Vignette 8 – Place Value: mental computation

SUMMARY KEYWORDS
students, place, computation, numbers, link, tenths, renaming, shorthand, shown, partitioning, mental, sits, knowledge, important, balance, takeaway, algorithms, tens, traditional methods, conceptual understanding

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Okay, welcome to the vignette number 8, mental computation. Okay, so if we look at the mental computation, and these, again, are just links straight from the curriculum elaborations. This is where we're now, we've got all that knowledge of place value. And now we're looking at some of those strategies and meaningful context with our students and seeing how they are using that knowledge of place value to round and compensate, to use that place value partitioning.

Okay, and so obviously, we know that place failures intended to prepare students for the written algorithms. And we don't want to rush to these written algorithms. We want to take it slowly. So what we want to do is get them to expand the numbers right beside the algorithm. And so we've got a little sequence here to show you. So, five take away two (=) three. Thirty take away 70? Can't do. So what do we need to do? We need to borrow 100 from the 200 to add to our 30, to now make that 130. Take away the 70 comes 60. We move to the next column 100 take away six, so 100 take away 600. We can't do so what do we need to do, we need to borrow 1000 this time, from the 1000s column, we bring that across. And so now we have 1100. Now we can take 600 away, and we're left with 500. And now we do 3000 take away 1000 is 2000. So what does that look like when we come to doing the shorthand of it. So once we've actually understood all this, and pulled apart those numbers, and actually physically done it with equipment, so you can have your equipment sitting beside this as you do it, step by step, to actually understand, ahh, so I'm taking 100 off there, and I'm giving it to the tens, oh, but I've got more tens, I've actually got 130 tens, which is 130. So it's really important. Remember, we talked about the language that sits alongside this. And so you can physically manipulate as you work your way through this equation. And so then it just becomes the shorthand. So we can do this at the same time. So children can see what it looks like when we are doing the shorthand. It's as simple as just crossing and renaming those place values digits. So then again, we have some more examples here. So when we look at these bigger numbers 4.2 tenths take away two point 68 tenths, we know what is the place value, it's 420 hundredths taking away 268 hundredths. So it's important that they know about this renaming. And that they can just do this because they've played with it so many times, they just know what is sitting inside it. So again, it's know, with reasoning. without all that extra calculating, we just know the stuff, we have the knowledge of their place value system to be able to solve this. So 4.7 tenths, 4.8 tenths, 4.9 tenths, what comes next, okay, and in the same is 1.8 times 0.4, is equivalent to

18 times four divided by 100. Why? Because we just know the place value that sits inside these numbers, we know that we're now partitioning in the hundreds, really important.

Another example link to aid mental computation is looking at place value bar model methods are just helping teachers, again, students to understand and visualize what's happening here. With a million, we've got five lots of 200 thousands here, and then the number sentences that actually represent that in different ways. And a great thing here is when we're looking at place value is also to link in at times what fractions are because for most students, fractions can sometimes be a completely different language that has no commonalities with the place value or the number system, so it's good to incorporate this. So the children actually see that these are linked and integrated together and we don't need to wait a few more weeks introduce fractions, they can be introduced alongside looking at place value mental computation. Another quick example here as well as we get into level four, and we start to look at the powers of 10. A quick example here was this was given to like 37 high schools in 2018, and two lots of Year 9. And first step, students were unable to even have a go at this many said, ‘that looks too hard’, ‘I’ve forgotten’. But once we actually linked it back and showed them a structure, we said, Look, what we're doing here is we know that 10 cubed is 1000. And the kids knew that 10 squared is 100. And suddenly, using their place value knowledge, they're able to put another lens through this, they're able to interpret this question slightly differently. And all we've done is re-promoted the links to place value for mental computation. It goes beyond this. And it does say in the level three and level four curriculums that we want our students to have a deep knowledge and understanding of place value, before we introduce the column additions and the traditional methods. There's nothing wrong with these traditional methods because they do work. The bad press comes from when students are shown the shortcuts without the understanding. And we find that students and get up to Year 8, 9 & 10 and beyond and still make careless errors with these procedures. So we need to balance both the procedural and the conceptual understanding. That's what a good rounded research on a good balance practices, bearing between one extreme to the other is never going to benefit all kids. But if we can promote the vignettes, we've shown you around pace value, which encompasses all these different things. This is going to help you, and Robyn and I've shown you that all of these come from the pink booklets, they all come from the elaborations. And all of them have got activities on the NZ Maths page. So we would encourage you to spend some time familiarising with all the different aspects of place value and how they link to mental computation. And encourage them and go on a journey with your students to find out how face value is actually a really powerful enabler for all of us to better identify with mental computation when we travel through levels three, four and beyond.