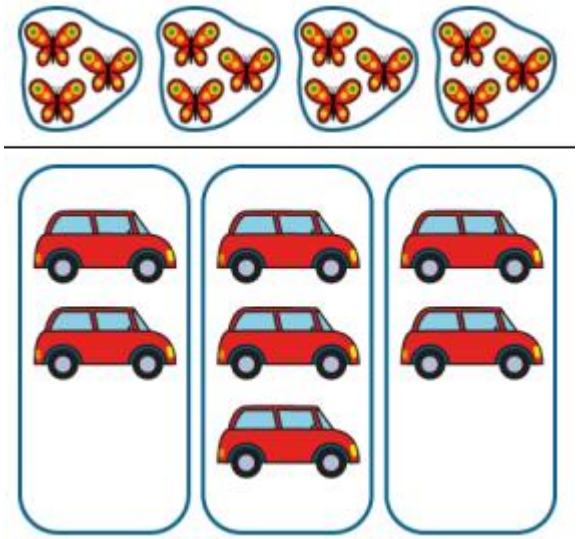
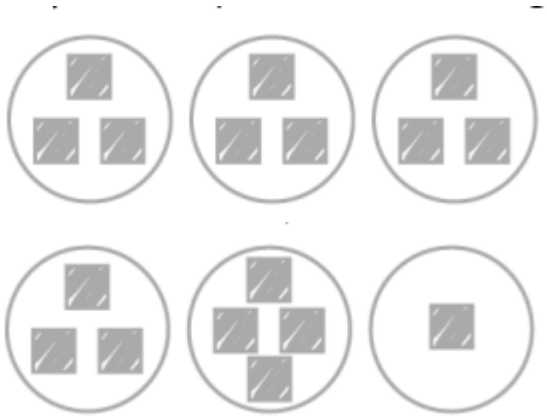
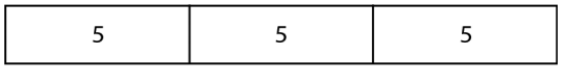
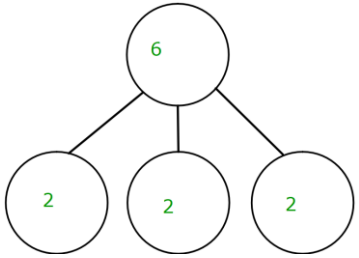
Maths Calculation Policy – Multiplication

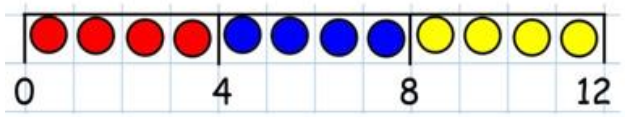
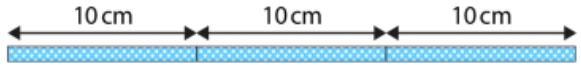
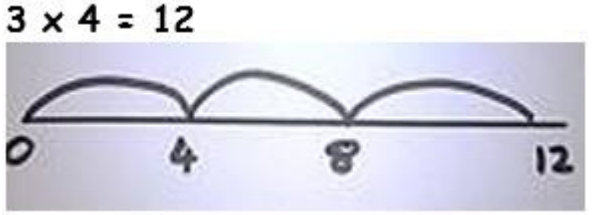
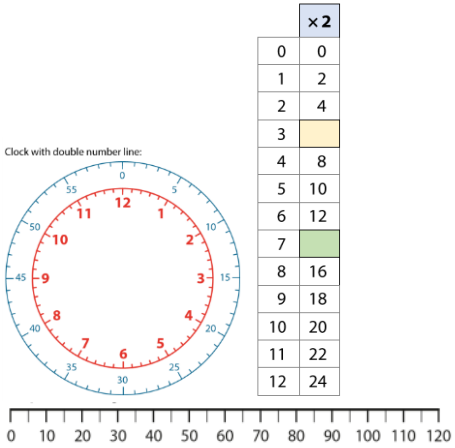
This document shows the progression in the models, pictures and calculations we used to support teaching multiplicaiton at Stottesdon C of E Primary School.

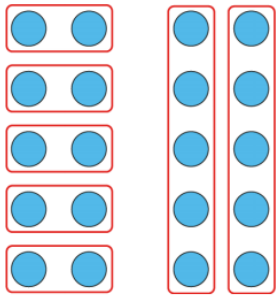
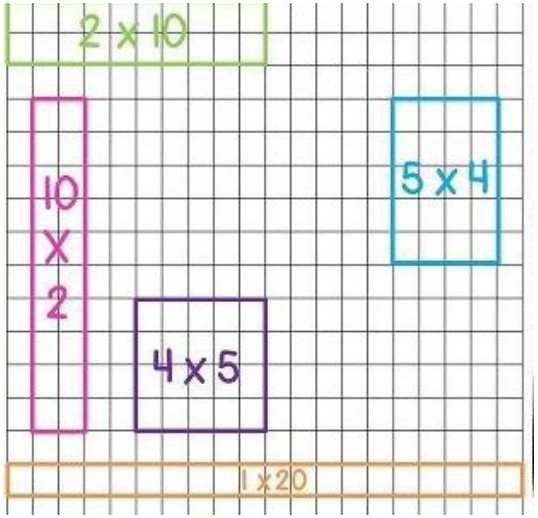
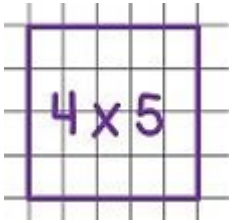
Multiplication-

Key language which should be used: double times, multiplied by, the product of, groups of, lots of, is equal to, is the same as, twice as big, arrays, factors

Concrete	Pictorial	Abstract
Understanding of equal and unequal groups 	Drawing of equal and unequal groups from concrete models 	Using stem sentences to describe the grouping concept.  • There are ___ equal groups of eggs. • There are ___ eggs in each group. • There are ___ groups of ___.

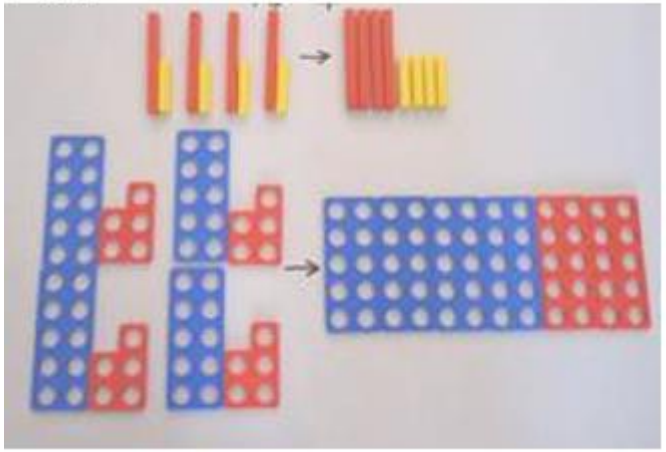
Repeated grouping/repeated addition (With lots of different types of equipment 3 x 4 three groups of four/lots of four 4 x 3 a group of four, three times. 4 + 4 + 4 = 	Children to represent the practical resources in a picture e.g. xx xx xx xx xx xx Use of bar models and part whole models for a more structured method.   	3 x 4 = ___ 4 + 4 + 4 = ___ ____ = 4 x 3 There are four cubes in each group. There are three groups. There are 12 cubes altogether. Three groups of four cubes are equal to 12 cubes

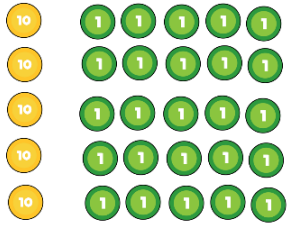
Use number lines to show repeated groups   	Represent multiplication stories pictorially alongside a number line.   Using pictures of measurement, both to scale and not to scale. Include scaling problems e.g. the ribbon is three times as long. The table is twice as heavy.	Abstract number lines include vertical and scales.   ×2 0 0 1 2 2 4 3 4 8 5 10 6 12 7 8 16 9 18 10 20 11 22 12 24

Use arrays to illustrate commutativity (counters and many other objects should also be used.)  Finding and interpreting arrays in and around school.  	Draw arrays to demonstrate commutativity and solve problems. 	Children can use the arrays to write a range of calculations.  Eg. 4 x 5 = 20 5 x 4 = 20 4 + 4 + 4 + 4 + 4 = 20 5 + 5 + 5 + 5 = 20 Include missing number. __ + ___ + ___ + _____ = 20 20 = _____ x 5

Partitioning to multiply
(use a variety of resources such as numicom, base 10, cuissinaire rods and place value counters.

4 x 15





15 x 4 =

Tens | Ones

4 x 10 = 40
4 x 5 = 20

40 + 20 = 60

This can also be drawn as a bar model.
32 x 3 =

90	30	2
	30	2
	30	2

6

Children to be encouraged to show and explain the steps they have taken.

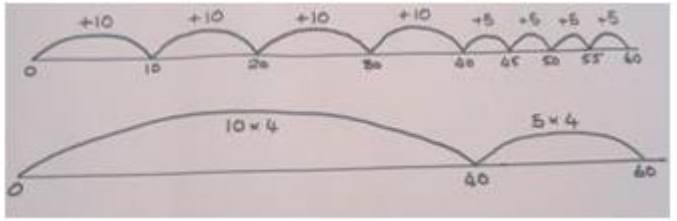
15 x 4 =

10 5

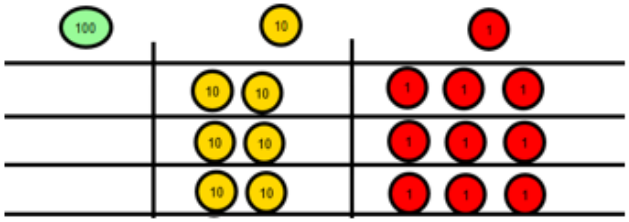
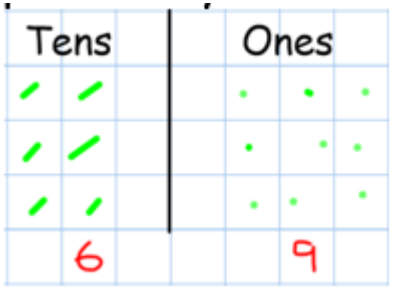
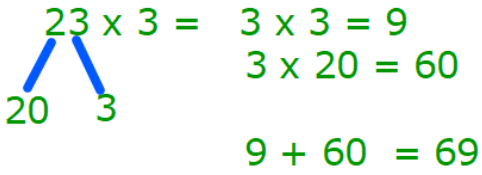
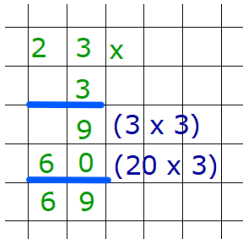
4 x 10 = 40
4 x 5 = 20

40 + 20 = 60

A numberline can also be used.



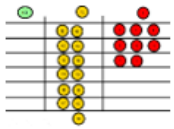
Encourage use of known number facts to calculate.

Formal methods of multiplication With place value counters or base 10 3 x 23 Make 23, 3 times. See how many ones, then how many tens 	Children to represent the counters in a pictoral way. 	Children to record what it is they are doing to show understanding.  

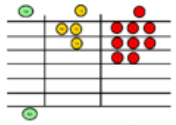
The concrete model is briefly acknowledged, but children should be ready to rapidly grasp the written method.

6 x 23

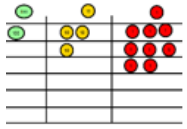
Step 1: get 6 lots of 23



Step 2: 6 x 3 is 18. Can I make an exchange? Yes! Ten ones for one ten....

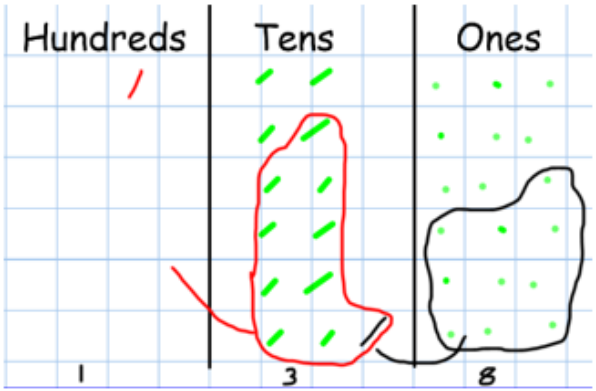


Step 3: 6 x 2 tens and my extra ten is 13 tens. Can I make an exchange? Yes! Ten tens for one hundred...

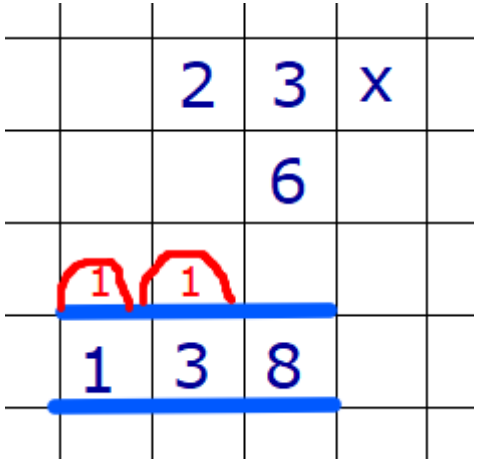


Step 4- what do I have I each column?

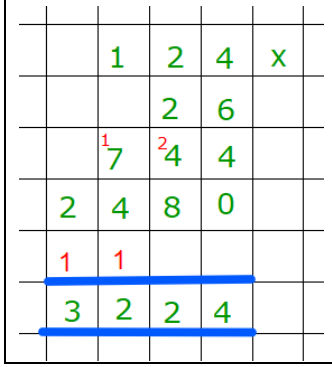
Again the pictorial method is briefly acknoeldged, but children should be ready to rapidly grasp the written method by this stage.



The aim is to achieve the formal method, but ensuring that the children need to understand how it works.



When children start to multiply 3d x 3d and 4d x 2d etc, they should be confident with the abstract formal method.



Fluency variation, Different ways to ask children to solve calculations. ***Always encourage children to make independent choices about the most efficient method for them to solve calculations***

23	23	23	23	23	23

?

Use counters, prove that 6 x 23 = 138.

Why is 6 x 23 = 32 x 6?

Function machines

3	X 60	
4		
7		

Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?

Tom saved 23p three days a week. How much did he save in 2 weeks, 3 weeks? Etc.

Sarah water bottle had 23ml of water left. Tim had six times as much water as Sarah. How many ml of water did Tim have?

Multi step word problems including a mix of different calculation types.

Missing number problems

80 x ___ = 7200

420 = 7 x _____

23 x 6 = 23 x __ x ___

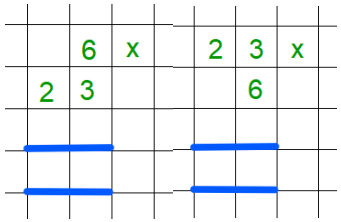
23 x 6 = ___ x 6 + ___ x 6

Find the product of 6 and 23.

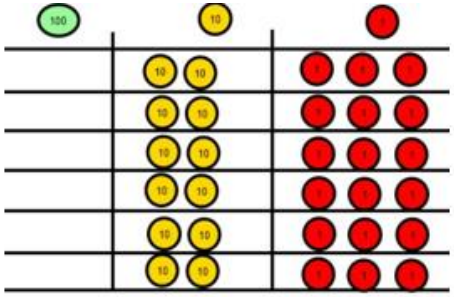
What number are 6 and 23 factors of?

_____ = 6 x 23

6 x 23 = _____



What is the calculation?
What is the answer?



__, __, 18, 24, __, __, 64

8 x ___ = 32 x _____