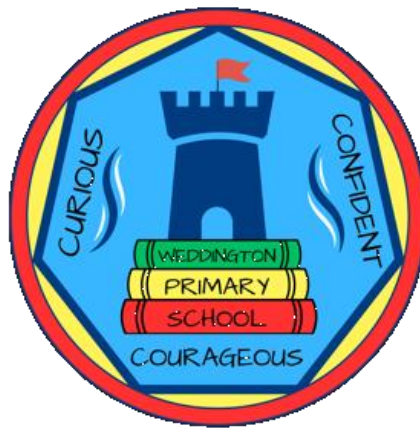


# Calculation Policy

## Year 1 to Year 6

# Multiplication



# Introduction

Weddington Primary School uses the White Rose schemes of work as a planning guidance to teach a mastery approach from Reception to Year 6.

Therefore, Weddington Primary School has used the White Rose Calculation policy as a guidance to show the progression of multiplication skills taught from Year 1 to Year 6 at Weddington.

- There is a separate document that gives an overview of the different models and images (the concrete manipulatives and pictorial images that can support the teaching of the different concepts in the different operations). White Rose provides the explanation of the benefits of using the models and shows links between the different operations.
- First, there is a Key vocabulary all staff should be familiar with, as White Rose uses this language in their schemes of work.
- Next, an overview of the progression of the multiplication skills from Year 1 to Year 6.
- Then, a progression of multiplication skills linked to year groups to encourage and support consistency throughout the school. Each skill shows different models and images that could be used to effectively teach that concept.

## **Key vocabulary** - *All staff should be familiar with.*

**Array** – An ordered collection of counters, cubes or other item in rows and columns.

**Commutative** – Numbers can be multiplied in any order.

**Dividend** – In division, the number that is divided.

**Divisor** – In division, the number by which another is divided.

**Exchange** – Change a number or expression for another of an equal value.

**Factor** – A number that multiplies with another to make a product.

**Multiplicand** – In multiplication, a number to be multiplied by another.

**Partitioning** – Splitting a number into its component parts.

**Product** – The result of multiplying one number by another.

**Quotient** – The result of a division

**Remainder** – The amount left over after a division when the divisor is not a factor of the dividend.

**Scaling** – Enlarging or reducing a number by a given amount, called the scale factor

# An Overview of Multiplication Skills

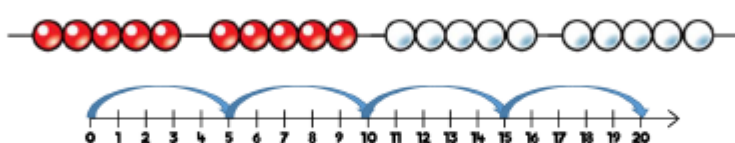
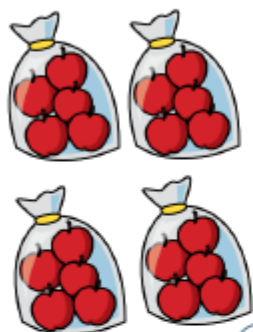
(from Year 1 to Year 6)

Skill	Year	Representations and models	
Solve one-step problems with multiplication	1/2	Bar model Number shapes Counters	Ten frames Bead strings Number lines
Multiply 2-digit by 1-digit numbers	3/4	Place value counters Base 10	Short written method Expanded written method
Multiply 3-digit by 1-digit numbers	4	Place value counters Base 10	Short written method
Multiply 4-digit by 1-digit numbers	5	Place value counters	Short written method

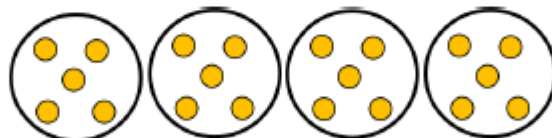
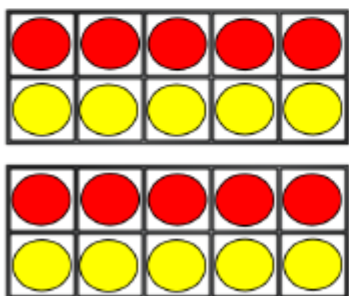
Skill	Year	Representations and models	
Multiply 2-digit by 2-digit numbers	5	Place value counters Base 10	Short written method Grid method
Multiply 2-digit by 3-digit numbers	5	Place value counters	Short written method Grid method
Multiply 2-digit by 4-digit numbers	5/6	Formal written method	

**Skill: Solve 1-step problems using multiplication**

**Year: 1/2**



One bag holds 5 apples.  
How many apples do 4 bags hold?



$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

*In Year 1*, the children explore repeated addition using a variety of concrete and pictorial representations; teddies, pencils, cakes, cubes etc.

Children also explore equal and unequal groupings.

*In Year 1*, the children explore building arrays-

4 rows with 3 counters in and 3 rows with 4 counters in.

*In Year 2*, repeat activities from Year 1 with bigger numbers and combinations e.g. 3 lots of 6.

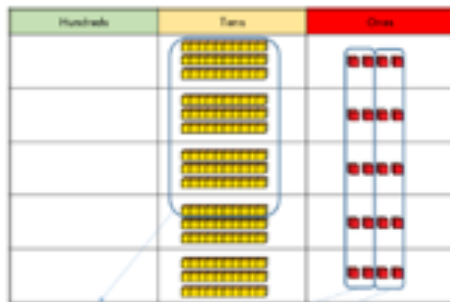
*In Year 2*, the children explore how the multiplication symbol is commutative through concrete and pictorial representation. The children can create their own concrete and pictorial representation.

$$6 \times 3 = 3 \times 6$$

$$5 \text{ lots of } 2 = 2 \text{ lots of } 5$$

### Skill: Multiply 2-digit numbers by 1-digit numbers

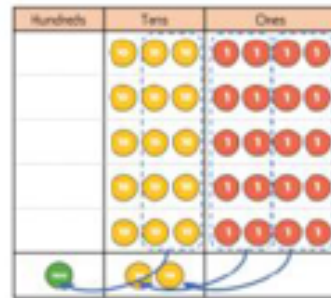
Year: 3/4



	H	T	O	
		3	4	
x			5	
		2	0	(5 × 4)
+	1	5	0	(5 × 30)
	1	7	0	

$$34 \times 5 = 170$$

	H	T	O
		3	4
x			5
		7	0
	1		



Teachers may decide to first look at the expanded column method before moving on to the short multiplication method. The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.

In year 3 **do not** teach the expanded method for multiplication, concentrate on the place value grids and counters to support the column multiplication.

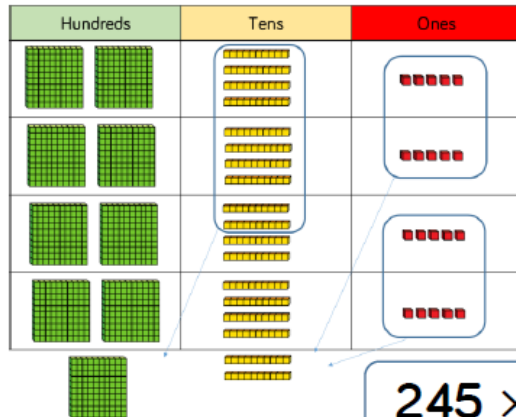
Always have the place value grids alongside the abstract multiplication calculation.

By the end of Year 3, the majority of children (on the Year 3 curriculum) should aim to do 1 digit by 2 digits using column multiplication.

Year 3 are not taught 3 digits by 1 digit. This is introduced in Year 4.

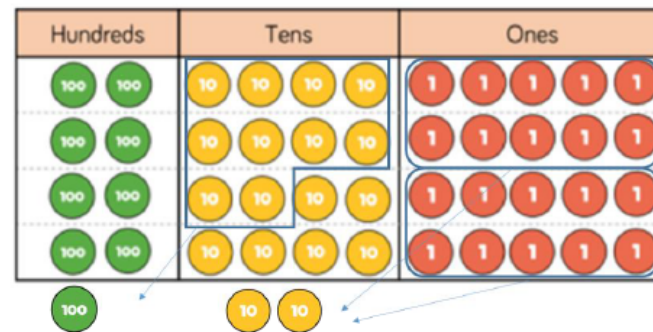
## Skill: Multiply 3-digit numbers by 1-digit numbers

Year: 4



	H	T	O
	2	4	5
x			4
	9	8	0
	1	2	

$$245 \times 4 = 980$$



When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method. Base 10 and place value counters continue to support the understanding of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

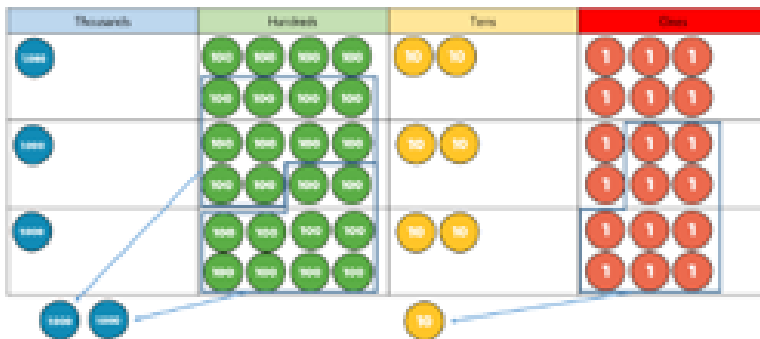
*In Year 4, teach the expanded method for multiplication as this will help when the children do 2 digits by 2 digits in Year 5.*

*By the end of Year 4 all children (on the Year 4 curriculum) should be secure in column multiplication 2 digit by 1.*

*By the end of Year 4 the aim is for the majority of children (on the Year 4 curriculum) to be secure with the concept.*

### Skill: Multiply 4-digit numbers by 1-digit numbers

Year: 5



$$1,826 \times 3 = 5,478$$

	Th	H	T	O
	1	8	2	6
x			3	
	5	4	7	8
	2		1	

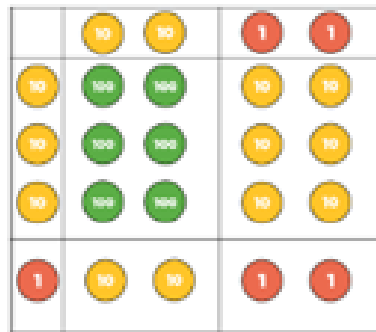
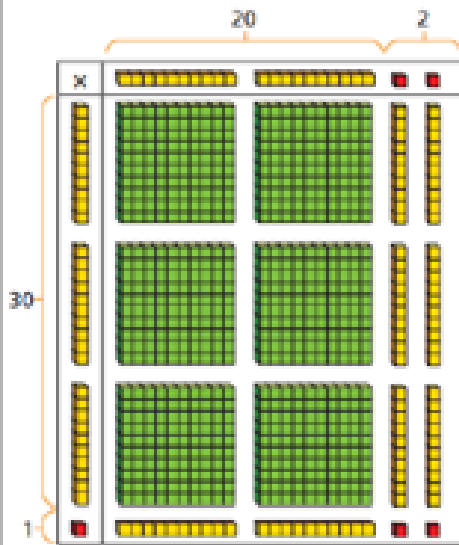
When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

By the end of Year 5 the aim is for the majority of children (on the Year 5 curriculum) to be secure with the concept even children who do not know their times tables.

Let the children use times tables grids.

### Skill: Multiply 2-digit numbers by 2-digit numbers

Year: 5



x	20	2
30	600	60
1	20	2

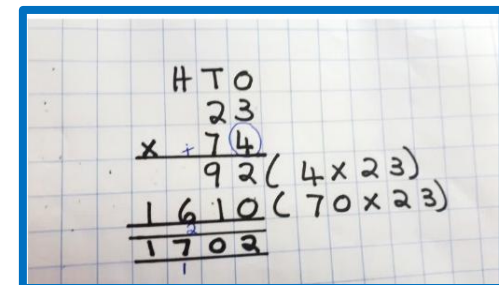
	H	T	O
		2	2
x		3	1
		2	2
	6	6	0
	6	8	2

$$22 \times 31 = 682$$

When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10. The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.

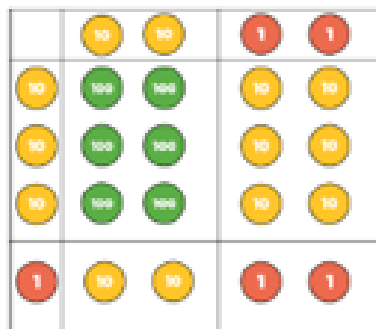
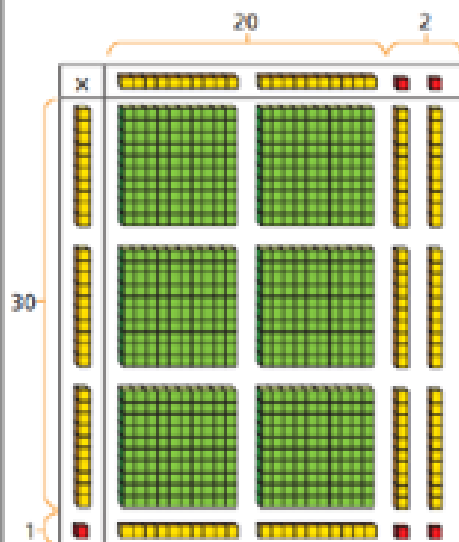
In Year 5, use the expanded brackets when teaching the formal method.

Also focus on where the 'exchange' is placed for consistency in Year 5 and Year 6.



## Skill: Multiply 2-digit numbers by 2-digit numbers

Year: 5



x	20	2
30	600	60
1	20	2

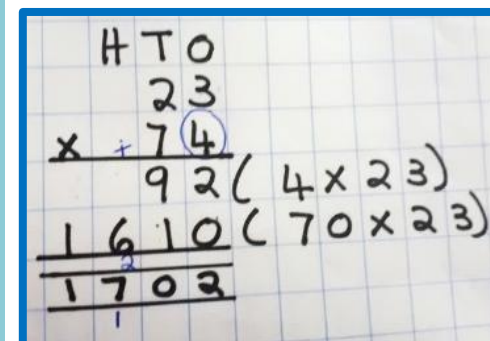
	H	T	O
		2	2
x		3	1
		2	2
	6	6	0
	6	8	2

$$22 \times 31 = 682$$

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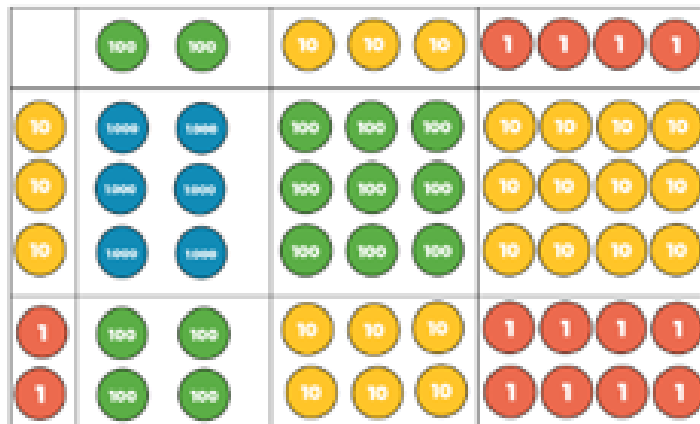
In Year 5, use the expanded brackets when teaching the formal method.

Focus on where the 'exchange digits' are placed for consistency in Year 5 and Year 6.



### Skill: Multiply 3-digit numbers by 2-digit numbers

Year: 5



	Th	H	T	O
		2	3	4
x			3	2
		4	6	8
1	7	1	0	0
7		4	8	8

x	200	30	4
30	6,000	900	120
2	400	60	8

$$234 \times 32 = 7,488$$

Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.

Encourage children to move towards the formal written method, seeing the links with the grid method.

In Year 5, use the expanded brackets when teaching the formal method.

By the end of Year 5, the aim is for the majority of children (on the Year 5 curriculum) to be secure with this skill.

Also focus on where the 'exchange digits' are placed for consistency in Year 5 and Year 6.

Skill: Multiply 3-digit numbers by 2-digit numbers

Year: 5

The image shows a handwritten multiplication problem on a grid background. At the top, the place values are labeled: T<sub>H</sub> H T O. The numbers 573 and 82 are written below. A circled '2' in 82 indicates the units digit. The multiplication is performed in three steps: first, 2 x 573 = 1146; second, 80 x 573 = 45840; and finally, the two partial products are added to get the final result, 46,986. The final result is written with a comma as a thousands separator.

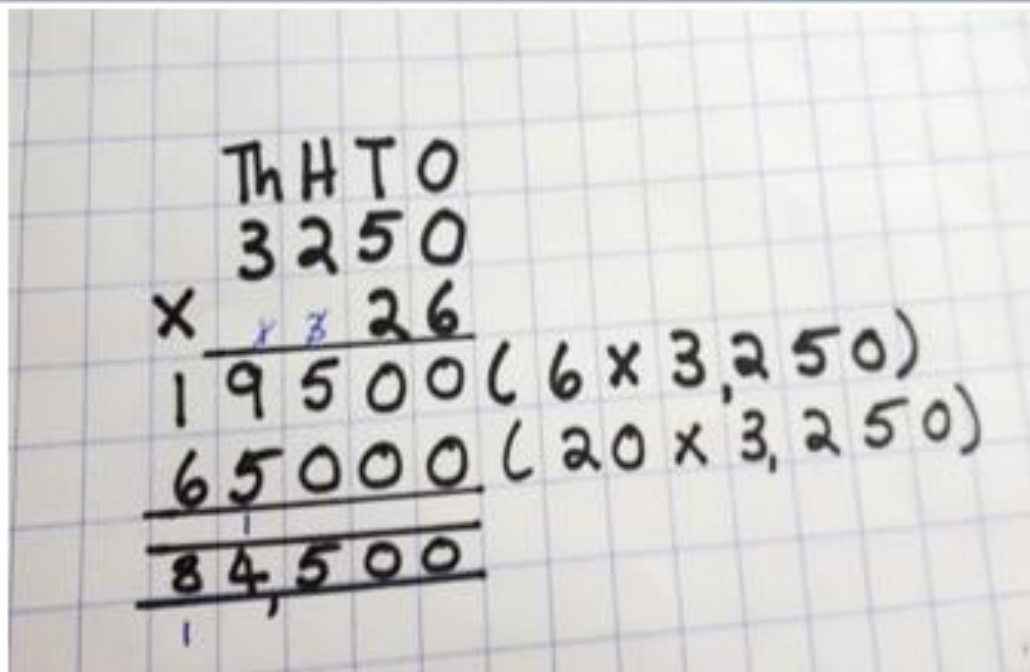
Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.

Encourage children to move towards the formal written method, seeing the links with the grid method.

$$573 \times 82 = 46,986$$

Skill: Multiply 4-digit numbers by 2-digit numbers

Year: 5/6



$$3,250 \times 26 = 84,500$$

This skill is to be taught in Year 6 only.

Focus on where the 'exchange digits' are placed for consistency in Year 5 and Year 6.

When multiplying 4-digits by 2-digits, children should be confident in the written method.

If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

Consider where exchanged digits are placed and make sure this is consistent.