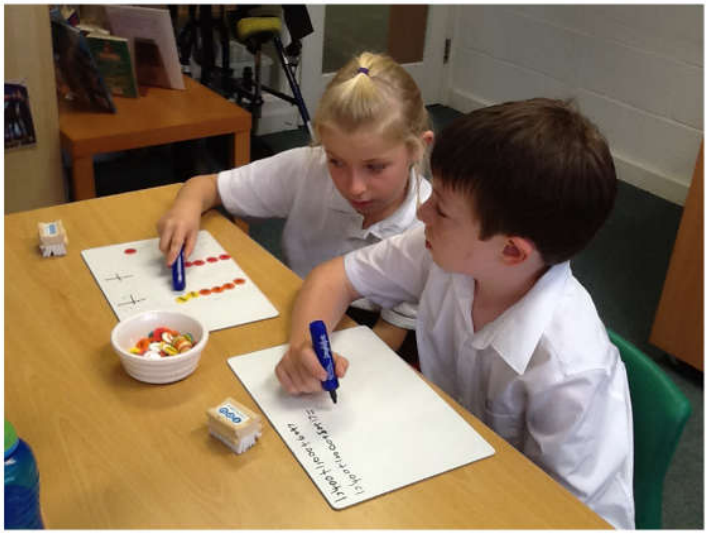
Y2 mathematics workshop



Tuesday 12th December 2017

Aims of today

To learn about teaching for mastery

To understand the key objectives for Y2

To focus on developing fluency of addition and subtraction facts

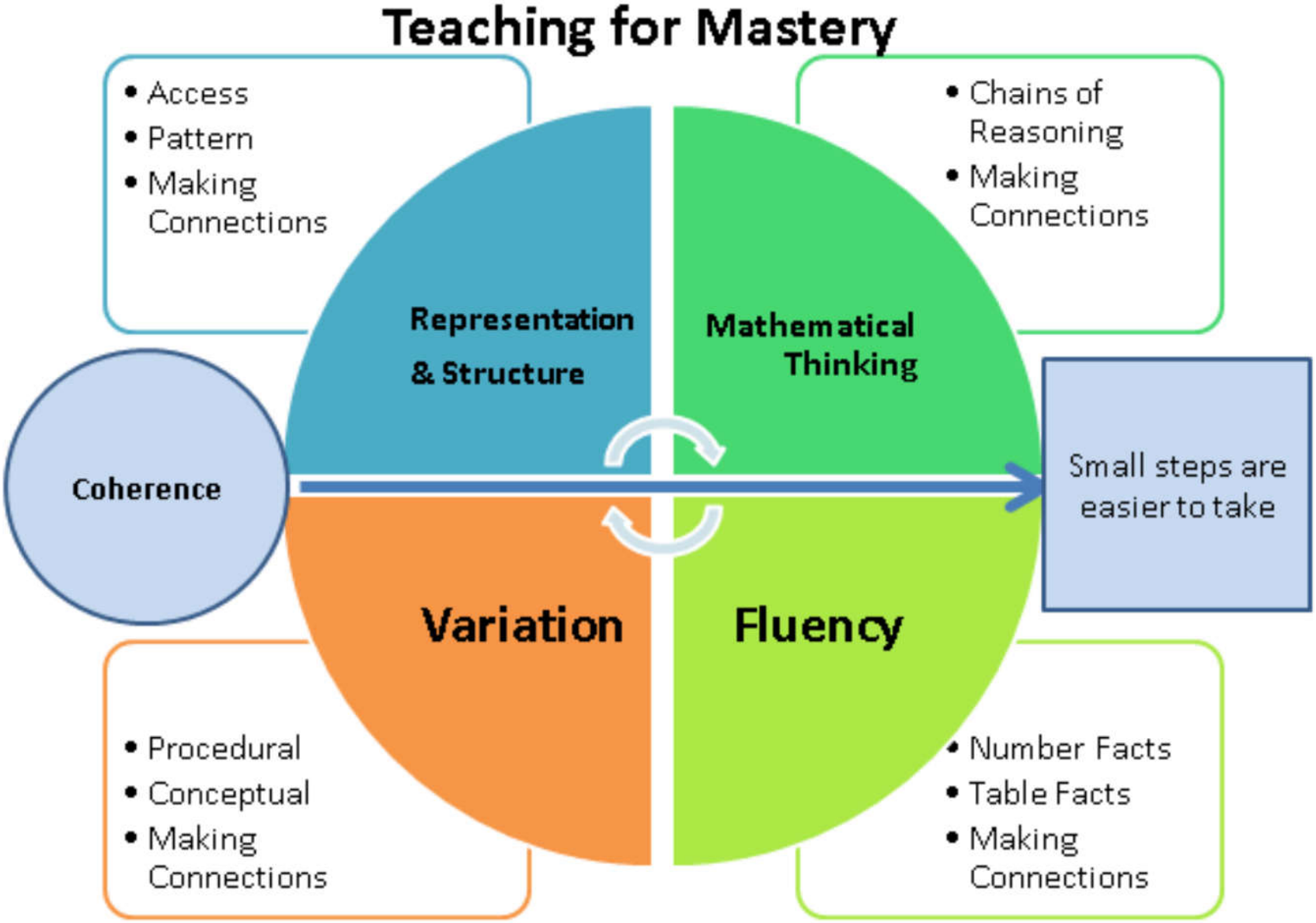
The importance of number bonds and addition/subtraction facts

The methods for teaching addition, subtraction, multiplication and division

How to help at home

The maths mastery approach

The five big ideas



The Y2 key objectives

Number – number and place value

Statutory requirements

Pupils should be taught to:

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- recognise the place value of each digit in a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use <, > and = signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- solve problems with addition and subtraction:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Number – multiplication and division

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Number – fractions

Statutory requirements

Pupils should be taught to:

- recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
- write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.

Measurement

Statutory requirements

Pupils should be taught to:

- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- compare and order lengths, mass, volume/capacity and record the results using >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money
- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- know the number of minutes in an hour and the number of hours in a day.

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects.

Geometry – position and direction

Statutory requirements

Pupils should be taught to:

- order and arrange combinations of mathematical objects in patterns and sequences
- use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).

Statistics

Statutory requirements

Pupils should be taught to:

- interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask and answer questions about totalling and comparing categorical data.

Fluency in Y2

If children are not fluent in basic addition and subtraction facts, then when solving complex problems the working memory is taken up by calculating basic facts and children have less working memory to focus on solving the actual problem.

What do we want by the end of Y2?

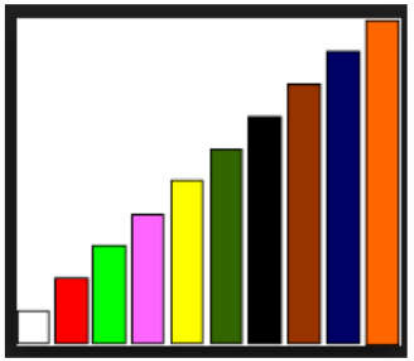
Children to know the number bonds of numbers from 1-20

Basic addition facts

Basic subtraction facts

Number bonds

It is <u>essential</u> that children first work with concrete objects to understand and work out the bonds.



Number bonds

How many ways? (Using resources)

Writing bonds systematically and discussing patterns

Learning the bonds from memory

Using and applying this knowledge

Basic addition facts

0+0	1+0	2+0	3+0	4+0	5+0	6+0	7+0	8+0	9+0	10+0
0+1	1+1	2+1	3+1	4+1	5+1	6+1	7+1	8+1	9+1	10+1
0+2	1+2	2+2	3+2	4+2	5+2	6+2	7+2	8+2	9.2	10+2
0+3	1+3	2+3	3+3	4+3	5+3	6+3	7+3	8+3	9+3	10+3
0+4	1+4	2+4	3+4	4+4	5+4	6+4	7+4	8+4	9+4	10+4
0+5	1+5	2+5	3+5	4+5	5+5	6+5	7+5	8+5	9+5	10+5
0+6	1+6	2+6	3+6	4+6	5+6	6+6	7+6	8+6	9+6	10+6
0+7	1+7	2+7	3+7	4+7	5+7	6+7	7+7	8+7	9+7	10+7
0+8	1+8	2+8	3+8	4+8	5+8	6+8	7+8	8+8	9+8	10+8
0+9	1+9	2+9	3+9	4+9	5+9	6+9	7+9	8+9	9+9	10+9
0+10	1+10	2+10	3+10	4+10	5+10	6+10	7+10	8+10	9+10	10+10

Basic subtraction facts

0-0	1-0	2-0	3-0	4-0	5-0	6-0	7-0	8-0	9-0	10-0
1-1	2-1	3-1	4-1	5-1	6-1	7-1	8-1	9-1	10-1	11-1
2-2	3-2	4-2	5-2	6-2	7-2	8-2	9-2	10-2	11-*2	12-2
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8-8	9-8	10-8	11-8	12-8	13-8	14-8	15-8	16-8	17-8	18-8
9-9	10-9	11-9	12-9	13-9	14-9	15-9	16-9	17-9	18-9	19-9
10-10	11-10	12-10	13-10	14-10	15-10	16-10	17-10	18-10	19-10	20-10

How to help at home

Incorporate maths into daily routines

Odd and even patterns

Shape hunts
Direction games

Counting forwards and backwards

Measures in everyday play

"I'm thinking of a number"

Fluency of bonds, addition and subtraction facts

Positive messages about maths

Do not praise children for being 'clever'.

Praise given for hard work.

Let children know that they can improve.

Make maths fun!

Regular and often

Raise the profile of maths in line with reading.

Work on number bonds and basic addition and subtraction fluency in particular.

Follow the home learning letter information to continue to add to skills.

Written methods in Year 2

Number – addition and subtraction

Statutory requirements

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- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Year 2

Addition & Subtraction

- Recall and use addition and subtraction facts up to 20 fluently, and derive and use related facts up to 100.
- Add and subtract with concrete objects, representations and mentally

  TO + O = TO + tens = TO + TO = O + O + O =
- Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- Recognise and use the inverse relationship between addition and use this to check calculations and solve missing number problems.

Teachers and/or pupils may demonstrate these strategies on a numbered number line supported by a variety of materials.

DEVELOPING MENTAL FLUENY STRATEGIES

Addition

Reordering Children should understand why it is more efficient to reorder numbers when adding. 14 + 27 becomes 27 + 14

Bridging They should then use knowledge of number bonds with bridging. 27 + 14 = 27 + 3 + 11 3 + 8 + 7 becomes to 3 + 7 + 8 (using knowledge of number bonds to 10)

Partition both numbers then add and recombine
42 + 36 = 40 + 30+ 2 + 6 = 70 + 8 = 78

Partition just one number
55 + 42 =
55 + 40 = 95 + 2

Doubles and near doubles
15 + 16 becomes double 15 + 1

Compensating ~ adding a close multiple of 10 (e.g. 18, 19, 21, 22)
23 + 19 becomes 23 + 20 - 1 = 42

Deriving new facts
3 + 7 = 10 therefore
30 + 70 = 100 100—30 = 70 30 = 100—70 70 = 100 - □

Subtraction

Bridging through ten and multiples of ten should also be used when subtracting.
73 - 16 becomes 73 - 10 - 3- 3
=63 - 3 - 3
= 57

Counting on in tens and ones to find the difference.
Count on because the numbers are close together ~ 23 - 17 = 6
17 + 3 = 20
20 + 3 = 23

Count back if numbers are further apart ~ 45 - 22 = 23 45 - 20 - 2 = 23

Compensating ~ subtracting a close multiple of 10 (e.g. 18, 19, 21, 22)
65 - 18 becomes 65 - 20 + 2 = 47

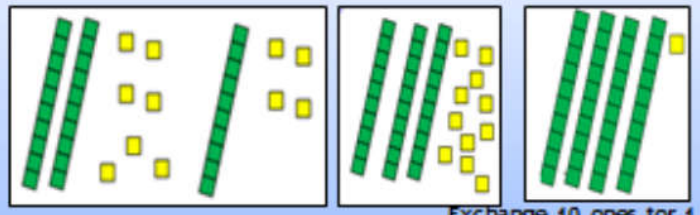
Year 2

Addition - TO + O = TO + tens = TO + TO = O + O + O =

When teaching the stages in progression start with models and make connections with the number line. Place emphasis on the ability to explain and reason about the mathematics behind the method. E.g. Ask 'What's the same and what's different about these three approaches to the same calculation?

MANUPLATIVES AND REPRESENTATIONS

27 + 14 = 41

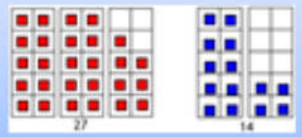


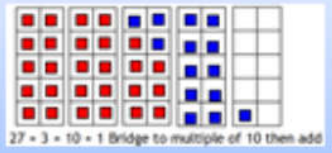
Exchange 10 ones for 1 ten

27 + 14 = 41

7 + 4 = 11

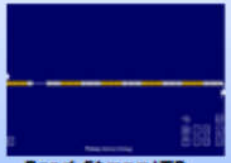
27 + 14 = 41



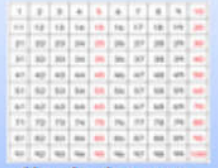


27 + 3 + 10 + 1 Bridge to multiple of 10 then add

Other Representations

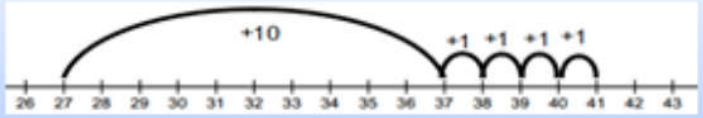


Bead String ITP

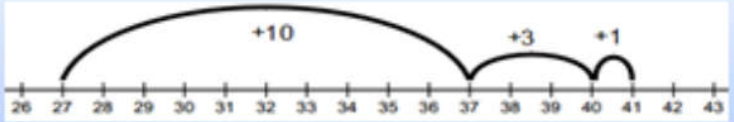


Hundred square

NUMBERED NUMBER LINES (LEADING TO ENL)



Adding tens then ones



Using knowledge of bonds to ten

JOTTINGS

27 + 14 = 27 + 10 + 4
= 37 + 4
= 41

27 + 14 = 20 + 10 + 7 + 4
= 30 + 11
=41

27 + 19 = 27 + 20 - 1
= 47 - 1
= 46

Begin to record addition in columns to support place value and prepare for formal written.

30 + 4
20 + 5
50 + 9

Year 2

Subtraction - TO - O = TO - Tens = TO -TO

When teaching the stages in progression start with models and make connections with the number line. Place emphasis on the ability to explain and reason about the mathematics behind the method. E.g. Ask 'What's the same and what's different about these three approaches to the same calculation?'

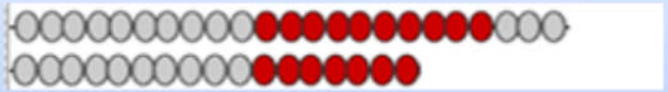
MODELS

45 - 27 = 45 - 20 - 7
= 25 - 7
= 18

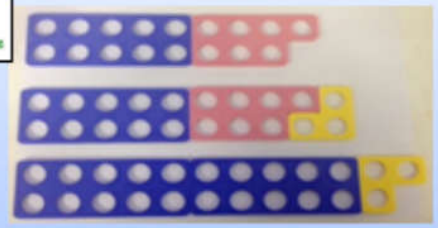
Beadstring - subtract tens then ones.

Minuend and subtrahend close together 23 - 17 = 6

8 - 3 = 5
Minuend Subtrahend Difference

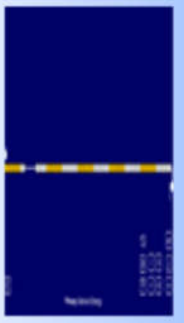


Beadstring can make it easier to see it is more efficient to count on when difference is small. Bridge to nearest 10 and add remainder.

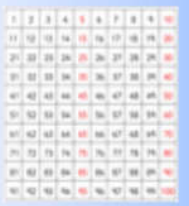


Numicon - Bridge to nearest 10 and add remainder.

Other representations



Bead String ITP

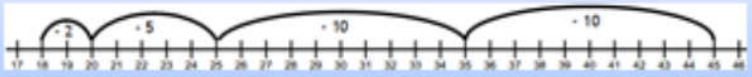


Hundred

Difference

NUMBERED LINES (LEADING TO ENL then Jottings)

Minuend and subtrahend far apart count back

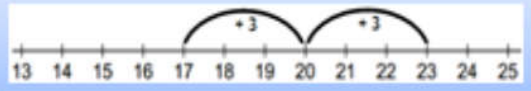


Smaller jumps leading to more efficient jumps.

45 - 27 = 45 - 20 -7
= 25 - 7
= 18

73 - 16 = 73 - 10 - 6
= 63 - 3 - 3
= 60 - 3
= 57

Minuend and subtrahend close together



23 – 17 = 6

65 - 18 = 65 - 20 + 2
= 45 + 2
= 47

Addition - 1 digit add 1 digit

$$4 + 3 =$$

Addition - 2 digit add 1 digit

$$24 + 3$$

Addition - 2 digit add a multiple of ten

$$40 + 30 =$$

Addition - 2 digit add 2 digit

When adding 2, 2-digit numbers together we encourage the children to partition the numbers (into tens and ones) to make it more manageable.

$$25 + 34 = 59$$

20	+	5
30	+	4
50	+	9

Not bridging 10

Partitioning is when you split numbers up into smaller numbers that have the same total value. For example:

$$36 = 30 + 6$$

$$36 = 20 + 16$$

$$36 = 10 + 26$$

Addition - 2 digit add 2 digit

When adding 2, 2-digit numbers together we encourage the children to partition the numbers (into tens and ones)to make it more manageable.

$$28 + 34 = 62$$

20	+	8
30	+	4
50	+	12

Bridging 10

Subtraction - 1 digit subtract 1 digit

$$5 - 2 =$$

Subtraction - 2 digit subtract 1 digit

$$25 - 2 =$$

Subtraction - 2 digit minus a multiple of ten

$$50 - 20 =$$

Subtraction - 2 digit subtract 1 digit - bridging through 10

When subtracting, if the numbers are far apart we recommend subtracting on a number line.

3 6

$73 - 9 = 64$

$73 - 3 = 70$

$70 - 6 = 64$

Subtraction - 2 digit subtract 2 digit - bridging through 10

When subtracting, if the numbers are far apart, we recommend subtracting on a number line.

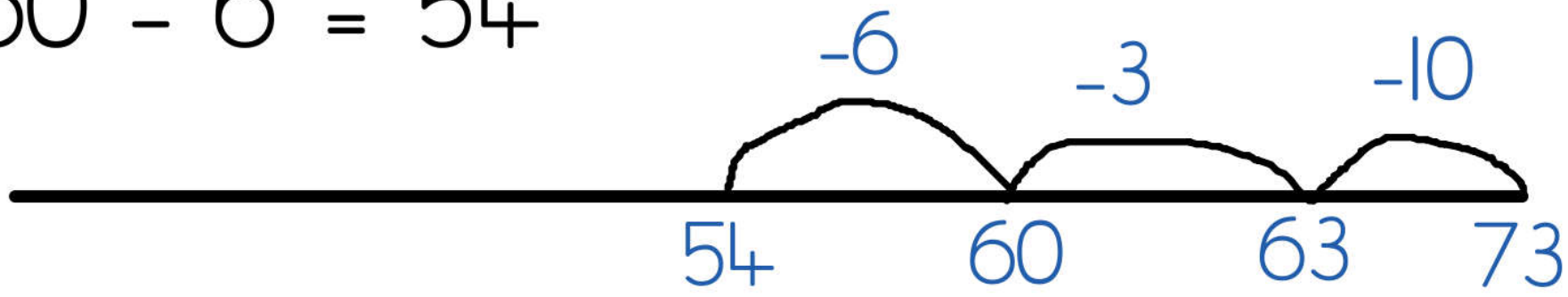
10 3 6

73 - 19 =

73 - 10 = 63

63 - 3 = 60

60 - 6 = 54



Number – multiplication and division

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- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

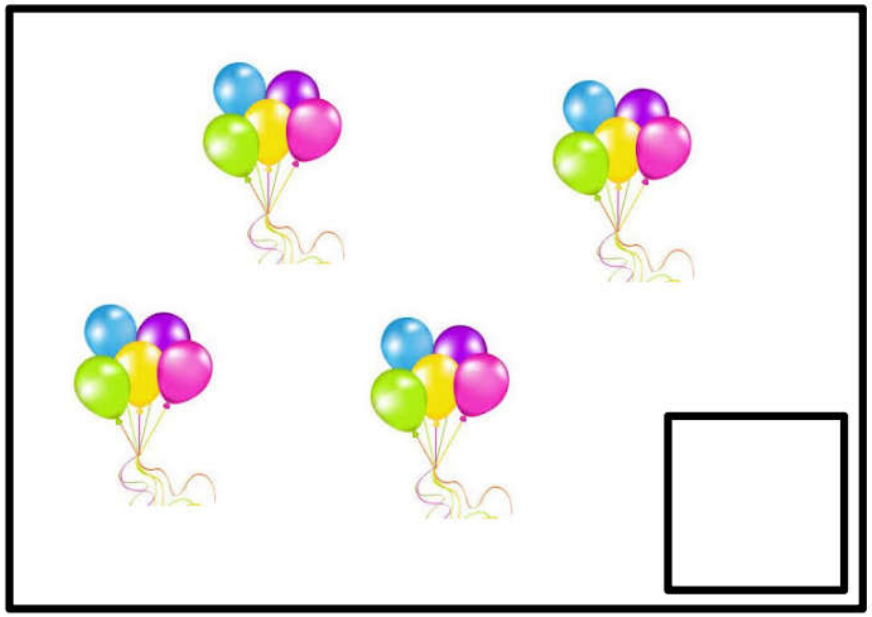
Multiplication

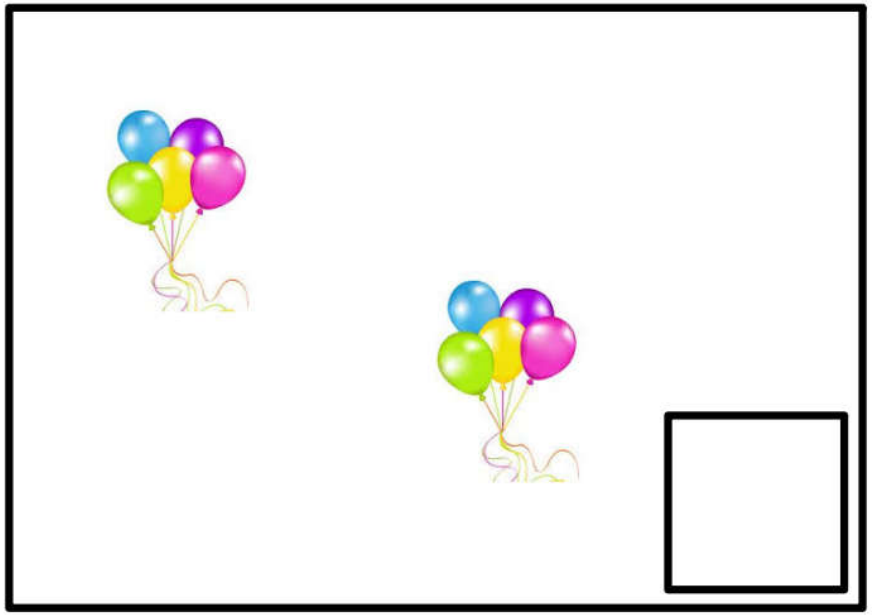
By the end of Year 2 the children must be fluent with the 2, 5 and 10 times tables. They must also be familiar with the 3 times table.

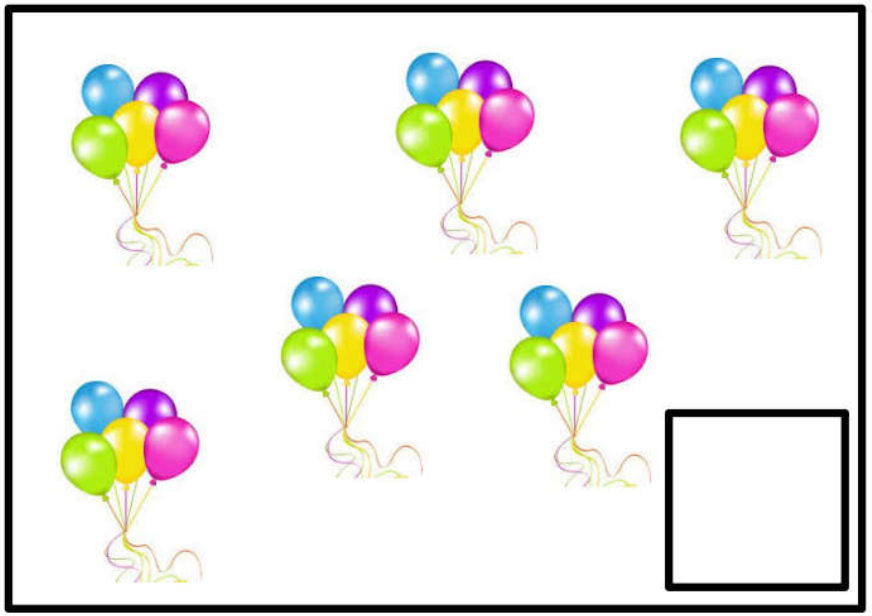
$$3 \times 5 = 15$$

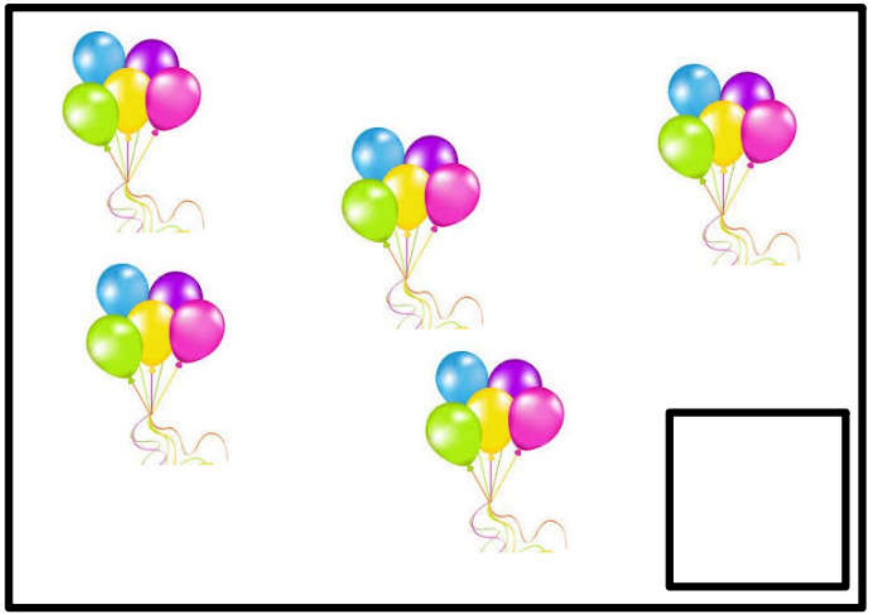
$$5 \times 3 = 15$$

Multiplication - Ideas from lessons









New

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

20.11.17

We are learning to count in fives

0, 5, 10, 15, 20, ___

15, 20, 25, ___, 35, 40

55, 60, 65, 70, 75, ___

20, 15, ___, 5, 0

85, 80, 75, 70, ___, 60

60, ___, 50, 45, 40, 35

New

New

2 x 5 = 10

New

New

3 x 5 = 15

New

What do you notice?
What is the same?
What is different?

1 x 5 = 5

2 x 5 = 10

3 x 5 = 15

4 x 5 = 20

5 x 5 = 25

Develop

Multiplication is commutative!

It can be done in any order, just like addition.

$$2 \times 5 = 10$$

$$5 \times 2 = 10$$

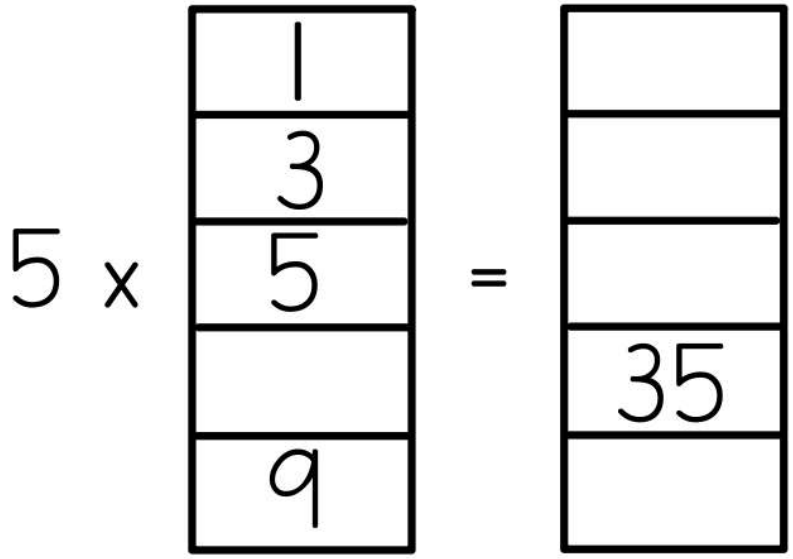
The position of the factors can change and the product stays the same.

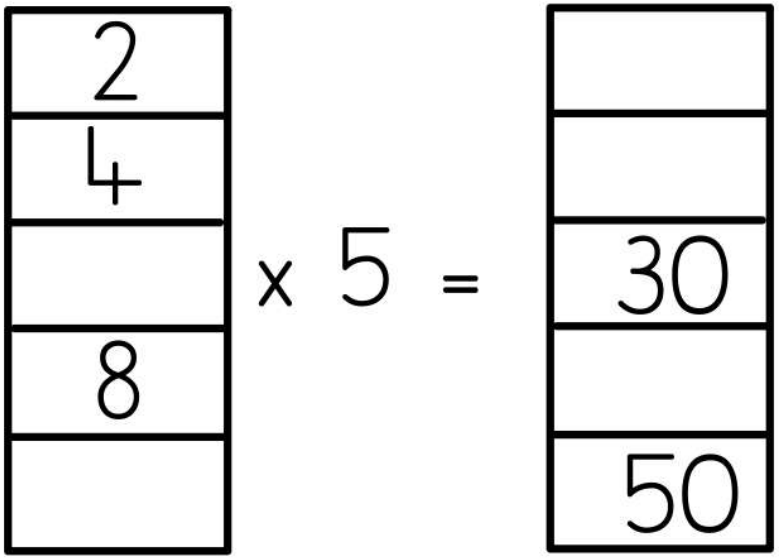
When you change the position of the factors, the product stays the same!

1 x 5 = 5	5 x 1 = 5
2 x 5 = 10	5 x 2 = 10
3 x 5 = 15	5 x 3 = 15
4 x 5 = 20	5 x 4 = 20
5 x 5 = 25	5 x 5 = 25
6 x 5 = 30	5 x 6 = 30
7 x 5 = 35	5 x 7 = 35
8 x 5 = 40	5 x 8 = 40
9 x 5 = 45	5 x 9 = 45
10 x 5 = 50	5 x 10 = 50
11 x 5 = 55	5 x 11 = 55
12 x 5 = 60	5 x 12 = 60

22.11.17

We are learning to solve missing number problems using our knowledge of multiplying by five





0 x 5 =

40 = x 5

5 x 3 =

50 = 5 x

Division

By the end of Year 2 the children must be fluent with all related division facts for the 2, 5 and 10 times table. They must also be familiar with division facts for the 3 times table.

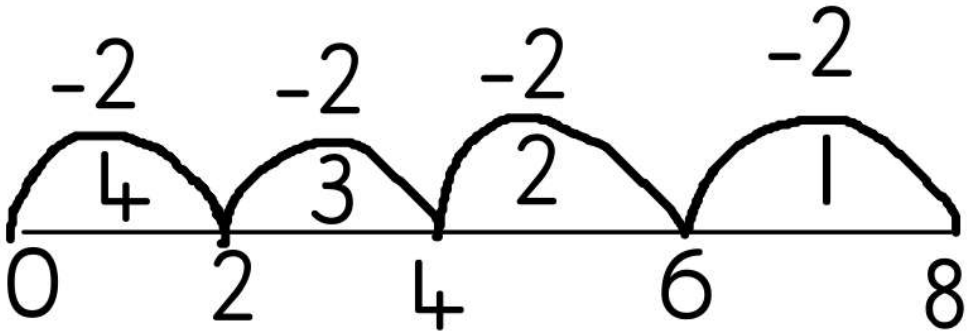
$$15 \div 3 = 5$$

$$15 \div 5 = 3$$

Division

Children need to understand that division is the same as repeated subtraction.

$$8 \div 2 = 4$$



grouped in

divided into groups of

Fact families

$$2 \times 5 = 10$$

$$5 \times 2 = 10$$

$$10 \div 5 = 2$$

$$10 \div 2 = 5$$

Multiplication and division challenges

1 x 5 = 5
2 x 5 = 10
3 x 5 = 15
4 x 5 = 20
5 x 5 = 25
6 x 5 = 30
7 x 5 = 35
8 x 5 = 40
9 x 5 = 45
10 x 5 = 50

2 x 5 = 10
7 x 5 = 35
4 x 5 = 20
10 x 5 = 50
6 x 5 = 30
5 x 5 = 25
8 x 5 = 40
9 x 5 = 45
3 x 5 = 15
1 x 5 = 5

15 = 3 x 5
7 x 5 = 35
40 5 = 8
5 x 2 = 10
50 = 10 x 5
35 = 5 x 7
1 x 5 = 5
0 x 5 = 0
5 x 6 = 30
45 9 = 5

Useful apps

Hit the button

Cloud tables

KS1 Assessments

The KS1 assessments take place in the Summer Term. In maths, children will complete an arithmetic paper and a reasoning paper. They form one part of evidence, along with the continuous teacher assessment that has taken place throughout the year.

Arithmetic

$4 + 2 =$ ☐

2 $19 - 9 =$ ☐

3 $89 + 10 =$ ☐

4 $17 - 6 =$ ☐

5

$15 + 3 + 3 =$ ☐

7

☐ $+ 5 = 9$

18

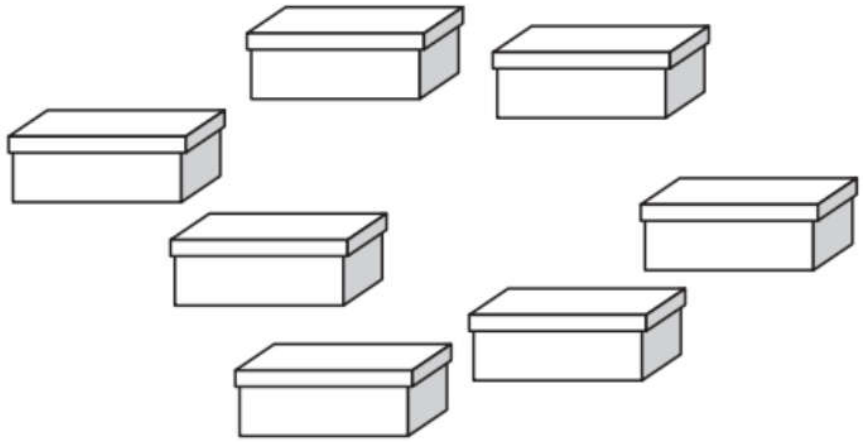
$\frac{1}{4}$ of $20 =$ ☐

11

$87 - 40 =$ ☐

Reasoning

7



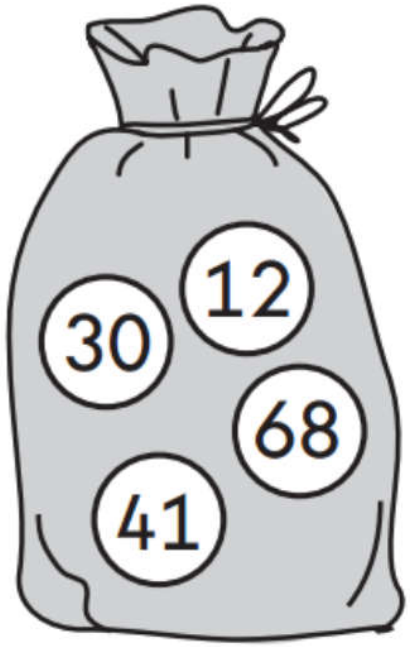
Sita puts **2** shoes in each of these boxes.

How many shoes are there altogether?

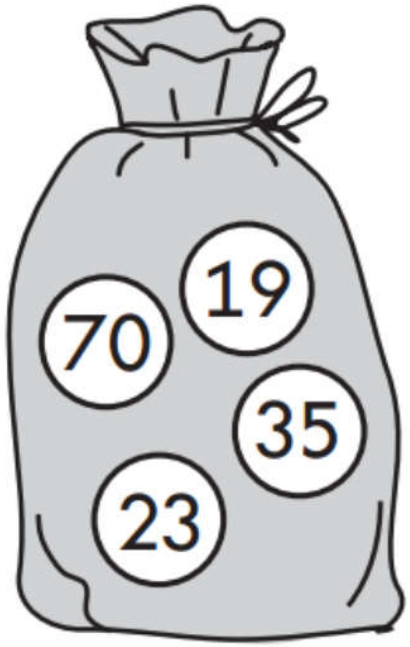
shoes

12 **Two** of the numbers are in the **wrong** bag.

Draw a cross (✗) on each of them.



even numbers



odd numbers

8 Complete the table.

words	digits
thirty-eight	38
	40
ninety-four	

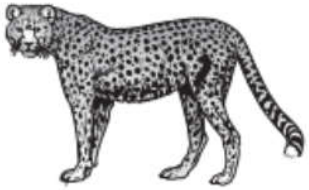
19 Amy buys an ice-cream for 90p.

(a) Tick (✓) **three** coins to show how Amy can make **90p**.

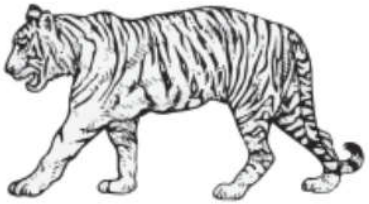
(b) Tick (✓) **four** coins to show another way to make **90p**.

28 Abdul goes to the zoo.

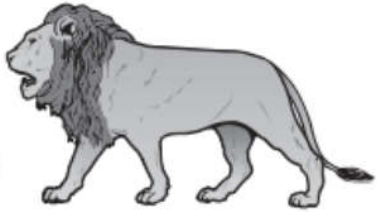
He finds out the mass of some animals.



Cheetah
58 kg



Tiger
94 kg



Lion
94 kg

Compare the mass of the animals.

Write **<** or **>** or **=** in each box.

Cheetah's mass ☐ Tiger's mass

Tiger's mass ☐ Lion's mass