Mfacts121

Teacher Talk
&
Prerequisite Skills

Brush up on Partitions (Addition & Subtraction)

Teacher Talk:

All key number skills are interconnected. To develop a solid base for multiplication, students will also need their addition and subtraction skills. Automatic recall of 'partitions' of small numbers (may also be known as 'friends of', 'splits' etc) helps with basic addition and subtraction facts. Anyone needing revision on this can use these:

Partitions of 8 Activities

Partitions of 9 Activities

Partitions of 10 Activities

Zeros Facts

Teacher Talk:

Even though the 'zeros facts' may seem easy, there is evidence to suggest that they can cause some difficulty. Avoid assuming that they are easily understood by students. View the Mfacts121 Video and refer to the strategy as it arises in class. Once the students have thought about the concepts involved, they will realise the rule and master the facts quickly.

Ones Facts

Teacher Talk:

Even though the 'ones facts' may seem easy, they can cause some confusion if not addressed initially. Students will often answer that 1 x 6 equals 7, presumably because they are thinking about the fact that 1 + 6 equals 7. A moment spent developing their conceptual understanding, can help overcome this easily. View the Mfacts121 Video. Once the students have seen some of the 'ones facts' represented in arrays and have been exposed to the rule, (the product will be the other factor) they will master the facts quickly.

Twos Facts

Teacher Talk:

Working on the **'double' strategy** for the twos facts and spending some time making sure the students are secure with it, is important. Although it is a simple, initial strategy, the concepts involved lay the groundwork for further, more complex strategies later. It is an essential lead-in to the 'double, plus one more group' (threes facts) strategy and of course the 'double, double' (fours facts) and 'double, double, double' (eights facts) strategies too! It's worth spending some time on this. Check our included activities and games (in the curriculum section) to help you flesh this out with your class.

Prerequisite Skills:

All key number skills in Maths are interlinked. So...here's some addition work, with **the doubles**, to help out with **those basics** that are so essential!

Addition Facts for the 2x_ strategy (worksheet).

The doubles are something that students should be able to answer with automaticity. Practise is required...see how many they can do in one minute! It's all about encouraging personal best and increasing speed- even the high attainers in your class can do this to see how speedy they are!

Threes Facts

Teacher Talk:

Make sure you have **spent time previously**, working on the **'double' strategy** for the *twos facts.* It is a good lead-in to the 'double, plus one more group' (threes facts) strategy. Draw attention to the idea that we are trying to learn strategies that will be **most efficient and take least number of steps,** to get to the answer. Reiterate that in the beginning, *when learning a new strategy, the calculations may be slow*. It's like learning to ride a bike; in the beginning you need to think about every part of the

process, until one day, after lots of practise, it becomes automatic. To calculate **3 x** 6, is much faster when using the 'double, plus one more group' strategy, rather than to **count by 3s, six times**.

Prerequisite Skills:

To be able to use the Mfacts121 Strategies, lots of **prerequisite skills in number** need to be in place. It's like one big puzzle! **Addition skills** need to be in place, for adding the multiples together for the threes facts.

Here's a tools/warm up activity you can do. This is all about practise, picking up speed and automaticity. The more the students do it, the better they will get. All students, even your high attainers, can do these types of activities. It's about striving for personal best.

Addition Facts for 3 x_ strategy (worksheet).

Anyone needing doubles facts revision? Try this: Addition Facts for the 2x_ strategy (worksheet).

Fours Facts

Teacher Talk:

Make sure you have **spent time previously**, working on the **'double' strategy** for the twos facts. Draw attention to the idea that we are trying to learn strategies that will be **most efficient and take least number of steps,** to get to the answer. Reiterate that in the beginning, *when learning a new strategy, the calculations may be slow*. With practise, the calculations and use of the strategy becomes much faster and even automatic. Talk about the idea that when you double one number, then double that again, you get four 'lots' of that number in total.

Prerequisite Skills:

Skills in adding are necessary when using the **'double, double'** strategy. One great way to add two larger numbers together, is to use the **'split strategy**'. E.g. when adding 18 and 18 *(to work out **4 x** 9*).

You could split the numbers into their **tens** and **ones** and add each part together:

10 + 10 = 20

8 + 8 = 16

Then add the parts back together = 36

Attached is a worksheet to practise this skill. Addition, Split Strategy

As we know, **all key number skills are interconnected**! Addition skills are necessary skills for making the multiplication strategies possible.

Fives Facts

Teacher Talk:

Many students will not naturally think of these multiplication strategies themselves. Leading them to understand, practice and develop these efficient strategies, is part of our role as teachers. Without explicit instruction students may get stuck in inefficient patterns. It is our role to move them on, to more sophisticated strategies. This is a great strategy which is quite simple to understand, but many students will not have thought of it without assistance. It works especially well for products that are easier to halve! E.g. 5 x 8, think 10 x 8 = 80 and halve it, 40.

Prerequisite Skills:

Halving is a skill that is key to basic number sense. It needs a little attention, even in the Senior year levels. Do some work on 'splitting' numbers up, e.g. split 70 into half, by splitting it into 30 and 30 and 5 and 5. Also work on making connections, like, what is **half of 8**? Then that helps us know **half of 80** etc.

Sixes Facts

Teacher Talk:

Many students will not naturally think of these suggested multiplication strategies themselves. Leading them to understand, practise and develop these efficient strategies, is part of our role as teachers. Without explicit instruction students may get stuck in inefficient patterns. It is our role to move them on to more sophisticated strategies. When working on the sixes facts, various strategies can be used. For 6 x 6 students may have memorised this answer, then use it help them with 7 x 6 or 6 x 7. It is still necessary to work through and expose students to a set of efficient strategies, which they can then draw on, such as the 6 x _ Strategy- Think 5 x _ and take away one group.

Eights Facts

Teacher Talk:

It is our aim to lead students to use the **most efficient strategy** and not allow them to become 'stuck' in the less efficient 'skip counting' phase. It requires us to be vigilant and explicit, propelling students forward, to this type of thinking. It does take longer in the beginning, but the results will pay dividends later!

Prerequisite Skills:

Doubling with large numbers, requires **good mental strategies for addition**. The two **best and clearest** mental strategies for addition with large numbers, are the **'jump'** and **'split'** strategies. See the attached worksheets for some practise with your students.

Addition, Jump Strategy

Addition, Split Strategy

All students, even high attainers in Maths, should still be encouraged to develop mental strategies and be able to show and explain their thinking. It's an important part of number sense development.

Nines Facts

Teacher Talk:

'Think 10 x_, then take away one group.' One of the most common difficulties with this strategy is confusion about **which number to 'take away'**. For example, in 9 x 6, we think 10 x 6 = 60...then what do we take away??...is it a 9 or a 6 or even a 1? There is one way to successfully overcome this, and that is to use the array model. See the Mfacts121 strategy video for a guide, but also use your **own array in class**, showing **'10 x 6' or '10 rows of 6' or '10 sixes'** then physically taking away **(covering up) one group of /row of 6**, to now show **'9 sixes' or '9 x 6'.** Therefore, illustrating that it is a **group of 6 that we must take away.** This works really well and solves the confusion fast!

Prerequisite Skills:

Students will need to be able to subtract from a tens number to use this strategy, e.g. quickly solve 80-8. This relates back to knowing partitions of 10 (or 'friends of 10' etc). If students know that 8 and 2 make 10, when they take 8 from a tens number, they will be left with a 2.

Try this worksheet to reinforce and practise this skill.

Subtract from a tens number, 9 x strategy

Tens Facts

Teacher Talk:

Many students will not naturally think of these multiplication strategies themselves. Leading them to understand, practice and develop these efficient strategies, is part of our role as teachers. Without explicit instruction students may get stuck in inefficient patterns. It is our role to move them on to more sophisticated strategies. It's like learning to ride a bike; in the beginning you need to think about every part of the process, until one day, after lots of practise, it becomes automatic.

Making Connections

Teacher Talk:

This is where all the work on previous strategies and student 'number sense' comes into play. Due to the time and attention given to conceptual understandings, arrays and strategies, students will have improved on their number sense and be able to develop ways to solve multiplication questions efficiently. This is an interesting stage! Let's see what the students come up with...remember, being able to articulate strategies and solutions, is an important part of laying strong foundations in Maths!

Commutativity (Turn Around Facts)

Teacher Talk:

The turn-around facts are so important. It is key that students understand when they swap the factors around in a multiplication question, they will still end up with the same product. Even more importantly, it should be drawn to their attention that they should turn the fact around, to suit the strategy they find most efficient.

Suggested Activity: show an array of 9 x 3 (9 rows of 3) and ask, 'What is this array showing?' Then rotate the array 90° and ask what the array shows now (3 x 9 or 3 rows of 9). Ask 'which expression/fact would **you** use to figure out the answer/product?'. Answers will vary- some will say it is easier think of it as 3 nines and others may refer to using the 'think 10 x _, then take away one group' concept. Some may talk of skip counting by 3s. Accept all suggestions, aiming to lead students towards seeing which way may be more efficient for them (adjusted from The Book Of Facts, Burnett et. al, 2007).

Distributive Property

Teacher Talk:

Student 'number sense' and true levels of understanding, come into play when using distributive property. If students have had attention and time given to conceptual development, using arrays, Mfacts121 videos and activities, they should understand ways to distribute or separate the question into easier parts. The key idea is that when they put the parts back together, they have the original question, in total. Such as, if they decide to separate 8 x 4 (8 fours) into 4 x 4 (4 fours) and 4 x 4 (4 fours), they can confirm that in total, that still makes 8 fours. It's a great strategy for multiplying two-digit numbers with one-digit numbers- 23 x 6, do 20 x 6 and 3 x 6...that's still 23 sixes in total.