



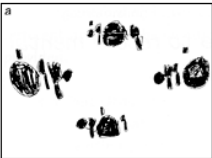
Mathematics Calculation Guidelines

Progression through Calculations for MULTIPLICATION

- These standards are age-related expectations and therefore we expect the majority of children to achieve them.
- New learning is likely to be taught to groups rather than the whole class to acknowledge the different learning stages of the children.
- Children need to understand that multiplication is commutative and use this information to rearrange calculations knowing that $4 \times 6 = 24$ gives the same answer as $6 \times 4 = 24$.
- Children need to understand that multiplication is repeated addition.
- Ensure that children understand the = sign means is the same as, not makes, and that children see calculations where the equals sign is in a different position, e.g. $3 \times 5 = 15$ and $15 = 3 \times 5$.
- Children should be encouraged to approximate before calculating and check whether their answer is reasonable.

EARLY YEARS:

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities involving equal sets or groups using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, etc.



END OF YEAR 1 EXPECTATIONS:

Children will use practical equipment to make groups of objects to represent multiplication. They should see everyday versions of arrays, e.g. egg boxes, baking trays, ice cube trays, wrapping paper etc and use this in their learning answering questions such as 'How many eggs would we need to fill the egg box? How do you know?'

End of Year 1 Expectations

Multiplication: Pre-Stage 1
Pictures and symbols.

There are 3 sweets in a bag.
How many sweets are there in 5 bags?



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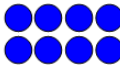
END OF YEAR 2 EXPECTATIONS:

Children should utilise multiplication as repeated addition - linked to arrays (**as this knowledge will support with the development of the grid method**). They should also use jottings to support their calculation.

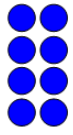
These should be supported by the use of counters/cubes.

End of Year 2 Expectations

Multiplication: Stage 1
Arrays and repeated addition.



2×4
 $4 + 4$



4×2
 $2 + 2 + 2 + 2$

Children should continue to utilise multiplication as repeated addition linked to arrays (**as this knowledge will support with the development of the grid method**) and use jottings to support their calculation.

These should be supported by the use of crosses on squared paper, e.g.

$4 \times 7 =$

x	x	x	x	x	x	x	
x	x	x	x	x	x	x	
x	x	x	x	x	x	x	
x	x	x	x	x	x	x	

E.g. "a row of seven four times." Or "four lots of seven rows."

$4 \times 7 = 7 + 7 + 7 + 7 = 28$

(For mathematical accuracy the above example is actually 7×4 i.e. seven, four times, however, because we use terms such as 'groups of' or 'lots of', children are more familiar with the initial notation. Once children understand the commutative order of multiplication the order is irrelevant).

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

x		10		4

60 24

$(6 \times 10) + (6 \times 4)$

$60 + 24$

84



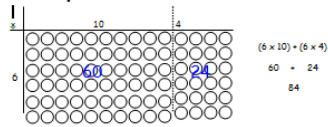
Mathematics Calculation Guidelines

Progression through Calculations for MULTIPLICATION

End of Year 2 Expectations

Multiplication: Stage 2

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



END OF YEAR 3 EXPECTATIONS:

End of Year 3 & 4 Expectations

Multiplication: Stage 3

Grid Method.

Partition/Grid (Multiplication by a single unit)

TU x U Estimate and check 35×3 is approx. 30×3

$$\begin{array}{r|l} \text{X} & 30 \quad 5 \\ 3 & 90 + 15 = 105 \end{array}$$

HTU x U

$$\begin{array}{r|l} \text{X} & 100 \quad 30 \quad 5 \\ 3 & 300 + 90 + 15 = 405 \end{array}$$

ThHTU x U

$$\begin{array}{r|l} \text{X} & 1000 \quad 100 \quad 30 \quad 5 \\ 3 & 3000 + 300 + 90 + 15 = 3405 \end{array}$$

u.th x U

$$\begin{array}{r|l} \text{X} & 4 \quad 0.9 \\ 3 & 12 + 2.7 = 14.7 \end{array}$$

END OF YEAR 4 EXPECTATIONS:

End of Year 4 Expectations

Multiplication: Stage 4 (Step 1)

Grid Method.

TU x TU

Estimate and check 72×38 is approx. $70 \times 40 = 2800$

$$\begin{array}{r|l} \text{X} & 70 \quad 2 \\ 30 & 2100 \quad 60 = 2160 \\ 8 & 560 \quad 16 + 576 \\ & \underline{\quad 2736} \\ & 1 \end{array}$$

HTU x TU Estimate and check

372×24 is approx. $400 \times 20 = 8000$

$$\begin{array}{r|l} \text{X} & 300 \quad 70 \quad 2 \\ 20 & 6000 \quad 1400 \quad 40 = 7440 \\ 4 & 1200 \quad 280 \quad 8 + 1488 \\ & \underline{\quad 8928} \\ & 1 \end{array}$$

HTU x HTU Estimate and check

372×224 is approx. $400 \times 200 = 80000$

$$\begin{array}{r|l} \text{X} & 300 \quad 70 \quad 2 \\ 200 & 60000 \quad 14000 \quad 400 = 74400 \\ 20 & 6000 \quad 1400 \quad 40 + 7440 \\ 4 & 1200 \quad 280 \quad 8 + 1488 \\ & \underline{\quad 83328} \\ & 111 \end{array}$$



Mathematics Calculation Guidelines

Progression through Calculations for MULTIPLICATION

End of Year 5 Expectations

Multiplication: Stage 4 (Step 2)

Column Method.

TU x TU Estimate and check

72×24 is approx. $70 \times 20 = 1400$

$$\begin{array}{r}
 72 \\
 \times 24 \\
 \hline
 288 \quad (2 \times 72) \\
 1440 \quad (20 \times 72) \\
 \hline
 1728 \\
 1
 \end{array}$$

END OF YEAR 6 EXPECTATIONS:

End of Year 6 Expectations

Multiplication: Stage 5

Decimals

1. 4.92×3

x	4	0.9	0.02	=	
3	12	2.7	0.06		= 14.76

2. 7.2×3.8

x	7	0.2	=	
3	21	0.6		= 21.60
0.8	5.6	0.16		= 5.76 + 27.36

3. 7.35×6.21

x	7	0.3	0.05	=	
6	42	1.8	0.30		= 44.1
0.2	1.4	0.6	0.01		= 2.01
0.01	0.07	0.003	0.0005		= 0.0805

45.6435

End of Year 6 Expectations

Multiplication: Stage 6

Long multiplication method:

$$\begin{array}{r}
 72 \\
 \times 24 \\
 \hline
 288 \quad (\text{red arrows}) \\
 + 1440 \quad (\text{blue arrows}) \\
 \hline
 1728 \\
 1
 \end{array}$$

$$\begin{array}{r}
 72.6 \\
 \times 24 \\
 \hline
 14.4 \\
 48 \\
 + 1680 \\
 \hline
 1742.4 \\
 1
 \end{array}$$

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 not be made to go onto the next stage if:

- 1) they are not ready.
- 2) they are not confident.



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