



# St Mary's Church of England (Aided)

## Primary School

2

5

6

8

9

0

1

4

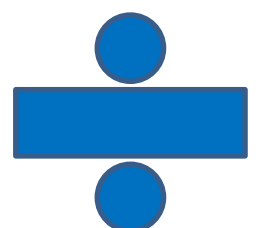
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3



## Progression of Skills in

## Mathematics



At St Mary's we aim to develop procedural fluency in maths through deep and meaningful conceptual understanding.

Maths is made fun and relevant and the children are encouraged to be independent thinkers, mathematical talkers and problem solvers.

The written strategies in this booklet are taught consistently alongside a range of mental strategies allowing children to identify the strategy **they** wish to use.

# Our Maths Vocabulary

## Addition

Sum

Total

Add

Plus

Increase

More

Altogether

## Subtraction

Subtract

Less

Minus

Find the difference

Difference between

Fewer

Take away

## Multiplication

Multiply

Times

Lots of

Product

Repeated addition

## Division

Divided by

Groups of

Share

Share equally

Remainder

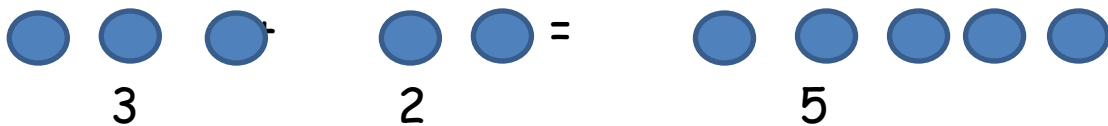
# Addition

## Early Addition Skills

Counting objects reliably

Adding one more using physical resources (e.g. fingers)

Combining two groups



Understand that addition can be done in any order

$$4 + 6 = 10$$

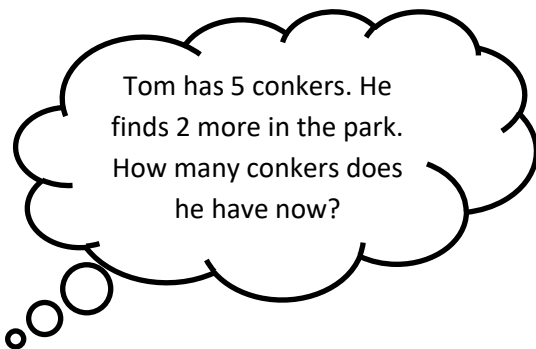
$$6 + 4 = 10$$

Know number bonds within 10



Record addition as a number sentence using

symbols



Understand addition is the inverse of subtraction  
and derive related facts

$$8 + 2 = 10 \quad 10 - 2 = 8$$



Use the inverse to calculate unknown amounts

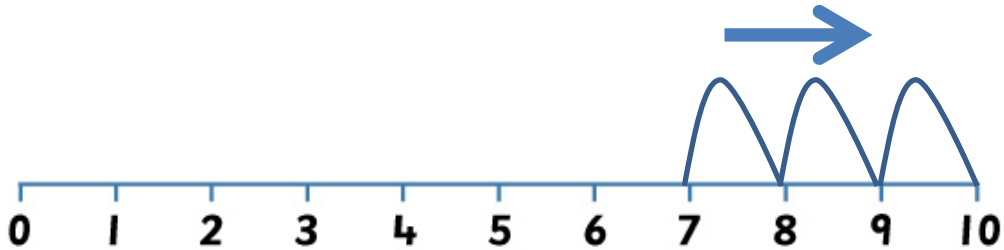
$$9 + \boxed{\phantom{00}} = 10$$

## Addition on a Number Line

(Labelled and unlabelled number lines)

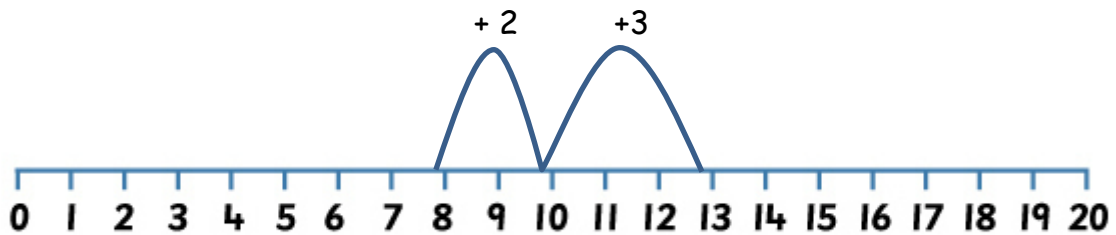
Counting on in jumps of 1

$$7 + 3 = 10$$



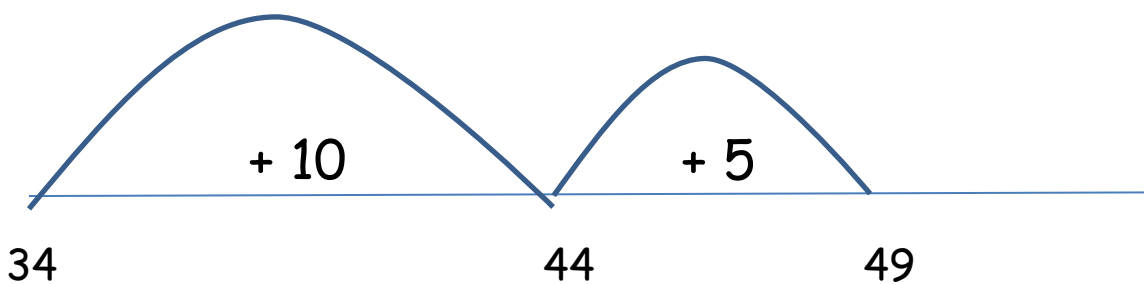
Use partitioning when *bridging* a multiple of 10

$$8 + 5 = 13$$

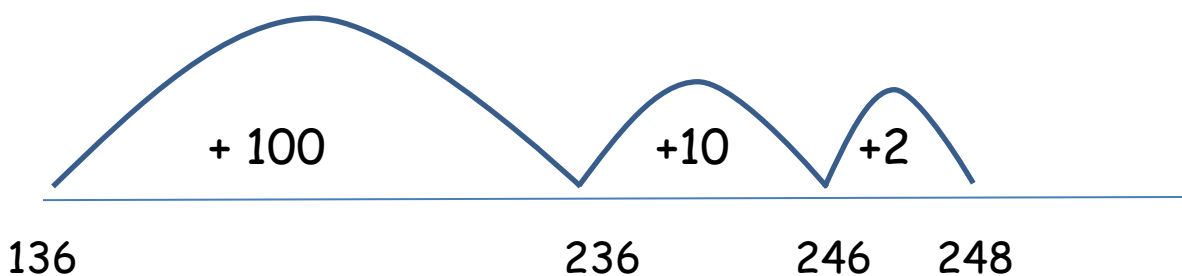


To partition numbers and count on in tens and units

$$34 + 15 = 49$$

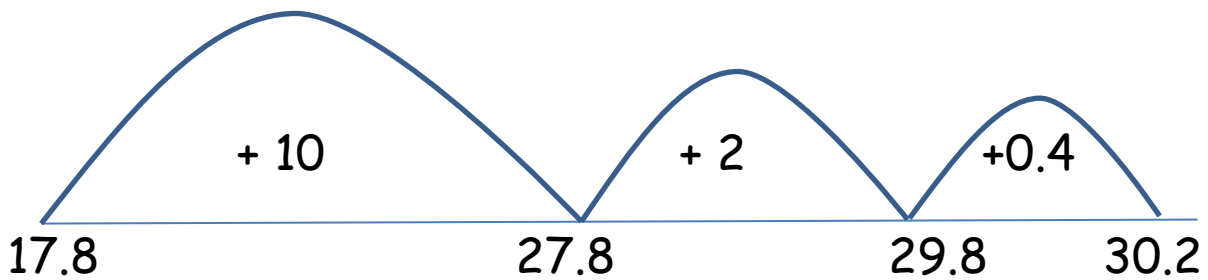


$$136 + 112 = 248$$



Use partitioning to add decimal numbers

$$17.8 + 12.4 = 30.2$$



### Partitioning and Re-combining

$$34 + 15 = (30 + 10) + (4 + 5)$$

$$40 + 9 = 49$$

Extend to decimals

$$24.6 + 13.5 = (20 + 10) + (4 + 3) + (0.6 + 0.5)$$

$$30 + 7 + 1.1 = 38.1$$

## Column Addition

Expanded column addition

$$\begin{array}{r} 34 \\ + 15 \\ \hline 9 \quad (4 + 5) \\ \hline 40 \quad (30 + 10) \\ \hline 49 \end{array}$$

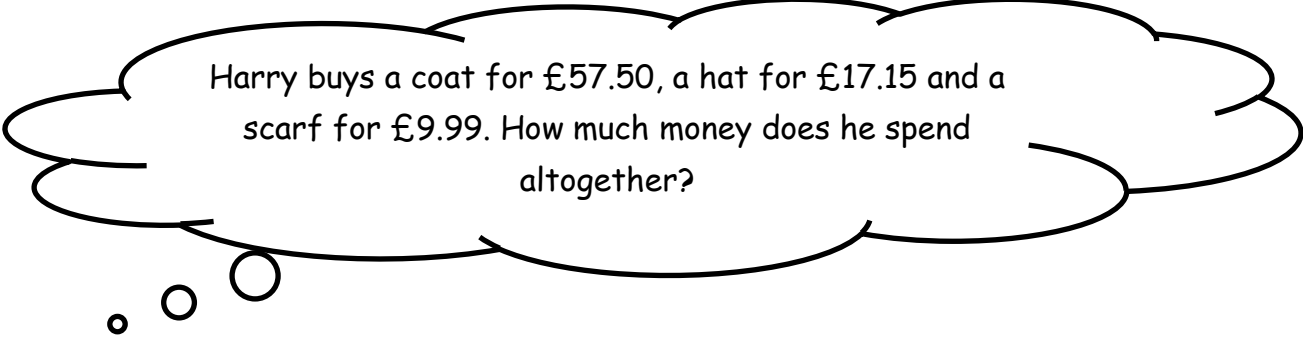
Compact column addition

$$\begin{array}{r} 59 \\ + 27 \\ \hline 1 \quad \underline{\quad} \\ \hline 86 \end{array}$$

Compact column addition to add integers and decimals

$$\begin{array}{r} 28.7 \\ + 26.5 \\ \hline 1 \quad 1 \quad \underline{\quad} \\ \hline 55.2 \end{array}$$

## Applying appropriate strategies to 'real life' problems



Harry buys a coat for £57.50, a hat for £17.15 and a scarf for £9.99. How much money does he spend altogether?



# Early Subtraction Skills

Counting objects reliably



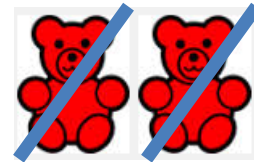
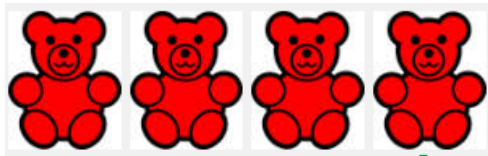
Counting forwards and backwards, including over boundaries

8, 9, 10, 11, 12      22, 21, 20, 19, 18

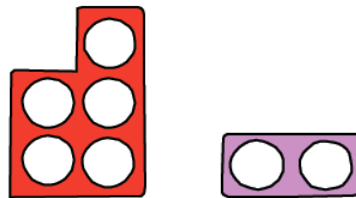


Understand subtraction as taking away

$$6 - 2 = 4$$



Understand subtraction as finding the difference



"The difference between 5 and 2 is 3"



Know and use number bonds within 10



Record subtraction as a number sentence using symbols



Understand subtraction is the inverse of addition and derive related facts

$$10 - 3 = 7 \text{ so } 7 + 3 = 10 \text{ and } 3 + 7 = 10$$



Use the inverse to calculate unknown amounts

$$20 - \boxed{\phantom{00}} = 9$$

## Subtraction on a Number Line

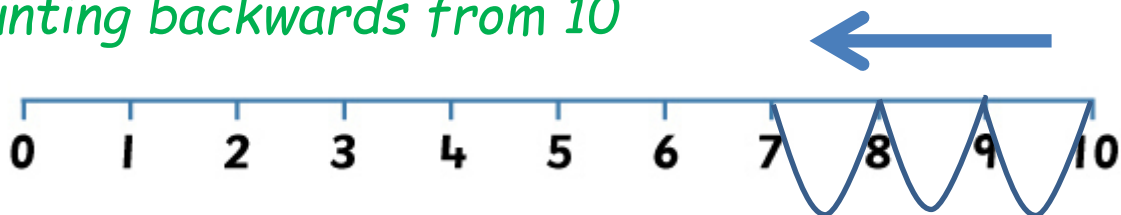
(Labelled and unlabelled number lines)

Using

Count forwards and backwards in jumps of 1

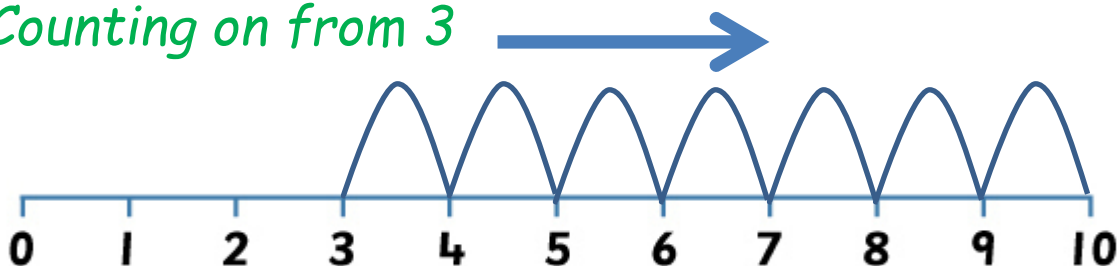
$$10 - 3 = 7$$

*Counting backwards from 10*



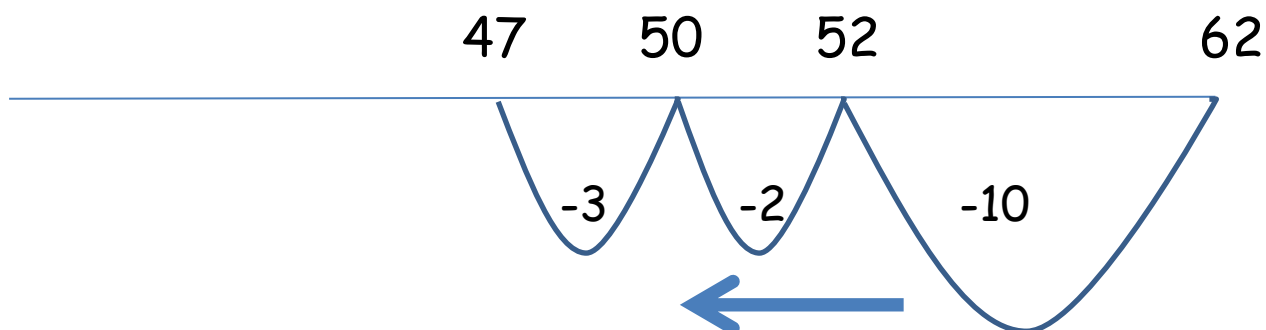
$$10 - 3 = 7$$

*Counting on from 3*



Using a number line to represent subtraction as 'taking away'

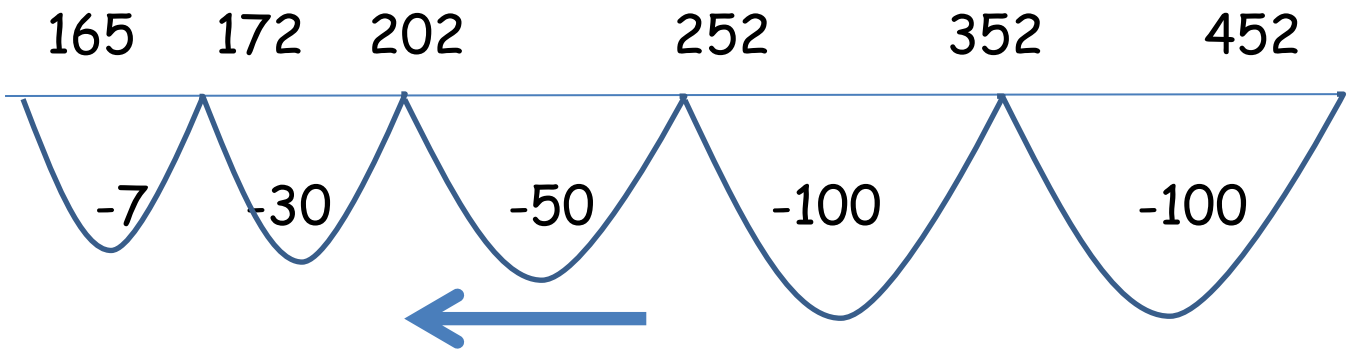
$$62 - 15 = 47$$



Children are introduced to the frog resource on Abacus at this stage

Using a number line to 'take' a 3 digit number from another 3 digit number

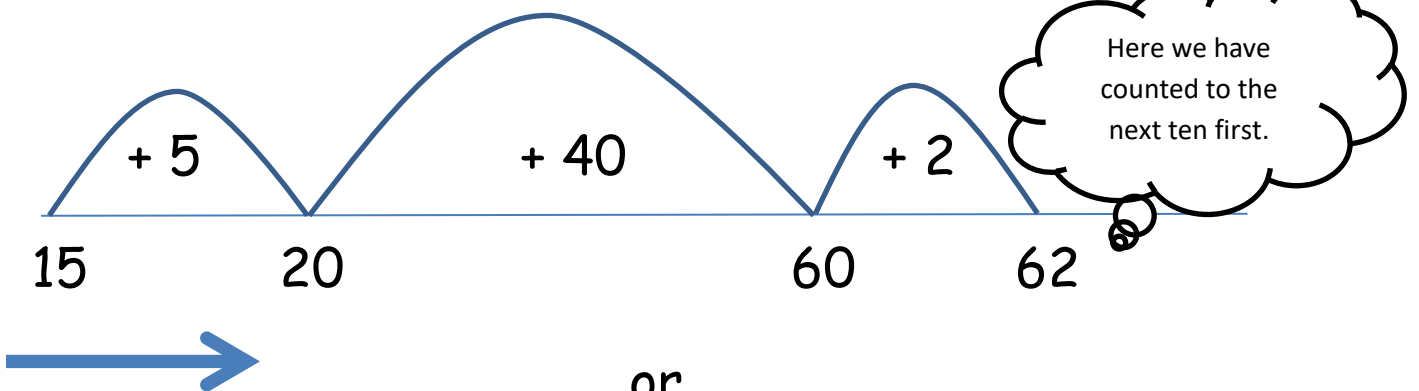
$$452 - 287 = 165$$



Using a number line to represent subtraction as 'finding the difference'

$$62 - 15 = 47$$

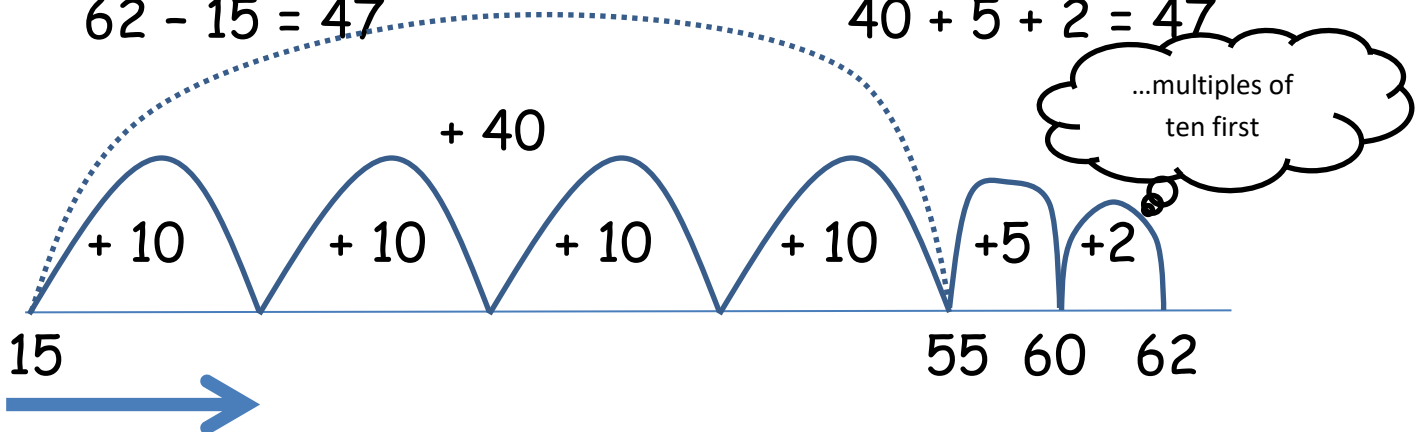
$$40 + 5 + 2 = 47$$



or...

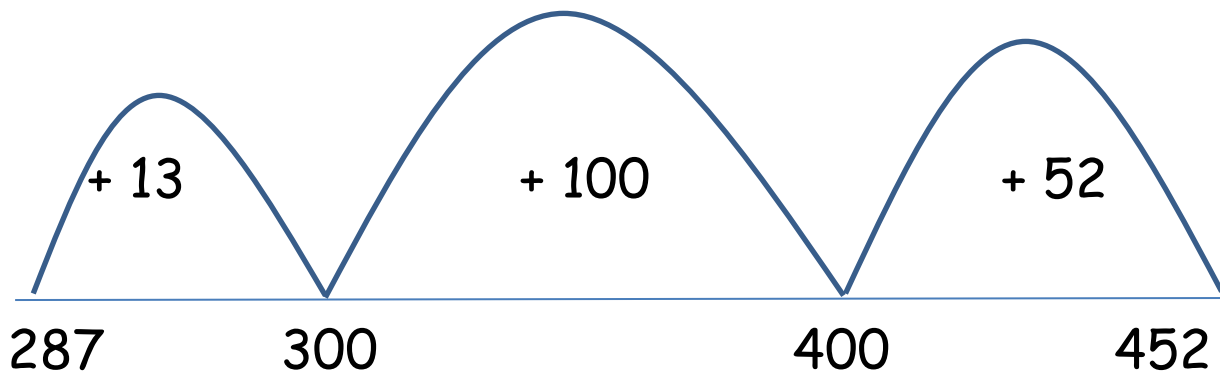
$$62 - 15 = 47$$

$$40 + 5 + 2 = 47$$



Using a number line to find the difference between two  
3 digit numbers

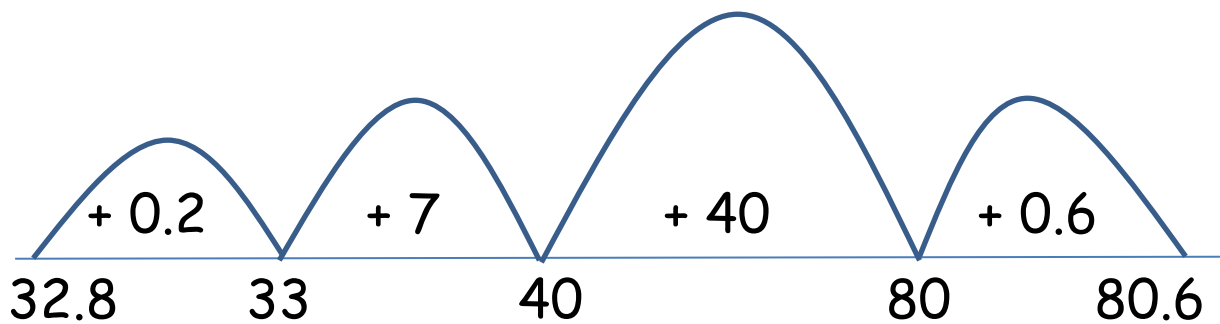
$$452 - 287 = 165$$



$$100 + 52 + 13 = 165$$

Using a number line to subtract decimals

$$80.6 - 32.8 = 47.8$$



$$40 + 7 + 0.6 + 0.2 = 47.8$$

*Either by 'finding the difference,' as shown here.  
Or by 'taking away' down a number line as shown earlier.*

## Expanded Subtraction

$$874 - 523 = 351$$

$$800 \rightarrow 70 \rightarrow 4$$

$$- 500 \rightarrow 20 \rightarrow 3$$

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$$300 + 50 + 1 = 351$$

$$943 - 627 = 316$$

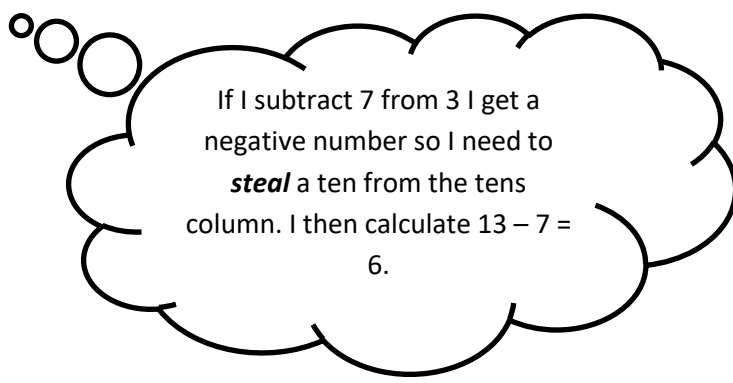
$$30 \quad 1$$

$$900 \rightarrow \cancel{40} \rightarrow 3$$

$$- 600 \rightarrow 20 \rightarrow 7$$

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$$300 + 10 + 6 = 316$$



If I subtract 7 from 3 I get a negative number so I need to **steal** a ten from the tens column. I then calculate  $13 - 7 = 6$ .

## Compact Subtraction

$$932 - 457 = 475$$

$$\begin{array}{r} 8 \quad 12 \quad 1 \\ \cancel{9} \quad \cancel{3} \quad 2 \\ - \quad 4 \quad 5 \quad 7 \\ \hline 4 \quad 7 \quad 5 \end{array}$$

2 subtract 7 equals a negative number so I need to **steal** a ten from the tens column. I need to **steal** a hundred from the hundreds column to make  $120 - 50$ .

Subtracting decimal numbers using compact column

method

$$\begin{array}{r} 5 \quad 1 \\ 8 \quad \cancel{6} \quad . \quad 7 \\ - \quad 4 \quad 3 \quad . \quad 8 \\ \hline 4 \quad 2 \quad . \quad 9 \end{array}$$

## Choosing and applying appropriate strategies to solve 'real life' problems

A pair of trainers cost £37.65. How much change would you get from £50?

John has £432 and Ben has £307. How much more money does John have than Ben?

# Multiplication

## Early Multiplication Skills

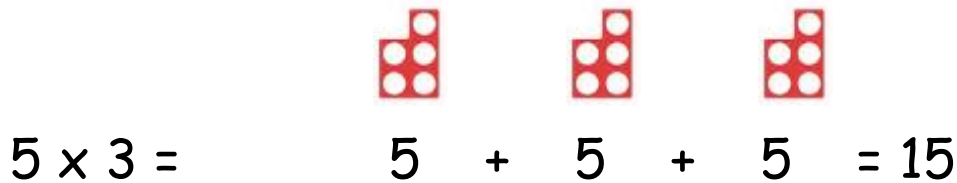
Counting reliably in different sizes



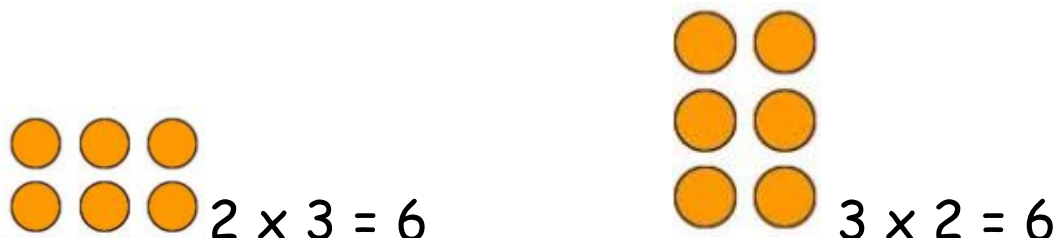
Understand doubling 2 equal groups



Understand multiplication as repeated addition



Understand the commutative nature of multiplication



Know multiplication facts up to  $12 \times 12$



Understand that multiplication is the inverse of  
division

$3 \times 6 = 18$

$6 \times 3 = 18$

$18 \div 6 = 3$

$18 \div 3 = 6$



Multiply any number by 10, 100 and 1000 using our  
understanding of place value

$63 \times 10 = 630$

Hundreds	Tens	Ones
	6	3
6	3	0

We put a zero  
in the units  
column as a  
place holder.

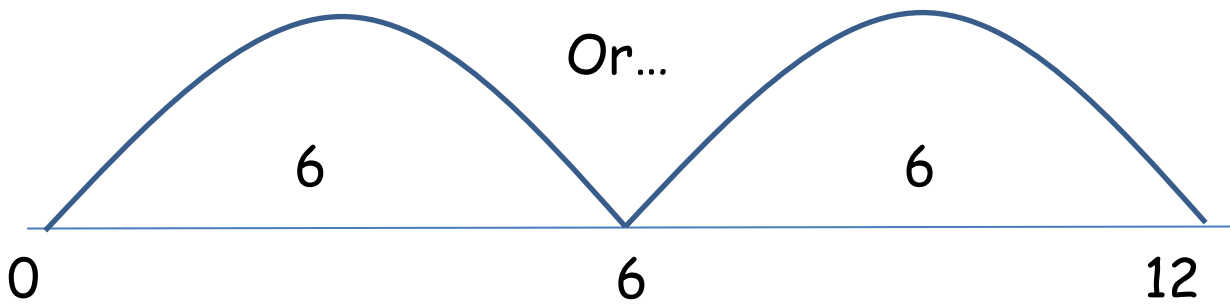
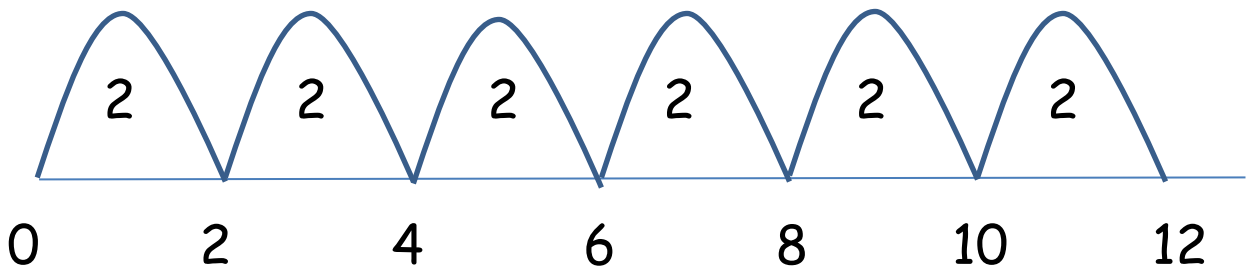
$4.8 \times 10 = 48$

Tens	Ones	.	Tenths
	4	.	8
4	8	.	0

## Multiplication on a Number Line

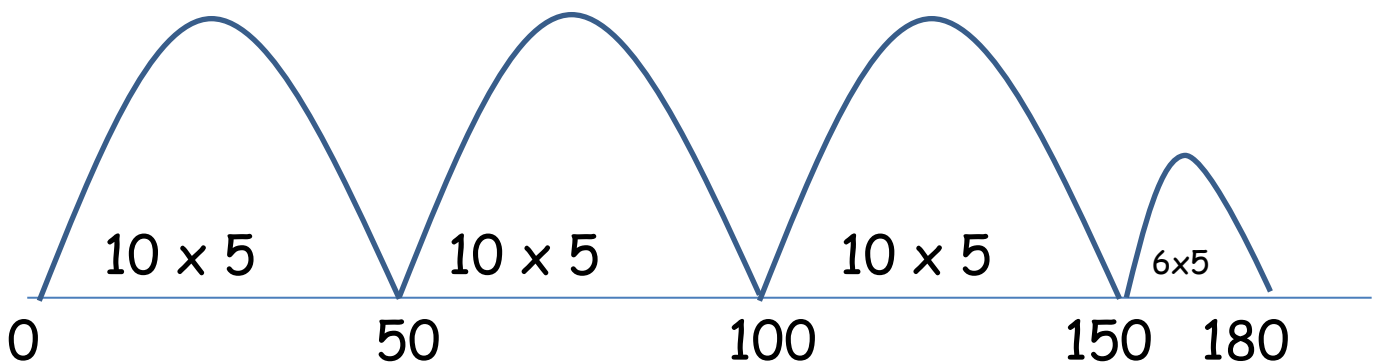
$$6 \times 2 = 12$$

(one digit  $\times$  one digit)



$$36 \times 5 = 180$$

(2 digit  $\times$  1 digit)



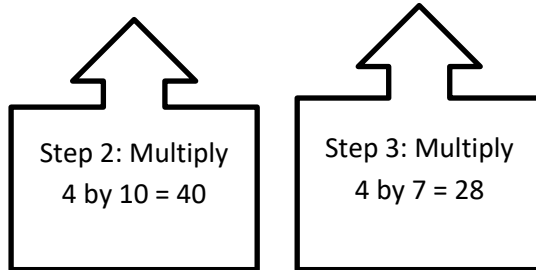
# Grid Method for Multiplication

$$17 \times 4 = 68$$

(2 digit  $\times$  1 digit)

$\times$	10	7
4	40	28

Step one: Partition the 2 digit number  
e.g.  $17 = 10 + 7$



$$\begin{array}{r} 40 \\ + 28 \\ \hline 68 \end{array}$$

Step 4: Add together you two answers from step 2 and step 3 to get your final answer  
e.g.  $40 + 28 = 68$   
Therefore,  $17 \times 4 = 68$

$$136 \times 5 = 680$$

(3 digit  $\times$  1 digit)

$\times$	100	30	6
5	500	150	30

$$\begin{array}{r} 500 \\ 150 \\ + 30 \\ \hline 680 \end{array}$$

$$46 \times 13 = 598$$

(2 digit  $\times$  2 digit)

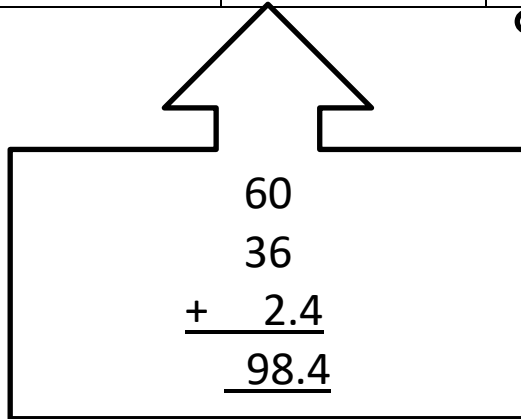
$\times$	40	6
10	400	60
3	120	18

$$\begin{array}{r} 400 \\ 120 \\ 60 \\ + 18 \\ \hline 598 \end{array}$$

$$16.4 \times 6 = 98.4$$

(Grid Method to multiply decimals)

x	10	6	0.4
6	60	36	2.4



If I multiply 0.4 I get an answer of 4. I can then do  $6 \times 4 = 24$

Because I multiplied by 10, I must divide the answer by 10.  $24 \div 10 = 2.4$

### Apply strategies to 'real-life' problems

There are 38 seats on a coach. How many seats on 10 coaches?

### Short Multiplication

$$24 \times 6 = 136$$

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \end{array}$$

$$342 \times 7 = 2394$$

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \end{array}$$

As with the grid method, we multiply units first, then tens, then hundreds.

## Long Multiplication

(2 digits x 2 digits)

$$24 \times 16 = 384$$

$$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ + 240 \\ \hline 384 \end{array}$$

$6 \times 4 = 24$  (carry 20 into the tens column).  
 $6 \times 20 = 120$  (add the 20 you carried earlier = 140)  
 $10 \times 24 = 240$ .  
 $144 + 240 = 384$

(3 digits x 2 digits)

$$124 \times 26 = 3224$$

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ + 2480 \\ \hline 11 \\ \hline 3224 \end{array}$$

$6 \times 4 = 24$  (carry 20 into the tens column).  
 $6 \times 20 = 120$  (add the 20 you carried earlier = 140)  
 $6 \times 100 = 600$  (add the 100 you carried earlier = 700)  
 $20 \times 124 = 2480$   
 $744 + 2480 = 3224$

# Division

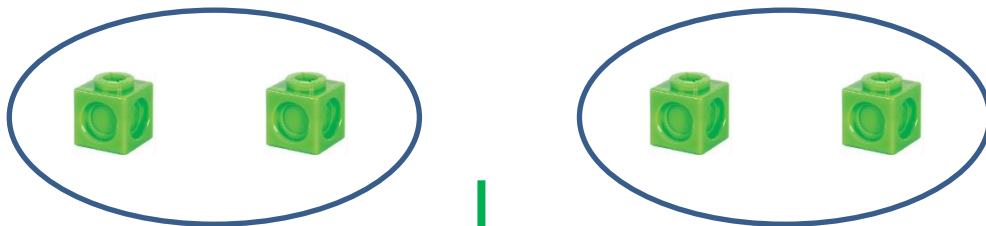
## Early Division Skills

Counting reliably in different sizes

Understand halving as 2 equal groups

$$\text{Half of } 4 = 2$$

$$4 \div 2 = 2$$

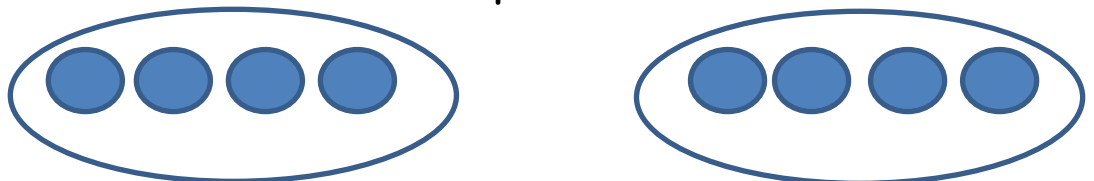


Understand division as sharing and grouping

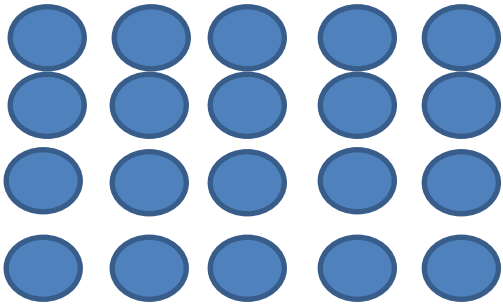
$$8 \div 4 = 2 \rightarrow 8 \text{ in } 4 \text{ equal groups}$$



$$8 \div 2 = 4 \rightarrow 8 \text{ shared into } 2 \text{ equal sets of } 4$$

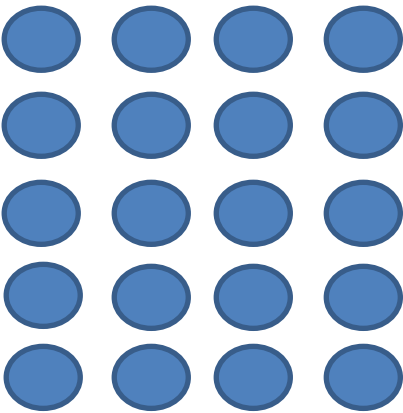


## Grouping



$20 \div 5 = 4$   
4 groups of 5 = 20  
20 in groups of 5 gives  
4 groups

## Sharing



$20 \div 5 = 4$   
5 sets of 4 = 20  
20 in 5 sets gives 4 in  
each set



Record division as a number sentence using symbols



Understand that division is the inverse of multiplication

$$24 \div 6 = 4$$

$$24 \div 4 = 6$$

$$6 \times 4 = 24$$

$$4 \times 6 = 24$$

Divide numbers by 10, 100 & 1000 using our understanding of place value

$$63 \div 10 = 6.3$$

Tens	Ones	.	Tenths
6	3		
0	6	.	3

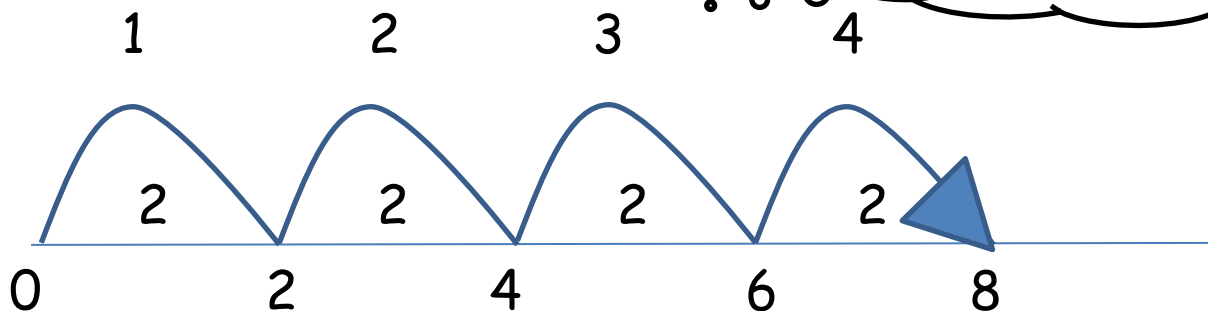
$$63 \div 100 = 0.63$$

Tens	Ones	.	Tenths	Hundredths
6	3			
0	0	.	6	3

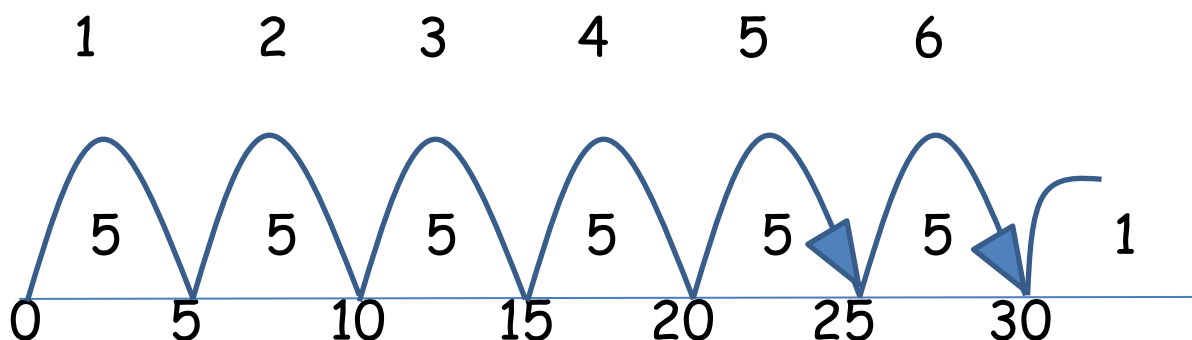
### Division on a Number Line

$$8 \div 2 = 4$$

How many jumps of 2 do I need to reach 8?



$$31 \div 5 = 6 \text{ remainder } 1$$





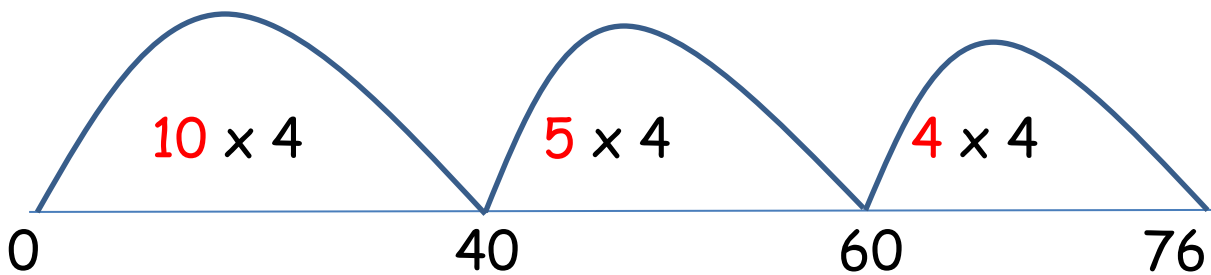
Apply strategies to practical examples involving rounding remainders up or down

Eggs are packed into boxes of 6. If I pack 50 eggs into boxes, how many full egg boxes will I have?

4 children fit into one car. How many cars will Mr Kolter need to transport 41 children ASSHletics?

Chunking on a Number Line

$$76 \div 4 = 19$$



$$10 + 5 + 4 = 19$$

## Short Division (the 'Bus Stop Method')

$$98 \div 7 = 14$$

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \end{array}$$

$$432 \div 5 = 86 \text{ r } 2$$

$$\begin{array}{r} 086 \text{ r } 2 \\ 5 \overline{) 432} \end{array}$$

## Long Division

$$432 \div 15 = 28 \text{ r } 12$$

Take away 30 from 43 to find the remainder

Bring down the number 2 to make 132

$$\begin{array}{r} 028 \\ 15 \overline{) 432} \\ \underline{30} \phantom{0} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

(15 x 2)

(15 x 8)

1 2

## Glossary of Mathematical Terms

<b>Arrays</b>	A set of objects or symbols arranged in rows or columns
<b>Bridging</b>	Where a calculation requires you to cross a multiple of ten
<b>Calculation</b>	A mathematical determination of the amount or number of something
<b>Commutative</b>	The order of the numbers in a calculation can be reversed e.g. $2 + 4 = 6$ and $4 + 2 = 6$
<b>Exchanging</b>	The process of swapping ones for tens or vice-versa when adding or subtracting (this is not called borrowing because we never give it back)
<b>Integers</b>	A whole number
<b>Inverse</b>	Reverse operations e.g. addition and subtraction are inverse operations
<b>Multiple</b>	A number is added to itself a number of times
<b>Number Bonds</b>	Two numbers that total a whole number
<b>Number Sentence</b>	A written calculation including an equals sign
<b>Operations</b>	There are four basic operations in arithmetic used to solve problems. They are: addition, subtraction, multiplication and division
<b>Partitioning</b>	Splitting a number into the value of each digit
<b>Place Value</b>	The value of each digit in a number depending on its position
<b>Product</b>	The result of multiplying numbers together
<b>Re-combining</b>	Adding partitioned numbers back together
<b>Remainder</b>	The amount 'left over' after a division calculation
<b>Sum</b>	To add together
<b>Total</b>	The sum of a set of numbers

<http://www.amathsdictionaryforkids.com/>