

# KEY STAGE ONE

## CALCULATION METHODS



### Addition/Subtraction

#### Year 1 Objectives:

- Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) sign
- Represent and use number bonds and related subtraction facts within 20
- Add and subtract one-digit and two-digit numbers to 20, including zero
- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as  $7 = ? - 9$

#### Year 2 Objectives:

- 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
- 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 problems

### Addition Methods (in order of progression)

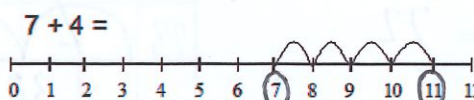
#### 1. Using objects

$$3 + 2 = 5$$

#### 2. Using pictorial representations

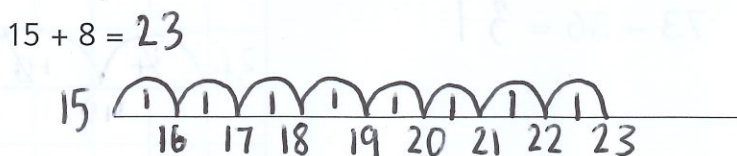
$$5 + 2 = 7$$

#### 3. Using number lines (numbered)



#### 4. Using number lines (blank)

1-digit + 1-digit / 2-digit + 1-digit

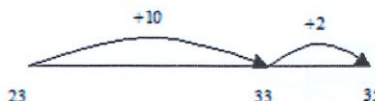


#### 5. Using number lines (blank)

2-digit + 2-digit

Partition the smallest number:

$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$



#### 6. Column Addition



Practical using tens and ones

	2	5
+	1	3
<hr/>		
	3	8

	8	4
+	3	2
<hr/>		
1	1	6

	2	8
+	1	4
<hr/>		
	4	2

crossing 100

carrying a 10

# Subtraction Methods (in order of progression)

## 1. Using objects

$$7 - 4 =$$

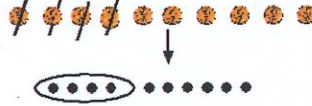


Physically take away/cover 4 cubes. How many are left?

## 2. Using pictorial representations

Using pictures / symbols  
(subtract by crossing out)

Sam spent 4p. What was his change from 10p?

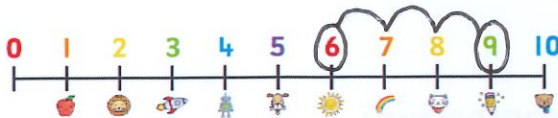


## 3. Using number lines (numbered)

1-digit - 1-digit / 2-digit - 1-digit

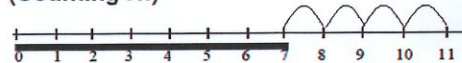
(Counting back – for experience and conceptual understanding)

$$9 - 3 =$$



$$11 - 7 =$$

The difference between 7 and 11  
(Counting on)



Children to develop understanding to decide the most appropriate strategy

Subtracting a small number – count back

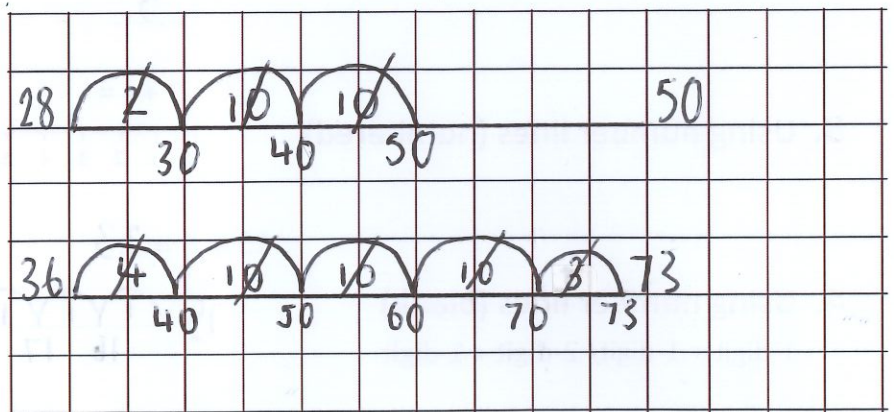
Subtracting a larger number – count on

## 4. Using number lines (blank)

2-digit - 2-digit (counting on)

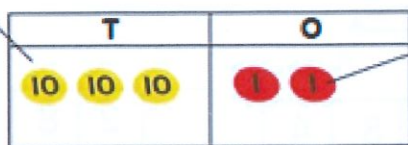
$$50 - 28 = 22$$

$$73 - 36 = 37$$



## 5. Column Subtraction

Use place value counters/ tens and ones to secure concrete/ conceptual understanding prior to teaching formal written method



Practical using tens and ones

32 - 11  
Subtract 1  
Subtract 10

T	O
3	2
1	1
2	1

<del>7</del> 8	13
4	6
3	7

EXCHANGING a 10

## Missing Number Calculations

### Year 1

Experience of missing number problems and moving the = sign

$3 + 4 = \square$

$\square = 3 + 4$

$7 - 3 = \square$

$\square = 7 - 3$

$3 + \square = 7$

$7 = \square + 4$

$7 - \square = 4$

$4 = \square - 3$

$\square + 4 = 7$

$7 = 3 + \square$

$\square - 3 = 4$

$4 = 7 - \square$

$\square + \nabla = 7$

$7 = \square + \nabla$

$\square - \nabla = 4$

$4 = \square - \nabla$

### Year 2

Continue using a range of missing number problems using appropriate, larger numbers and more complex equations

$14 + 5 = 10 + \square$

$31 - \square = 28$

$\square + \square = 30$

$\square - 11 = 9$

$\square + \square + \square = 30$

$\square - \square - 5$

## Inverse Operations/ Fact Families



$5 + 2 = 7$

$2 + 5 = 7$

$7 - 5 = 2$

$7 - 2 = 5$

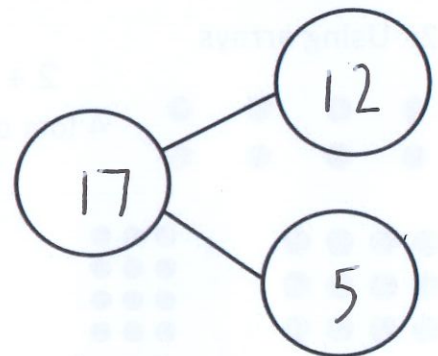
$12 \quad 5 \quad 17$

$12 + 5 = 17$

$5 + 12 = 17$

$17 - 12 = 5$

$17 - 5 = 12$



# Multiplication/Division

## Year 1 Objectives:

- Solve one-step problems involving multiplication and division

## Year 2 Objectives:

- 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 ( $\times$ ), division ( $\div$ ) 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.

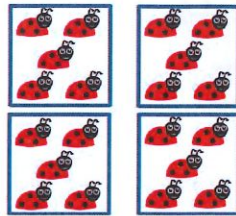
## Multiplication Methods (in order of progression)

### 1. Add equal groups

(Understand multiplication as repeated addition)

- Use cubes to make equal groups
- Use pictorial representations

Complete the sentences.



There are ..... groups.

Each group has ..... ladybirds

There are ..... ladybirds altogether.

$$2 + 2 + 2 + 2 = 8$$

$$4 \text{ lots of/groups of } 2 = 8$$

$$4 \times 2 = 8$$



### 2. Using arrays



$$2 + 2 + 2 + 2 = 8$$

$$4 \text{ lots of/groups of } 2 = 8$$

$$4 \times 2 = 8$$

and

$$4 + 4 = 8$$

$$2 \text{ lots of/groups of } 4 = 8$$

$$2 \times 4 = 8$$



$$3 \times 4 = 12$$

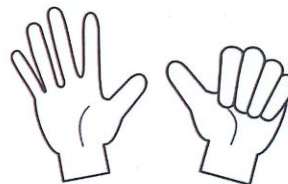


$$4 \times 3 = 12$$

### 3. Counting in multiples to solve multiplication calculations

$$6 \times 5 = 30 \text{ (put 6 fingers up, count in 5s)}$$

Develop recall speed



### 4. Grid Method Multiplication (G+T children)

2-digit x 1-digit

x	10	5
2	20	10

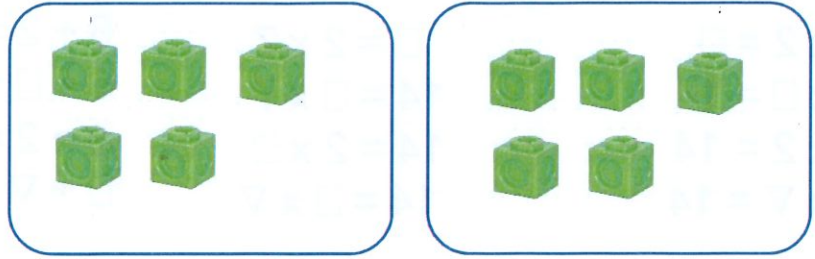
## Division Methods (in order of progression)

Children must explicitly learn division as sharing and division as grouping

### Sharing

1. Using cubes

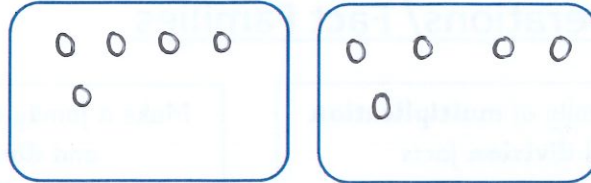
$$10 \div 2 = 5$$



10 cubes **shared** into two equal groups

2. Drawing pictorial representations

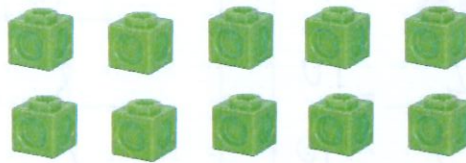
$$10 \div 2 = 5$$



### Grouping

1. Using cubes

$$10 \div 2 = 5$$



10 cubes **divided** into **groups** of 2  
How many **groups of 2** are there in 10?

2. Drawing pictorial representations

$$10 \div 2 = 5$$



10 **divided** into **groups** of 2

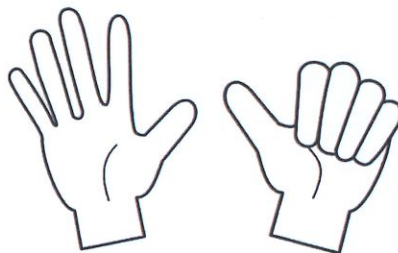
How many **groups of 2** are there in 10?

3. Counting in multiples to solve division calculations

**Grouping** progresses to solving calculations mentally by counting in multiples.

$30 \div 5 = 6$  (count in 5s using fingers, how many lots of 5 are there? 6!)

Develop recall speed



# Missing Number Calculations

## Year 2

$7 \times 2 = \square$

$7 \times \square = 14$

$\square \times 2 = 14$

$\square \times \nabla = 14$

$\square = 2 \times 7$

$14 = \square \times 7$

$14 = 2 \times \square$

$14 = \square \times \nabla$

$6 \div 2 = \square$

$6 \div \square = 3$

$\square \div 2 = 3$

$\square \div \nabla = 3$

$\square = 6 \div 2$

$3 = 6 \div \square$

$3 = \square \div 2$

$3 = \square \div \nabla$

## Inverse Operations/ Fact Families

Make a family of **multiplication**  
and **division** facts



$$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array} = 10$$

$$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array} = 10$$

$$\begin{array}{r} 10 \\ \div 5 \\ \hline \end{array} = 2$$

$$\begin{array}{r} 10 \\ \div 2 \\ \hline \end{array} = 5$$

Make a family of **multiplication**  
and **division** facts



$$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array} = 16$$

$$\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array} = 16$$

$$\begin{array}{r} 16 \\ \div 2 \\ \hline \end{array} = 8$$

$$\begin{array}{r} 16 \\ \div 8 \\ \hline \end{array} = 2$$

# Fractions of a number

## Year 1 Objectives:

- Recognise, find and name a half as one of two equal parts of a quantity
- Recognise, find and name a quarter as one of four equal parts of a quantity

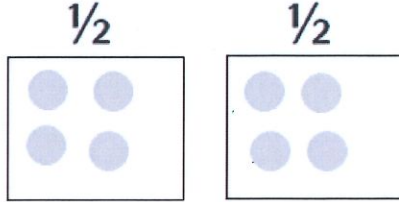
## Year 2 Objectives:

- Recognise, find, name and write fractions  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{2}{4}$  and  $\frac{3}{4}$  of a set of objects or quantity

## Sharing

(link to division – sharing)

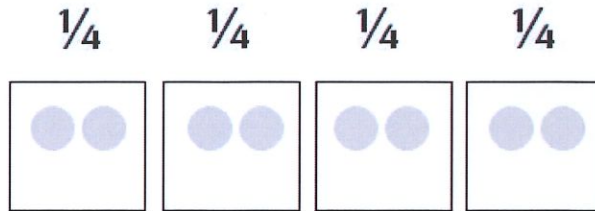
$$\frac{1}{2} \text{ of } 8 = 4$$



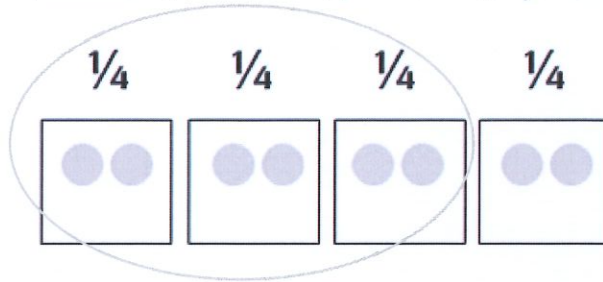
First– Use cubes to share (see division methods)

Then– Draw pictorial representations

$$\frac{1}{4} \text{ of } 8 = 2$$



$$\frac{3}{4} \text{ of } 8 = 6$$



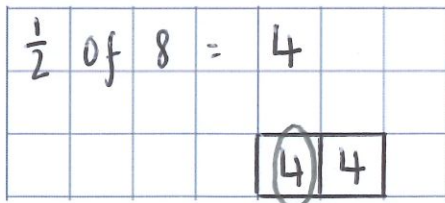
## Using a bar model

(link to division – grouping)

### Steps to Success:

- Use your 2 times table to find  $\frac{1}{2}$  ( $\div$  by 2)
- Show your halves using a bar model
- Circle  $\frac{1}{2}$

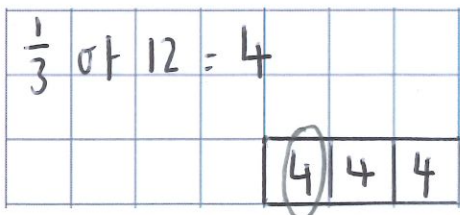
$\frac{1}{2}$  of 8 is



### Steps to Success:

- Use your 3 times table to find  $\frac{1}{3}$  ( $\div$  by 3)
- Show your thirds using a bar model
- Circle  $\frac{1}{3}$

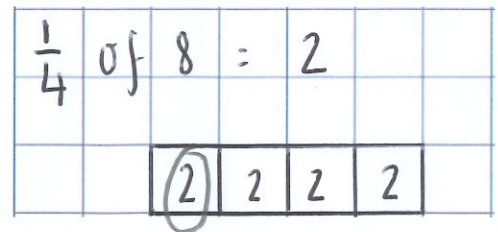
$\frac{1}{3}$  of 12 is



### Steps to Success:

- Use your 4 times table to find  $\frac{1}{4}$  ( $\div$  by 4)
- Show your quarters using a bar model
- Circle  $\frac{1}{4}$

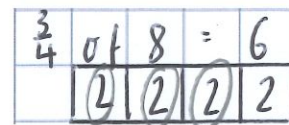
$\frac{1}{4}$  of 8 is



### Steps to Success:

- Use your 4 times table to find  $\frac{3}{4}$  ( $\div$  by 4)
- Show your quarters using a bar model
- Circle  $\frac{3}{4}$  and calculate

$\frac{3}{4}$  of 8 =



### NOTE:

Remember  $\frac{1}{4}$  is 'halve it, halve it again'.  
If children see  $\frac{2}{4}$  – they should find  $\frac{1}{2}$