

## Number sense (in relation to EYFS ELG number and numerical pattern)

Children in EYFS will develop their number sense through play-based enquiry, continuous provision and direct teacher input exploring the concepts of:

- Amount - This is the ability for children to understand and have an awareness of what different digits represent;
- Ordering - We can challenge number sense by acknowledging their ability to compare numbers with one another;
- Number Identification - Children should be able to recognise and name numerals to 10.
- 1:1 Correspondence - Children should understand that a number relates to objects and things that can have numerical value
- Stable Order - Children should be able to understand and appreciate that numbers always come in a set order. They should be able to count to 20 and start to count beyond.
- Magnitude - Children should be able to compare quantities to understand which is greater and also identify if they are equal.
- Cardinality - Children understand that the cardinal value of a number refers to the quantity, or 'howmanyness' of things it represents
- Perceptual Subitising- Children are able to recognise how many there are, without counting. (up to 5).
- Conceptual Subitising – children will use their ability to recognise the number of objects as a combination of smaller amounts without counting

### Amount



### Ordering



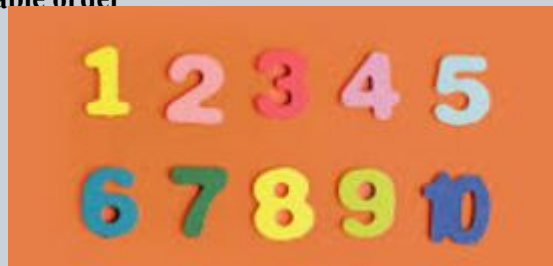
### Number identification



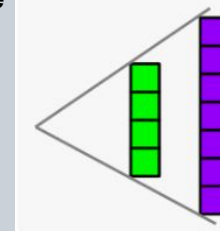
### 1:1 correspondence



### Stable order



### Magnitude



## EYFS classroom suggested resources

- Counters
- Cubes
- Natural objects
- Bead string
- Tens frames
- Part whole models,
- Loose parts
- Number tracks
- Number lines
- Pictures
- Dice
- Numicon
- Pegs

## Addition

### ELG: Number

Children at the expected level of development will:

- **Have a deep understanding of numbers to 10, including the composition of each number.**
- **Subitise (recognise quantities without counting) up to 5.**
- **Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5** (including subtraction facts) and some number bonds to 10, including double facts.

### ELG: Numerical Patterns

Children at the expected level of development will:

- **Verbally count beyond 20, recognising the pattern of the counting system.**
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

### Language

Add, more, plus, altogether, makes, total, equal to, equals, number sentence, forwards, counting on, first, then, now

## Addition

### Concrete

#### Counting and adding more

Children add one more person or object to a group to find one more.

### Pictorial

#### Counting and adding more.

Children add one more cube or counter to a group to represent one more.

One more than 4 is 5.

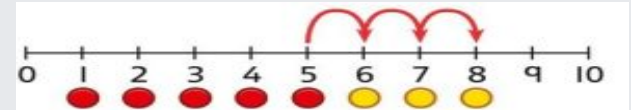
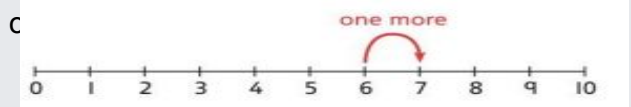


### Abstract

Children do not need to record in an abstract way to meet the ELG.

#### Counting and adding more

Use a number line to understand how to link counting on with finding one more. One more than 6 is 7. 7 is one more than 6. Learn to link counting on



## Addition

### Concrete

Understanding part-part-whole relationship

Sort people and objects into parts and understand the relationship with the whole..

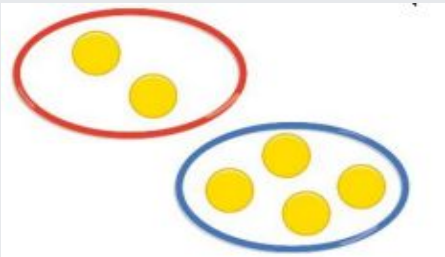


The parts are 2 and 4. The whole is 6

### Pictorial

Understanding part-part-whole relationship

Children draw to represent the parts and understand the relationship with the whole..



T

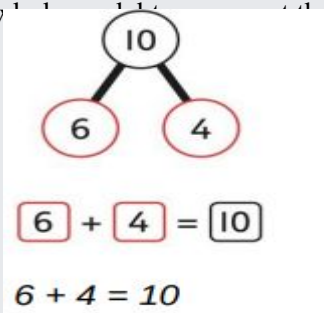
The parts are 2 and 4. The whole is 6.

### Abstract

Children to not need to record in an abstract way to meet ELG.

Understanding part-part-whole relationship

Use a part-whole model to represent the numbers.

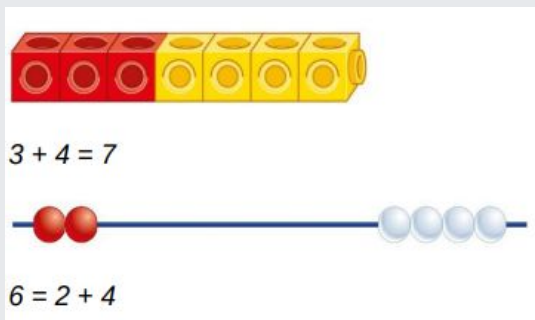


## Addition

### Concrete

#### Knowing and finding number bonds within 10

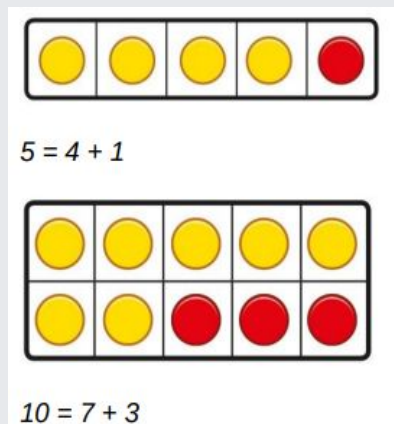
Break apart a group and put back together to find and form number bonds.



### Pictorial

#### Knowing and finding number bonds within 10

Use five and ten frames to represent key number bonds.



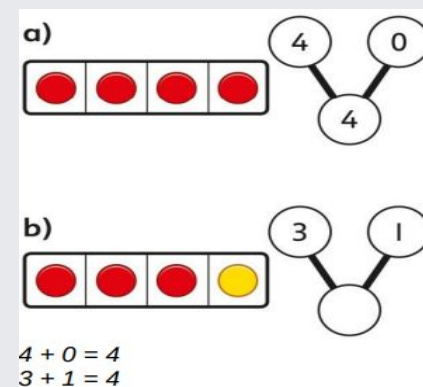
### Abstract

**Children to not need to record in an abstract way to meet ELG.**

#### Knowing and finding number bonds within 10.

Use a part-whole concept alongside other representations to find number bonds. Make sure to include examples where one of the parts is zero.

Children may draw their own model, use hoops, or use a teacher created template/resources to demonstrate their understanding.

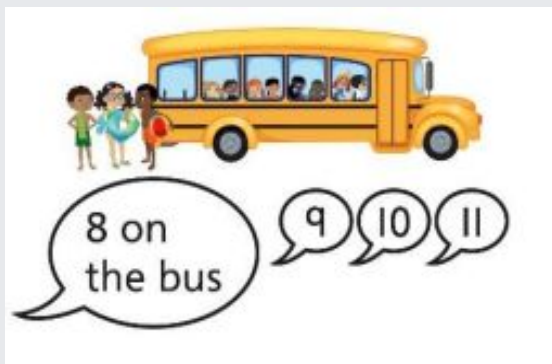


## Addition

### Concrete

#### Adding by counting on

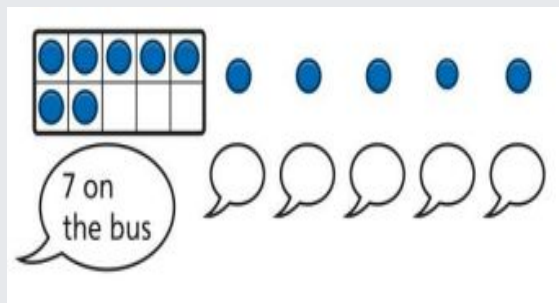
Children use knowledge of counting to 20 to find a total by counting on using people or objects.



### Pictorial

#### Adding by counting on.

Children use counters to support and represent their counting on strategy.



### Abstract

**Children to not need to record in an abstract way to meet ELG.**

## Subtraction

### ELG: Number

- Have a deep understanding of number to 10, including the **composition of each number**.
- Subitise (recognise quantities without counting) up to 5.
- Automatically recall (without reference to rhymes, counting or other aids) **number bonds up to 5 (including subtraction facts)** and some number bonds to 10, including double facts.

### ELG: Numerical Patterns

- Verbally count beyond 20, recognising the pattern of the counting system.
- **Compare quantities up to 10 in different contexts**, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

### Subtraction Language:

Take away, subtract, remove, minus, equals, makes, number sentence, total, less, fewer, counting backwards, first, then, now, how many, count back, how many less.

## Subtraction

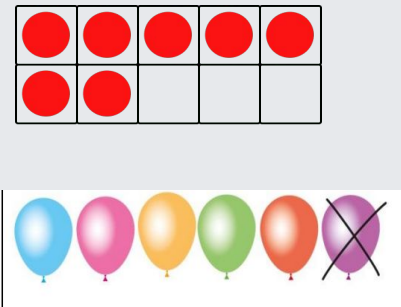
### Concrete

They understand subtraction as counting out. They remove objects from a group.



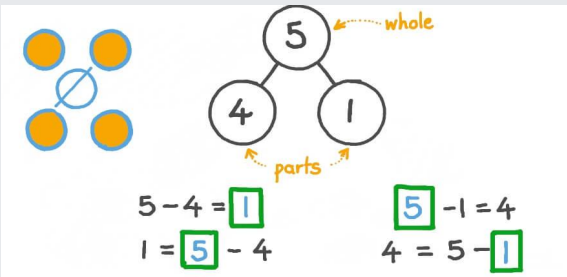
### Pictorial

Children cross out pictures or drawings to show what is left.



### Abstract

Children to not need to record in an abstract way to meet ELG.



## Subtraction

### Concrete

They begin to count back in ones using objects, cubes, bead string and number line.



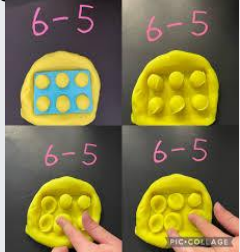
### Pictorial



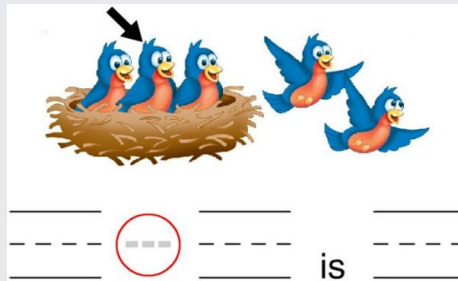
### Abstract

Children to not need to record in an abstract way to meet ELG.

They use concrete objects to show their understanding of calculations. They begin to understand - and =



Children start to use pictorial representations to solve simple subtraction calculations.



Children to not need to record in an abstract way to meet ELG.

## **Multiplication**

### **ELG: Number**

- Have a deep understanding of number to 10, including the composition of each number.
- Subitise (recognise quantities without counting) up to 5.
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

### **ELG Numerical Patterns**

- Verbally count beyond 20, recognising the pattern of the counting system.
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

### **Language:**

Equal, unequal, pattern, double, even, odd, total, groups of/lots of, repeating addition.

## Multiplication

### Concrete

Children use concrete objects to make and count equal groups of objects.



### Pictorial

Children can recognise equal and unequal groups



### Abstract

**Children to not need to record in an abstract way to meet ELG.**

Children explore doubles in their environment including in games such as on dominoes or dice. They focus on the understand equal groups.

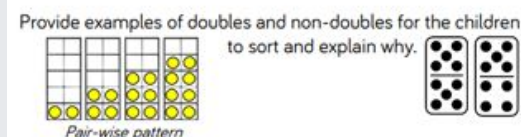


Represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.



**Children to not need to record in an abstract way to meet ELG.**

Children understand doubling as repeated addition i.e.  $2+2=4$



**Children to not need to record in an abstract way to meet ELG.**

## Division

### ELG: Number

- Have a deep understanding of number to 10, including the composition of each number.
- Subitise (recognise quantities without counting) up to 5.
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

### ELG: Numerical Patterns

- Verbally count beyond 20, recognising the pattern of the counting system.
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

### Language:

Equal, unequal, share, group, divide, odd, even, total, half, left/left over

## Division

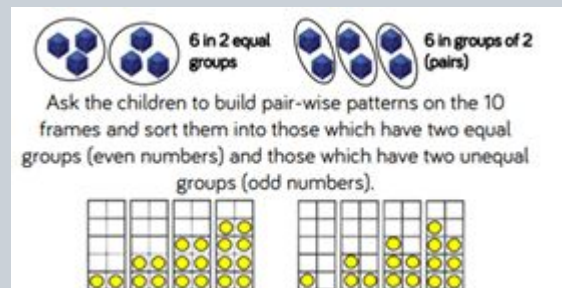
### Concrete

Sharing equally into 2 groups using concrete objects.



### Pictorial

They count a set of objects and halve them by making two equal groups. They can recognise odd and even groups.

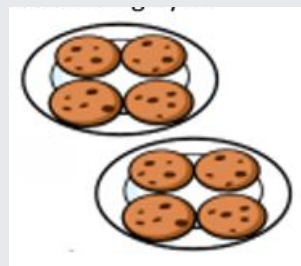


### Abstract

Children do not need to record in an abstract way to meet ELG.

Children do not need to record in an abstract way to meet ELG.

Children are able to share and halve (dividing by two) by using concrete resources to practically show their understanding.



Children do not need to record in an abstract way to meet ELG.

## Addition

### Addition - Key Language

Sum, add, total, count on, altogether, parts and wholes, plus, bonds, more, across 10

#### Concrete

##### Counting and adding more

Children add one more person or object to a group to find one more.



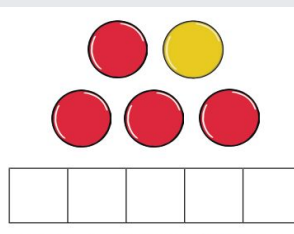
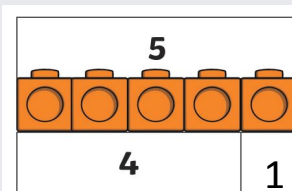
*One more than 4 is 5*



#### Pictorial

##### Counting and adding more

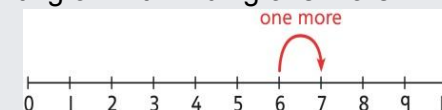
Children add one more cube or counter to a group to represent one more.



#### Abstract

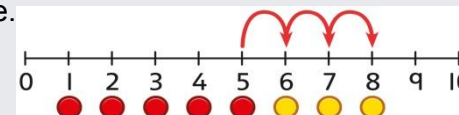
##### Counting and adding more

Use a number line to understand how to link counting on with finding one more.



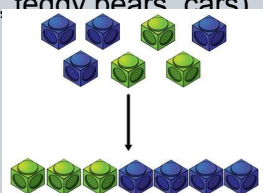
*One more than 6 is 7.  
7 is one more than 6.*

Learn to link counting on with adding more than one.

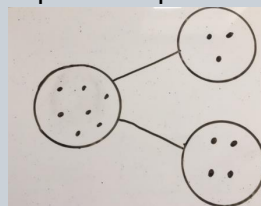


$$5 + 3 = 8$$

**Combining two parts to make a whole** (use other resources too e.g. eggs, shells, teddy bears, cars)



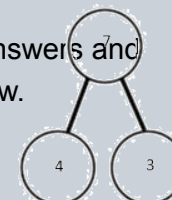
Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.



$$4 + 3 = 7$$

Four is a part, 3 is a part and the whole is seven.

Use the inverse to check answers and understand commutative law.



## Addition

### Concrete

#### Knowing and finding number bonds within 10

Break apart a group and put back together to find and form number bonds.

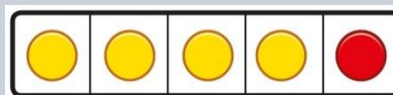


### Pictorial

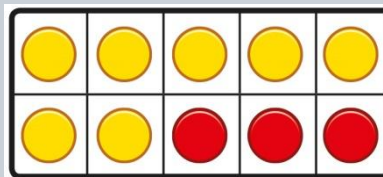
#### Knowing and finding number bonds within 10

Use five and ten frames to represent key number bonds.

$$5 = 4 + 1$$



$$10 = 7 + 3$$



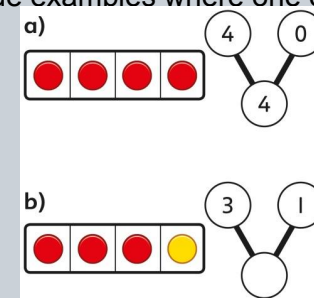
### Abstract

#### Knowing and finding number bonds within 10

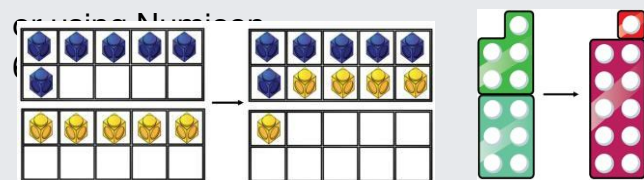
Use a part-whole model alongside other representations to find number bonds. Make sure to include examples where one of the parts is zero.

$$4 + 0 = 4$$

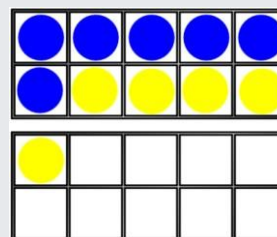
$$3 + 1 = 4$$



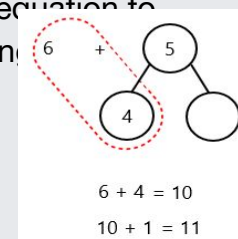
#### Regrouping to make 10; using ten frames and counters/cubes



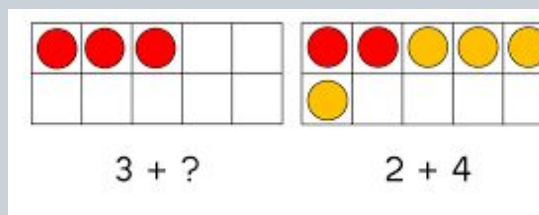
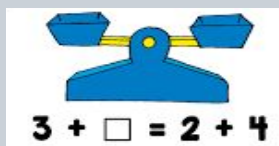
Children to draw the ten frame and counters/cubes.



Children to understand composition of numbers and write an equation to represent the partitioning.



Understand the function of the equals sign; it is not only to be followed by the answer but to show a balanced equation.



Children to develop an understanding of equality e.g.

$$3 + \square = 5$$

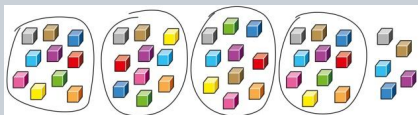
$$2 + 4 = 3 + \square$$

$$3 + 3 = \square + 4$$

## Addition

### Concrete

Group objects into 10s and 1s.

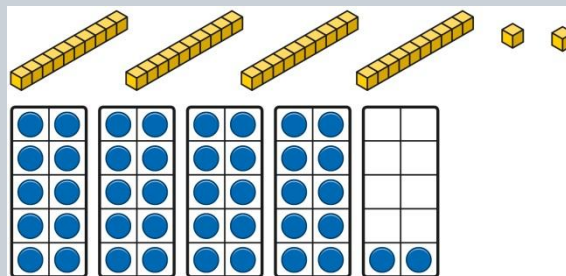


Bundle straws to understand unitising of 10s.



### Pictorial

Understand 10s and 1s equipment, and link with visual representations on ten frames.



### Abstract

Represent numbers on a place value grid, using equipment or numerals.

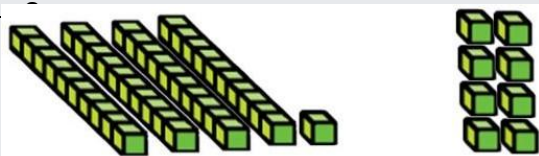
| Tens                                                                                | Ones                                                                                |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |
| 3                                                                                   | 2                                                                                   |

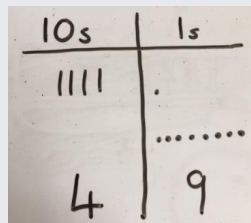
| Tens | Ones |
|------|------|
| 4    | 3    |

**TO + O using base 10.** Continue to develop understanding of partitioning and place value.

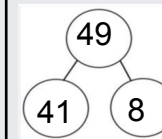
41 + 8



Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.



41 + 8



$$1 + 8 = 9$$

$$40 + 9 = 49$$

|   |   |   |
|---|---|---|
|   | 4 | 1 |
| + |   | 8 |
|   | 4 | 9 |

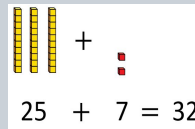
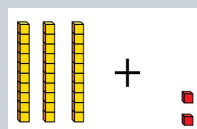
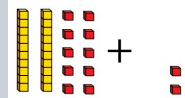
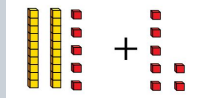
Children to use the inverse to check answers at this stage.

**2 or 3-digit number + 1s with exchange**

Understand that when the 1s sum to 10 or more, this requires an exchange of 10 ones for 1 ten.

Children should explore this using unitised objects or physical apparatus.

Exchange 10 ones for 1 ten where needed. Use a place value grid to support the understanding.



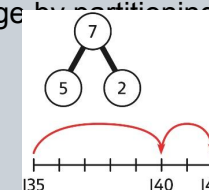
$$25 + 7 = 32$$

$$30 + 2 = 32$$

Understand how to bridge by partitioning to the 1s to make the next 10.

$$135 + 7 = ?$$

$$135 + 5 + 2 = 142$$



Ensure that children understand how to add 1s bridging a 100.

$$198 + 5 = ?$$

$$198 + 2 + 3 = 203$$

## Addition

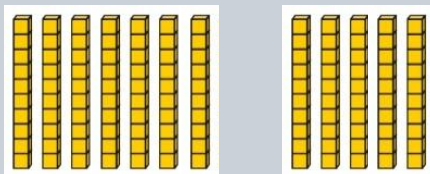
### Concrete

Use place value equipment to model addition and understand where exchange is required.

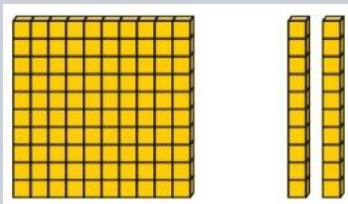
*Use place value counters to represent*

$$154 + 72.$$

*Use this to decide if any exchange is required.*



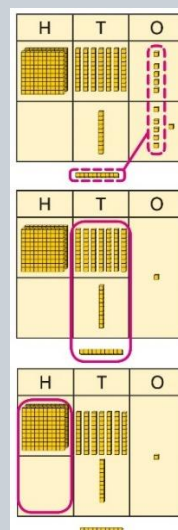
*There are 5 tens and 7 tens. That is 12 tens so I will exchange.*



### Pictorial

Represent the required exchange on a place value grid using equipment.

$$275 + 16 = ?$$



$$275 + 16 = 291$$

Note: In this example, a mental method may be more efficient. The numbers for the example calculation have been chosen to allow children to visualise the concept and see how the method relates to place value.

Children should be encouraged at every stage to select methods that are accurate and efficient.

### Abstract

Children must understand how the method relates to place value at each stage of the calculation.

$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{O} \\ 2 \quad 7 \quad 5 \\ + \quad 1 \quad 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{O} \\ 2 \quad 7 \quad 5 \\ + \quad 1 \quad 6 \\ \hline 9 \quad 1 \end{array}$$

$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{O} \\ 2 \quad 7 \quad 5 \\ + \quad 1 \quad 6 \\ \hline 2 \quad 9 \quad 1 \end{array}$$

$$275 + 16 = 291$$

## Addition

### Concrete

#### Column addition with whole numbers

Use place value equipment to represent additions.

*Add a row of counters onto the place value grid to show  $15,735 + 4,012$ .*

| TTh | Th    | H     | T     | O     |
|-----|-------|-------|-------|-------|
| ●   | ●●●●● | ●●●●● | ●●●●● | ●●●●● |

### Pictorial

Represent additions, using place value equipment on a place value grid alongside written methods.

| TTh | Th    | H | T     | O     |
|-----|-------|---|-------|-------|
| ●●  |       | ● | ●●●●● | ●●●●● |
| ●●  | ●●●●● | ● | ●●●●● | ●●●●● |

*I need to exchange 10 tens for a 100.*

| TTh | Th | H | T | O |
|-----|----|---|---|---|
| 2   | 0  | 1 | 5 | 3 |
| +   | 1  | 9 | 1 | 7 |
| 3   | 9  | 3 | 2 | 8 |

### Abstract

Use column addition, including exchanges.

| TTh | Th | H | T | O |
|-----|----|---|---|---|
| 1   | 9  | 1 | 7 | 5 |
| +   | 1  | 8 | 4 | 1 |
| 3   | 7  | 5 | 9 | 2 |

#### Adding decimals using column addition

Use place value equipment to represent additions.

*Show  $0.23 + 0.45$  using place value counters.*

Use place value equipment on a place value grid to represent additions.

| O | • | Tth   | Hth   |
|---|---|-------|-------|
|   | • | ●●●●● | ●●●●● |
|   | • | ●●●●● | ●●●●● |

Represent exchange where necessary.

| O     | • | Tth | Hth   |
|-------|---|-----|-------|
| ●●●●● | • |     |       |
| ●     | • | ●●  | ●●●●● |

Include examples where the numbers of decimal places are different.

Add using a column method, ensuring that children understand the link with place value.

| O | • | Tth | Hth |
|---|---|-----|-----|
| 0 | • | 2   | 3   |
| + | • | 4   | 5   |
| 0 | • | 6   | 8   |

Include exchange where required, alongside an understanding of place value.

| O | • | Tth | Hth |
|---|---|-----|-----|
| 0 | • | 9   | 2   |
| + | • | 3   | 3   |
| 1 | • | 2   | 5   |

Include additions where the numbers of decimal places are different.

| O | • | Tth | Hth |
|---|---|-----|-----|
| 3 | • | 4   | 0   |
| + | • | 6   | 5   |

$$3.4 + 0.65 = ?$$

## Subtraction

### Subtraction - Key Language

Take away, less than, count back, difference, subtract, minus (careful of confusion with directed number), fewer, decrease

#### Concrete

##### Counting back and taking away

Children arrange objects and remove to find how many are left.



*1 less than 6 is 5.*

*6 subtract 1 is 5.*

##### Finding the difference

Arrange two groups so that the difference between the groups can be worked out.

*8 is 2 more than 6.*

*6 is 2 less than 8.*

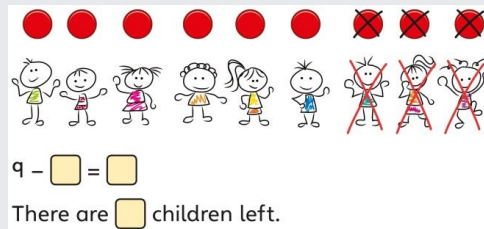


*The difference between 8 and 6 is 2.*

#### Pictorial

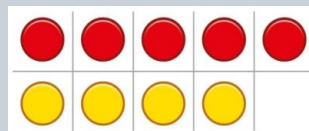
##### Counting back and taking away

Children draw and cross out or use counters to represent objects from a problem.



##### Finding the difference

Represent objects using sketches or counters to support finding the difference.



$$5 - 4 = 1$$

*The difference between 5 and 4 is 1.*

#### Abstract

##### Counting back and taking away

Children count back to take away and use a number line or number track to support the method.



$$9 - 3 = 6$$

##### Finding the difference

Children understand 'find the difference' as subtraction.



$$10 - 4 = 6$$

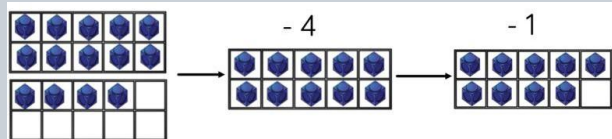
*The difference between 10 and 6 is 4.*

## Subtraction

### Concrete

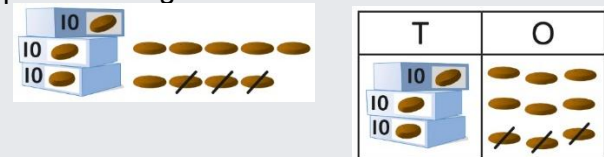
#### Making 10

using ten frames.  $14 - 5$

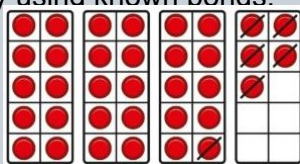


#### Subtracting a single-digit number

Subtract the 1s. This may be done in or out of a place value grid.



Bridge 10 by using known bonds.

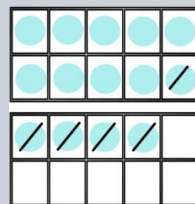


$$35 - 6$$

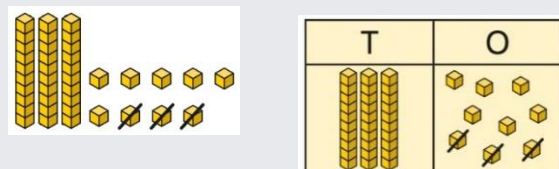
*I took away 5 counters, then 1 more.*

### Pictorial

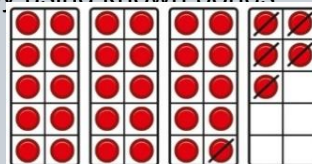
Children to present the ten frame pictorially and discuss what they did to make 10.



Subtract the 1s. This may be done in or out of a place value grid.



Bridge 10 by using known bonds.



$$35 - 6$$

*First, I will subtract 5, then 1.*

### Abstract

Children to show how they can make 10 by partitioning the subtrahend.

$$14 - 5 = 9$$

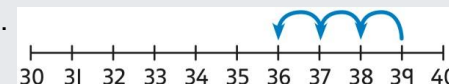
4      1

$$14 - 4 = 10$$

$$10 - 1 = 9$$

Subtract the 1s. Understand the link between counting back and subtracting the 1s using known bonds.

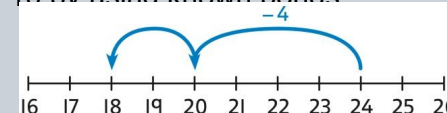
| T | O |
|---|---|
| 3 | 9 |
| - | 3 |
| 3 | 6 |



$$9 - 3 = 6$$

$$39 - 3 = 36$$

Bridge 10 by using known bonds.



$$24 - 6 = ?$$

$$24 - 4 - 2 = ?$$

**Check with the inverse**

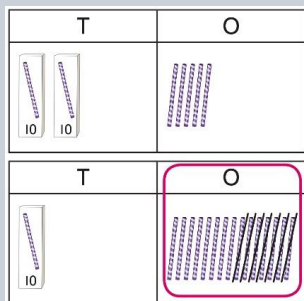
$$18 + 6 = 24$$

## Subtraction

### Concrete

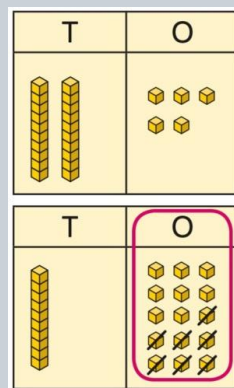
#### Subtracting a single-digit number using exchange

Exchange 1 ten for 10 ones. This may be done in or out of a place value grid.



### Pictorial

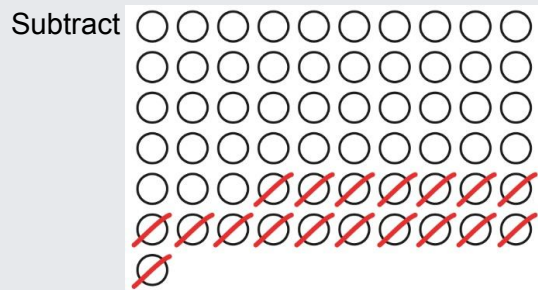
Exchange 1 ten for 10 ones.



### Abstract



#### Subtracting a 2-digit number



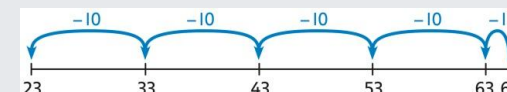
$$61 - 18$$

I took away 1 ten and 8 ones.

Subtract the 10s and the 1s.

This can be represented on a 100 square.

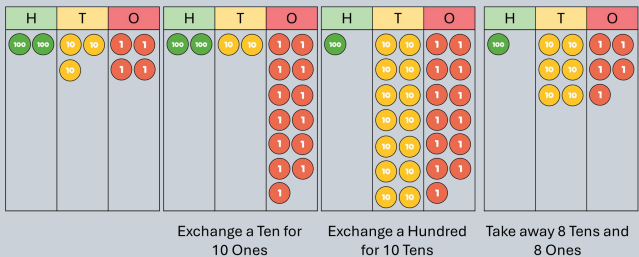
|    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|-----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20  |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30  |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 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 |



Subtraction

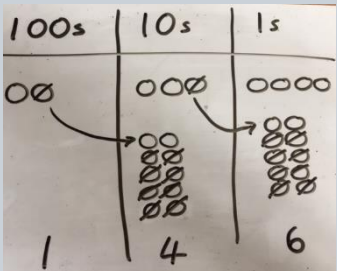
Concrete

Column method using place value counters. 234 – 88



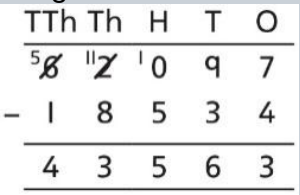
Pictorial

Represent the place value counters pictorially; remembering to show what has been exchanged.



Abstract

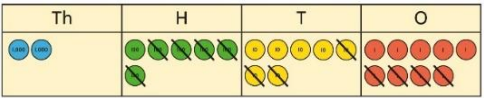
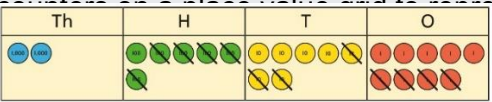
Formal column method. Children must understand what has happened when they have crossed out digits.



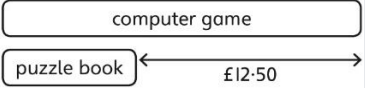
62,097 – 18,534 = 43,563

Comparing and selecting efficient methods

Use a place value chart to represent subtraction.

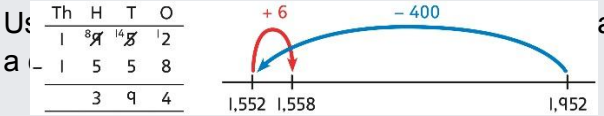


Use a bar model to represent calculations, including 'find the difference' with two bars as compared:

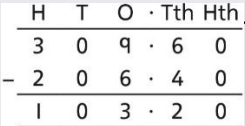


Compare and select methods.

Use column subtraction when mental methods are not efficient.



Use column subtraction for decimal problems, in context of measure.



## Multiplication

### Multiplication - Key Language

Double, times, multiplied by, product, groups of, lots of, equal groups, multiple, factors, arrays, squared, cubed, repeated addition, inverse

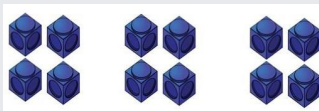
#### Concrete

##### Repeated Addition

$$3 \times 4$$

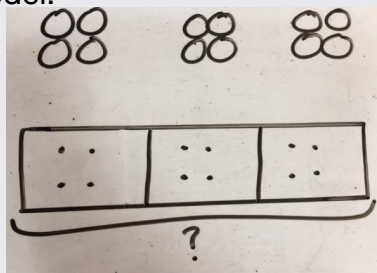
$$4 + 4 + 4$$

There are 3 equal groups with 4 in each group.



#### Pictorial

Children to represent the practical resources pictorially, for example, a bar model.



#### Abstract

$$3 \times 4 = 12$$

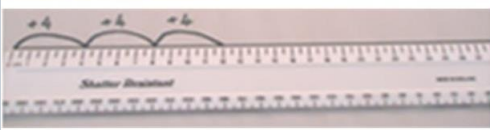
$$4 + 4 + 4 = 12$$

$$12 \div 4 = 3$$

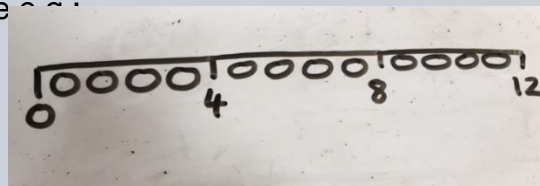
(using the inverse to check answers)

##### Number lines to show

repeated addition



Represent this pictorially alongside a number line



Abstract number line showing three jumps of four.

$$3 \times 4 =$$



## Multiplication

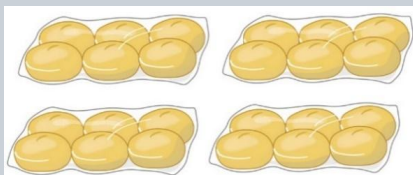
### Concrete

Understand how to use multiplication facts flexibly and within context.



*There are 6 groups of 4 pens.*

*There are 4 groups of 6 bread rolls.*

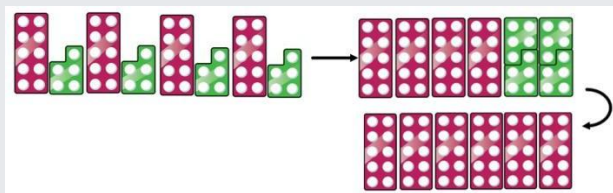


*I can use the same multiplication fact to work out both products.*

**Partition to multiply** using Numicon, base 10 or Cuisenaire rods.

$$4 \times 15 = 60, 4 \times 10 = 40, 4 \times 5 = 20.$$

$$40 + 20$$

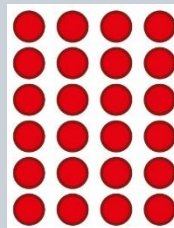
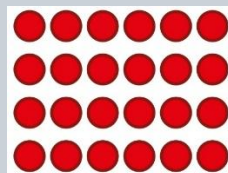


### Pictorial

Understand how multiplication facts relate to **commutativity**.

$$6 \times 4 = 24$$

$$4 \times 6 = 24$$



### Abstract

Understand how multiplication facts relate to commutativity.

*I need to work out 6 groups of 4.*

*I know that  $6 \times 4 = 24$*

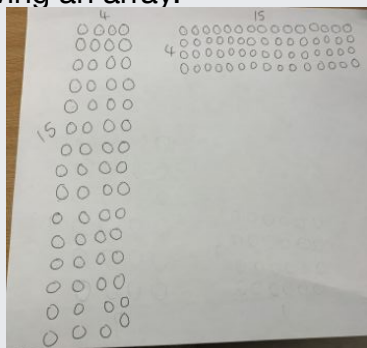
*so, I know that*

*6 groups of 4 = 24*

*and*

*4 groups of 6 = 24.*

Children to represent the concrete manipulatives pictorially, for example, by drawing an array.



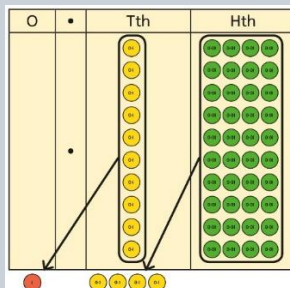
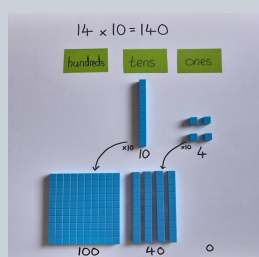
|   |    |    |
|---|----|----|
|   | 10 | 5  |
| 4 | 40 | 20 |

## Multiplication

### Concrete

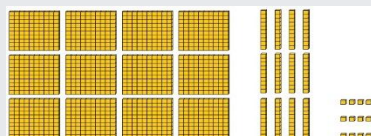
#### Multiplying by 10, 100 and 1,000 (inc decimals)

Use place value to explore numbers getting 10/100/1000x greater and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths.



#### Related multiplication facts

Use multiplication facts to understand how to multiply numbers that are 10/100/1000 times greater.



3 groups of 4 ones is 12 ones.

3 groups of 4 tens is 12 tens.

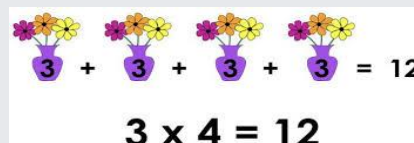
3 groups of 4 hundreds is 12 hundreds.

### Pictorial

Represent multiplication by 10/100/1000 (inc decimals) as exchange on a place value grid.

| Th | H | T | O | . | Tt<br>h | Ht<br>h |
|----|---|---|---|---|---------|---------|
|    |   |   | 0 | . | 1       | 4       |
|    |   |   | 1 | . | 4       |         |
|    |   | 1 | 4 | . |         |         |
| 1  | 4 | 0 | . |   |         |         |

Use pictures (in context) and known facts to represent the product getting 10, 100 and 1000 times greater.



$$3 \times 4 = 12$$

$$3 \times 40 = 120$$

$$3 \times 400 = 1,200$$

### Abstract

Use knowledge of making a number 10/100/1000x greater to multiply mentally.

$$14 \times 10 = 140$$

$$0.14 \times 10 = 1.4$$

Use known facts and understanding of place value and commutativity to multiply mentally.

$$3 \times 4 = 12$$

$$3 \times 40 = 120$$

$$3 \times 400 = 1200$$

$$3 \times 4000 = 12,000$$

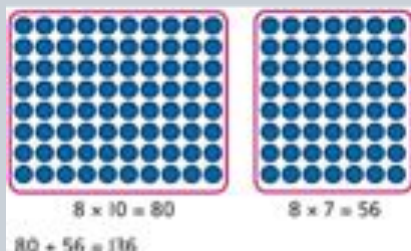
$$3 \times 7 = 21$$

## Multiplication

### Multiplying up to 4-digit numbers by a single digit

Explore how to use partitioning to multiply efficiently.

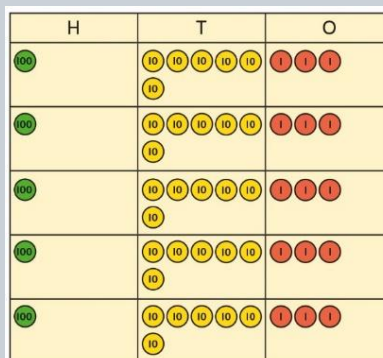
$$8 \times 17 = ?$$



So,  $8 \times 17 = 136$

### Pictorial

Represent multiplications using a place value chart and add the 1s, then 10s, then 100s, then 1,000s. This links to repeated addition and a step between the formal written method.



### Abstract

Use an area model and then add the parts.

|   |                      |                     |                   |
|---|----------------------|---------------------|-------------------|
|   | 100                  | 60                  | 3                 |
| 5 | $100 \times 5 = 500$ | $60 \times 5 = 300$ | $3 \times 5 = 15$ |

$$500 + 300 + 15 = 815$$

Use a column multiplication, including any required exchanges.

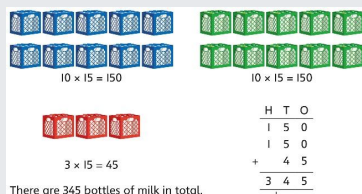
|   | H | T | O |
|---|---|---|---|
|   | 1 | 6 | 3 |
|   |   |   | 5 |
| X | 8 | 1 | 5 |
|   | 3 | 1 |   |

### Multiplying up to 4-digit numbers by 2-digit numbers

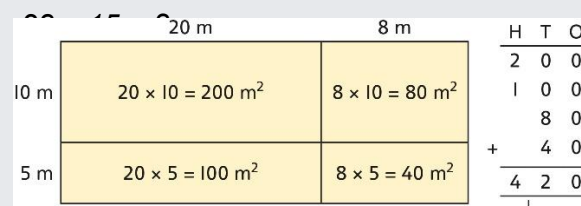
Partition one number into 10s and 1s, then add the parts.

$$23 \times 15 = ?$$

$$23 \times 15 = 345$$



Use an area model and add the parts to create a product.



$$28 \times 15 = 420$$

Use column multiplication, ensuring understanding of place value at each stage.

|   |   |   |   |
|---|---|---|---|
|   | 3 | 4 |   |
| x | 2 | 7 |   |
|   | 2 | 3 | 8 |
|   | 6 | 8 | 0 |
|   | 9 | 1 | 8 |

## Division

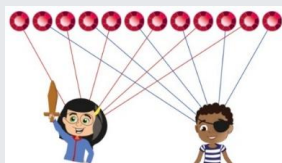
### Division - Key Language

Share, equal group, divide, factor, ratio, half, quarter, dividend, quotient, remainder/remaining.

(Careful with fraction language e.g. “*what is half of*” or “*find a half of*” not “*divide by half*”)

#### Concrete

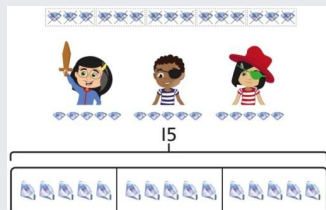
Start with a whole and share into equal parts, one at a time.



*12 shared equally between 2.  
They get 6 each.*

Start to understand how this also relates to grouping.

To share equally between 3 people, take a group of 3 and give 1 to each person. Keep going until all the objects have been shared.

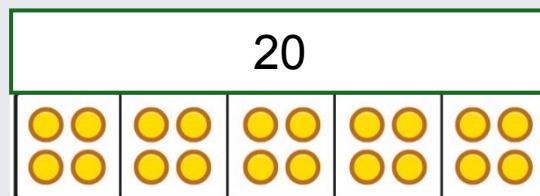


They get 5  each.

*15 shared equally between 3.  
They get 5 each.*

#### Pictorial

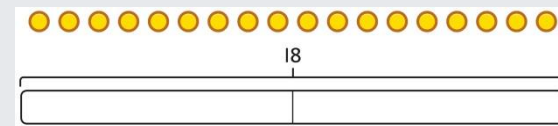
Represent the objects shared into equal parts using a bar model. This can be done with physical blank bar models and place counters on top, progressing to drawing dots/counters and finally placing numbers in the bar model sections.



*20 shared into 5 equal parts.  
There are 4 in each part.*

#### Abstract

Use a bar model to support understanding of the division.



$$18 \div 2 = 9$$

## Division - Remainders

### Concrete

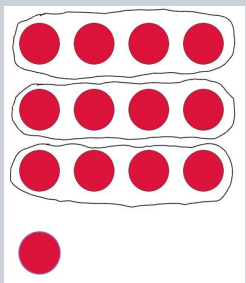
### Pictorial

### Abstract

Once equal grouping and sharing is understood, the concept of 'remainders' can be explored through organisation of objects and then drawing of dots.

Example of a remainder when grouping...

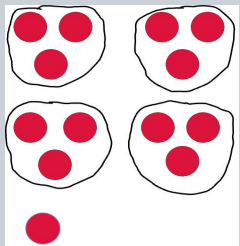
13 divided by 4...



(13 counters put into equal groups of 4)

(There is one counter remaining which cannot fit into a group of 4)

Example of a remainder when sharing...



(13 counters shared between 4)

(There is one counter remaining)

When completing an example such as 13 divided by 4,

Count in 4s...

4, 8, 12

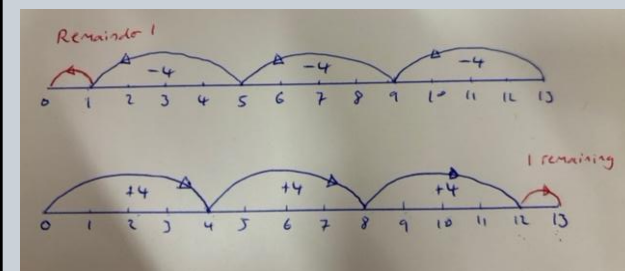
We listed 3 multiples of 4.

12 was the last multiple we said.

We stopped at 12 because the next multiple of 4 is greater than 13.

The difference between 12 and 13 is one.

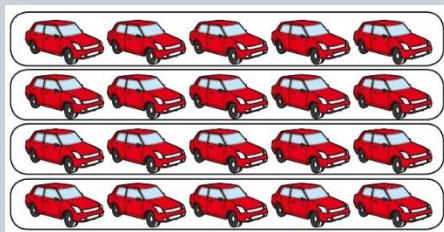
13 divided by 4 is 3 remainder one.



## Division

### Concrete

Understand the relationship between multiplication facts and division.

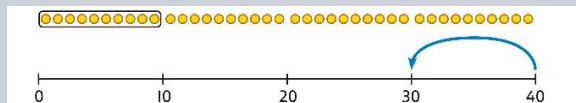


4 groups of 5 cars is 20 cars in total.

20 divided by 4 is 5.

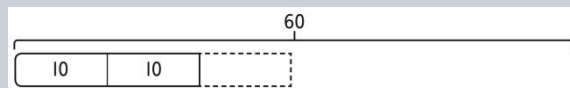
### Pictorial

Link equal grouping with repeated subtraction and known times-table facts to support division.



40 divided by 4 is 10.

Use a bar model to support understanding of the link between times-table knowledge and division.



### Abstract

Relate times-table knowledge directly to division.

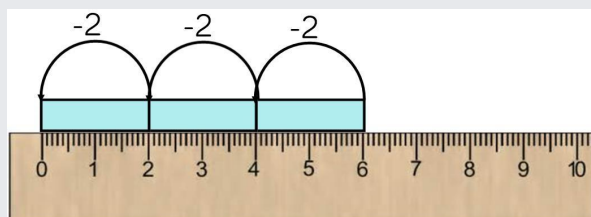
$1 \times 10 = 10$   
 $2 \times 10 = 20$   
 $3 \times 10 = 30$   
 $4 \times 10 = 40$   
 $5 \times 10 = 50$   
 $6 \times 10 = 60$   
 $7 \times 10 = 70$   
 $8 \times 10 = 80$

I used the 10 times-table to help me.  
 $3 \times 10 = 30$ .

I know that 3 groups of 10 makes 30, so I know that 30 divided by 10 is 3.

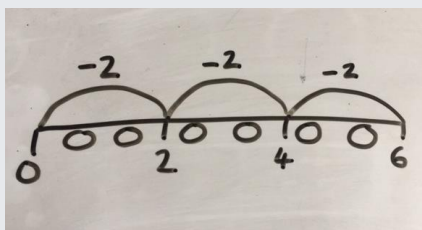
$3 \times 10 = 30$  so  $30 \div 10 = 3$

**Repeated subtraction** using Cuisenaire rods above a ruler.  $6 \div 2$

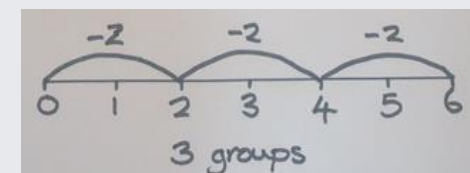


3 groups of 2

Children to represent repeated subtraction pictorially.



Abstract number line to represent the equal groups that have been subtracted.



# Abstract

I cannot share the hundreds/tens equally, so I need to exchange 1 ... for 10 ...

$80 \div 4 = 20$   
 $4 \div 4 = 1$   
 $84 \div 4 = 21$

Diagram illustrating the division of 435 by 3 using base ten blocks:

- $435 \div 3 = 145$
- $300 \div 3 = 100$
- $120 \div 3 = 40$
- $15 \div 3 = 5$

The base ten blocks are organized into three columns: Hundreds, Tens, and Ones.

| Hundreds | Tens        | Ones      |
|----------|-------------|-----------|
| 100      | 10 10 10 10 | 1 1 1 1 1 |
| 100      | 10 10 10 10 | 1 1 1 1 1 |
| 100      | 10 10 10 10 | 1 1 1 1 1 |
| 100      | 10          |           |

Red arrows indicate the grouping of blocks into 3 equal groups of 100, 40, and 5.

There are ... groups of ... hundreds/tens/ones/ in ...  
I can exchange 1 ... for 10 ...

There are 10 groups of 100 hundreds, ten thousands, in 100,000. I can exchange 1 ... for 10 ...

## Division

### Abstract

\*Children's understanding of decimal place value should be secure before this stage\*

#### Turning a remainder into a decimal using short division...

57 divided by 8 could be written as 7 remainder 1. However contexts such as money require decimal answers.

Complete short division, place the remainder after a decimal point, next to zero as a place holder.

In this example this then becomes 10 divided by 8.

If another remainder occurs, insert another zero as a place holder and place the remainder next to

The zero – here this becomes 20 divided by 8.

Continue this process until no remainders occur. If the same answer repeats, this is considered a recurring answer.

#### Division: Leaving Remainders as Decimals

$$\begin{array}{r} 07.125 \\ 8 \overline{) 57.1000} \\ \underline{40} \phantom{00} \\ 17 \phantom{00} \\ \underline{16} \phantom{00} \\ 10 \phantom{00} \\ \underline{8} \phantom{00} \\ 20 \phantom{00} \\ \underline{16} \phantom{00} \\ 40 \phantom{00} \\ \underline{40} \phantom{00} \\ 0 \end{array}$$

#### NEED TO DO A LONG DIVISION SLIDE

$$\begin{array}{r} 6 \\ -2 \\ \hline 4 \\ -2 \\ \hline 2 \\ -2 \\ \hline 0 \end{array}$$