# Calculation

# at TAS

# Year 3

# The Five Big Ideas

At TAS, we want our pupils of all ages to acquire a deep, long-term, secure and adaptable understanding and enjoyment of maths.

## Coherence

Lessons are broken down into small connected steps that gradually build up from what a child already knows to the introduction of new concepts.

## Representation and Structure

Representations are used in lessons to show children a visual representation of the maths they are doing.

## Mathematical Thinking

Children work on ideas by discussing with others and explaining their reasoning, rather than being told how to think.

## Fluency

Quick and efficient recall of facts and procedures is vital, so that it can be applied in different contexts.

## Variation

The teacher often represents the concept being taught in more than one way, to develop a deeper understanding.  Children are also given

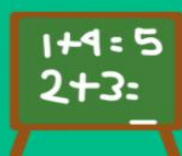the opportunity to practise their skills in varied ways, by making connections

## The CPA Approach

**CONCRETE -** using physical objects to solve maths problems.

**PICTORIAL -** using drawings to solve maths problems.

1+4 = 5
2+3: _

**ABSTRACT -** solving maths problems using only numbers.
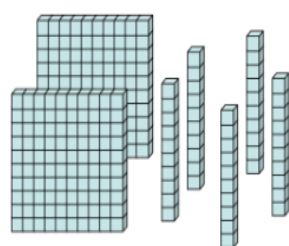
Children might begin by handling real objects...

...then using physical representations of them.

Drawings act as a bridge between the concrete objects children have been using and the abstract symbols they must learn to use.

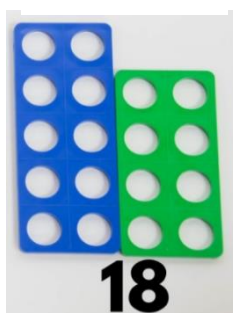Finally, children learn to use abstract symbols to solve problems.

10 + 7 = 17

# Representations and Resources

**Base ten**

253

**Numicon**

18

**place value counters**

| Hundreds | Tens | Ones |
|---|---|---|
| 100 100 | 10 10 10 10 10 | 1 1 1 1 1 1 |
| 2 | 5 | 6 |

**money**

**straws**

1  2  6

10 - 6 = 4

**number lines**

0 1 2 3 4 5 6 7 8 9 10 11

**Cuisenaire rods**

5  5
6  4
7  3
8  2
9  1
10

**part whole models**

part  part
5  2
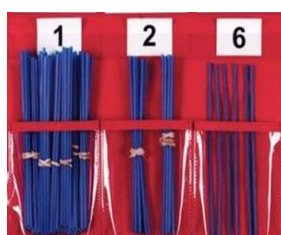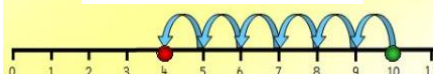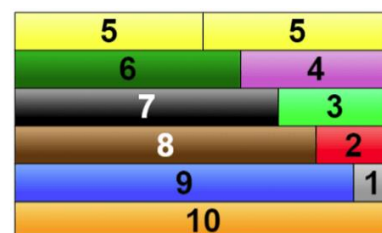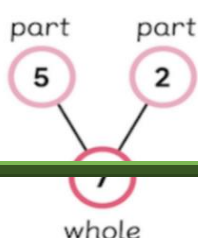
whole

**tens frames**
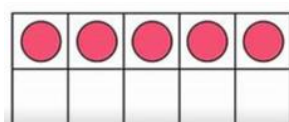
**Rekenreks**

# Addition

- Column method - regrouping
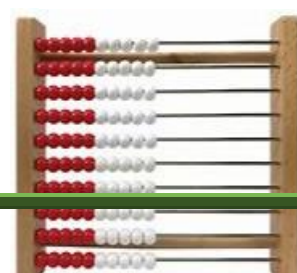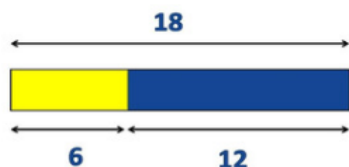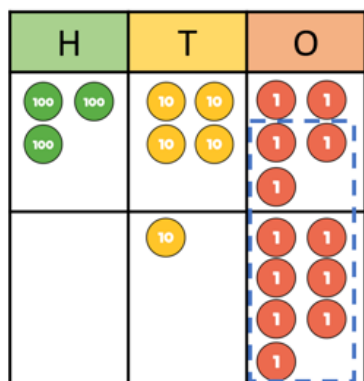- Use of place value counters (up to 3 digits)

## Concrete

### place value counters

345 + 7 = 352

| H | T | O |
|---|---|---|
| 100 100 100 | 10 10 10 10 | 1 1 1 1 1 1 1 |
| | 10 | 1 1 1 1 1 1 1 |

26 + 47 =

| Tens | Ones |
|---|---|
| 10 10 | 1 1 1 1 1 1 |
| 10 10 10 10 | 1 1 1 1 1 |
| 7 | 3 |

10

## Pictorial

### base ten

26 + 47 = 73

Tens    Ones

+
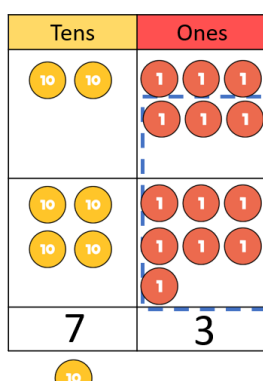
## Abstract

### formal written method

| | T | O |
|---|---|---|
| | 2 | 6 |
| + | $_1$4 | 7 |
| | 7 | 3 |

## Different ways to solve

### part whole model

### number line

6 + 7 = 7 3

+ 2    + 5

345  346  347  348  349  350  351  352
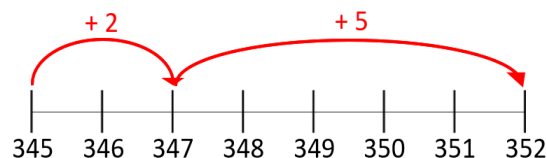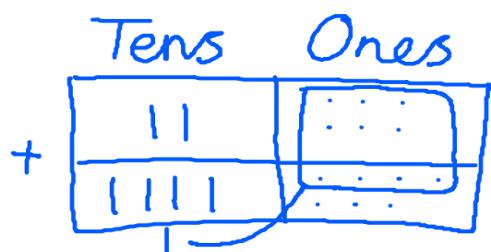
## Key Vocabulary

sum          total          plus          add

parts and wholes          the same as

altogether          more          equa

# Subtraction

- Column method with regrouping (up to 3 digits using place value counters)
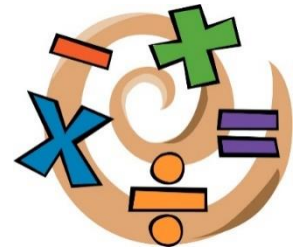
## Concrete

**place value counters**

325 − 40 = 285
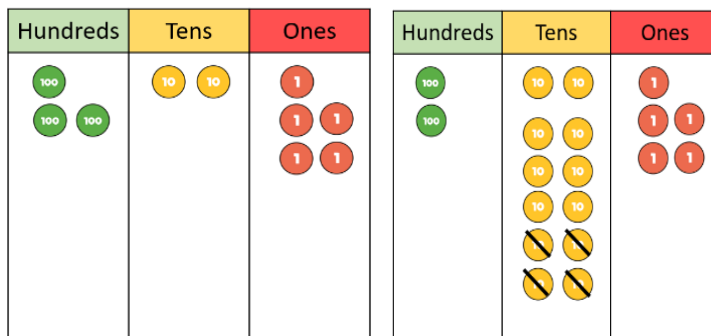


## Abstract

**formal written method**

| H | T | O |
|---|---|---|
| $^2\cancel{3}$ | $^12$ | 5 |
| − |   | 4 | 0 |
| 2 | 8 | 5 |

## Pictorial

**bar model**
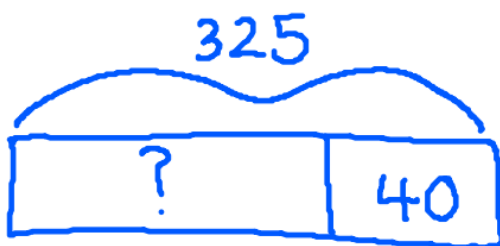


## Different ways to solve

**missing box problems**

325 − 🐸 = 285

**part whole model**
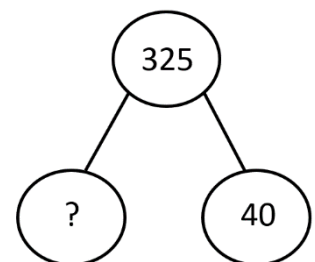


## Key Vocabulary

| | | |
|---|---|---|
| take away | less than | decrease |
| the difference | subtract | |
| minus | fewer | |

# Multiplication

- Arrays
- 2 digits by 1 digit using base 10

## Concrete

**place value counters**

34 x 5

## Abstract

**formal written method (expanded and short)**

## Pictorial

**base ten**

34 x 5 = 170
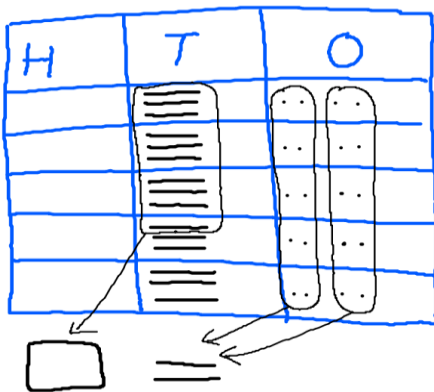
## Different ways to solve

**bar model**

| 34 | 34 | 34 | 34 | 34 |
|----|----|----|----|----|

?
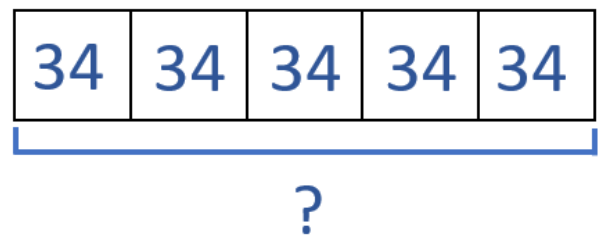
## Key Vocabulary

double                    times                lots of

multiplied by        the product of

groups of              equal groups

# Division

- Division with a remainder using practical resources, times tables and repeated subtraction
- 2 digits divided by 1 digit using base 10 or place value counters

## Concrete

place value counters

53 ÷ 4 = 13 r 1



## Abstract

write calculations to show the process

53 ÷ 4
53 = 40 + 13
40 ÷ 4 = 10
13 ÷ 4 = 3 r 1
10 + 3 r 1 = 13 r 1

## Different ways to solve

part whole model



## Pictorial

bar model



## Key Vocabulary

share          group

divide        divided by

half

# Methods of calculation for each year group

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|
| **Addition** | Add two 1-digit numbers to 10<br><br>Add 1- and 2-digit numbers to 20 | Add three 1-digit numbers<br><br>Add 1 and 2-digit numbers to 100<br><br>Add two 2-digit numbers | Add with up to 3 digits | Add with up to 4 digits | Add with more than 4 digits<br><br>Add with up to 3 decimal places | |
| **Representations and models** | Part whole model, bar model, Ten frames, bead strings, number line, straws | Part whole model, bar model, Ten frames, bead strings, number line, straws, hundred square, Base 10 | Column Addition<br><br>Part whole model, bar model, Base 10, place value counters | Column Addition<br><br>Part whole model, bar model, Base 10, place value counters | Column Addition<br><br>Part whole model, bar model, place value counters | |
| **Subtraction** | Subtract two 1-digit numbers to 10<br><br>Subtract 1- and 2-digit numbers to 20 | Subtract 1 and 2-digit numbers to 100<br><br>Subtract two 2-digit numbers | Subtract with up to 3 digits | Subtract with up to 4 digits | Subtract with more than 4 digits<br><br>Subtract with up to 3 decimal places | |
| **Representations and models** | Part whole model, bar models, number lines, ten frames, bead strings number tracks, straws | Part whole model, bar Model, number lines, Straws, hundred square, Base 10, place value counters | Column subtraction<br><br>part whole model, bar model, Base 10, place value counters | Column subtraction<br><br>part whole model, bar model, place value counters | Column subtraction<br><br>part whole model, bar model, place value counters | |
| **Times Tables** | | Recall and use multiplication and division facts for the 2, 10 and 5 times tables | Recall and use multiplication and division facts for the 3, 4 and 8 times tables | Recall and use multiplication and division facts for the 6, 7, 9, 11 and 12 times tables | | |
| **Representations and models** | | Hundred square, Base 10, number lines, bead strings, place value counters, number tracks, everyday objects | Hundred square, Base 10, number lines, bead strings, place value counters, number tracks, everyday objects | Hundred square, Base 10, number lines, bead strings, place value counters, number tracks, everyday objects | | |
| **Multiplication** | Solve one-step problems with multiplication | Solve one-step problems with multiplication | Multiply 2-digit by 1-digit numbers | Multiply 2 and 3-digit by 1-digit numbers | Multiply 4-digit by 1-digit numbers<br><br>Multiply 2-digit by 2 and 3-digit numbers | Multiply 2-digit by 4-digit numbers |
| **Representations and models** | Bar models, counters, Base 10, Ten frames, bead strings, number lines | Bar models, counters, Base 10, Ten frames, bead strings, number lines | Expanded written method<br><br>Short written method<br><br>Place value counters, Base 10 | Expanded written method<br><br>Short written method<br><br>Place value counters, Base 10 | Formal written method<br><br>Place value counters, Base 10 | Formal written method |
| **Division** | Solve one-step problems with division (grouping and sharing) | Solve one-step problems with division (grouping and sharing) | Divide 2 digits by 1 digit (sharing with and without exchange, with and without remainders | Divide 2 digits by 1 digit (grouping and sharing with remainders) | Divide 3 and 4 digits by 1 digit (sharing with exchange and grouping) | Divide multi digits by 2 digits (short and long division) |
| **Representations and models** | Real life objects, bead strings, ten frames, number lines, arrays, counters, bar models | Real life objects, bead strings, ten frames, number lines, arrays, counters, bar models | Straws, Base 10, bar models, place value counters, part whole models | Written short division<br><br>Place value counters, | Written short division<br><br>Base 10, bar models, place value counters. part whole models | Written sort and long division. list of multiples |

Please note: some children may need to work in the stage before or after their year group, as appropriate for their needs.