Knowing multiplication and division facts to 10

Instant recall of multiplication and division facts is a key objective in developing children's numeracy skills. Learning these facts and being fluent at recalling them quickly is a gradual process which takes place over time and which relies on regular opportunities for practice and a variety of situations. We begin work on multiplication by encouraging children to count on in different quantities. You could help your child with this at home with activities such as counting how many pegs would be needed to hang out seven pieces of washing or how many knives, forks and spoons will be needed if six people were staying for dinner.

E.g. Count in twos - 2, 4, 6, to 20

Count in sixes - 6, 12, 18, to 60

Children will then be expected to recall specific facts related to each times table.

E.g. Recall the two times table up to 2 x 10

Recall the six times table up to 6 x 10

The children will then be taught to recall the corresponding division facts by understanding that multiplication and division are the opposite of each other.

E.g. 2 x 6 = 12 $\longrightarrow$ 12 ÷ 6 = 2   6 x 5 = 30 $\longrightarrow$ 30 ÷ 5 = 6

Multiplying and dividing by multiples of 10

Being able to multiply and divide by 10 and multiples of 10 depends on an understanding of place value and is fundamental to being able to multiply and divide larger numbers. We use place value charts to show children the effect of multiplying and dividing numbers by 10.

E.g. When multiplying 8 by 10 the number 8 becomes ten times bigger and moves one place to left on a place value chart, becoming 8 tens instead of 8 units. We then explain to the children that we need to place 0 in the units column to complete the number, 80. We do not say that we just add zero as this confuses children when they move to multiplying decimals by 10.

i.e. If you multiply 0.8 by 10, the answer is 8 not 0.80.

T	U	.t
	8	
8	0	
	8	
	0	.8

If we divide 8 by ten, the number 8 becomes ten times smaller and moves one place to the right on the place value chart becoming 8 tenths instead of 8 units. We then explain to the children that we need to place 0 in the units column to complete the number, 0.8.

We can use the knowledge of multiplying/dividing by 10 to multiply/divide by other multiplies of 10.

E.g.

8 x **20** $\longrightarrow$ 8 x **10** = 80   80 x **2** = 160   therefore 8 x 20 = 160

180 ÷ **30** $\longrightarrow$ 180 ÷ **10** = 18 18 ÷ **3** = 6   therefore 180 ÷ 30 = 6

7 x **40** $\longrightarrow$ 7 x **4** = 28   28 x **10** = 280 therefore 7 x 40 = 280

240 ÷ **60** $\longrightarrow$ 240 ÷ **6** = 40   40 ÷ **10** = 4   therefore 240 ÷ 60 = 4

You can see from the above examples that the children can multiply/divide first by 10 then the unit (x10 then x2 to multiply by 20 or ÷10 then ÷3 to divide by 30) or by the unit first and then the 10 (x4 then x10 to multiply by 40 or ÷6 then ÷10 to divide by 60). We encourage both strategies at **School Name** and the children can then choose their preferred method.

Expanded grid method - Multiplication

The expanded grid method uses knowledge gained using the partitioning method as explained in the addition booklet. Children need to know that numbers can be partitioned into , for example, tens and ones, so that 24 = 20 + 4. They can then use this to solve calculations such as 24 x 7 using the grid method.

24 x 7

24 is partitioned into 20 + 4.
Each number is then multiplied by 7.
The answers to each section are then added to give the final answer of 168.

	20	4
7	140	28

140 + 28 = 168
24 x 7 = 168

The same method can be used with larger numbers as shown below. In this example 245 is partitioned into 200 and 40 and 5. Each part of the number is then multiplied by 6 and the total for each section is added to give the final answer of 1470.

245 x 6

	200	40	5
6	1200	240	30

1200 + 240 + 30 = 1470
245 x 6 = 1470

Using the expanded grid method the children are able to see all of the steps within a calculation and therefore can develop an understanding of the concepts within multiplication. This understanding supports the children in moving towards using an expanded vertical method, which still allows them to work with partitioned numbers to further enhance their understanding.

Expanded vertical method - Multiplication

	24 x 7	24
		x 7
(20 x 7)		140
(4 x 7)		28
		168

This digit is worth 20 and is carried below the line in the compact method

	245 x 6	245
		x 6
(200 x 6)		1200
(40 x 6)		240
(5 x 6)		30
		1470

This digit is worth 200 and is carried below the line in the compact method

This digit is worth 30 and is carried below the line in the compact method

Compact written method - Multiplication

Once the children have a secure understanding of the expanded vertical method they will begin to move towards the compact method as shown below.

	24 x 7	24
		x 7
		168
		2

This digit is worth 20

|	**245 x 6**	245
		x 6
		1470
		2 3

This digit is worth 200

This digit is worth 30

Progression towards a written method of division.

Children will need to understand that division can be seen as sharing or grouping.

Sharing

There are 12 sweets and 2 children. They share the sweets equally, how many sweets does each child have? There are 2 children so we can use a 'one for you, one for me' approach to sharing the sweets equally, giving each child 6 sweets in total.
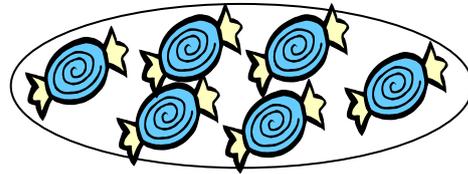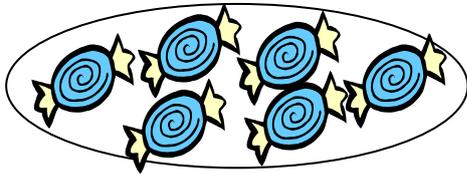
Grouping

There are 12 sweets and each party bag needs two sweets. How many party bags can be made? This time we know that each bag will have two sweets but we do not know how many groups there are. If we take away 2 repeatedly, we will find out that 6 groups of 2 can be made.

The calculation for both of these questions would be 12 ÷ 2 and the answer is 6 in both cases. It is important that children attempt both types of question and realise that the same calculation supports them in answering each of the questions even though the language involved is slightly different.

Grouping on a number line

Children should work practically in both methods shown above, teachers will then begin to introduce the children to moving this onto a number line using the same questions, as shown below.

12 ÷ 2

| -2	-2	-2	-2	-2	-2

| 0 | 2 | 4 | 6 | 8 | 10 | 12 |
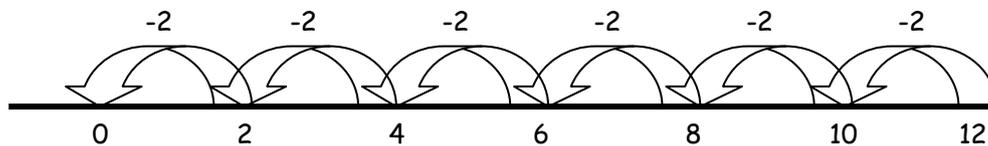
The method encourages children to continue subtracting the divisor until you cannot take away anymore. Count how many groups they were able to take away, 6 groups of 2 were taken, therefore the answer is 6.

As the numbers become larger this methods becomes inefficient so children are encouraged to take away larger multiples of the divisor by using their times table knowledge. This method is called 'Chunking'

Chunking using a number line

48 ÷ 6

-36	-6	-6
6 x **6**	6 x **1**	6 x **1**

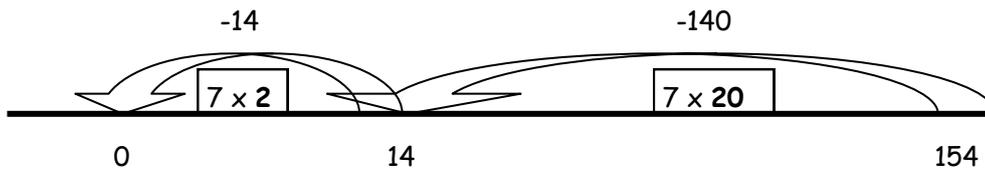| 0 | 36 | 42 | 48 |
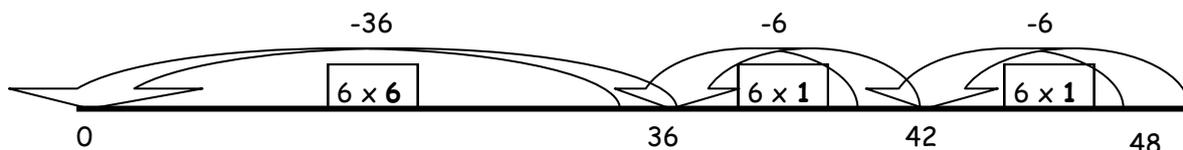
Here we have started to take away 6 each time until we get to 36. Then we have used the knowledge that 6 × 6 = 36 to take away 36 in one go, therefore taking away 6 groups of 6. Altogether we have taken away 8 groups of 6 making the answer to 48 ÷ 6 = 8.

If children are secure with their knowledge of times tables then they are able to become more efficient when solving division calculations. It can help to write down some of the related times table facts prior to starting a division calculation as shown on the examples on the following page.

154 ÷ 7

Things I know about x 7

7 x 1 = 7	7 x 10 = 70
7 x 2 = 14	7 x 20 = 140
7 x 3 = 21	7 x 30 = 210

-14   -140


```
        7 x 2          7 x 20
  0         14                    154
```

By jotting down some facts about x7 prior to starting the calculation, you can start by taking away the largest multiple of 10 first. You then add the number of groups of 7 that were taken away to get the answer **20 + 2** = 22, therefore 154 ÷ 7 = 22.

Children will then learn how to solve problems related to division.
E.g. The hens have laid **348** eggs. Eggs are packed into boxes of **6**.
How many boxes will be needed?

348 ÷ 6

Things I know about x 6

6 x 1 = 6	6 x 10 = 60
6 x 5 = 30	6 x 50 = 300
6 x 6 = 36	6 x 60 = 360

6 x 8 = 48

-48   -300

```
        6 x 8          6 x 50
  0         48                    348
```

50 + 8 = 58. This means that 58 boxes will be needed to pack 348 eggs into boxes of 6.

Expanded vertical method using chunking

Both of the calculations above can be solved using an expanded vertical method once the children have the understanding of division as repeated subtraction using a number line. The children will use the same process of repeated subtraction to solve the calculation in a vertical format as they have on the number line.

154 ÷ 7   **348 ÷ 6**

```
        22                                      58
   7|154                                   6| 348
   - 140   (7 x 20)                        - 300     (6 x 50)
     14                                      48
   - 14    (7 x 2)                          - 48      (6 x 8)
      0                                       0
```

This method can also be used in calculations where the divisor is a 2-digit number or if there is a remainder in the calculation.

397 ÷ 16

```
        24 r 13
   16 |397

    - 320    (16 x 20)
      77

    - 64     (16 x 4)
      13
```

Things I know about x 16

16 x 1 = 16	16 x 10 = 160
16 x 2 = 32	16 x 20 = 320
16 x 3 = 48	16 x 30 = 480
16 x 4 = 64	

There is one additional step in the progression for division, however, this should only be introduced when the children have a thorough understanding of the chunking method. When your child is ready for this stage it will be indicated on their homework with an example of how to complete the calculations using this method.