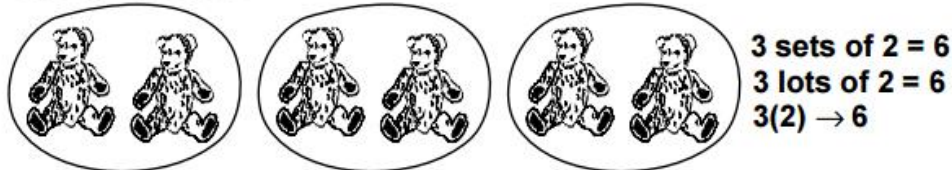


Introducing the \times Symbol

The recording of multiplication using repeated addition notation of the form $2 + 2 + 2 + \dots$ is long-winded. Alternative ways of recording can thus be sought. Some common intermediate recording methods are:



It is worth checking which, if any, of these recording methods are used in your school (e.g. in school mathematics scheme or in published schemes) before introducing these to children so as to avoid confusion.

The \times symbol is variously interpreted by children (and teachers!). For example,

3×4 is often interpreted by children as one of the following:

- 3 multiplied by 4**
- 3 times 4**
- 3 fours**
- 3 by 4**
- 4 by 3**
- 4 threes**
- 3 lots of 4**
- 4 lots of 3**
- 3 'timesed' by 4**

These interpretations are not all equivalent. In consequence, children are often confused about how to interpret the \times symbol, particularly when they are asked to use apparatus to model a multiplication task such as $3 \times 4 = \blacksquare$. The confusion is about which of the two numbers describes the cardinal value of the set (the numerical value of its contents) and which refers to the number of sets i.e. Should there be 3 or 4 sets? Should there be 3 or 4 objects in a set?

Essentially, all of the 'possible' interpretations listed above fall into one of two categories:

(a) a set of 4 elements replicated 3 times



The interpretations **3 times 4**, **3 lots of 4**, **3 fours** and **4 by 3** all result in the above type of representation consisting of 3 sets, each of 4 objects.

(b) a set of 3 elements replicated 4 times



The interpretations **3 multiplied by 4**, **4 threes**, **3 by 4**, **4 lots of 3** and **3 'timesed by' 4** all result in a representation of 4 sets each containing 3 objects.

Strictly speaking, **the \times symbol has only one correct interpretation, namely, 'multiplied by'** and so representation (b) above is the correct representation of 3×4 . The $\times 4$ is the multiplicative operation which is performed on the set of 3.

Unfortunately, parents, children and teachers are often inconsistent in their interpretations of multiplication tasks of the form $3 \times 4 = \blacksquare$, adopting different representations and different vocabulary on different occasions. Even some long-serving teachers are often unaware that they are causing major confusion because they are not consistent in their representation of multiplication tasks and in their use of mathematical language when reading or describing such tasks.

This is partly because of the use of the incorrect term 'times' as a substitute term for the correct term 'multiplied by' (these terms imply different representations) and partly because most adults know the commutative law for multiplication (and subconsciously use it without realising that they are doing so) whereas children at this stage do not possess this knowledge. It should be obvious from this that the confusion experienced by children tends to lessen on introduction of the commutative law for multiplication (in this case, $3 \times 4 = 4 \times 3$). Equally, the need for consistency of interpretation on the part of the teacher is apparent.

Because of the potential for the confusion described above, some published schemes and some teachers avoid the introduction of the \times symbol until after the commutative law has been mastered, preferring instead to persist with the brackets notation $4(3)$. Again, it may be advisable to check the published schemes and/or mathematics scheme of work in operation in a particular school before deciding what approach to take with any particular class of children in this regard.