



Denmead Junior School

* Calculation Methods

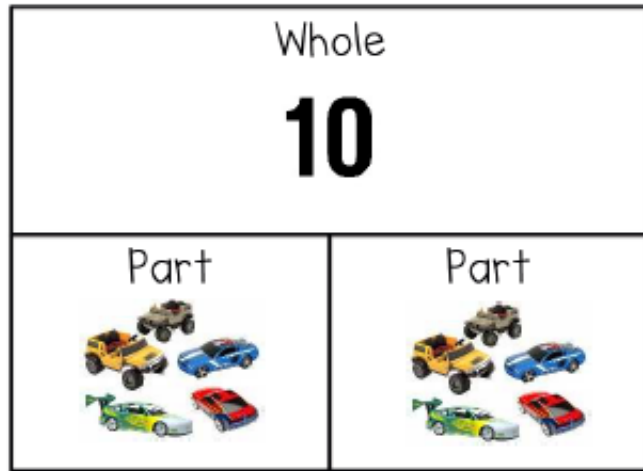
Mrs. Jo Marks

Maths Leader & Lower
School Phase Leader

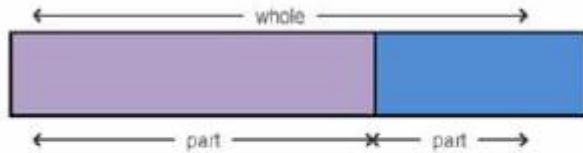
*Key ideas for DJS

- *One more, one less
- *Doubling and halving
- *Part/whole
- *Patterning
- *Positioning a number (on the number line) helps inform the right decision for calculation

Part, Part, Whole Mat



* Part/whole



Part + Part = Whole

Whole - Part = Part

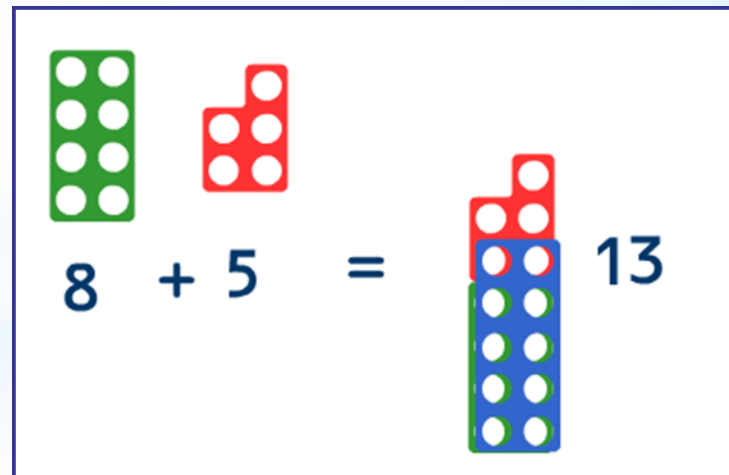
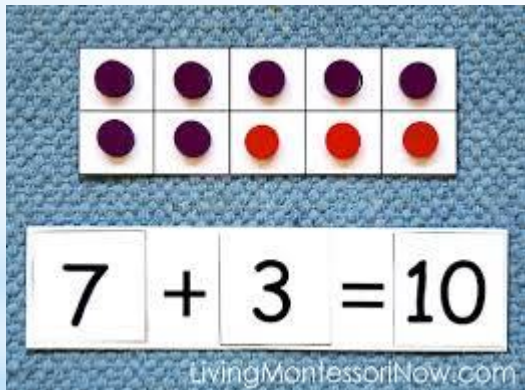
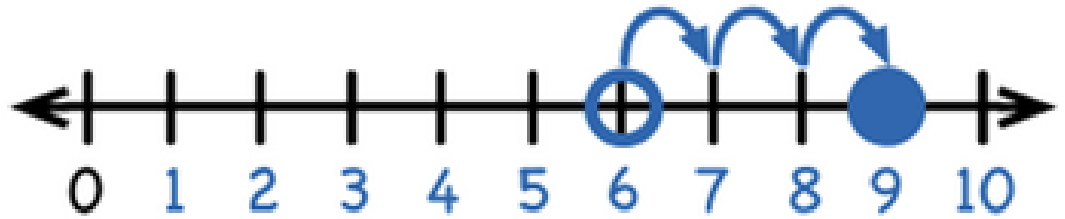
A pupil really understands a mathematical concept, idea or technique if they can:

- * *describe it in their own words;*
- * *represent it in a variety of ways*
- * *explain it to someone else*
- * *create examples and non-examples;*
- * *see connections with other facts and ideas;*
- * *recognise it in new situations and contexts;*
- * *make use of it in various ways, including new situations.*

Addition

Addition

$$6 + 3 = 9$$



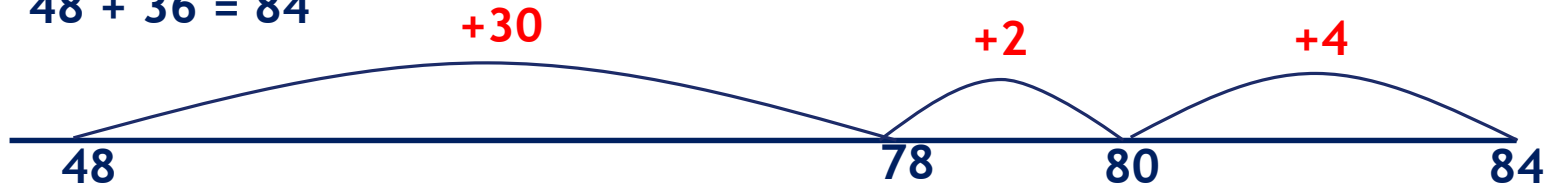
Addition

Unstructured number line

$$8 + 7 = 15$$



$$48 + 36 = 84$$

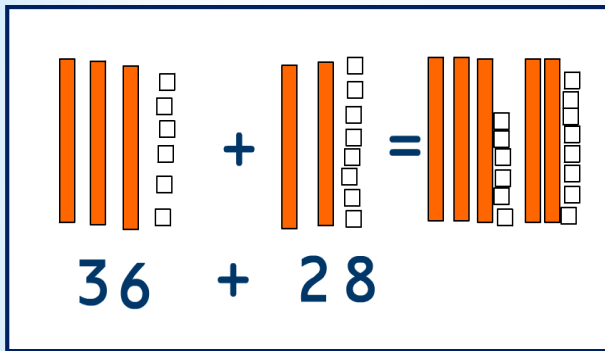


or:



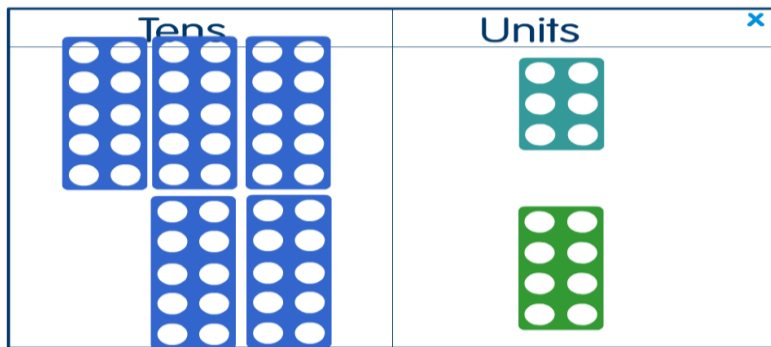
Addition

Partitioning



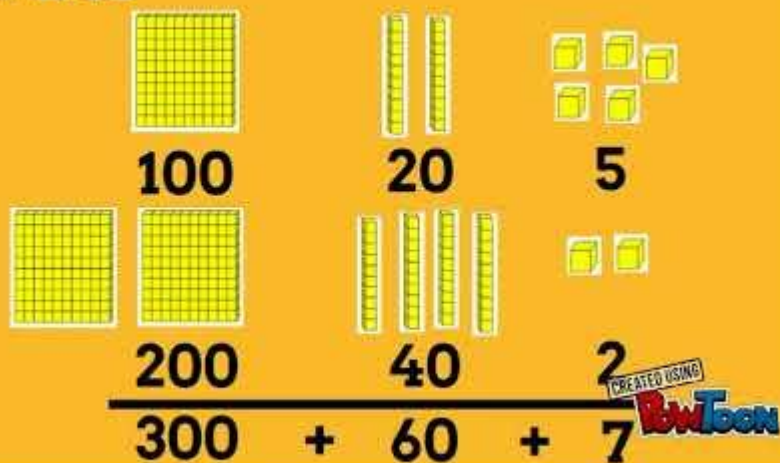
$$25 + 14 = \underline{39}$$

A handwritten diagram showing the partitioning of the addition $25 + 14 = 39$. The number 25 is partitioned into 20 and 5, and 14 is partitioned into 10 and 4. A purple bracket groups 20 and 10 to form 30. An orange bracket groups 5 and 4 to form 9. Below these, the equation $30 + 9 = 39$ is written.



$$\begin{array}{r} 47 \\ + 76 \\ \hline \end{array} = \begin{array}{r} 40 + 7 \\ 70 + 6 \\ \hline 110 + 13 = 123 \end{array}$$

$125 + 242$



Addition

Expanded column method

$$\begin{array}{r} 47 \\ + 76 \\ \hline 13 \\ \hline 110 \\ \hline 123 \end{array}$$

Addition

Compact column method

$$\begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 258 \\ + 87 \\ \hline 345 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 366 \\ + 458 \\ \hline 824 \\ \hline 11 \end{array}$$

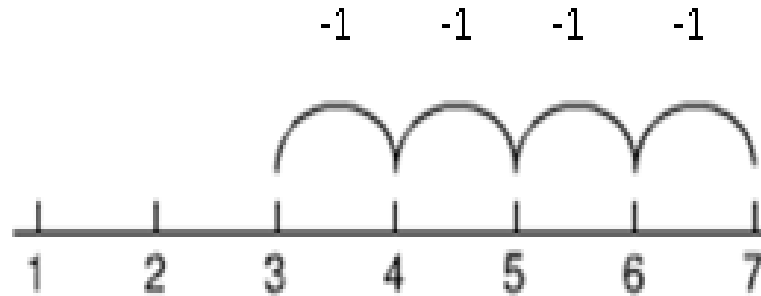
Subtraction

Subtraction

*Counting back
(taking away from largest to smallest)*

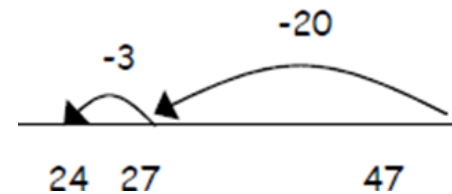
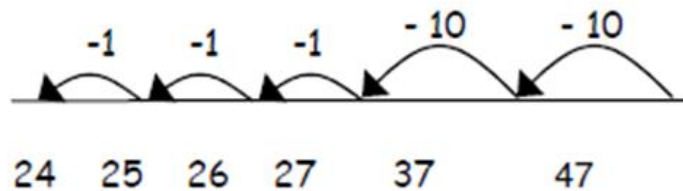
Subtraction

Structured number line



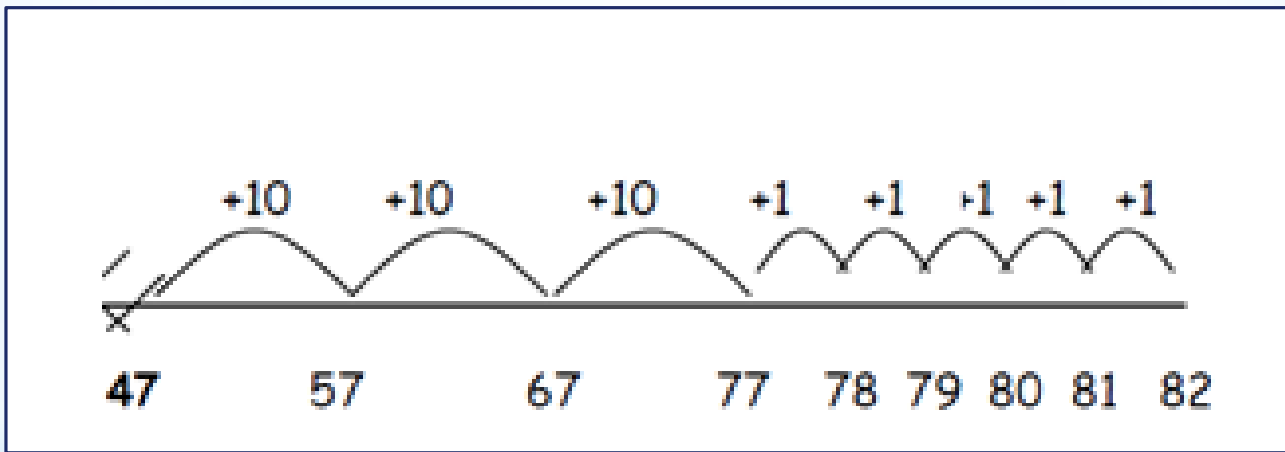
Subtraction

Unstructured number line



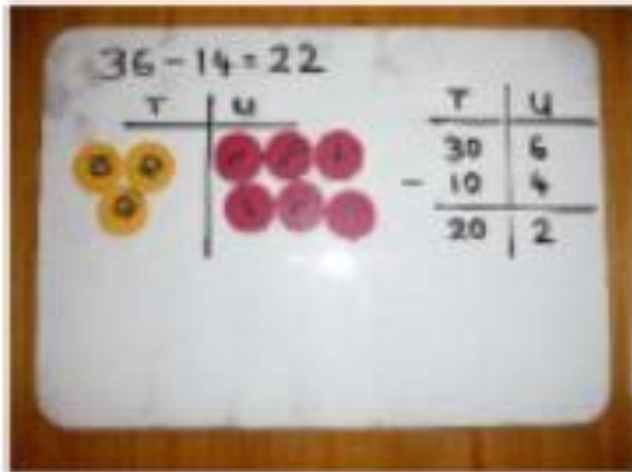
Subtraction

Counting on (adding)

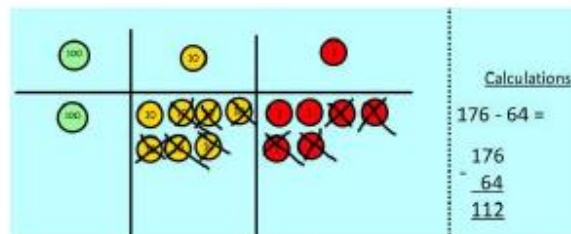
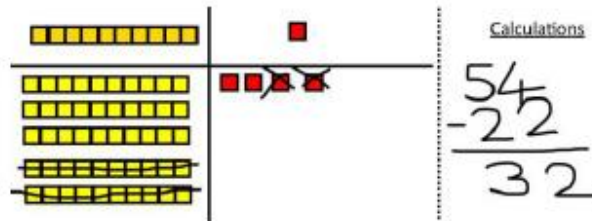


Subtraction

Expanded column method – no 'taking'



$$\begin{array}{r}
 500 + 60 + 3 \\
 - 200 + 40 + 1 \\
 \hline
 300 + 20 + 2
 \end{array}$$



Subtraction

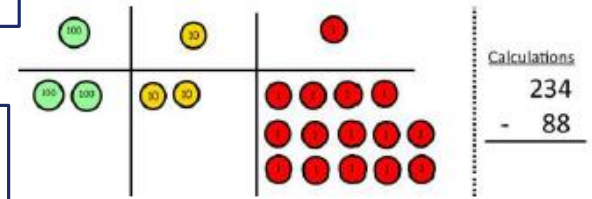
Expanded column with 'taking'

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 70 + 1 \\ \hline \end{array}$$

$$\begin{array}{r} 400 \quad 160 \\ \cancel{500} + \cancel{60} + 3 \\ - 200 + 70 + 1 \\ \hline 200 + 90 + 2 \end{array}$$

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 70 + 8 \\ \hline \end{array}$$

$$\begin{array}{r} 400 \quad 150 \quad 13 \\ \cancel{500} + \cancel{60} + \cancel{3} \\ - 200 + 70 + 8 \\ \hline 200 + 80 + 5 \end{array}$$



Subtraction

Expanded column with 'taking'

$$\begin{array}{r} 500 + 0 + 3 \\ - 200 + 70 + 8 \\ \hline \end{array}$$

$$\begin{array}{r} 400 \quad 90 \quad 13 \\ -400 \quad -100 \quad 3 \\ \hline \cancel{500} + \cancel{0} + \cancel{3} \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array}$$

Subtraction

Compact column

$$\begin{array}{r} 4 \quad 16 \\ \cancel{5} \quad \cancel{6} \quad 3 \\ - 271 \\ \hline 292 \end{array}$$

$$\begin{array}{r} 4 \quad 15 \quad 13 \\ \cancel{5} \quad \cancel{6} \quad \cancel{3} \\ - 278 \\ \hline 285 \end{array}$$

$$\begin{array}{r} 4 \quad 9 \quad 13 \\ \cancel{5} \quad \cancel{0} \quad \cancel{3} \\ - 278 \\ \hline 225 \end{array}$$

Multiplication

Multiplication

Multiplication as repeated addition



$$2 + 2 + 2 + 2$$

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

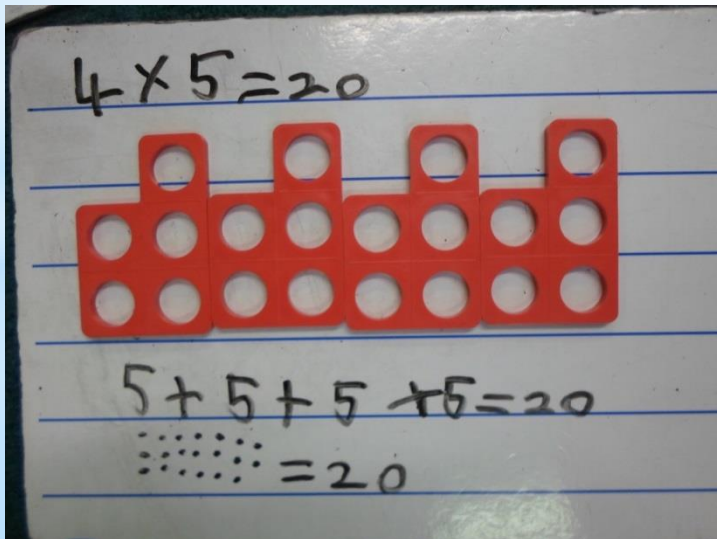
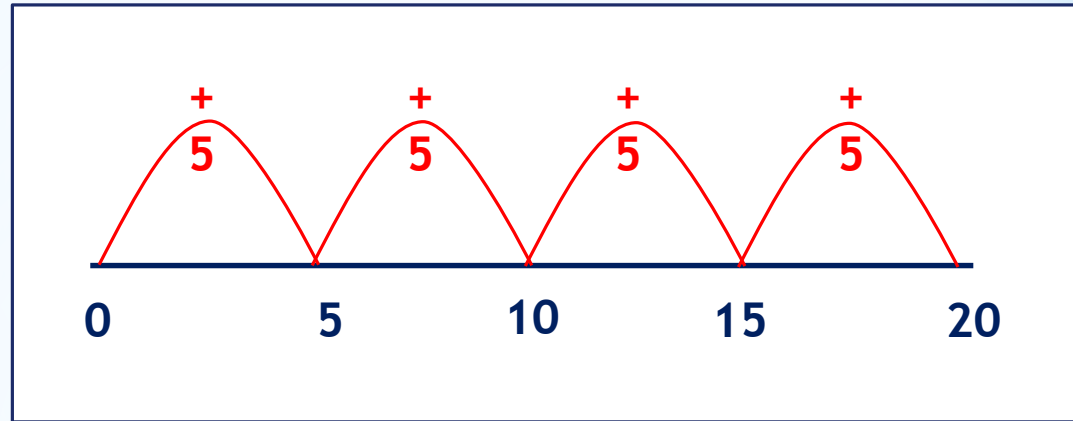
$$4 \times 2 = 8$$

2 multiplied by 4

4 lots of 2

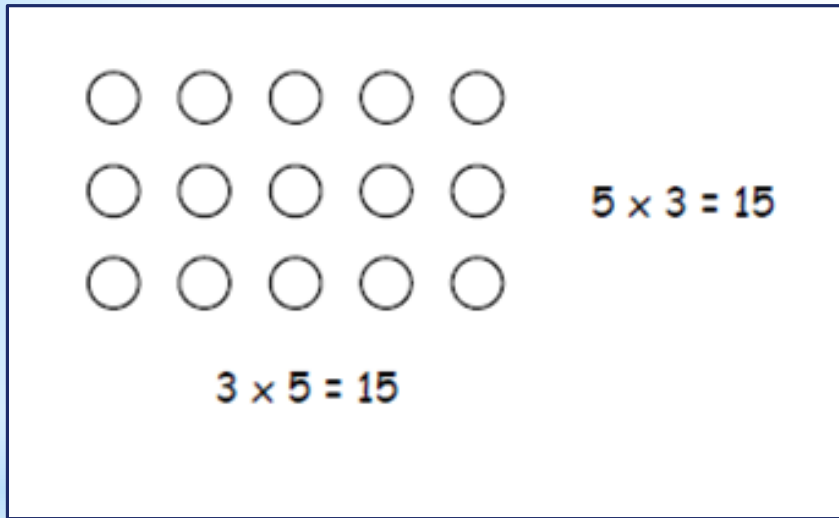
Multiplication

Repeated addition on a number line



Multiplication

Understand multiplication as an array



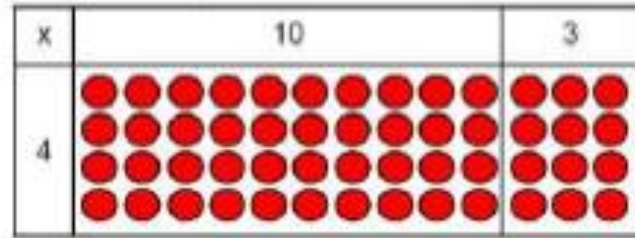
Know multiplication tables - up to 12×12

Multiplication

Grid method

$$23 \times 8$$

X	20	3
8	160	24



$$23 \times 8 = 184$$
$$160 + 24 = 184$$

$$136 \times 5$$

X	100	30	6
5	500	150	30

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

Multiplication

Short multiplication—only if the multiplier is a 'one'

E.g. 24×6 or 342×7 or 2741×6
(Year 5 and Year 6)

24×6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline 2 \end{array}$$

Answer: 144

342×7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ \hline 21 \end{array}$$

Answer: 2394

2741×6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ \hline 42 \end{array}$$

Answer: 16 446

Multiplication

Grid method

$$78 \times 25$$

X	70	8
20	1400	160
5	350	40

$$\begin{array}{r} 1560 \\ + 390 \\ \hline 1950 \end{array}$$

Multiplication

Long multiplication—when the multiplier is a 2 or 3 digit number

(Year 5 and Year 6)

$$\begin{array}{r} 32 \\ \times 24 \\ \hline 8 \\ 120 \\ 40 \\ 600 \\ \hline 768 \end{array}$$

(4 x 2)
(4 x 30)
(20 x 2)
(20 x 30)

$$\begin{array}{r} 153 \\ \times 243 \\ \hline 459 \\ 6120 \\ + 30600 \\ \hline 37179 \end{array}$$

$$\begin{array}{r} 34 \\ \times 56 \\ \hline 204 \\ 1700 \\ \hline 1904 \checkmark \end{array}$$

Division

Division

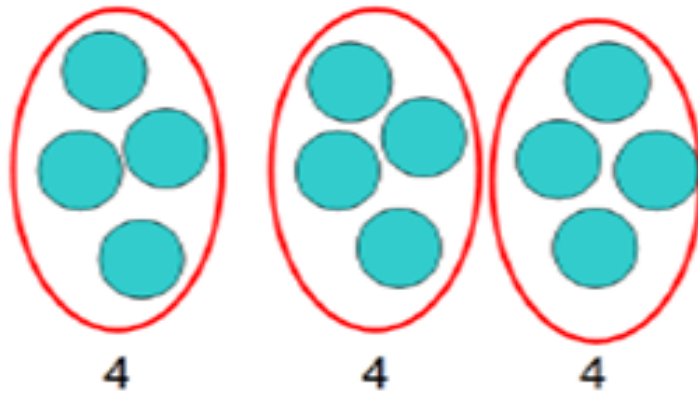
Grouping



How many groups of 4 can
be made with 12? 3

Division

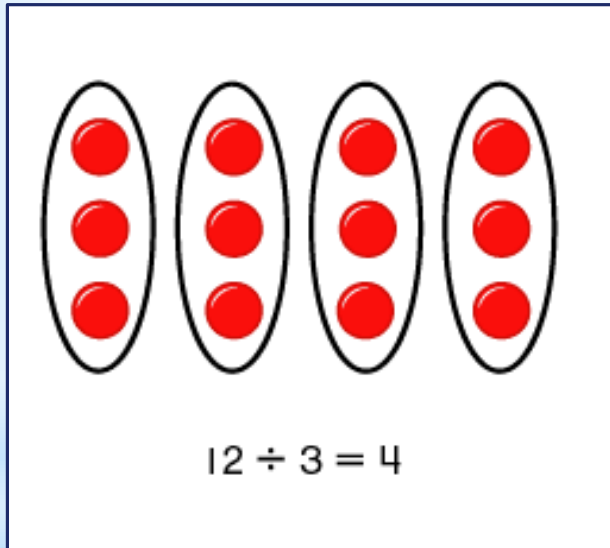
Sharing



12 shared between 3 is 4

Division

Division using arrays



Pupils should also show that the same array can represent $12 \div 4 = 3$ if grouped horizontally.

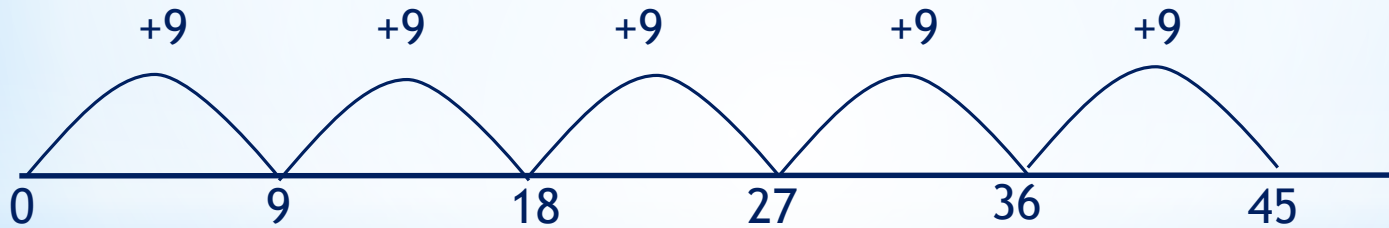
Division

Chunking on a number line

Division

Adding on or taking away

$$45 \div 9 = 5$$



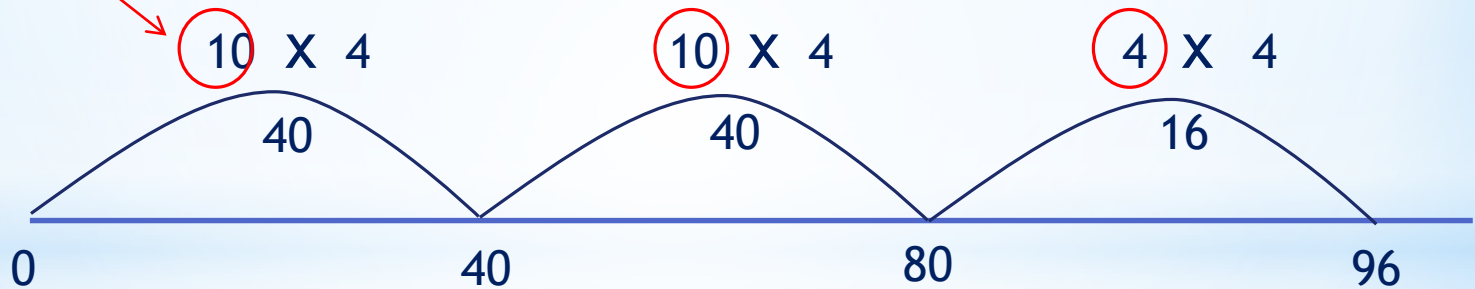
How many lots of 9 makes 45?

Division

Division by chunking on a number line

Make sure the number you multiply by goes in the same position each time

$$96 \div 4 = 24$$

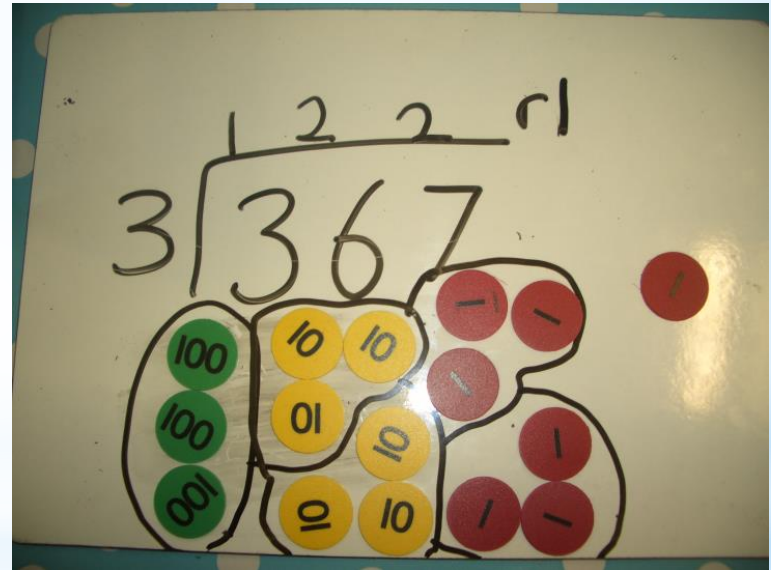


How many lots of 4 altogether?

$$10 + 10 + 4 = 24$$

Division

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$



Division

$$\begin{array}{r} 18 \\ 4 \overline{) 732} \end{array}$$

	2	1	8
4	8	7 ³	2

Division

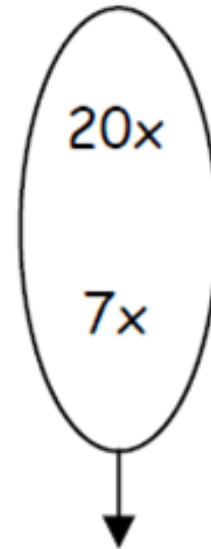
What does the remainder mean? How should it be represented?

		0	6	6	3	r	5
8)	5	3	0	2	9	

.....as a fraction or as a decimal

Division

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{- 720} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$



Answer : 27

Can I do this in my head?

How big will my answer be?
(approximation)



Could I use jottings to keep track of the calculation?

Do I need to use an expanded or compact method?



Did I check
my answer?

Inverse
check

Against my
approximation

Using another
method

$$40 + 1,000 =$$

$$122,456 - 11,999 =$$

$$2.7 + 3.014 =$$

$$72 \div 9 =$$

$$9 - 3.45 =$$

$$0.9 \div 10 =$$

			7	1	
			4	6	
×			<hr/>		

$$30 \times 40 =$$

$$1,320 \div 12 =$$

$$95 \div 5 =$$

4	3		1	1	1	8

*Ways to support your child

Love maths!

Number bonds and

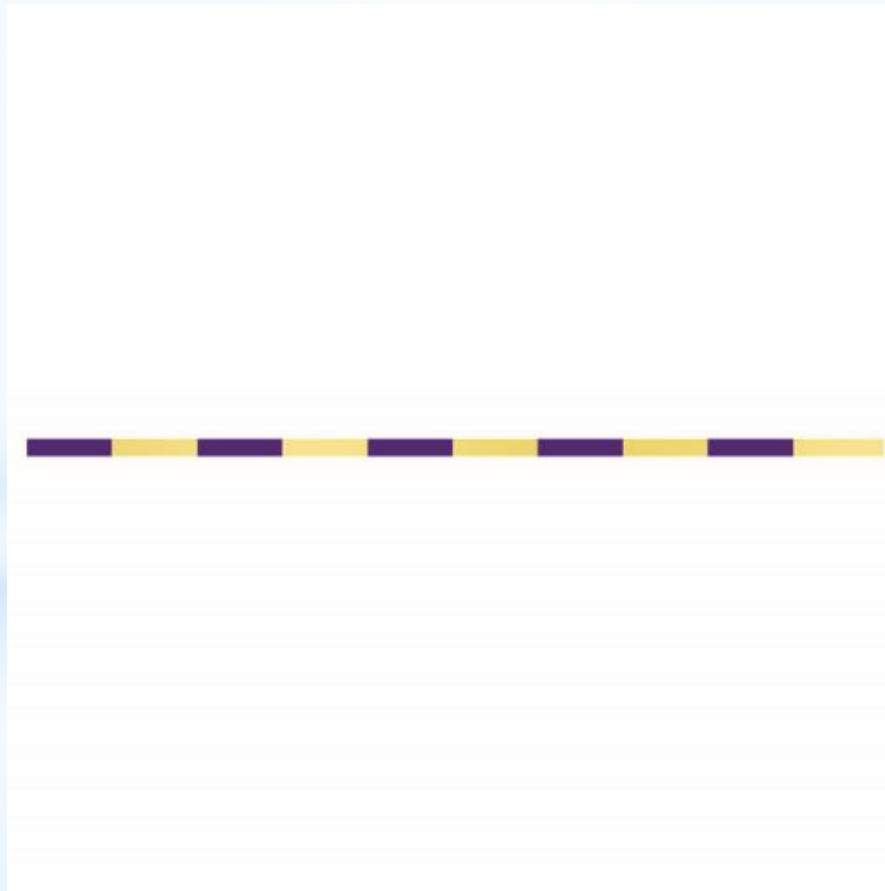
Times tables

Telling the time

Measurements

* Multiplication facts

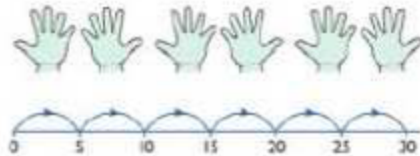
* 1, 10, 5 strategy for calculating multiplication facts



Count in multiples supported by concrete objects in equal groups.



Use real-life arrays or build arrays.



Use a number line or pictures to continue support in counting in multiples.

What do you notice?

$3 \times 2 = 6$

3

2 {

Link multiplication and division facts.

Count in multiples of a number aloud.

Write sequences with multiples of numbers.

2, 4, 6, 8, 10

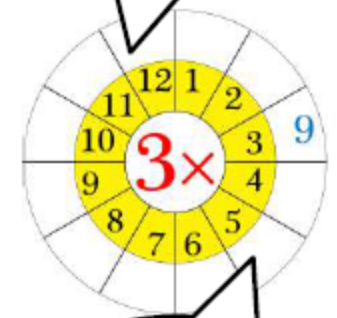
5, 10, 15, 20, 25, 30

Record multiplication number sentences.

$1 \times 7 = 7$	$7 \div 7 = 1$
$2 \times 7 = 14$	$14 \div 7 = 2$
$3 \times 7 = 21$	$21 \div 7 = 3$
$4 \times 7 = 28$	$28 \div 7 = 4$
$5 \times 7 = 35$	$35 \div 7 = 5$
$6 \times 7 = 42$	$42 \div 7 = 6$
$7 \times 7 = 49$	$49 \div 7 = 7$
$8 \times 7 = 56$	$56 \div 7 = 8$
$9 \times 7 = 63$	$63 \div 7 = 9$
$10 \times 7 = 70$	$70 \div 7 = 10$
$11 \times 7 = 77$	$77 \div 7 = 11$
$12 \times 7 = 84$	$84 \div 7 = 12$

Recite times tables by rote orally.

3 times 3 equals 9, so 9 divided by 3 equals 3. One third of 9 equals 3.



If you know 3 times 3 equals 9, what else do you know? $3 \times 30 = 90$ etc.