Calculation Policy

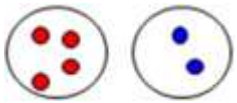
EYFS

Number – addition and subtraction

add two single digit numbers

aggregation

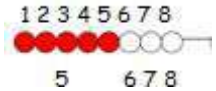
Counters on plates



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.

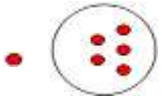
5 + 3 = 8



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.

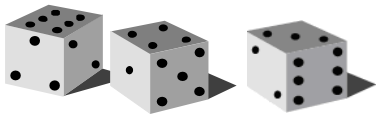
Count on to find the answer

augmentation

Practically with objects, fingers etc.

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

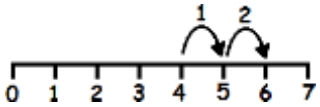
Dice… *4 + 3 = 7*



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

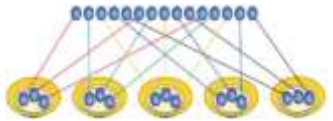
solve problems including halving and sharing

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

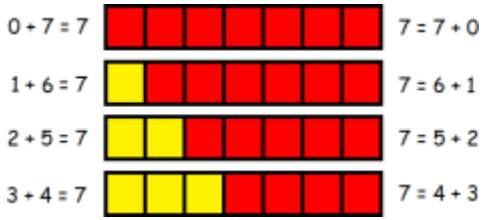
is the same as

Year 1

Number – addition and subtraction

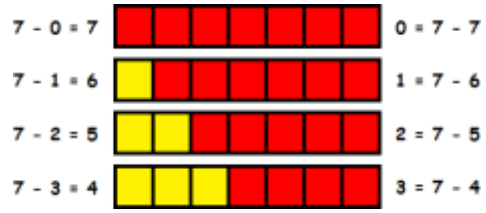
represent and use number bonds up to 20

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.

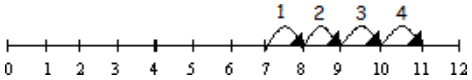


add one-digit and two-digit numbers to 20, including zero

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

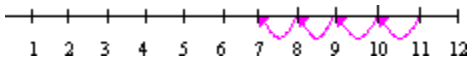


On a hundred square… 3 + 4

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

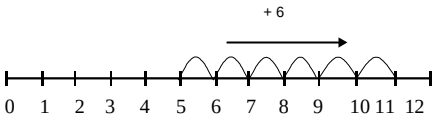
Practically with objects, fingers etc.
5 - 2 "Put 5 in your head, 4, 3."

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)



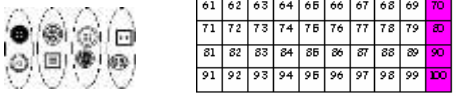
Use practical equipment (such as numicon or cuisenaire) to identify the 'difference':

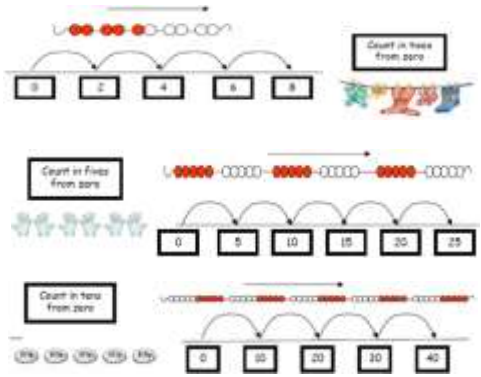
'The difference between 7 and 4 is 3' or 'Seven is 3 more than four'.

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.

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.

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?

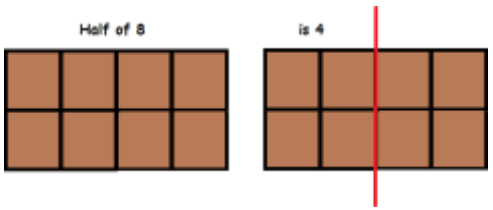
There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there?
Jo has 12 Lego wheels. How many cars can she make?

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?

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.



Year 1

Number – addition and subtraction

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

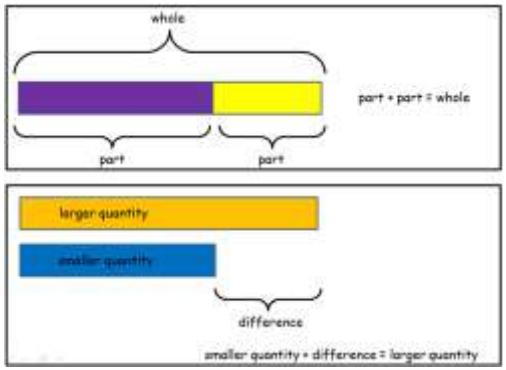
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = [] + 4

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



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

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

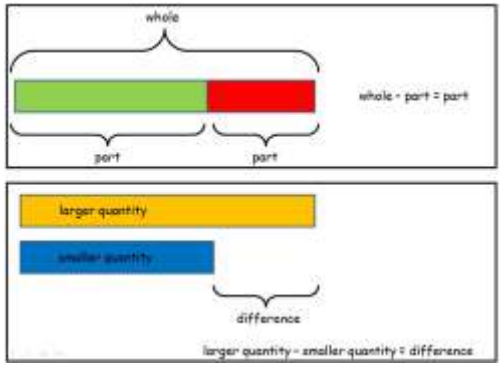
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = []– 9

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



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

Number – multiplication and division

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

• • • •
• • • •

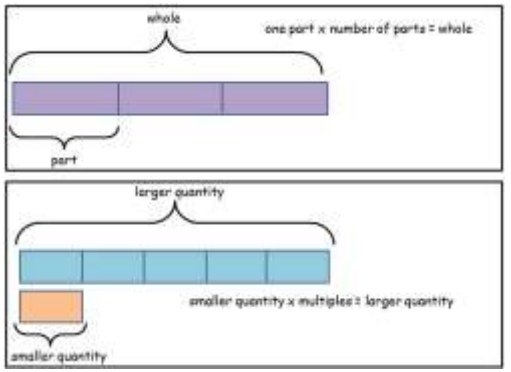
4 x 2 or 4 + 4

2 x 4
or 2 + 2 + 2 + 2

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

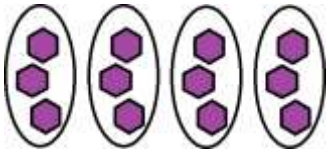


use a variety of language to describe multiplication

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

make connections between arrays and number patterns

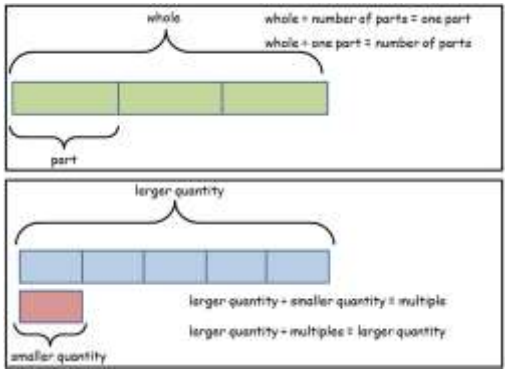


There are 4 groups of 3 in 12.
12 shared between 4 is 3.

solve one-step problems 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



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

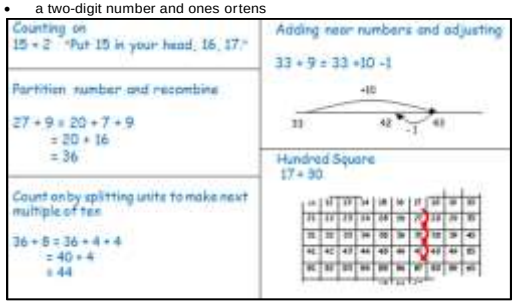
Number – addition and subtraction

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

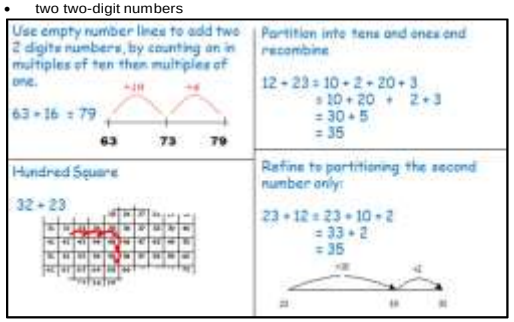
Play games, chant, test etc to increase speed of recalling facts to 20.
Make models and images to display facts.
Investigate related facts to 100 and repeat above.

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

- a two-digit number and ones or tens



- two two-digit numbers



- adding three one-digit numbers

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

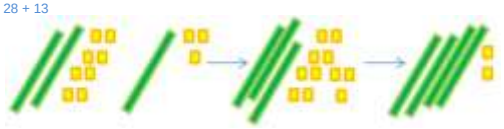
3 + 9 + 7 = (3 +7) + 9
= 10 + 9
= 19

record addition and subtraction in columns

Use partitioned column method.

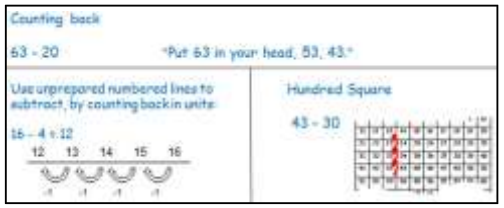
Solve calculations that do not cross the tens boundary, until they are secure with the method. Then solve calculations that do cross the tens boundary. Use base 10 (diennes) to support the understanding of 'carrying' and the value of 'digits'.

28 + 13

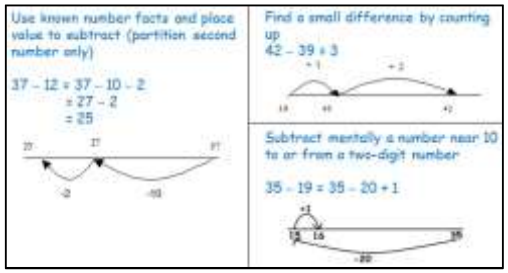


subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones or tens



- two two-digit numbers



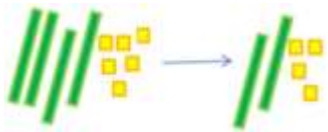
record subtraction in columns

Introduce partitioned column method where no exchanging is required:

46 – 22 = 24

$$\begin{array}{r} 40 + 6 \\ -\ 20 + 2 \\ \hline 20 + 4 \end{array}$$

use base 10 (diennes) to support understanding

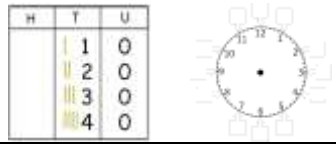


Number – multiplication and division

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



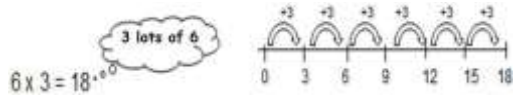
relate multiplication to arrays and to repeated addition using a range of materials and contexts

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)

Use a number line for repeated addition:



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:

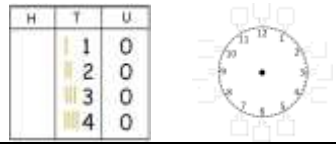
"3 times 4 equals 12"

"3 lots of 4 are 12"

"3 multiplied by 4 equals 12"

"The product of 3 and 4 is 12"

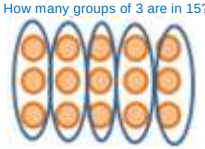
connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face



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

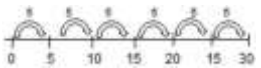
Initially, pupils to practically 'share' and 'group' using practical equipment and pictorial representation. Move on to using arrays to identify groups, use physical counters before pictorial representations:

How many groups of 3 are in 15?

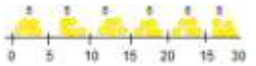


Grouping using a number line:

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 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"

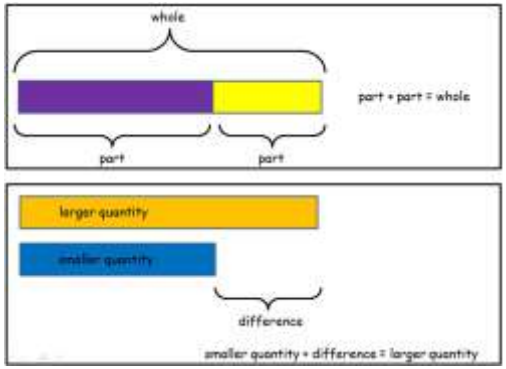
Year 2

Number – addition and subtraction

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.

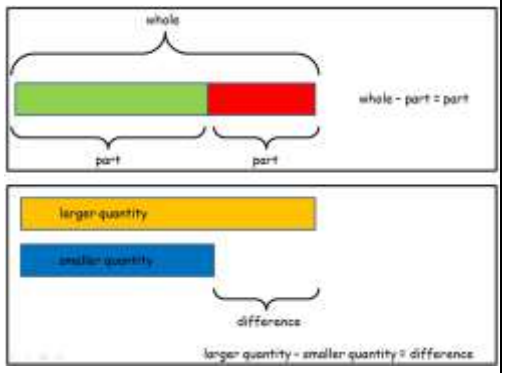
Singapore Bar Method



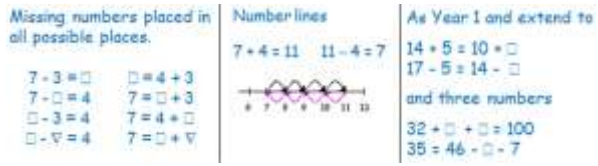
solve problems with subtraction:
- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  applying increasing knowledge of mental and written methods

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

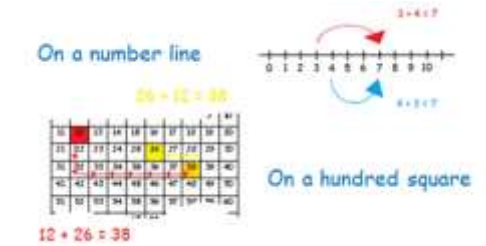
Singapore Bar Method



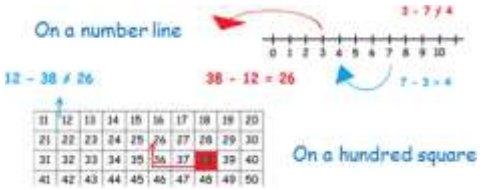
recognise and use the inverse relationship between addition and subtraction and use this to solve missing number problems



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



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



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.

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

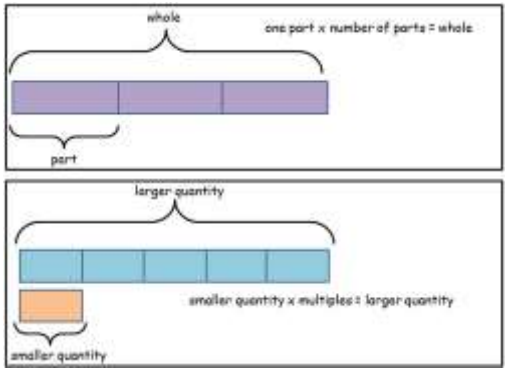
= equals, sign, is the same as

Number – multiplication and division

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.

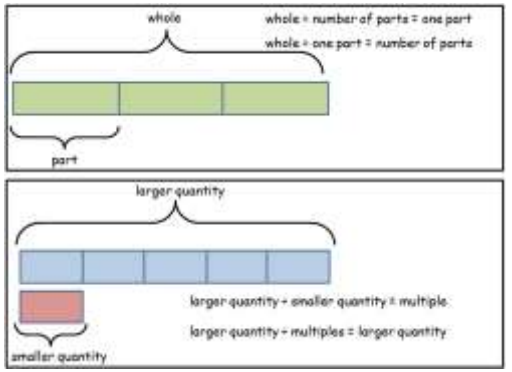
Singapore Bar Method



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

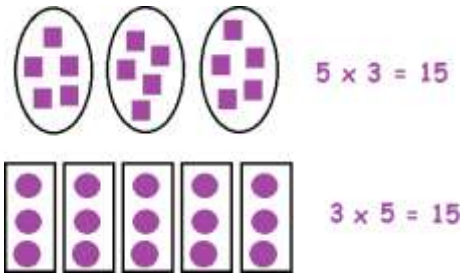
Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method

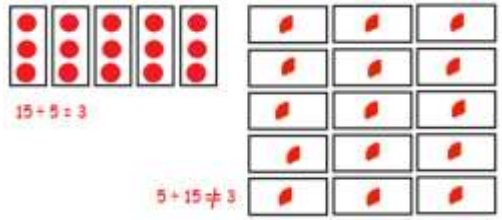


recognise and use the inverse relationship between multiplication and division and use this to solve missing number problems

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



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



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

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

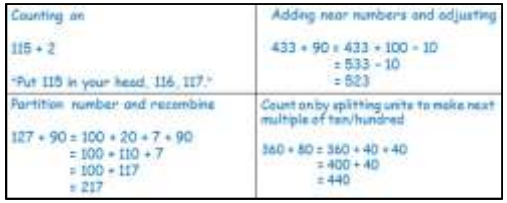
= equals, sign, is the same as

Year 3

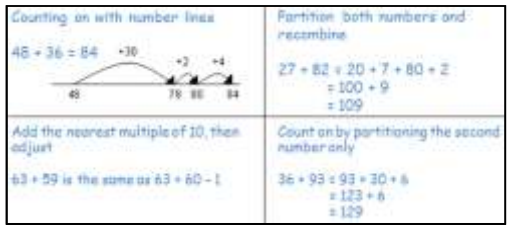
Number – addition and subtraction

add numbers mentally, including:

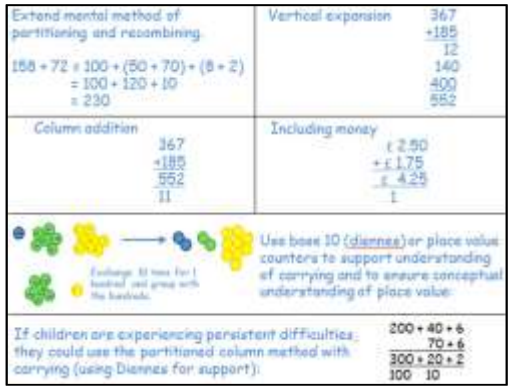
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds



- *two two-digit numbers (including answer crossing 100)*

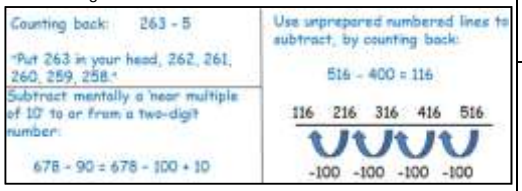


add numbers with up to three digits, using formal written methods of columnar addition (*See Appendix 1*)

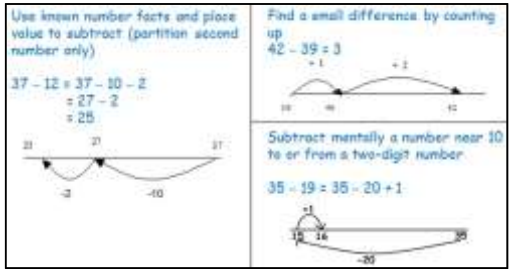


subtract numbers mentally, including:

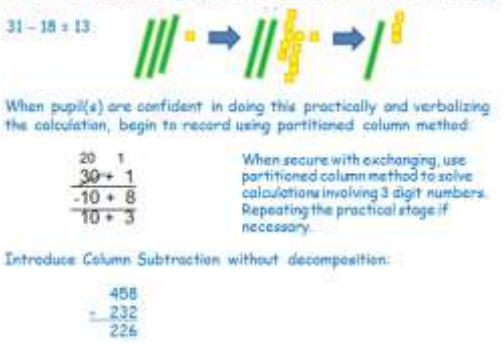
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds



- *two two-digit numbers (including answer crossing 100)*



subtract numbers with up to three digits, using formal written methods of columnar subtraction (*See Appendix 1*)



Number – multiplication and division

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

Play games, chant, test etc to increase speed of recalling facts.
Make models and images to display facts.
Investigate patterns within tables.

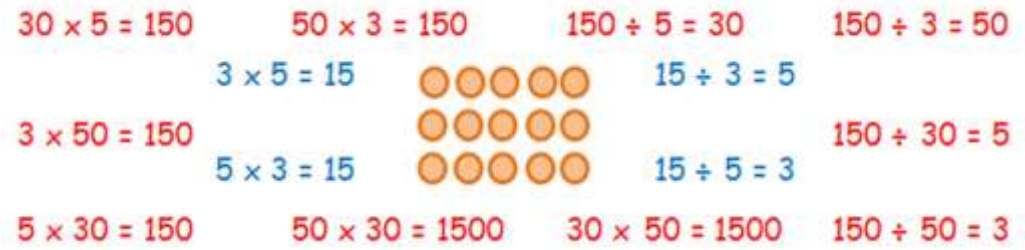
recall and use division facts for the 3, 4 and 8 multiplication tables

Play games, chant, test etc to increase speed of recalling facts.
Make models and images to display facts.
Investigate patterns within tables.

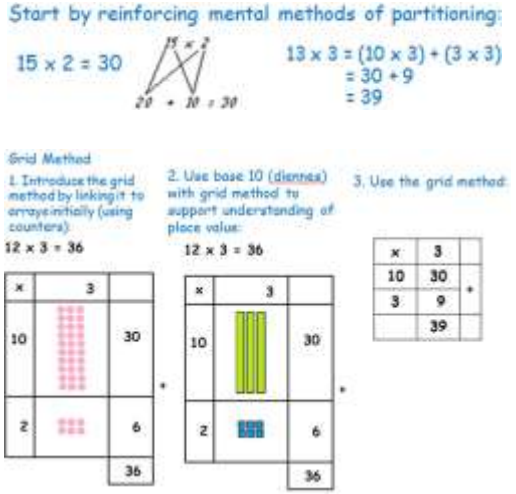
understand and use mental methods using commutativity and associativity (for example, 4 × 12 × 5 = 4 × 5 × 12 = 20 × 12 = 240)

Use a variety of resources (including a calculator) to investigate order of multiplication.
Make models and images to display facts.

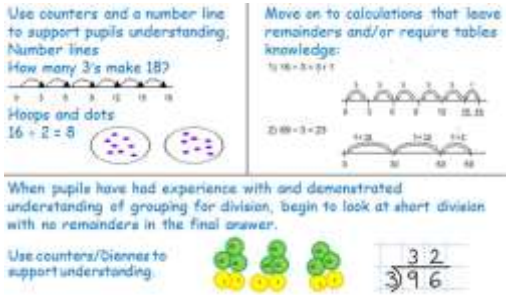
understand and use mental methods using multiplication a facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (e.g. 30 × 2 = 60, 60 ÷ 3 = 20 and 20 = 60 ÷ 3)



develop reliable written methods for multiplication, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication



develop reliable written methods for division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short division



Year 3

Number – addition and subtraction

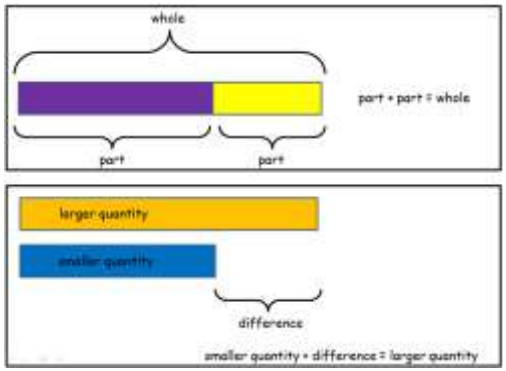
solve problems, including missing number problems, using number facts, place value, and more complex addition

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



estimate the answer to a calculation and use inverse operations to check answers

Estimate answers before solving any calculation.
Once inverse operation has been learnt use as a method for checking.

use a variety of language to describe addition

+, add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more… ten more… one hundred more, how many more to make…? how many more is… than…? how much more is…?

= equals, sign, is the same as

tens boundary, hundreds boundary

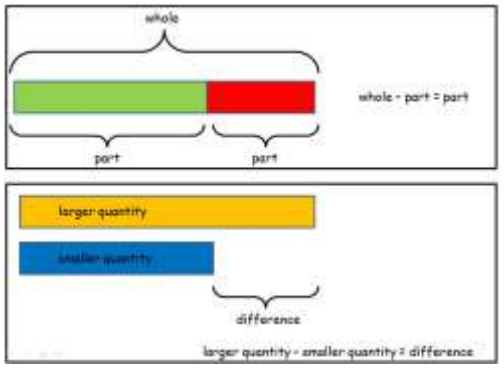
solve problems, including missing number problems, using number facts, place value, and more complex subtraction

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



estimate the answer to a calculation and use inverse operations to check answers

Estimate answers before solving any calculation.
Once inverse operation has been learnt use as a method for checking.

use a variety of language to describe subtraction

- 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

= equals, sign, is the same as

Number – multiplication and division

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

solve simple problems in contexts, deciding which of the four operations to use and why

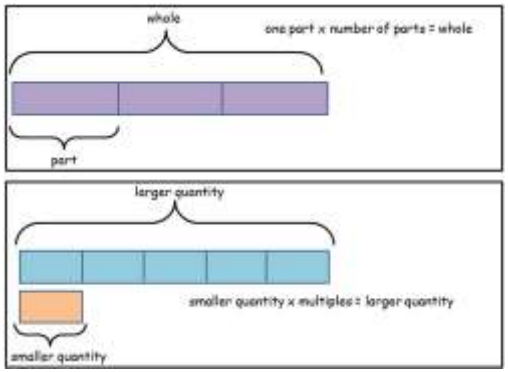
Missing numbers placed in all possible places.

7 x 2 = = 2 x 7
7 x = 14 14 = x 7
– x 2 = 14 14 = 2 x
– x ∇ = 14 14 = x ∇

Extend to
2 x 6 = 3 x
and using three numbers
10 x x = 60 12 = 2 x x 2

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

Singapore Bar Method



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

See models and images above.

use a variety of language to describe multiplication

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

= equals, sign, is the same as

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

solve simple problems in contexts, deciding which of the four operations to use and why

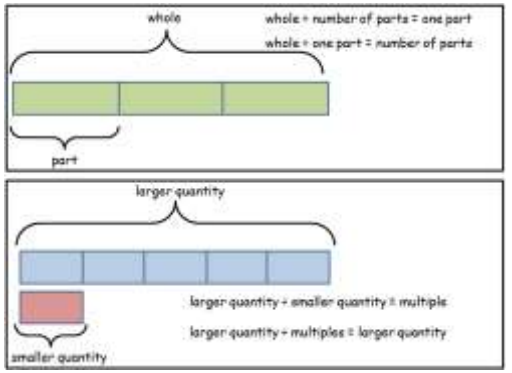
Missing numbers placed in all possible places.

6 ÷ 2 = = 6 ÷ 2
6 ÷ = 3 3 = 6 ÷
– ÷ 2 = 3 3 = ÷ 2
– ÷ ∇ = 3 3 = ÷ ∇

Extend to
12 ÷ 6 = 8 ÷
and using three numbers
10 ÷ 5 ÷ = 1 3 = 12 ÷ ÷ 2

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

Singapore Bar Method



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

See models and images above.

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, division, divided by, divided into, left, left over, remainder

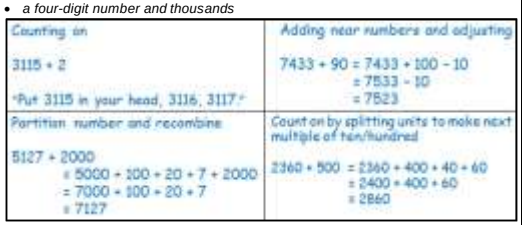
= equals, sign, is the same as

Year 4

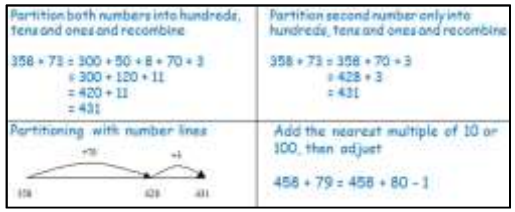
Number – addition and subtraction

add numbers mentally, including:

- *a four-digit number and ones*
- *a four-digit number and tens*
- *a four-digit number and hundreds*
- *a four-digit number and thousands*

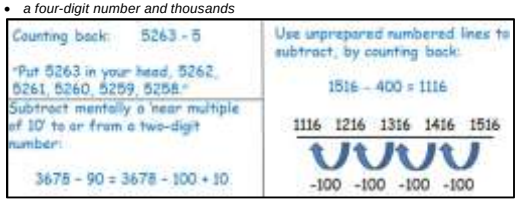


- *three and two-digit numbers*

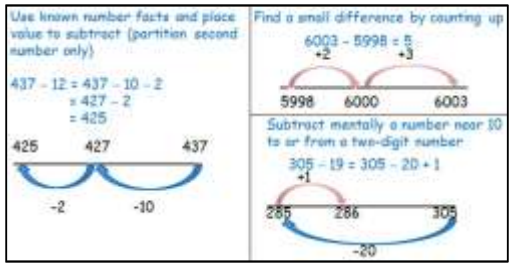


subtract numbers mentally, including:

- *a four-digit number and ones*
- *a four-digit number and tens*
- *a four-digit number and hundreds*
- *a four-digit number and thousands*



- *three and two-digit numbers*



add numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate *(see Appendix 1)*

Column addition

```
 2358
+ 373
 2731
  11
```

To ensure conceptual understanding, it is essential that place value is reinforced by frequently.
Discussing the actual value of each digit, e.g. the 5 digit represents 5 hundreds.

Use base 10 (Diennes) or place value counters to support understanding of carrying and to ensure conceptual understanding of place value (see year 2 and 3 for how to use these manipulatives).

Including decimals

```
 72.8
+54.6
 127.4
  1
```

To ensure conceptual understanding, it is essential that place value is reinforced by frequently discussing the actual value of each digit, e.g. the 2 digit represents 2 tens.

Use money to support understanding.

subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate *(see Appendix 1)*

Revision of partitioned column method from Year 3. Moving on to numbers with 4 digits: (use Diennes to support when required.)

Column Subtraction without decomposition

```
 458
- 232
 226
```

Column Subtraction with decomposition
Once pupils are confident in exchanging and have a clear understanding of place value, move towards the formal compact column method: (use Diennes to support when required.)

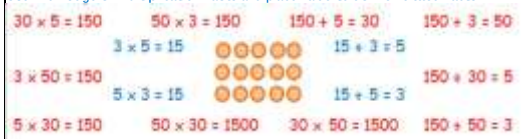
Number – multiplication and division

recall multiplication facts for multiplication tables up to 12 × 12

Play games, chant, test etc to increase speed of recalling facts.
Make models and images to display facts.
Investigate patterns within tables.

use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers
practise and extend mental methods to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6)

Use knowledge of multiplication facts and place value to derive related facts.



Partition

```
18 × 9 = (10 × 9) + (8 × 9)
       = 90 + 72
       = 162
```

recognise and use commutativity in mental calculations
write statements about the equality of expressions (for example, use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4))

Use a variety of resources (including a calculator) to investigate order of multiplication. Make models and images to display facts.

multiply two-digit and three-digit numbers by a one-digit number using formal written layout (*see Appendix 1*)

Grid method
231 x 7 is approximately 200 x 10 = 2000

231 × 7 = 1617

×	7
200	1400
30	210
1	7
	1617

move onto formal method of short multiplication when proficient

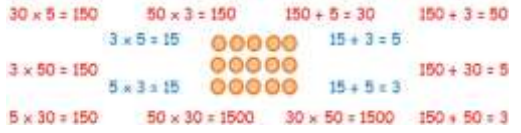
```
  452
X   3
 1356
  1
```

recall division facts for multiplication tables up to 12 × 12

Play games, chant, test etc to increase speed of recalling facts.
Make models and images to display facts.
Investigate patterns within tables.

use place value, known and derived facts to divide mentally, including: dividing by 1
practise and extend mental methods to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6)

Use knowledge of multiplication facts and place value to derive related facts.



Partitioning/Chunking

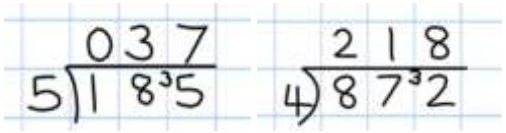
```
77 ÷ 5 = (50 ÷ 5) + (25 ÷ 5) + (remainder 2)
       = 10 + 5 + (remainder 2)
       = 15 remainder 2
```

recognise and use factor pairs in mental calculations

Use a variety of resources (including a calculator) to investigate factor pairs. Make models and images to display facts.

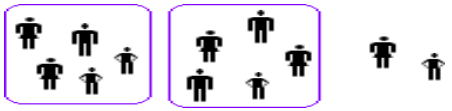
divide numbers up to 3 digit by a one-digit number using the formal written method of short division and begin to interpret remainders.

Short division with no remainders in the final answer, use place value counters/Diennes where support is required.



Remainders
Begin to interpret remainders by looking at word problems to give context and small numbers to start with.

Cars carry 5 people. !2 people are going on a trip. How many cars will they need?



12 ÷ 5 = 2 r 2 So they would need 3 cars.

5 buttons are packed in a bag. How many full bags would there be if there were 12 buttons?

12 ÷ 5 = 2 r 2. So there are 2 full bags.

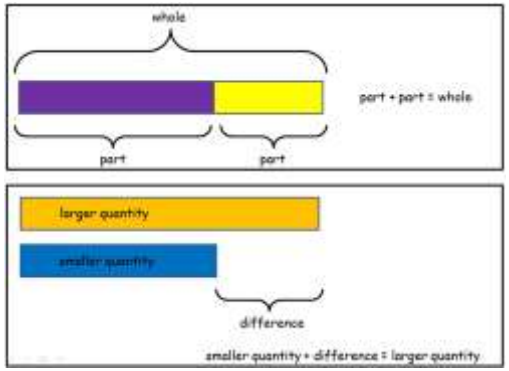
Year 4

Number – addition and subtraction

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

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

Singapore Bar Method



estimate and use inverse operations to check answers to a calculation

Estimate answers before solving any calculation.
Once inverse operation has been learnt use as a method for checking.

use a variety of language to describe addition

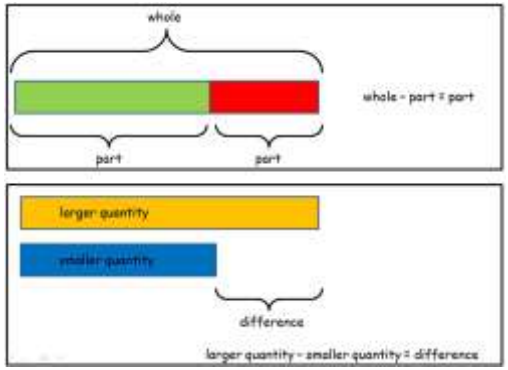
+ add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make...? tens boundary, hundreds boundary, inverse

= equals, sign, is the same as

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

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

Singapore Bar Method



estimate and use inverse operations to check answers to a calculation

Estimate answers before solving any calculation.
Once inverse operation has been learnt use as a method for checking.

use a variety of language to describe subtraction

- subtract, subtraction, take (away), minus, decrease, leave, how many are left/left over? difference between, half, halve, how many more/fewer is… than...? how much more/less is...? tens boundary, hundreds boundary, inverse

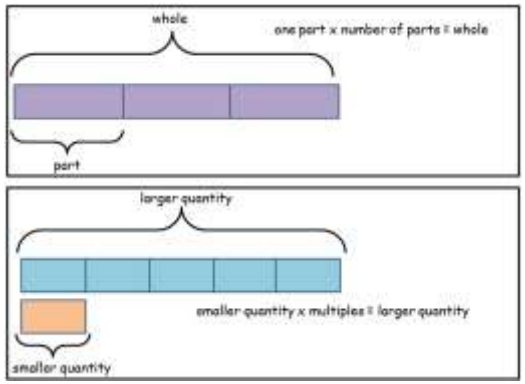
= equals, sign, is the same as

Number – multiplication and division

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
solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers

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

Singapore Bar Method



estimate and use inverse operations to check answers to a calculation

Estimate answers before solving any calculation.
Once inverse operation has been learnt use as a method for checking.

use a variety of language to describe multiplication

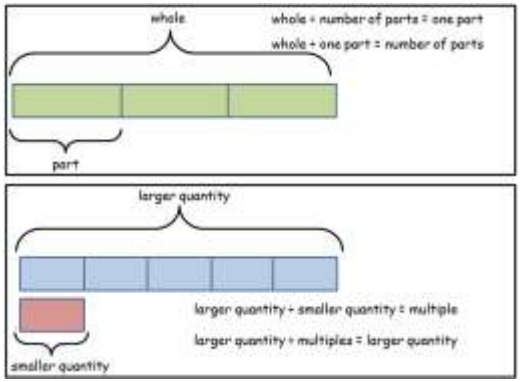
times, multiply, multiplication, multiplied by, multiple of, product
once, twice, three times... ten times... times as (big, long, wide... and so on)
repeated addition array, row, column, double, inverse

= equals, sign, is the same as

solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers

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

Singapore Bar Method



estimate and use inverse operations to check answers to a calculation

Estimate answers before solving any calculation.
Once inverse operation has been learnt use as a method for checking.

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, division, divided by, divided into, remainder, factor, quotient, divisible by, inverse

= equals, sign, is the same as

Year 5

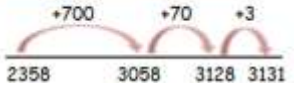
Number – addition and subtraction

add numbers mentally with increasingly large numbers (*e.g. 12 462 – 2300 = 10 162*)

Partition both numbers and recombine

2358 + 773
= 2000 + 300 + 50 + 8 + 700 + 70 + 3
= 2000 + 1000 + 120 + 11
= 3000 + 100 + 30 + 1
=3131

Partitioning with number lines



Partition second number only into hundreds, tens and ones and recombine

2358 + 773 = 2358 + 700 + 70 + 3
= 3058 + 70 + 3
= 3128 + 3
= 3131

Add the nearest multiple of 10 or 100, then adjust

458 + 79 = 458 + 80 - 1

subtract numbers mentally with increasingly large numbers (*e.g. 12 462 – 2300 = 10 162*)

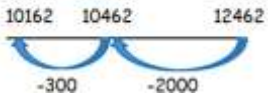
Subtract the nearest multiple of 10 or 100, then adjust

458 - 79 = 458 - 80 + 1
= 378 + 1
= 379

Find a difference by counting up

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

12 462 - 2300
= 12 462 - 2000 - 300
= 10 462 - 300
= 10 162



add numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction – *see Appendix 1*)

Column addition

124.90 (add in a zero to keep the place value)
+ 117.25
242.15
11

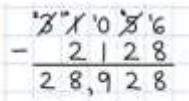
To ensure conceptual understanding, it is essential that place value is reinforced by frequently.
Discuss the value of each digit.
Use base 10 (Diennes) to support understanding of exchanging and to ensure conceptual understanding of place value.
Where there is an 'empty' space in a decimal column, pupils should insert a zero to show the value.
Children should be made aware that it is essential to align the columns carefully.

Pupils should be able to add more than 2 numbers using the compact column method.

3.25
+ 4.13
0.76
8.14
11

subtract numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction – *see Appendix 1*)

Revision of formal compact column method extending to calculations involving numbers with more than 4 digits (use Diennes to support understanding of decomposition and place value).



When confident in using formal compact column method with integers and decimals involving money (always 2 decimal places), extend to subtraction with mixtures of integers and decimals. A clear understanding of place value is essential. Align the decimal point and use '*place holders*', if needed.

263.0
- 26.5
236.5

Use Diennes or place value counters (add counters with 0.1) to support understanding of decomposition and place value.

Number – multiplication and division

multiply numbers mentally drawing upon known facts

Partition

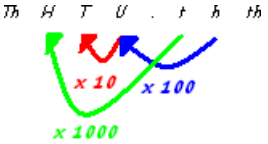
47 x 6 = (40 x 6) + (7 x 6)
= (240) + (42)
= 282

Double and halve

25 x 16 = 50 x 8 = 100 x 4 = 200 x 2 = 400

multiply whole numbers and those involving decimals by 10, 100 and 1000

Place Value



identify multiples, (*and use them to construct equivalence statements, e.g. 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 9² x 10*)

Use a variety of resources (including a calculator) to investigate multiples. Make models and images to display facts.

recall prime numbers up to 19
establish whether a number up to 100 is prime

Play games, chant, test etc to increase speed of recalling facts.
Make models and images to display facts.
Investigate patterns within primes.

recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)

Use a variety of resources (including a calculator) to investigate square and cubed numbers. Make models and images to display facts.
Investigate the patterns within squared and cubed numbers.

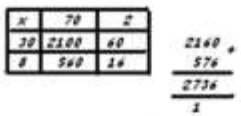
multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

Review formal method of short multiplication (for multiplying by one digit numbers) when proficient

452 x 3 = 1356

1243 x 8 = 9624

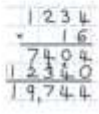
Start with grid method when multiplying by 2 digit numbers
72 x 38 is approximately 70 x 40 = 2800



Move onto formal long multiplication

34
X 13
102
340
442

Then formal multiplication with more complex numbers:



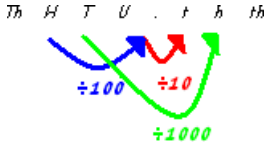
divide numbers mentally drawing upon known facts

Partitioning

72 ÷ 3 = (60 ÷ 3) = (12 ÷ 3)
= 20 + 4
= 24

divide whole numbers and those involving decimals by 10, 100 and 1000

Place Value



identify factors, including finding all factor pairs of a number, and common factors of two numbers (*and use them to construct equivalence statements, e.g. 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 9² x 10*)

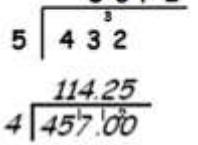
Use a variety of resources (including a calculator) to investigate factors. Make models and images to display facts.

recall prime numbers up to 19
establish whether a number up to 100 is prime

Play games, chant, test etc to increase speed of recalling facts.
Make models and images to display facts.
Investigate patterns within primes.

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 (*as fractions, as decimals or by rounding (for example, 98 ÷ 4 = 98/4 = 24 r 2 = 24 ½ = 24.5 ≈25*))

Bus shelter method (short division)



Pupils should consider whether remainders should be left as a reminder, rounded to the nearest whole or converted into a decimal or fraction.

Introduce long division (dividing by single digits)

256 ÷ 7 lies between 210 ÷ 7 = 30 and 280 ÷ 7 = 40

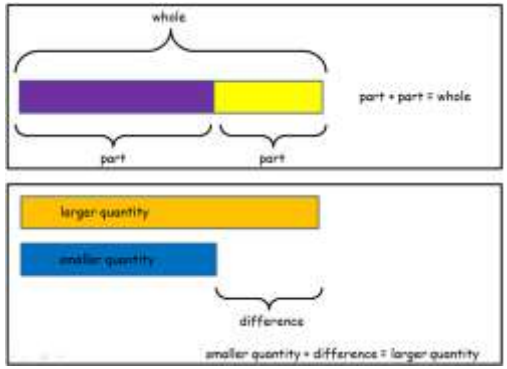
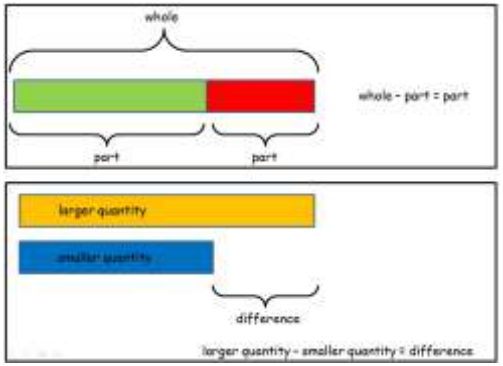
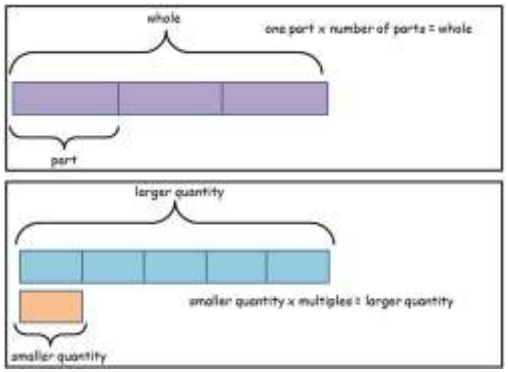
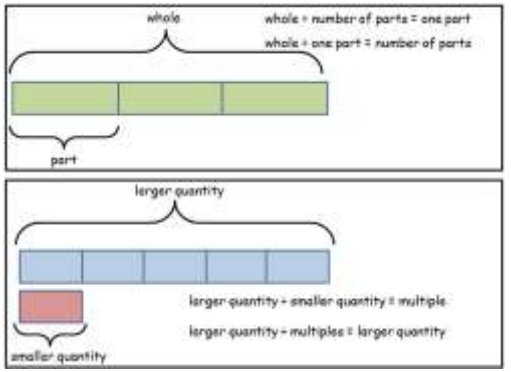
256
- 70 (10 groups) or (10 x 7)
186
140 (20 groups) or (20 x 7)
46
- 42 (6 groups) or (6 x 7)
4 (36 groups) or (36)

Answer: 36 remainder 4

Year 5

Number – addition and subtraction

Number – multiplication and division

solve addition multi-step problems in contexts, deciding which operations and methods to use and why Use all the models and images mentioned above. Discuss which is most effective and why. Singapore Bar Method 	solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why Use all the models and images mentioned above. Discuss which is most effective and why. Singapore Bar Method 	*Solve problems that use multiplication and division as inverses, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres* Use all the models and images mentioned above. Discuss which is most effective and why. Singapore Bar Method 	*Solve problems that use multiplication and division as inverses, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres* Use all the models and images mentioned above. Discuss which is most effective and why. Singapore Bar Method 
		use and explain the equals sign to indicate equivalence, including missing number problems (e.g, 13+24 = 12+25; 33 = 5 x []) *express distributivity, for example as a(b + c) = ab + ac* Use all of the models and images above to investigate a range of statements, ensuring the equals sign is in different positions. Allow time for discussion and reasoning. Display solutions and reasoning. Also use errors or misconceptions as a starting point.	*use and explain the equals sign to indicate equivalence, including missing number problems (e.g, 13+24 = 12+25; 33 = 5 x [])* Use all of the models and images above to investigate a range of statements, ensuring the equals sign is in different positions. Allow time for discussion and reasoning. Display solutions and reasoning. Also use errors or misconceptions as a starting point.
use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Estimate answers before solving any calculation. Check against estimate after calculating (and use inverse check).	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Estimate answers before solving any calculation. Check against estimate after calculating (and use inverse check).	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Estimate answers before solving any calculation. Check against estimate after calculating (and use inverse check).	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Estimate answers before solving any calculation. Check against estimate after calculating (and use inverse check).
use a variety of language to describe addition + add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make…? tens boundary, hundreds boundary, units boundary, tenths boundary, inverse = equals, sign, is the same as	*use a variety of language to describe subtraction* - subtract, subtraction, take (away), minus, decrease, leave, how many are left/left over? difference between, half, halve, how many more/fewer is… than…? how much more/less is…? tens boundary, hundreds boundary, units boundary, tenths boundary, inverse = equals, sign, is the same as	*use a variety of language to describe multiplication* know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, once, twice, three times… ten times… times as (big, long, wide… and so on), repeated addition, array, row, column, double,, inverse, prime, 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, division, divided by, divided into, remainder, factor, quotient, divisible by, inverse. Prime, factors equals, sign, is the same as

Year 6

Number – addition and subtraction

perform mental calculations, including with mixed operations and large numbers *(and decimals)*

Partition both numbers into hundreds, tens, ones and decimal fractions and recombine

35.8 + 7.3 = 30 + 5 + 0.8 + 7 + 0.3
= 30 + 12 + 1.1
= 42 + 1.1
= 43.1

Partition second number only into hundreds, tens, ones and decimal fractions and recombine

35.8 + 7.3 = 35.8 + 7 + 0.3
= 42.8 + 0.3
= 43.1

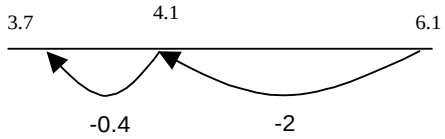
Add the nearest whole number then adjust

52 + 11.9 = 52 + 12 – 0.1
= 64 – 0.1
= 63.9

perform mental calculations, including with mixed operations and large numbers *(and decimals)*

Use known number facts and place value to subtract

6.1 – 2.4 = 3.7

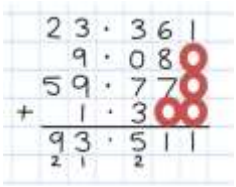


Subtract the nearest whole number then adjust

52 - 11.9 = 52 - 12 + 0.1
= 40 + 0.1
= 40.1

practise addition for larger numbers, using the formal written methods of columnar addition (see Appendix 1)

Extend the use of compact column method to adding several numbers with mixed decimals.

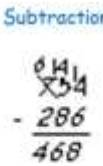


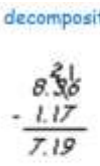
Children should be reminded of the importance of aligning the columns accurately.

Where there is an 'empty' space in a decimal column, pupils could insert a zero to show the value.

practise subtraction for larger numbers, using the formal written methods of columnar subtraction (see Appendix 1)

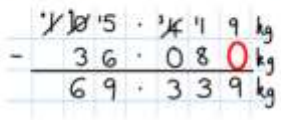
Column Subtraction with decomposition





Including decimals

Revision of formal compact column method extending to more complex integers and applying to problem solving using money and measures, including decimals with different numbers of decimal places. Align the decimal point when setting out calculations.
Use *'place holders'* to aid understanding of the value in that column.



Number – multiplication and division

perform mental calculations, including with mixed operations and large numbers *(and decimals)*

Partitioning

4.7 x 6 = (4 x 6) + (0.7 x 6)
= (24) + (4.2)
= 28.2

Double and halve

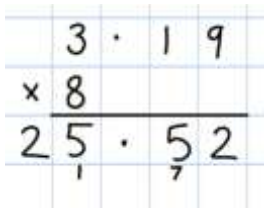
4.25 x 32 = 8.5 x 16
= 17 x 8
= 34 x 4
= 68 x 2
= 136

identify common factors, common multiples and prime numbers

Use a variety of resources (including a calculator) to investigate common factors, common multiples and prime numbers. Make models and images to display facts. Investigate the patterns within the numbers.

multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of short and long multiplication (*Appendix 1*)

Short multiplication and Long multiplication as in Year 5, but apply to numbers with decimals.



Pupils may need reminding that single digits belong in the ones (units) column.
A sound understanding of place value and the formal method itself are required before progressing to decimal multiplication.

perform mental calculations, including with mixed operations and large numbers *(and decimals)*

Partitioning

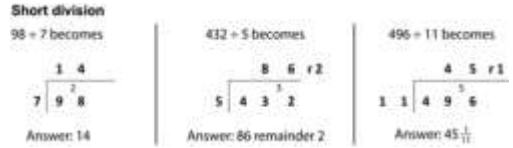
7.2 ÷ 3 = (6 ÷ 3) = (1.2 ÷ 3)
= 2 + 0.4
= 2.4

identify common factors, common multiples and prime numbers

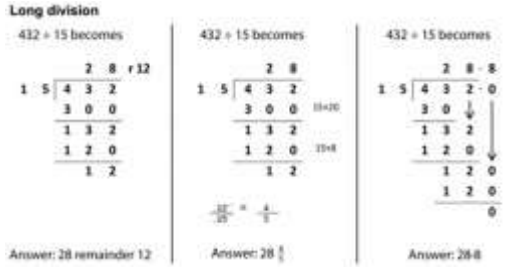
Use a variety of resources (including a calculator) to investigate common factors, common multiples and prime numbers. Make models and images to display facts. Investigate the patterns within the numbers.

divide numbers up to 4 digits by a two-digit whole number using the formal written method of short and long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context (*Appendix 1*)

Short division



Long division (for dividing by 2 digits)

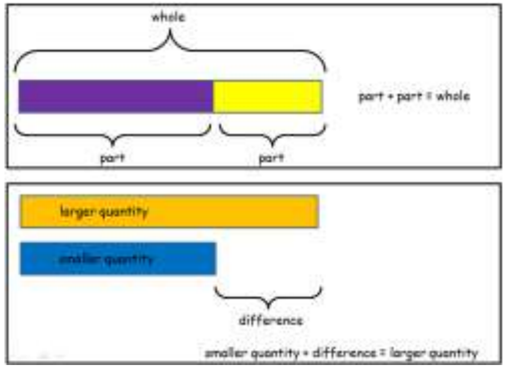


Remainders
Quotients expressed as fractions or decimal fractions

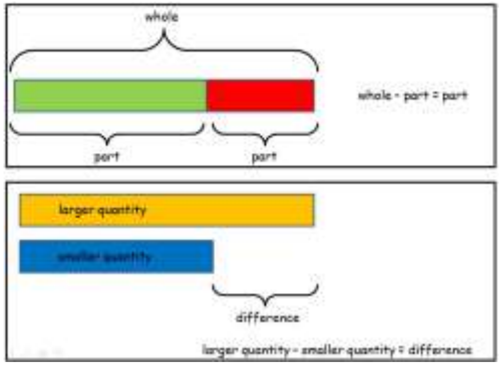
61 ÷ 4 = 15 ¼ or 15.25

<table>
<tr><th colspan="4">Year 6</th></tr>
<tr><th colspan="2">Number – addition and subtraction</th><th colspan="2">Number – multiplication and division</th></tr>
<tr>
<td>solve addition multi-step problems in contexts, deciding which operations and methods to use and why

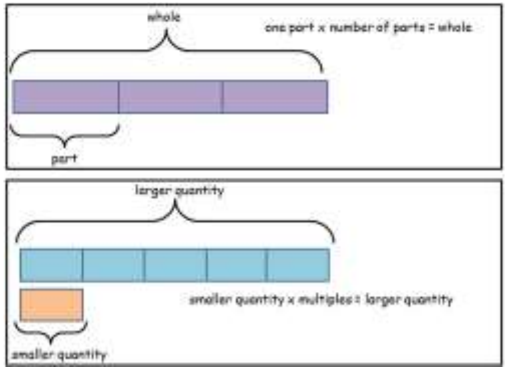
Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method
 
</td>
<td>solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

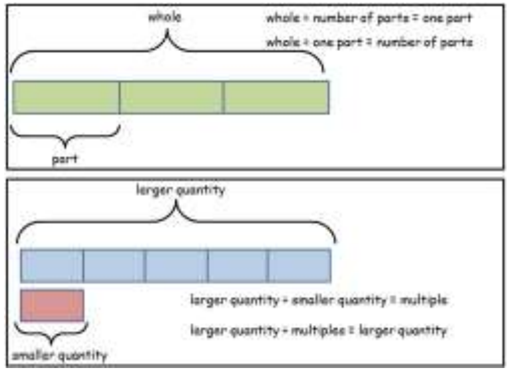
Use all the models and images mentioned above. Discuss which is most effective and why.

Singapore Bar Method
 
</td>
<td>solve problems involving multiplication

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

Singapore Bar Method
 
</td>
<td>solve problems involving division

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

Singapore Bar Method
 
</td>
</tr>
<tr>
<td>round answers to a specified degree of accuracy, e.g. to the nearest 10, 20, 50 etc., but not to a specified number of significant figures

Use knowledge of rounding (see fraction Policy) to create estimates.</td>
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</tr>
<tr>
<td>use their knowledge of the order of operations to carry out calculations involving the four operations
explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9

Review and investigate the effect of carrying out operations in different orders. Explore the effect.
Introduce and use BODMAS to solve calculations.</td>
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<tr>
<td>use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Estimate answers before solving any calculation.
Check against estimate after calculating (and use inverse check).</td>
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</tr>
<tr>
<td>use a variety of language to describe subtraction

+ add, addition, more, plus, increase, sum, total, altogether, score, double, near double, how many more to make...? tens boundary, hundreds boundary, units boundary, tenths boundary, inverse

= equals, sign, is the same as</td>
<td>use a variety of language to describe subtraction

- subtract, subtraction, take (away), minus, decrease, leave, how many are left/left over? difference between, half, halve, how many more/fewer is... than...? how much more/less is...? tens boundary, hundreds boundary, units boundary, tenths boundary, inverse

= equals, sign, is the same as</td>
<td>use a variety of language to describe subtraction

x lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, once, twice, three times... ten times... times as (big, long, wide… and so on), repeated addition, array, row, column double, inverse

= equals, sign, is the same as</td>
<td>use a variety of language to describe subtraction

Array, row, column, halve, share, share equally one each, two each, three each... group in pairs, threes... tens, equal groups of, divide, division, divided by, divided into, remainder, factor, quotient, divisible by, inverse

= equals, sign, is the same as</td>
</tr>
</table>