

✕ Multiplication ✕

Year 1 ✕

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count

Key skills for multiplication at Y1:

*Count in multiples of 2, 5 and 10.

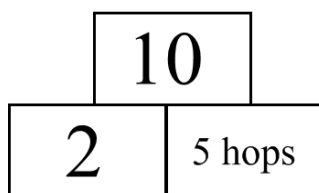
*Begin to say what three 5s are by counting in 5s or what four 2s are by counting in 2s, etc.

*Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

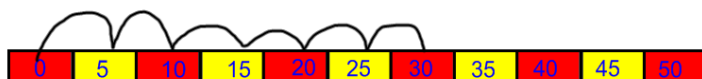
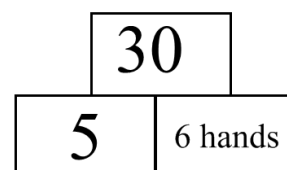
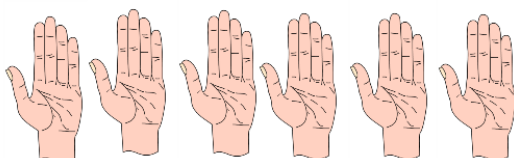
*Make connections between arrays, number patterns, and counting in twos, fives and tens.

*Double numbers to 10 using concrete objects and pictorial representations.

Children will experience equal groups of objects and will count in 2s, 5s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups, e.g. Count five hops of 2 along this number track. What number will you reach? (Children will begin to move from using number tracks to number lines as appropriate through year 1 and 2)

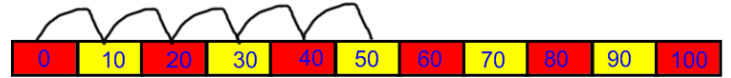
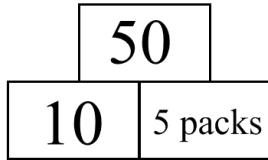


How many fingers are there altogether on six hands?





There are 10 crayons in each box.
How many crayons are there altogether?



$$3+3+3+3+3 = 15$$



There are 3 sweets in one bag.
How many sweets are in 5 bags altogether?

Year 2

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times...

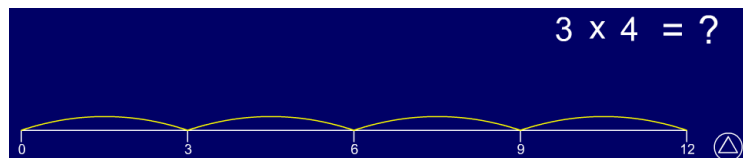
Key skills for multiplication at Y2:

- * Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- * Recall and use multiplication facts from the **2, 3, 5 and 10** multiplication tables, seeing these as 'lots of', e.g. 5 lots of 2
- * Recognising odds and evens.
- * Double numbers up to 20
- * Begin to double multiples of 5 to 100
- * Begin to understand that multiplication is repeated addition and to use arrays (E.g) 3×4 is three rows of four dots.
- * Write and calculate number statements **using the \times and $=$ signs.**
- * Show that multiplication can be done in any order (commutative).
- * Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- * Pupils use a variety of language to discuss and describe multiplication.

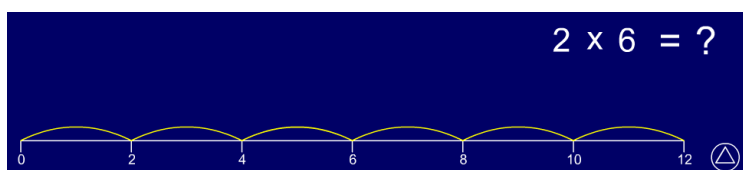
Children will develop their understanding of multiplication and use jottings to support calculation:

- Repeated addition
- Starting from zero, make equal jumps up on a number line to work out multiplication facts and write multiplication statements using \times and $=$ signs.

Show me on a number line how you could do:



3×4 , how would 4×3 be different?



2×6 , how would 6×2 be different?

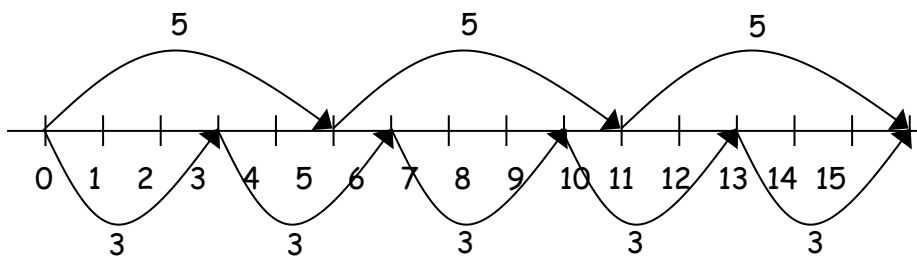
$$4 + 4 + 4 + 4 + 4 = 20$$

Write this addition fact as a multiplication fact.

$$\square \times \square = \square$$

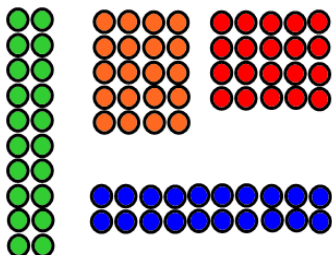
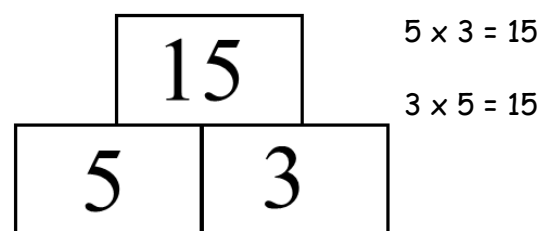
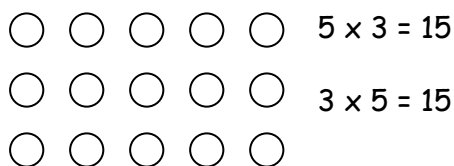
- **Commutativity**

Children should know that 3×5 has the same answer as 5×3 but describes a different situation. This can also be shown on the number line.



- **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method and makes links to division.

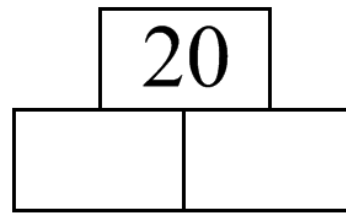


Here are 20 counters. How could you arrange them in equal rows? How could you use a number sentence to show your arrangement?

Link the above activity to missing box questions like the ones below.

What could the missing numbers be?

$$\square \times \square = 20$$



Year 3

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times..., **partition, grid method, multiple, product, tens, units, value**

Key skills for multiplication:

* Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply multiples of 10.

* Multiply whole numbers by 10 and 100.

* Use place value and number facts in mental multiplication. E.g 3×14 as 3×10 and 3×4 . * Write and calculate number statements using the multiplication tables they know, including **2-digit \times single-digit**, drawing upon mental methods, and progressing to reliable written methods.

* Solve multiplication problems, including missing number problems.

* Solve simple problems in contexts, deciding which operations and methods to use.

* Develop efficient mental methods to solve a range of problems e.g using commutativity ($4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and for missing number problems $x \times 5 = 20$, $3 \times x = 18$, $x \times 32$ and partitioning to partition teen numbers to multiply by a single digit number.

* Double numbers up to 50

Written

Use partitioning (grid multiplication) to multiply 2-digit and 3-digit numbers by 'friendly' single digit numbers.

Children must be able to:

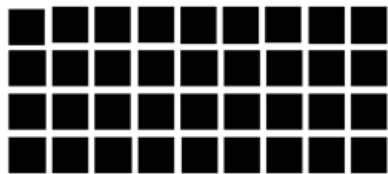
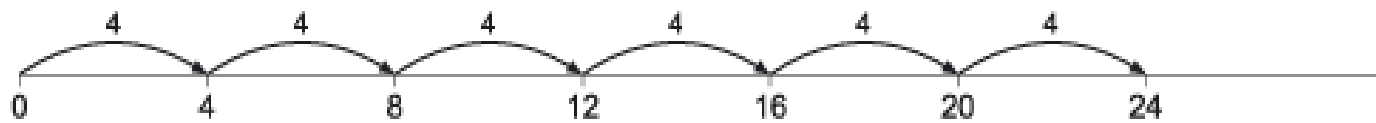
□ Partition numbers into tens and units

□ Multiply multiples of ten by a single digit (e.g. 20×4) using their knowledge of multiplication facts and place value

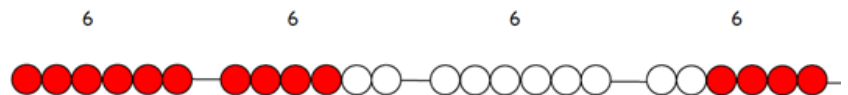
□ Recall and work out multiplication facts in the **2, 3, 4, 5, 8 and 10** times tables.

□ Work out multiplication facts not known by repeated addition or other taught mental strategies (e.g. by commutative law, working out near multiples and adjusting, using doubling etc.) Strategies to support this are repeated addition using a number line, bead bars and arrays:

For example, they find 6 fours by making 6 hops of 4.



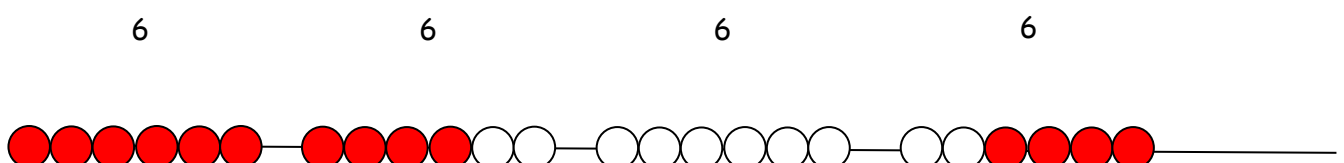
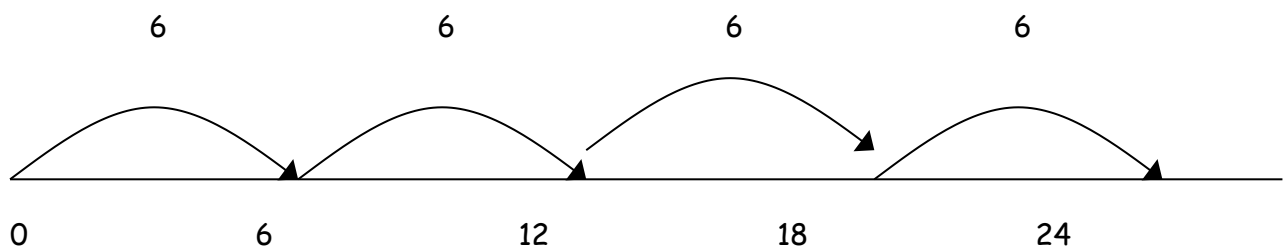
$$9 \times 4 = 36$$



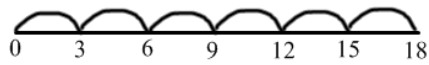
Children **understand the relationship between multiplication and division** . For example, they state two multiplication sentences and two division sentences that relate to a particular array, for example:

They use the image of an array to explain why, for example, 2×5 gives the same answer as 5×2 . They also use the image to show how many fives make 10 and how many twos make 10.

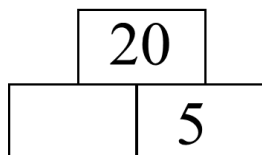
Children should use number lines or bead bars to support their understanding.



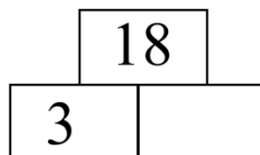
How many sides do six triangles have?



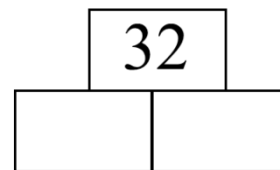
- Using symbols to stand for unknown numbers to complete equations using inverse operations



$$\square \times 5 = 20$$



$$3 \times \triangle = 18$$



$$\square \times \bigcirc = 32$$

- Partitioning

Children use partitioning to encourage them to use knowledge of 2, 5 and 10 times tables to work out multiples of 7, e.g. partition 7 into 5 and 2 to calculate 7×3 , i.e.



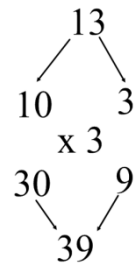
$$\begin{array}{r} 5 \times 3 + 2 \times 3 \\ 15 + 6 \end{array}$$

$$7 \times 3 = 21$$

Children use partitioning to **multiply two-digit numbers by one-digit numbers**. For example, they work out 13×3 by finding 10×3 and adding 3×3 . They record their working using informal methods:

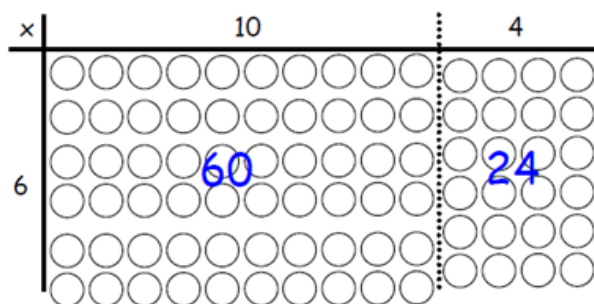
$$\begin{array}{r}
 10 \quad 10 \quad 10 \\
 13 \times 3 = (13) + (13) + (13) \\
 3 \quad 3 \quad 3 \\
 = 30 + 9 \\
 = 39
 \end{array}$$

or



Introduce the grid method for multiplying a 2-digit by single - digits,

Initially, link the layout to an array



x	10	4	
6	60	24	84

Introduce the grid method with children physically making an array to represent the calculation (e.g. make 6 lots of 14 with 10s and 1s place value counters), then translate this to grid method format

Year 4

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, **inverse**

Key skills for multiplication at Y4:

- * Count in multiples of 6, 7, 9, 25 and 1000
- * Recall multiplication facts for **all multiplication tables up to 12×12** .
- * Multiply whole numbers and one-place decimals by 10, 100, 1000
- * Multiply multiples of 10, 100, 1000 by single digit numbers. (E.g. 300×6 or 4000×8)
- * Use understanding of place value and number facts in mental multiplication. (E.g. 36×5 is half of 36×10 and $50 \times 60 = 3000$)
- * Partition 2-digit numbers to multiply by a single-digit number mentally. (E.g. 4×24 as 4×20 and 4×4)
- * Multiply near multiples using rounding. (E.g. 33×19 as $33 \times 20 - 33$)
- * Find doubles to double 100 and beyond using partitioning
- * Begin to double amounts of money. (E.g. £35.60 doubled = £71.20.)
- * Use commutativity and other strategies mentally $3 \times 6 = 6 \times 3$, $2 \times 6 \times 5 = 10 \times 6$, $39 \times 7 = 30 \times 7 + 9 \times 7$.
- * Solve problems with increasingly complex multiplication in a range of contexts.
- * Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

Written

- * Use a vertical written method to multiply a one-digit by a 3-digit number (ladder)
- * Use an efficient written method to multiply a 2-digit number by a number between 10 and 20 by partitioning (grid method)

- Multiply 2 and 3-digits by a single digit, using all multiplication tables to 12x12.

Children should be able to:

□ **Approximate before they calculate**, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer. e.g:

346 × 9 is approximately $350 \times 10 = 3500$

Record an approximation to check the final answer against.

□ Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.

□ Recall all times tables **up to 12 × 12**

Children will continue to use arrays where appropriate leading into the grid method of multiplication.

Developing the grid method:

Eg. $136 \times 5 = 680$

X	100	30	6
5	500	150	30

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

Encourage column addition to add accurately.

Move onto **short multiplication** (see Y5) if and when children are confident and accurate multiplying 2 and 3-digit numbers by a single digit this way, **and** are already confident in "carrying" for written addition.

Year 5

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, total, multiple, product, inverse, **square, factor, integer, decimal, short/long multi-plication, _carry'**

Key skills for multiplication at Y5:

- *Know by heart all the multiplication facts up to 12×12 .
- *Multiply whole numbers and one-and two-place decimals by 10, 100, 1000, 10,000
- *Use knowledge of factors and multiples in multiplication. (E.g. 43×6 is double 43×3 , and 28×50 is $\frac{1}{2}$ of $28 \times 100 = 1400$)
- *Use knowledge of place value and rounding in mental multiplication. (E.g. 67×199 as $67 \times 200 - 67$)
- *Use doubling and halving as a strategy in mental multiplication. (E.g. 58×5 = half of 58×10 , and 34×4 is 34 doubled twice)
- *Partition 2-digit numbers, including decimals, to multiply by a single-digit number mentally. (E.g. 6×27 as 6×20 (120) plus 6×7 (42) making 162 or 6.3×7 as 6×7 plus 0.3×7)
- *Double amounts of money by partitioning. (E.g. £37.45 doubled = £37 doubled (£74) plus 45p doubled (90p) £74.90)

Written

- *Use short multiplication to multiply a 1-digit number by a number with up to 4 digits
- *Use long multiplication to multiply 3-digit and 4-digit number by a number between 11 and 20
- *Choose the most efficient method in any given situation
- *Find simple percentages of amounts e.g. 10%, 5%, 20%, 155 and 50%)
- *Begin to multiply fractions and mixed numbers by whole numbers ≤ 10 , e.g. $4 \times \frac{2}{3} = \frac{8}{3} = 2\frac{2}{3}$.

- Multiply up to 4-digits by 1 or 2 digits.

Introducing column multiplication

□ Introduce by comparing a grid method calculation to a short multiplication method, to see how the steps are related, but notice how there are less steps involved in the column method

□ Children need to be taught to approximate first, e.g. for 72×38 , they will use rounding: 72×38 is approximately $70 \times 40 = 2800$, and use the approximation to check the reasonableness of their answer against.

Short multiplication for multiplying by a single digit

x	300	20	7
4	1200	80	28



	3	2	7
x			4
<hr/>			
1	3	0	8
	1	2	

Pupils could be asked to work out a given calculation using the grid method, and then compare it to the column method. What are the similarities and differences? Unpick the steps and show how they are reduced.

- Introduce long multiplication for multiplying by 2 digits

	10	8
10	100	80
3	30	24

	1	8	
x	1	3	
	2	4	
	3	0	
	8	0	
1	0	0	
2	3	4	
1			

3x8 on the 1st row 3x10 on the second row. 1x8 on the third. 10x10 on the last.

Use column addition to find the total.

Moving towards more complex numbers: 124 x 26

	1	2	
	1	2	4
x		2	6
2	4	8	0
	7	4	4
3	2	2	4
1	1		

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Key skills for multiplication at Y6:

*Know by heart all the multiplication facts up to 12×12 .

*Multiply whole numbers and decimals with up to three places by 10, 100 or 1000, e.g. $234 \times 1000 = 234,000$ and $0.23 \times 1000 = 230$)

*Identify common factors, common multiples and prime numbers and use factors in mental multiplication. (E.g. 326×6 is 652×3 which is 1956)

*Use place value and number facts in mental multiplication. (E.g. $40,000 \times 6 = 24,000$ and $0.03 \times 6 = 0.18$)

*Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25 (E.g. 28×25 is $\frac{1}{4}$ of $28 \times 100 = 700$)

*Use rounding in mental multiplication. (34×19 as $(20 \times 34) - 34$)

*Multiply one and two-place decimals by numbers up to and including 10 using place value and partitioning. (E.g. 3.6×4 is $12 + 2.4$ or 2.53×3 is $6 + 1.5 + 0.09$)

*Double decimal numbers with up to 2 places using partitioning

e.g. 36.73 doubled is double 36 (72) plus double 0.73 (1.46)

Written

*Use short multiplication to multiply a 1-digit number by a number with up to 4 digits

*Use long multiplication to multiply a 2-digit by a number with up to 4 digits

*Use short multiplication to multiply a 1-digit number by a number with one or two decimal places, including amounts of money.

*Multiply fractions and mixed numbers by whole numbers.

*Multiply fractions by proper fractions.

*Use percentages for comparison and calculate simple percentages.

Children will be able to:

□ Use rounding and place value to make approximations before calculating and use these to check answers against.

□ Use **short multiplication** (see Y5) to multiply numbers with **more than 4-digits by a single digit**; to multiply money and measures, and to **multiply decimals with up to 2d.p. by a single digit**.

□ Use **long multiplication** (see Y5) to multiply numbers with **at least 4 digits by a 2-digit number**.

Short and long multiplication as in Y5, and multiply decimals with up to 2d.p by a single digit.

	3	.	1	9
x	8			
<hr/>				
2	5	.	5	2
	1			7

Make sure the decimal points are lined up in the question and the answer.

This works well for multiplying money (£p) and other measures.

Remind children that the single digit belongs on the ones column.

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should always be encouraged to approximate their answers before calculating.

Children should always be encouraged to consider if a mental calculation would be appropriate before using written methods.

