

### 3. Multiplication and Division

If you want your child to succeed in Mathematics and want something that can be done at home to help them in Years 3 – 7, then what is detailed below is one of the most important things they can practise at home to improve.

Multiplication and Division form a hugely important part of our number system. These concepts are introduced formally from Year 3 and are vitally important to understanding most future mathematical concepts from Year 3 up to Year 12 and beyond.

A lack of understanding of these concepts often leads to misconceptions in the future and difficulty accessing much of the curriculum in future years.

Many of us who went to school before the 2000's, were taught these concepts in very different ways to which they are taught today. The way these concepts are taught today is not just focussed on knowing our times tables. This is an important and useful skill to have, but it is only knowledge-based. We need to develop a deep understanding of the number system that provides the skills and strategies to adapt this understanding to multiple contexts.

In the past we had to learn our times tables by a method known as rote learning. This meant that we learnt our times tables through repetition. E.g.  $1 \times 2 = 2$ ,  $2 \times 2 = 4$ ,  $3 \times 2 = 6$ ,  $4 \times 2 = 8$  etc. By teaching them this way, students do not develop a true understanding of multiplication, its link to division or strategies to solve more complex sums.

Explained below, are some important concepts including what students need to understand, why they need to understand them and how they can improve their skills at home. Any practise that students can do at home, as detailed below, can only benefit them in the long run.

#### The Commutative Law

It is important for students to understand this. If they can understand this concept, it will dramatically reduce the amount of multiplication facts they need to learn.

In short, the Commutative Law is as follows:

- If we take  $3 \times 4$ , this essentially means that we have 3 groups of 4. In the diagram below, you can see that there are 3 rows of 4.



- If the diagram is rotated around  $90^\circ$ , it will make 4 rows of 3, which is  $4 \times 3$ .



It is important that students understand that  $3 \times 4$  (3 groups of 4) is the same as  $4 \times 3$  (4 groups of 3). Both number sentences have a total of 12.

If students can understand this and they can apply it to all multiplication sums, then they can greatly reduce the number of facts they need to learn.

### Times Tables

By the end of Year 4, students are expected to know all their multiplication facts up to  $10 \times 10$ . Below is a chart which shows these facts (there are 100 of them).

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

However, if they understand the Commutative Law, then they do not have to learn all the yellow shaded facts, because they are a reversal of other facts in the top half. E.g. If I know that  $2 \times 7$  is 14, then I do not need to learn  $7 \times 2$ , because I understand that it is the same thing, just grouped differently. This removes 45 of the original 100 facts, leaving 55 to learn.

All students should know their one times table, so we can remove the blue facts from the list to learn (leaving 45 facts to learn).

The two times table and ten times table are ones that students are usually confident with (these should be known by the end of Year 3). So, if they know these, we can ignore the green and pink facts (leaving 28 facts to learn).

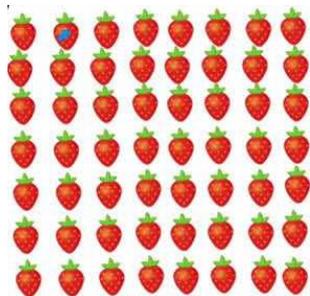
The five times table is fairly straightforward and should also be known by the end of Year 3. If these facts are known (the orange ones), then that just leaves 21 facts to learn. Straight away, this becomes less overwhelming and therefore easier to learn.

The nine times table is easy to learn if you can see and understand the pattern. After this there are few to learn and if you understand the following strategy, then you can learn the rest quickly.

### Strategies to help

The seven times table is often the most challenging to learn, but with an understanding of how to split (partition) numbers, this can be done fairly easily.

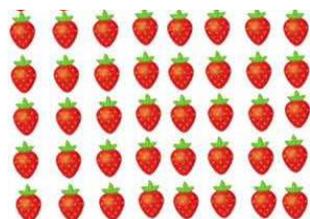
#### Example: $7 \times 8$



A student might struggle with their 7 times table, but if they know that 7 can be split into 5 and 2 (or 4 and 3 or 6 and 1), then they can adjust the sum.

Split the sum from  $7 \times 8$  (7 groups of 8) into:

$5 \times 8$  and  $2 \times 8$  (5 groups of 8 and 2 groups of 8)



They know their 5 times table, so they know that  $5 \times 8$  is 40.



They know their 2 times table, so they know that  $2 \times 8$  is 16.

Now they need to combine them ( $40 + 16$ ) to know that  $7 \times 8$  is 56.

Understanding this strategy demonstrates an excellent understanding of the number system and will enhance their mathematical knowledge and understanding.

### Links to Division

"Division is too hard"!

This is something that can frequently be heard in classrooms across the world.

The key to understanding division is understanding that it is closely linked to multiplication.

Multiplication is about joining items into equal groups.

Division is dividing items into equal groups.

As operations, they are the opposite of each other.

When learning their times tables, it is important to understand the inverse (opposite) sums.

**Example:  $3 \times 4 = 12$** 

There are four number sentences associated with these three numbers. If students can understand the link, they will be able to learn division facts. They should practise these as they do multiplication.

$3 \times 4 = 12$  (If I join three groups of 4 together, I will have 12)

$4 \times 3 = 12$  (If I join four groups of 3 together, I will have 12)

$12 \div 3 = 4$  (If I divide 12 into three equal groups, I will have 4 in each one)

$12 \div 4 = 3$  (If I divide 12 into four equal groups, I will have 3 in each one)

When presented with a division sum, it can be rewritten as a multiplication sum.

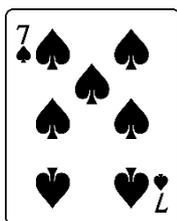
E.g. ' $30 \div 6 = \_$ ' can be rewritten as ' $\_ \times 6 = 30$ '. I know that  $5 \times 6 = 30$ , therefore  $30 \div 6 = 5$ .

**Activities / Games at home**

There are many activities and games that can be played at home. Games are a great way to learn number facts as they often do not feel like you are learning.

- Turn over two playing cards or Uno cards and write all four multiplication/division facts associated with those numbers.

E.g.



$$5 \times 7 = 35$$

$$7 \times 5 = 35$$

$$35 \div 5 = 7$$

$$35 \div 7 = 5$$

Alternatively, they can roll two dice (these are limited to numbers 1 – 6, so are not as effective).

- Turning over two playing cards/uno cards, rolling dice, or selecting dominoes are simple ways to practise.
- Using a 10 X 10 multiplication chart (above) or a snakes and ladders board, students can then place a counter or item on the answer to a sum. The first player to get three/four/five counters in a row, wins.
- Lay the cards out upside down, in a grid in the same way you play 'Memory'. Take it in turns to select two cards. If a player can name all four multiplication/division facts associated with those four numbers, they can keep them.
- Roll two dice/select two playing cards and make a two-digit number. Write down as many multiplication/division facts associated with that number as possible. You get a point for each number fact you can name/list.

E.g. if I roll a 3 and a 6, I could make 63 or 36.

For 63, I could use  $1 \times 63 = 63$  and the three associated multiplication/division facts. I could also use  $9 \times 7 = 63$  along with the other three facts, as well as  $3 \times 21$  and its associated facts.

For 36, I could use  $1 \times 36 = 36$ ,  $2 \times 18 = 36$ ,  $3 \times 12 = 36$ ,  $4 \times 9 = 36$  and  $6 \times 6 = 36$  along with their associated facts.

Therefore, choosing 36 could earn me more points.

- There are many other games that can be played. You can even make up your own!
- There are many multiplication and division games online which can be used to support/practise, but shouldn't be used as the sole method of practising.

Have fun!