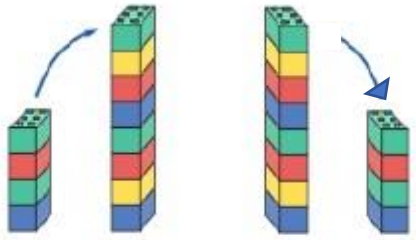
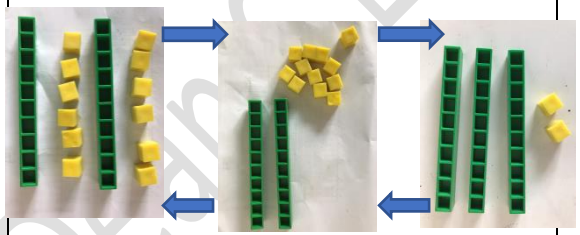
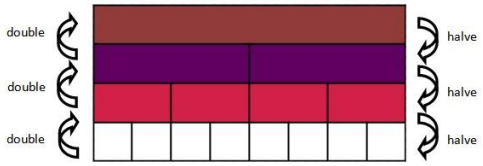
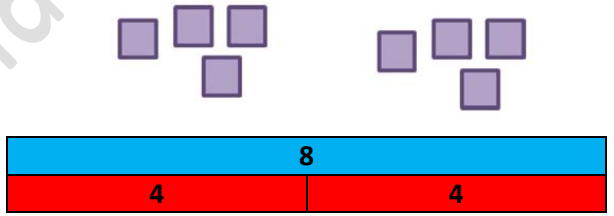
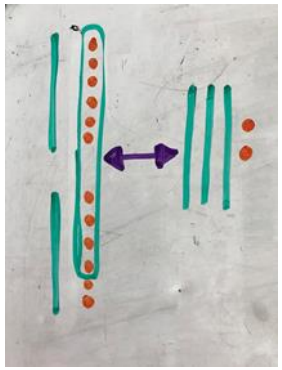
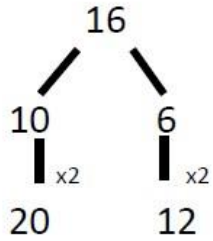
West Dean CE Primary School
Calculation Guide - Multiplication

Links with addition and division are absolutely key throughout

Objective and Strategies	Concrete	Pictorial	Abstract
Doubling and halving	Use practical activities to show how to double and halve a number.  Double 4 is 8 2 X 4 = 8 Half of 8 is 4 8 ÷ 2 = 4 16 X 2 = 32 with the inverse 32 ÷ 2 = 16  Cuisenaire rods 	Draw pictures to show how to double a number. The bar diagram supports a full understanding of the numbers. Double 4 is 8  	2 X 4 = 8 Partition a number and then double each part before recombining it back together.  16 X 2 = 32

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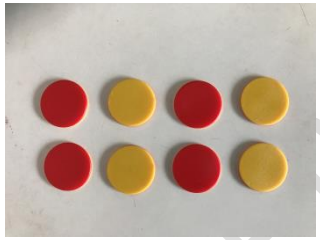
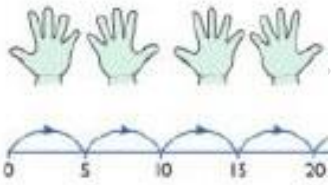
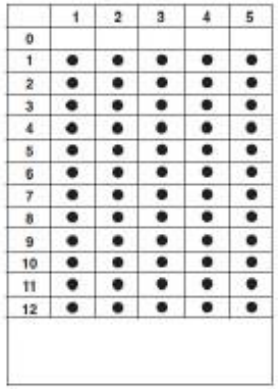
Counting in multiples	 Count in multiples supported by concrete objects in equal groups. 	  Use a number line or pictures to continue support in counting in multiples. Dotted paper and arrays create a visual representation for the range of multiplication facts.	Count in multiples of a number aloud. 5, 10, 15, 20 4 x 5 = 20 Write sequences with multiples of numbers. 2, 4, 6, 8 4 x 2 = 8 8 ÷ 4 = 2 link to multiplication and using the inverse operation 5, 10, 15, 20, 25 , 30, 35, 40, 45, 50, 55, 60 12 x 5 = 60 5 x 12 = 60 60 ÷ 5 = 12 60 ÷ 12 = 5

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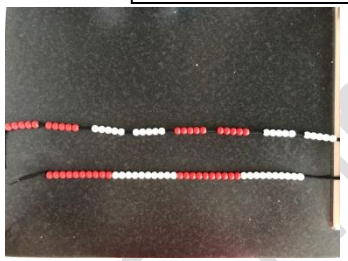
Repeated addition

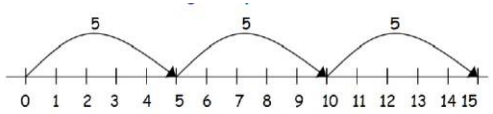
2 + 2 + 2 + 2 + 2 = 10

5 X 2 = 10

Use a variety of objects to add equal groups.

3 X 5 = 15
8 X 5 = 40





5 + 5 + 5 = 15

5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = □

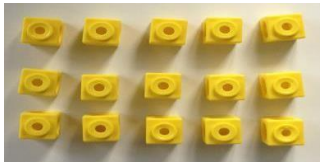
3 x 5 = 15
8 x 5 = 40

If there are 5 children in the family, how many socks will they need altogether?

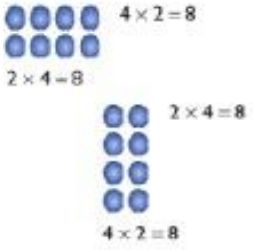
5 x 2 = 10

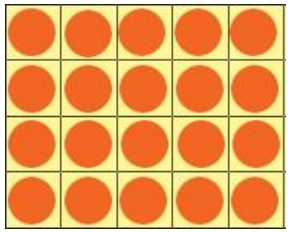
Arrays- showing commutative multiplication

Create arrays using counters/ cubes to show multiplication sentences.



Draw arrays in different rotations to find **commutative** multiplication sentences.





Link arrays to area of rectangles.

Use an array to write multiplication sentences and reinforce repeated addition.

5 + 5 + 5 = 15

3 + 3 + 3 + 3 + 3 = 15

5 x 3 = 15

3 x 5 = 15

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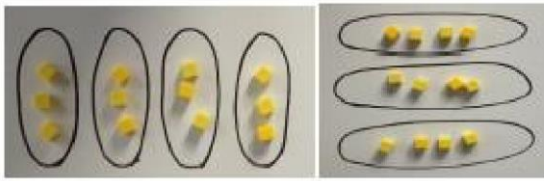
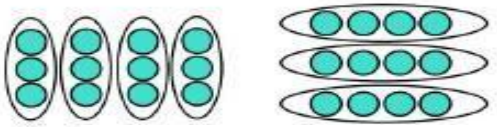
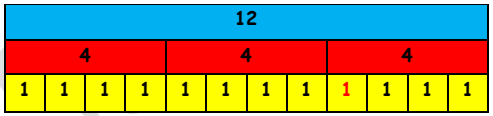
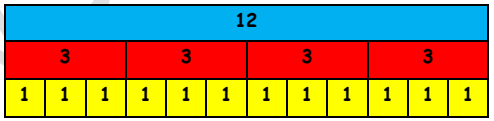
	 2 x 4 = 8 4 x 2 = 8 Cuisenaire rods may be useful here	 12 = 4 X 3 12 = 3 X 4   	15 – 5 – 5 – 5 = 0 15 – 3 – 3 – 3 – 3 – 3 = 0 15 ÷ 3 = 5 15 ÷ 5 = 3

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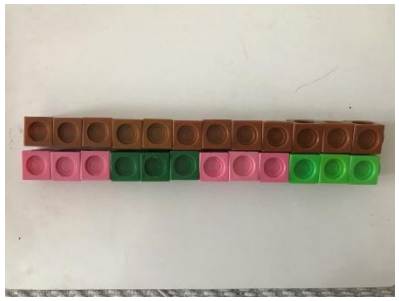
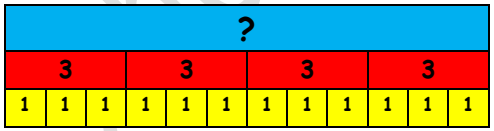
Bar Modelling	Cuisenaire rods, multilink or unifix cubes can be used to create bars to represent bar models. 	There are 4 bags of sweets and each bag has 3 sweets in it. How many sweets are there altogether?  3 + 3 + 3 + 3 = 12 4 x 3 = 12	4 X 3 = 12 This links well to division, repeated addition, repeated subtraction and fractions. 3 + 3 + 3 + 3 = 12 4 x 3 = 12 3 x 4 = 12 12 ÷ 3 = 4 12 – 3 – 3 – 3 – 3 = 0 One quarter of 12 is 3 One twelfth of 12 is 1

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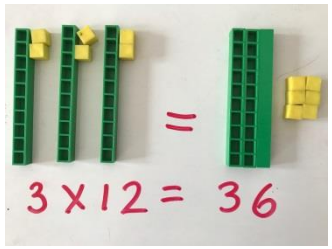
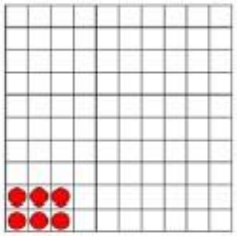
Multiplication of 2 digit by 1 digit numbers with partitioning - ensure children are secure with partitioning and with addition of 2 digit numbers before attempting this.

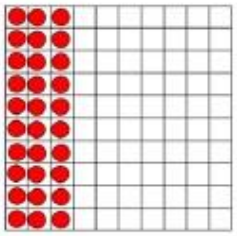
Children need to be secure with place value, particularly with multiplying by 10, 100 and 1000. [NB: we are moving digits to the left as they become 10 times greater in value, and not just adding a zero]

3 x 12 = (3 X 10) + (3 X 2)

3 X 10 3 X 2



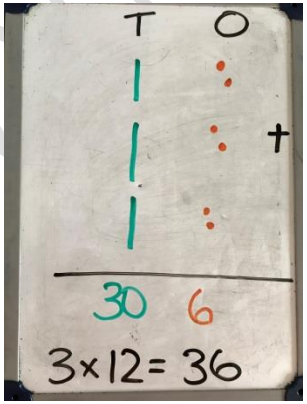




Now add the total number of tens and ones.

An understanding of the commutative law can be really helpful here. It will stop children drawing 12 lots of 3 ones.

12 x 3 = 36 3 x 12 = 36

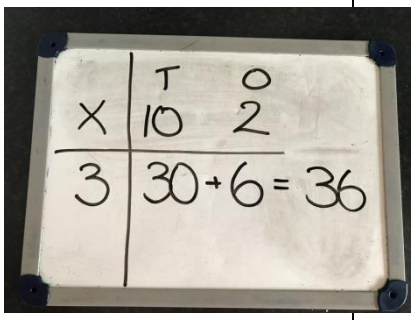


3 x 12 = (3 X 10) + (3 X 2)

= 30 + 6

= 36

(reinforces BODMAS)



Brackets
Order
Division
Multiplication
Addition or
Subtraction

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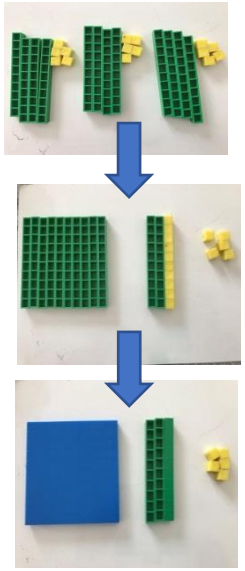
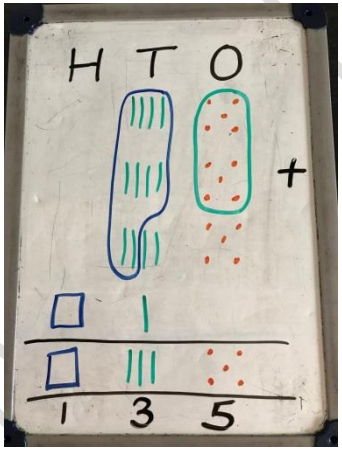
Multiplication of 2 digit numbers by a single digit with partitioning (regrouping)



3 x 45 = 135

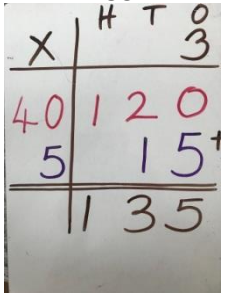
45 X 3 = 135



3 X 45 = (3 X 40) + (3 X 5)

= 120 + 15

= 135

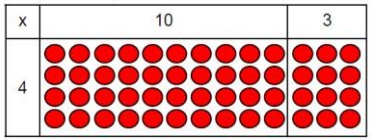


We say:
3 lots of 4 tens equals 12 tens, which is 120
3 times 5 ones equals 15 ones

Grid Method

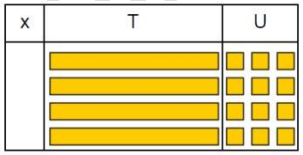
Children need to be secure with addition at the various stages before undertaking this as column addition is needed at the final stage.

Show the link with arrays to introduce the grid method.



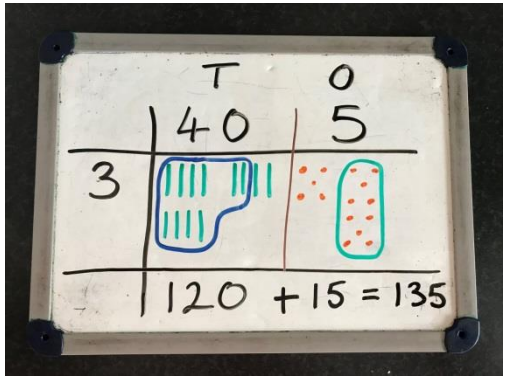
4 rows of 10
4 rows of 3

As above, move on to using Base 10 to move towards a more compact method.

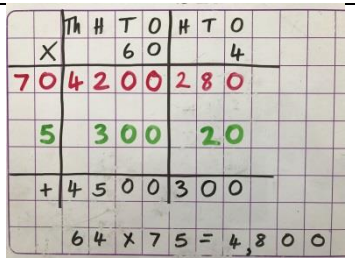


4 rows of 13

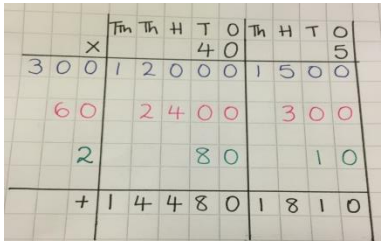
As above if necessary



The commutative law can be shown here, leading to an understanding of the layout for written methods: when putting the numbers with the greater value down the side, we are able to add the parts more easily to make two answers, which then just need adding together.



75 X 64 = 4,800 (or 64 X 75)



No commas in numbers within calculations, but in answers.

362 X 45 = 14,480+1,810

= 16,290

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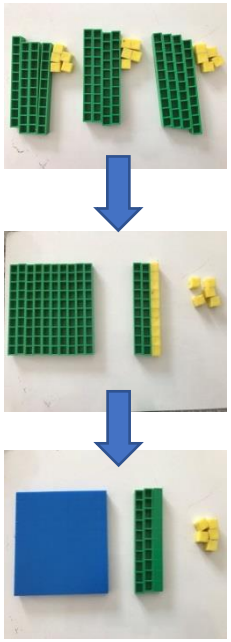
Column multiplication



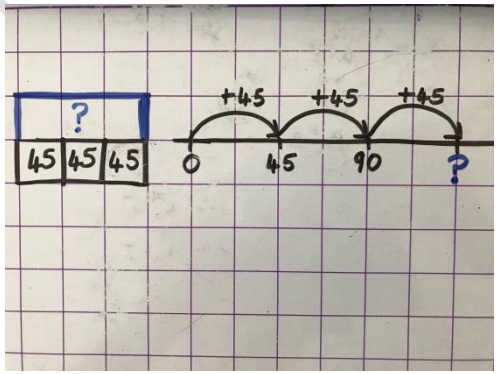
45 X 3 = 135

3 X 45 = 135

3 X 45 = 45 + 45 + 45 = 135

Knowledge of the commutative law will stop children working out 45 lots of 3 here, so that they tackle 45 X 3 in a more efficient way.

Bar modelling, repeated addition and number lines can support learners when solving problems with multiplication alongside the formal written methods.

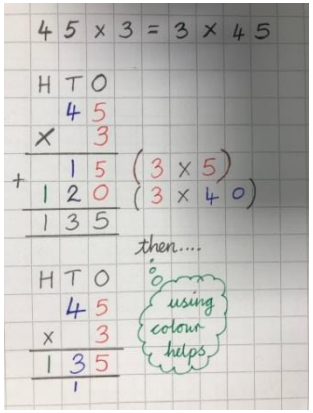


Children should be secure with this understanding of multiplication before they are taught the column, compact method.

They need to be very secure with partitioning as we are breaking the numbers up into hundreds, tens and ones etc

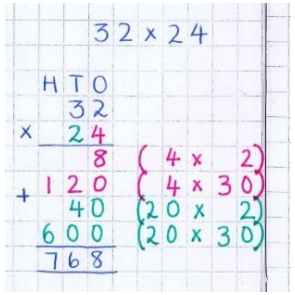
Also see the National Curriculum appendix.

Always multiply the ones first and note down the answer followed by the tens which they note below.

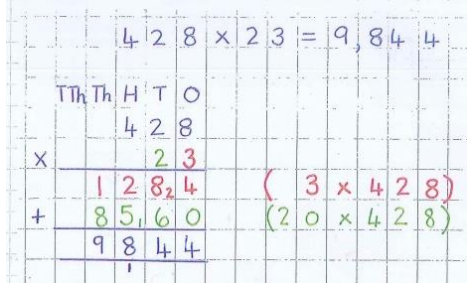


Set digits out clearly in columns. We often use colour to clarify the partitioning and the value of each digit.

A useful expanded step:



This moves to the compact method.



Finally, the numbers in brackets are removed.

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