**Mental Multiplication and Division Strategies**

Traditionally, many of us learned our ‘times-tables’ as a list of facts. If students are able to apply strategies to solve multiplication facts, then they will have the tools to know these quickly, but also to apply the strategies to larger numbers.

It is not advised that children start by learning 1x tables, then 2s up to 10 in order, in actual fact it is better to group them in a way that builds strategies. The more that families reinforce these strategies at home, the more likely children will attempt to use them and become proficient.

|  |  |  |
| --- | --- | --- |
| Multiplier | Think… | Explanation |
| X0 | No groups means zero things | Be careful about using the term ‘nothing,’ or it is possible children will see zero as irrelevant. |
| X 1 | One group of anything is itself |  |
| X 2 | Double |  |
| X 4 | Double, double |  |
| X 8 | Double, double, double |  |
| X 10 | Shift up a place and name any gaps | It is important that students don’t just ‘put a zero’ without understanding why. |
| X 5 | Halve, then X10 OR x10 then halve |  |
| X 3 | Double, then add a group |  |
| X 9 | X10, then subtract a group | You can see this thinking can then easily be applied to x11 (x10, then add a group) |
| X 6 | X5, then add a group OR x3 doubled |  |
| X 7 | X 5, then add two groups |  |

The strategies are listed above in one potential order, with each ‘fact’ highlighted below as learning progresses. To follow, you may wish to start with a blank grid and colour as you go.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Groups of | X0 | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 |
| X0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| X1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| X2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| X3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| X4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| X5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| X6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| X7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |
| X8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 |
| X9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 |
| X10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

There is some room to move in this sequence, with x10 often being introduced earlier. X9 may be taught before x3 to be sequential in ideas, however x3 is probably easier to conceptualise. Regardless, multiplying by 7 is the most difficult with it’s square (7x7) the last one to be mastered (so it would be reasonable to memorise this separately as a fact).

Hopefully you can see related facts have been highlighted by using shades of the same colour.

**Division Strategies**

You can also see how these multiplication strategies can be turned around to be used as division strategies.

|  |  |  |  |
| --- | --- | --- | --- |
| **Multiplication** | | **Division** | |
| Multiplier | Think… | Divisor | Think… |
| X 1 | One group of anything is itself | ÷ 1 | Items sorted into one group is the number of items |
| X0 | No groups means zero things | ÷ 0 | No groups means zero things |
| X 2 | Double | ÷ 2 | Halve |
| X 4 | Double, double | ÷ 4 | Halve, halve |
| X 8 | Double, double, double | ÷ 8 | Halve, halve, halve |
| X 10 | Shift up a place and name any gaps | ÷ 10 | Shift down a place and name any gaps |
| X 5 | Halve, then X10 OR x10 then halve | ÷ 5 | Double, then ÷10 OR ÷10, then double |
| X 3 | Double, then add a group | ÷ 3 | Halve, then subtract a group |
| X 9 | X10, then subtract a group | ÷ 9 | ÷10, then add a group |
| X 6 | X5, then add a group OR x3 doubled | ÷ 6 | ÷5, then subtract a group OR ÷3 halved |
| X 7 | X 5, then add two groups | ÷ 7 | ÷5, then subtract two groups |

The most important thing to remember when teaching children about multiplication and division strategies is to build understanding before any ‘drilling’ occurs. Concepts will not be understood overnight, and if they are introduced too quickly without enough understanding confusion will develop.

Use hands-on materials and real life scenarios to build understanding of the concept of multiplication and division. Examples could be counting cookies on a tray more efficiently and sharing cookies between siblings and/or friends, cutting up pizza for a certain number of people and working out how many pizzas would be needed for a party, dividing toy cars into equal groups or working out how many cars there are efficiently, and so on.

Build on this understanding by arranging objects and blocks into an array (lines) and drawing the jumps both forwards (multiplication/repeated addition) and backwards (division/repeated subtraction) on a number-line. Try to show what happens in as many ways as possible. Then you can start to introduce the strategies discussed here – using objects to physically talk through the process of each strategy.

Strategies can be recorded through drawings to begin with, introducing symbols and formal methods later as children consolidate their understanding.