Year 3

# Addition & Subtraction

- Mentally add and subtract: a HTO + / - a multiple of 1, 10 and 100
- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.
- Estimate the answer to a calculation and use inverse operations to check answers.
- Solve the missing number problems using relationship between +-
- Calculations with two-digit numbers (exceed 100).
- Pupils use number facts and their understanding of place value and partitioning to solve addition and subtraction calculations
- Pupils are beginning to develop a range of strategies such as balancing (17+24 becomes 20+21 ) and same difference (44-18 becomes 42-20) and other strategies such as those detailed below.
  Teachers and / or pupils may demonstrate these strategies on an empty number line (ENL) 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 to put the largest number first.
Bridging They should then use knowledge of number bonds with bridging.
48 + 7 = 48 + 2 + 5
= 50 + 5 = 55

**Partition both numbers then add and recombine.**
145 + 123 = 100 + 100 + 40 + 20 + 5 + 3
= 200 + 60 + 8
= 268

**Partition just one number**
234 + 122 = 234 + 100 + 20 + 2
= 334 + 20 + 2 =
= 354 + 2 = 356

**Doubles and near doubles**
143 + 145 = double 140 + 8 = 288

**Compensating ~ adding a close multiple of 10 (e.g. 18, 19, 21, 22)**
156 + 18 becomes 156 + 20 – 2 = 154

## Subtraction

**Bridging** through ten and multiples of ten should also be use 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 minuend and subtrahend are close together ~ 23 – 17 = 6 17 + 3 = 20 20+ 3 = 23

**Count back** if minuend and subtrahend are further apart ~ 45 – 22 = 45 – 20 = 25 – 2 = 23

**Compensating** ~ subtracting a close multiple of 10 (e.g. 18, 19, 21, 22)
72 – 19 = 72 – 20 + 1 = 52 + 1 = 53

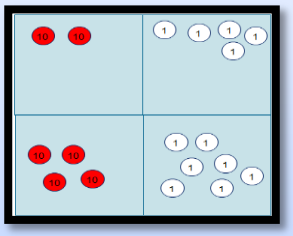
# Year 3

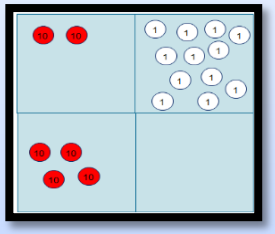
# Addition - Add up to 3 digits, using formal written methods

When teaching the stages in progression, start with models and make connections with the expanded and formal methods at the same time. For example using counters and/or Dienes alongside the expanded and formal methods. Children should be able to explain what is happening when they carry.
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?'

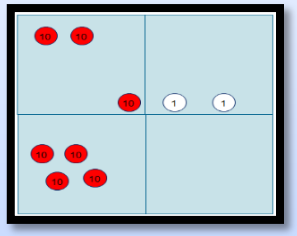
## MODELS

25 + 47 = 72

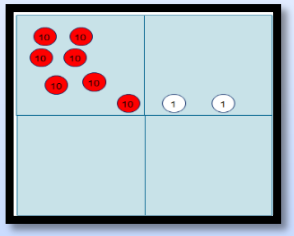




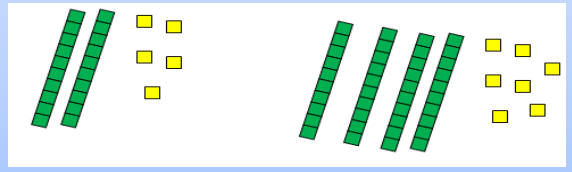
Combine ones

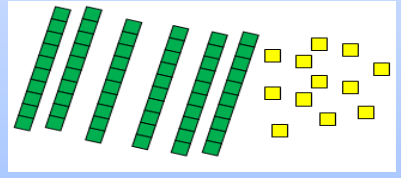


Exchange ten ones for one

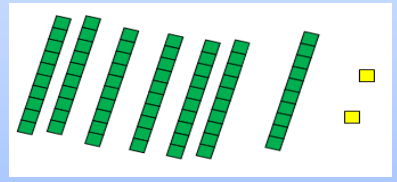


Combine tens



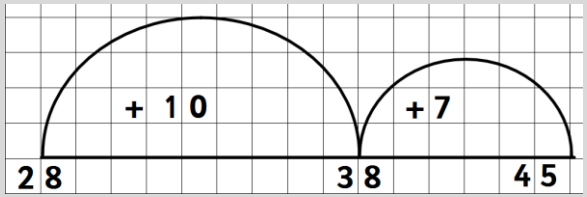


Combine all



Exchange ten ones for one ten

## NUMBER LINE AND JOTTINGS




227 + 19 = 227 + 20 - 1

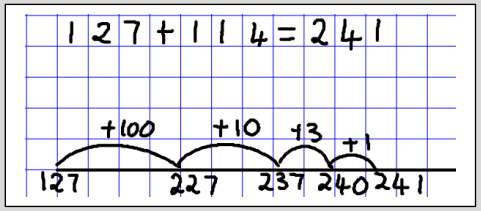
= 247 -1

=246

127 + 114 = 100 + 100 + 20 + 10 + 7 + 4

= 200 + 30 + 11

= 241




## EXPANDED AND FORMAL

| | |
|---|---|
| 200 + 30 + 4 | 234 |
| 500 + 20 + 7 | + 527 |
| 700 + 60 + 1 | 761 |
| 10 | 1 |

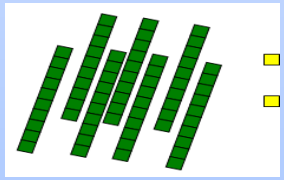
Year 3

# Subtraction – Subtract up to 3 digits using a formal written method

Children should continue to use horizontal number line - encourage use of visualisation of lines and grids. Children should also be encouraged to look at the difference between two numbers before making a decision about how to use the number line e.g. small or large difference - count on or count back. Children should be taught subtraction alongside addition. Decomposition should only be introduced when children are secure with informal jottings and number lines.

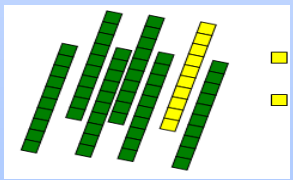
## MODELS

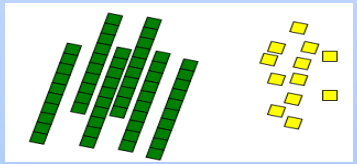
72 – 47



72

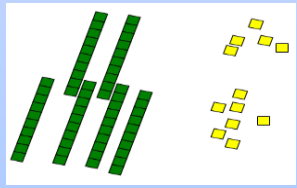
Exchange ten for ten ones.



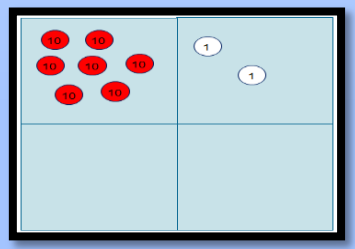


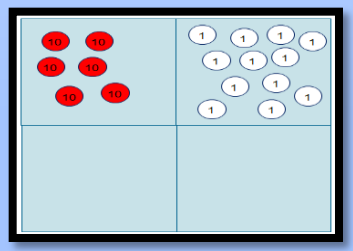
$^{6}\cancel{7}\,^{1}2$

Subtract 47

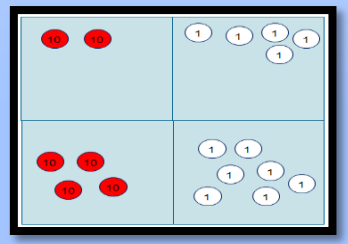


25

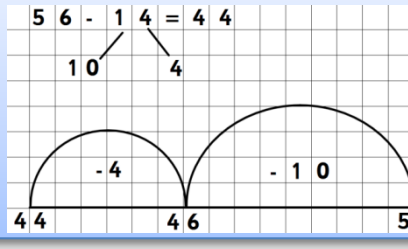


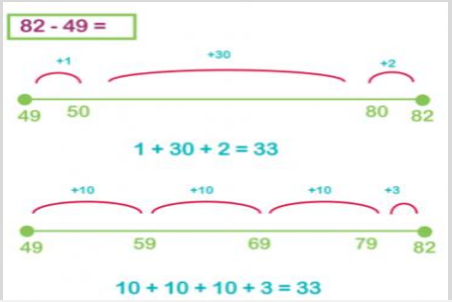


47 subtracted with 25 left at top



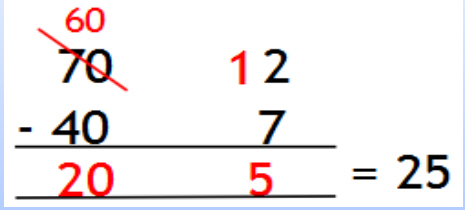
## NUMBER LINE

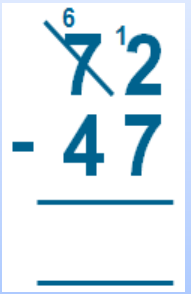



See Year 2 Jottings for methods

## EXPANDED AND FORMAL



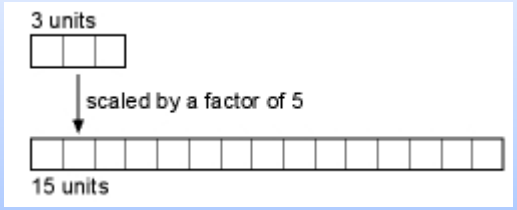



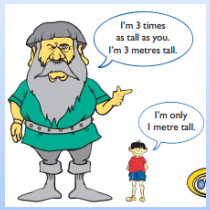
Year 3

# Multiplication and Division

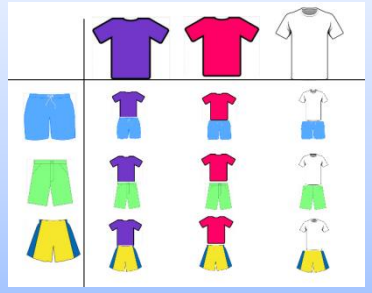
- Recall and use multiplication and division facts for 3,4 and 8 multiplication tables.
- Confidently x and ÷ by 10 and 100
- Solve missing number problems using the relationship between x and ÷
- Solve positive integer scaling problems and correspondence problems in which n objects are connected to m objects

## Scaling




The giant is three times bigger than the boy.



## Correspondence

How many outfits are possible?

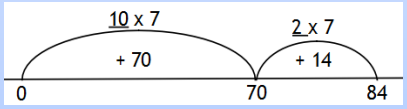
DEVELOPING MENTAL FLUENY STRATEGIES

**Write and mentally calculate mathematical statements for multiplication and division up to TUxU and TU ÷ U using mental methods:**

Through **doubling**, they connect the 2,4 and 8 multiplication tables. 4x6=24 so 8x6=48 and can derive facts such as 6x9 using 3x9

**Factorising:** 18 x 3 becomes 6 x 9

**Using Place Value and facts** solve 84 ÷ 7 using 70 + 14 knowing that 70 =10 x 7 and 14 = 2 x 7

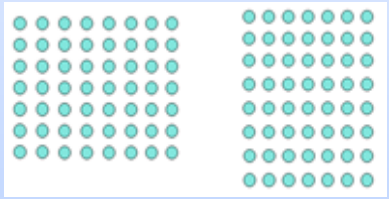




**Use known facts** 3 x 2 = 6 to derive 30 x 2 = 60, 60 ÷ 3 = 20 and 20= 60 ÷ 3

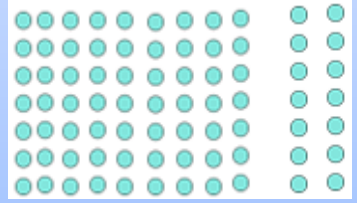
**Using commutative and associative laws**

4 x 12 x 5 = 4 x 5 x 12 = 20 x 12 = 240

**They know 7x8=8x7 and can explain using an array.**



**They calculate 12x7 using 10x7and explain using an array.**



Year 3

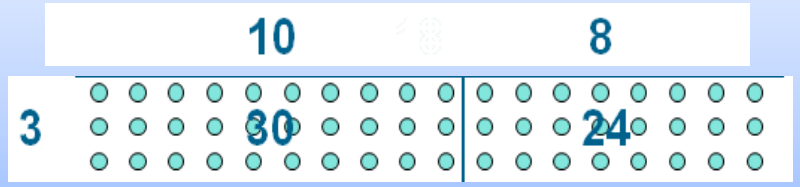
# Multiplication TU X U (Suggest no formal method is taught in year 3)

**When teaching the stages in progression, start with models and make connections with the expanded . Use counters and/or Dienes alongside the expanded as an explanation for the expanded method. 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? Children should become fluent in using the formal method.**

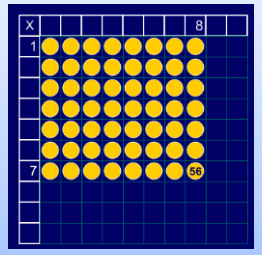
## MODELS

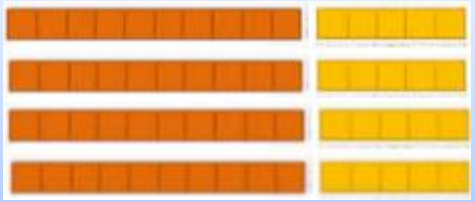
Continue to use a range of manipulatives, encouraging children to demonstrate to you how they are using them to calculate.

18 x 3 = 54




Multiplication Board ITP



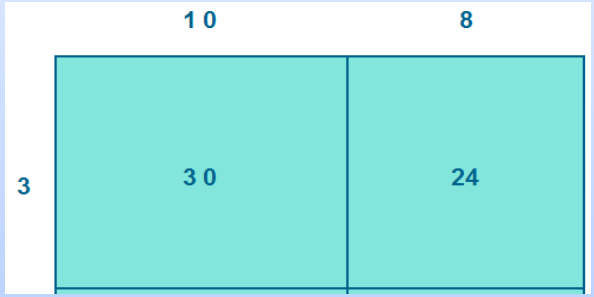


15 x 4 = 60

## EXPANDED

Grid method

18 x 3 = 54




To make link with array explicit, perhaps model the grid method initially with proportionally sized boxes. When you are confident children understand the concept then there is no longer a need to do this.

Grid method

35 x 7 = 245

| × | 30 | 5 |
|---|---|---|
| 7 | 210 | 35 |

210 + 35 = 245

35 x 7 = 245

30 x 7 = 210

5 x 7 = 35

Year 3

# Division - TU÷ U - Within 2, x5 and x10 multiplication tables, for example 80 ÷ 8 =

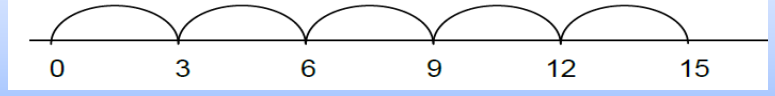
**In Year 3 focus on mental methods of division demonstrated using the number line and a variety of models before moving onto the beginings of short division which will be taught in Year 4.**

**When teaching the stages in progression, start with models and make connections with the expanded and formal methods at the same time. Use counters and/or Dienes alongside the expanded as an explanation for the formal method. 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? Children should become fluent in using the formal method.**

Representations to support mental and written calculations

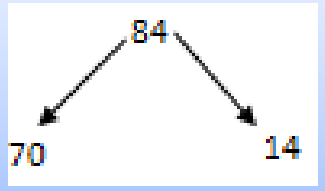
15 ÷3 = 5

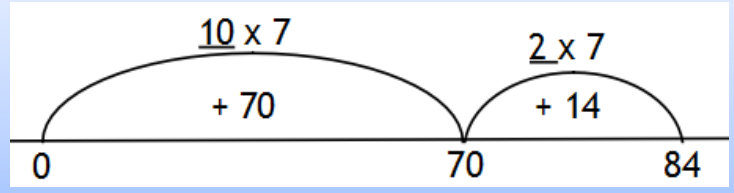
Counting groups forwards and backwards



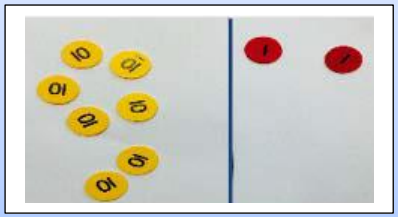

Encourage children to make more efficient jumps starting with ten lots of the divisor. If ten lots is not possible, encourage them to half to find five lots.

84 ÷ 7 = 12

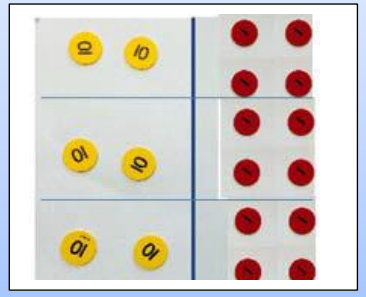



How could I calculate 72 ÷ 3?



Informal exploration with manipulatives supports the progression to formal written methods in Year 4



$$3\overline{)72}\quad 24$$