


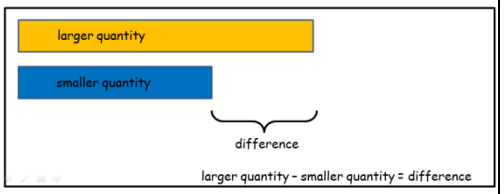
solve problems with subtraction:

- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  applying increasing knowledge of mental and written methods

Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method

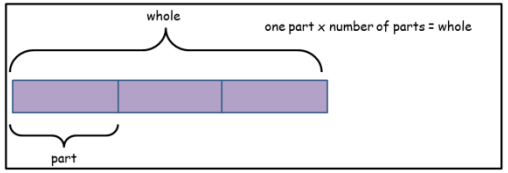


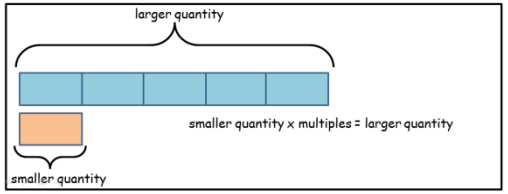


solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts

Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method

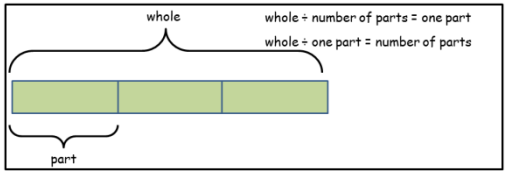


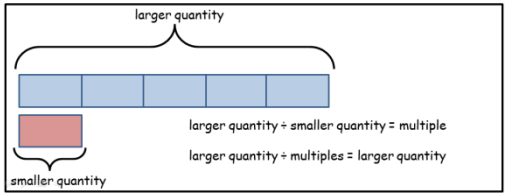


solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts

Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method





recognise and use the inverse relationship between addition and subtraction and use this to solve missing number problems

Missing numbers placed in all possible places.

7 - 3 = □ □ = 4 + 3
7 - □ = 4 7 = □ + 3
□ - 3 = 4 7 = 4 + □
□ - ▽ = 4 7 = □ + ▽

Number lines

7 + 4 = 11 11 – 4 = 7



As Year 1 and extend to

14 + 5 = 10 + □
17 - 5 = 14 - □

and three numbers

32 + □ + □ = 100
35 = 46 - □ - 7

recognise and use the inverse relationship between multiplication and division and use this to solve missing number problems

3 x 5 = 15

5 x 3 = 15

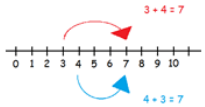


15 ÷ 3 = 5

15 ÷ 5 = 3

show that addition of two numbers can be done in any order (commutative)

On a number line



26 + 12 = 38

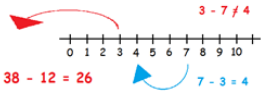


On a hundred square

12 + 26 = 38

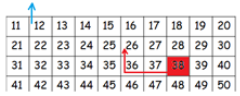
show that subtraction of two numbers cannot be done in any order

On a number line



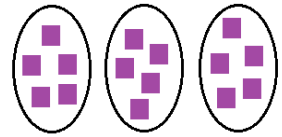
12 - 38 ≠ 26

38 - 12 = 26

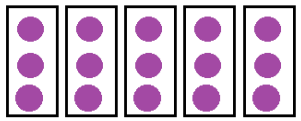


On a hundred square

show that multiplication of two numbers can be done in any order (commutative)

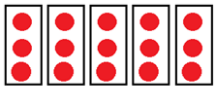


5 x 3 = 15

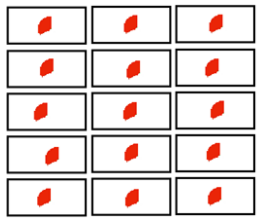


3 x 5 = 15

show that division of one number by another cannot be done in any order



15 ÷ 5 = 3



5 ÷ 15 ≠ 3

check their calculations, including adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5) - establishing commutativity and associativity of addition

See models and images above.

check their calculations, including by adding to check subtraction

See models and images above.

recognise and use the inverse relationship between addition and subtraction and use this to check calculations

See models and images above.

recognise and use the inverse relationship between addition and subtraction and use this to check calculations

See models and images above.

use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4)

Arrays – related facts

3 x 5 = 15
5 x 3 = 15



15 ÷ 3 = 5
15 ÷ 5 = 3

extend their understanding of the language of addition to include sum

+, add, more, plus, make, sum, total, altogether, score, double, near double, one more, two more… ten more, How many more to make…? How many more is… than…? How much more is…? Repetition of facts with different vocabulary:
"What is 2 add 5?" "What is 2 more than 5?"
"What is 2 plus 5?" What is the total of 2 and 5?" etc

= equals, sign, is the same as

extend their understanding of the language of subtraction to include difference

- subtract, subtraction, take (away), minus, leave, how many are left/left over? one less, two less… ten less… one hundred less, how many fewer is… than…? how much less is…? difference between, half, halve, tens boundary
13 + 5 = 8 Repetition of sentence with different vocabulary:
"13 subtract 5 equals 8" "5 less than 13 is 8
"13 take away 5 equals 8" "The difference between 13 and 5 is 8" etc

= equals, sign, is the same as

use a variety of language to describe multiplication

count on (from, to), count back (from, to), count in ones, twos, threes, fours, fives… count in tens, lots of, groups of, x, times, multiply, multiplied by, multiple of, once, twice, three times… ten times… times as (big, long, wide… and so on), repeated addition, array, row, column, double, halve

= equals, sign, is the same as

use a variety of language to describe division

Array, row, column, halve, share, share equally, one each, two each, three each… group in pairs, threes… tens, equal groups of, ÷, divide, divided by, divided into, left, left over

= equals, sign, is the same as