

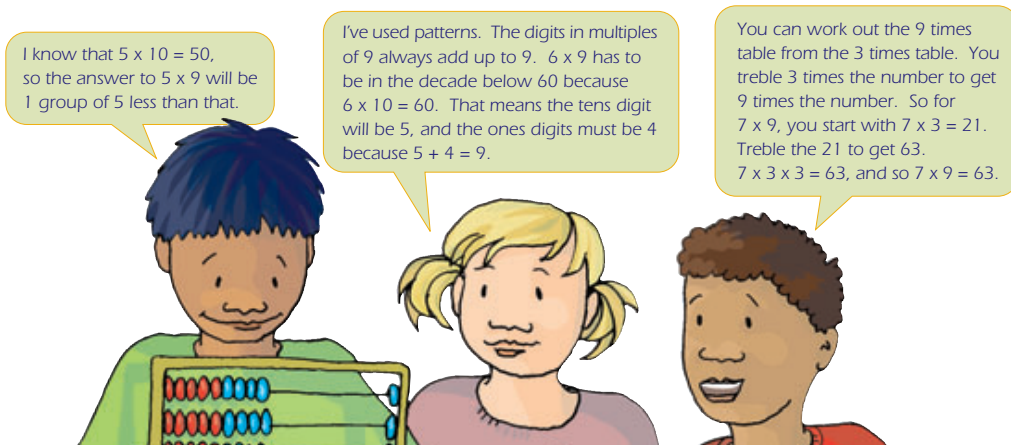
Factsheet for Parents

THE NEW ZEALAND INITIATIVE

Figure 1.

Activity One

Rewi, Caitlin, and Obeda all have different strategies for working out their 9 times table:



1. Complete your copy of the Easy Nines table.

	Using my 10 times table	Down a decade and digits adding up to 9	Using my 3 times table	Answer
$6 \times 9 =$				

Confused? Maybe your kids are too. This screenshot is from a Ministry of Education worksheet for children at “stage six” of the numeracy framework (which corresponds to around year five or year six). The worksheet asks children to use these three different strategies to work out the multiplication problem.

In 2013, a friend explained to me that her 10-year-old daughter was learning several different ways of working out her timestables, and that she was confused, losing confidence, and falling behind. When I was at school, we just learned them off by heart.

This spurred me on to research how maths is taught in primary schools in New Zealand today. The full report *Un(ac)countable: Why millions on maths returned little* is available here, but this information sheet provides a brief synopsis of the research findings for parents, and some suggestions about what parents can do to ensure their child’s school provides a good maths education.

There is much debate about the importance of different areas of the curriculum, but what can be said for sure is that getting a good foundation

in maths will open up more pathways for your child in secondary school and beyond. We live in a country where children should be able to achieve anything regardless of their background.

If your child aspires to be an astronaut, they better start with their times tables.

What is the Numeracy Project?

New Zealand kids, by international standards, have never been particularly strong in maths. In the 1990s some new methods of teaching maths were trialed in schools. Following initial indications of success, a completely new way of teaching maths was rolled out across the vast majority of New Zealand's 1,900 primary schools in 2001. Teachers were provided with intensive professional development on these new maths teaching methods. This was called the Numeracy Development Project (the Numeracy Project), and while it doesn't officially exist as a professional development programme now, the new methods and philosophy of teaching maths are now well ingrained in many schools.

Pendulum swings

So what are the new methods? Many of us can recall the days of learning facts and using the old vertical column methods. Children were probably bored in those days, especially if they didn't understand what the numbers meant. Perhaps children knew how to obtain the right answer by going through a formulaic process, but were not gaining a conceptual understanding of maths – the big picture.

But even in the 1960s, the curriculum discouraged “memorisation of facts through formal drills before meanings have been established”. But what is intended at the national level often plays out very differently in the classroom. It may be true that most of *our* teachers back in our schooling days put a bit too much emphasis on rote learning. One mathematics professor said in 2009 that “at all costs, we should ensure that we never return to the hundreds of algorithms that have made mathematics a wasteland full of the rote learning of incomprehensible rules”.

The Numeracy Project was the answer. It has been in swing since 2000, but the New Zealand Initiative's research has found that the pendulum has swung too far in the *other* direction. The screenshot of the activity sheet shown at the start of this information sheet illustrates this. The Ministry does provide other worksheets that do encourage learning of the

basic facts, but our research shows this happens too infrequently in real classrooms. New Zealand students, compared to students in the top performing countries in maths internationally, spend much more time explaining answers and less time learning basic facts and processes.

Too many children are not learning the basics off by heart at school. And paradoxically, this is what is holding them back from developing a more complex understanding of maths. It is hard to reason without the facts to reason with.

Many parents are confused. It is likely that you learned maths very differently, so it hard to know how to help your child at home. The below Q&As provide some advice on how you can help your child with maths.

Q: My child's teachers says that rote learning is not good for my child's development

Rote learning is very important, but not enough on its own.

On the one hand, rote learning without any understanding can seem meaningless for children. For example, knowing instantly that “ $3 + 2 = 5$ ”, is not enough without linking it to something concrete.

Using real world objects can help link such an ‘abstract’ equation like “ $3 + 2 = 5$ ” to the concrete. That is, understanding what each of these numbers represent.

Using five apples, and showing how a group of three apples and a group of two apples makes a group of five apples, helps make this equation meaningful.

On the other hand, understanding what 3 and 2 and 5 represent is not enough either. At some point, your child will move onto more difficult mathematical concepts like algebra. When it comes time to working out algebraic equations, children need to be able to instantly access facts stored away in memory, like $3 + 2 = 5$. If your child knows the answer instantly (rather than having to count it on her hands or think about apples), this saves her energy for solving the more difficult maths problem.

These basic facts are like building blocks for further knowledge. It is very important that your child masters these facts. There is really only one way to do this – and that is practice and repetition, and correcting mistakes. You can make it fun by turning it into a game or a song.

Q: Are children in the East Asian countries good at maths because they just rote learn everything?

This is a popular myth, and some commentary suggests that New Zealand children are better at problem solving in maths, compared to children in the top-performing East Asian countries. Indeed, kiwi kids are better at *applying* their knowledge to novel problems than they are at *knowing* their basic facts. Yet all of the international evidence shows

that children in the top-performing East Asian countries are ahead of New Zealand students in *both* of these arenas. It is a myth that the East Asian countries like China, Singapore and Japan are good in maths just because they rote learn. They *are* better at rote learning, but this seems to help, rather than hinder, the development of the deeper conceptual understanding of mathematics that we all want New Zealand children to have.

Q: I've been concerned about my child's progress in maths, but I keep getting told that everything is okay

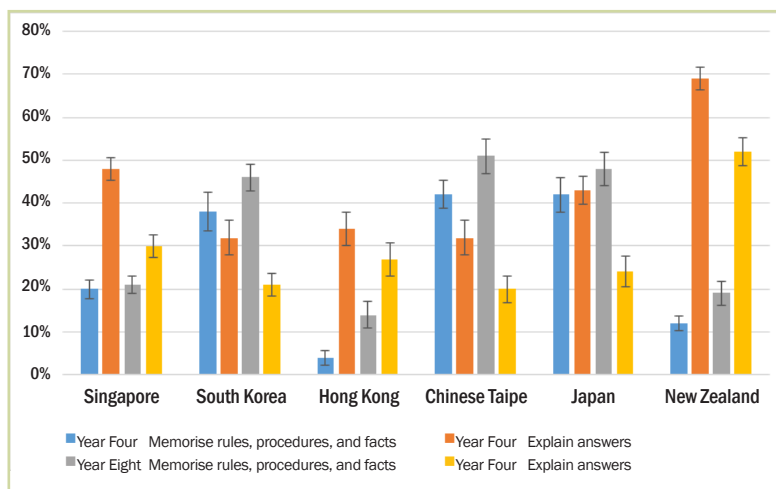
Teachers want to see your child progress, but many have up to 30 children in their class, and it is unlikely that the teacher knows your child as well as you do. If your child seems to be struggling with maths, listen to your instinct. Something often forgotten is that the education system is there to serve you and your child. Keep asking questions and put some positive pressure on your school. Ask the teacher to explain what kind of maths activities they are doing in class and what you can do at home to help. Talk to the school principal, or other parents at the school.

We have heard during our research that though the Ministry maintains maths knowledge is important, the words 'algorithm' (referring to the written vertical column methods) and 'rote learning' have become taboo words in some schools. Parents should claim these words back.

Q: My child's teacher doesn't seem to be very good at maths

There is some research that shows that too few primary school teachers have the required level of maths. There has been some "soul searching" among those who ran the Numeracy Project, that teachers may not have adequate levels of mathematical competency to teach these new methods.

Figure 2. Percentage of students whose teachers require students to memorise facts and explain answers in most classes



This is concerning because maths is one subject where teacher maths abilities actually do influence student learning. The research shows that both teachers' maths knowledge, and specialised knowledge of how to teach mathematics to children, influence student learning in maths.

The New Zealand Initiative's report puts out for discussion the idea of a *certificate of maths teaching proficiency* for teachers. Presently, there are no standardised requirements for those graduating from teacher education to show any kind of mathematical competency.

We don't think it should be mandatory for teachers, or driven from the Ministry of Education, but should be driven by parents. If parents value a good maths education for their children, they can search for schools where teachers have their certification.

Q: How can I help my child with maths?

The Ministry of Education's nzmaths.co.nz/families site offers some useful tips and tools for helping your child with maths. It encourages families to "help them see the maths around them", for example, by pointing out different shapes in supermarket aisles. It has tips, for each year level 1-8, of what you can

do as a parent at home to help develop your child's mathematical understanding. As well as seeing the importance of maths in everyday life, such as counting days on a calendar, figuring out the cheapest deal at the supermarket, or seeing that one side of the street has odd numbers while the other has even, it is also important that your child is fluent in quick recall of basic facts.

The nzmaths.co.nz/families site also has a series of activity sheets for each stage of schooling, including recall of basic facts, for example, a series of flash cards for *recalling number* facts to 5 (see below for definition). It might pay to check the curriculum level your child should be at, and check what basic facts they should know at their age. If your child doesn't know these facts or doesn't seem to be learning them at school, help them out at home.

Q: My child's teacher talks in language I just don't understand

We all have a tendency to speak in jargon depending on our trade or profession. The 'curse of knowledge' means that we assume people know the same things we do, and we sometimes speak in language that is specific to our occupation. Teachers do it too. For example, the nzmaths.co.nz website says "your child should be

able to recall the number facts to 5 and 10 instantly”. Well, what are the number facts to 5?

This researcher had to google this to find out (addition facts to 5, for example, are all the different combinations of two numbers that equate to 5, like $1 + 4 = 5$, and so on). The point is, teachers have a tendency to talk in education jargon, so if you don’t understand what they are talking about, it’s okay to ask for clarification.

Q: But my school does seem to focus on learning timestables and getting the basics right

There are 1,900 primary schools in New Zealand, each interpreting the national curriculum framework in their own way.

Many schools have excellent programmes in place and have an appropriate balance.

Q: Your report mostly concentrates on the ‘number’ part of the New Zealand Curriculum. What about other areas of maths like geometry and measurement?

The New Zealand Initiative’s report *Un(ac)countable: Why millions on maths returned little* presents research to suggest it is a lack of basic number facts and the inability to quickly do vertical written processes that is holding Kiwi kids back. Most of the examples given are in the ‘number’ domain. The Ministry of Education recently reported that “a lot of parents tend to think maths is about times tables and basic facts. But that’s just a very small part”. The Ministry has some very good data available on where the gaps are in children’s learning across the country. We think our report adds to the general debate on maths education. You should also be asking questions about where your child is with “space and shape” (geometry) and other areas of the maths curriculum too.

Q: The Ministry should scrap the Numeracy Project then, shouldn’t it?

We think that it is up to schools to take control and change if they need to. New Zealand’s education system is highly devolved and schools are set up to be responsive to their local communities. Success therefore relies on parents putting positive pressure on schools and asking questions. All parents should be able to vote with their feet, and choose a school that provides the kind of education they want for their child. The New Zealand Initiative’s position is that the Ministry’s role is to collect and provide robust data on student learning and achievement, but that ultimately, schools should be accountable to parents. In other words, change should occur from the ground up rather than from the top down.

Even if the Ministry changed things again and rolled out a new way of teaching maths that put more emphasis on the basics, this could be a costly exercise with no guarantee of success. There is a danger that if this was done at a national level, the pendulum might swing back too far in the other direction. It would not be good if children went back to learning step-by-step processes without understanding relationships and connections between numbers.

Many schools have already started to question the Numeracy Project methods and have adjusted their curriculums.

Q: Why is the report called ‘Un(ac)countable’?

New Zealand schools are self-governing, which is quite unusual internationally. What this means is that schools should be accountable to their local communities and the needs of parents and students directly. The Numeracy Project, however, was rolled out across the whole schooling system from the top down. It cost \$70

million, nationally, but it has likely also cost schools out of their usual day-to-day expenses. Yet, at a national level, we know that maths performance has been declining over the same period of time. The New Zealand Initiative is concerned that this new programme of teaching maths has cost New Zealand taxpayers for no gain. It is not clear who is accountable for the failings of the project.

Q: What else can I do?

For many years, it seems that parents have been asking questions about the new methods of teaching maths. It is now well recognised that the Numeracy Project – and these new methods – have not resulted in a lift in maths performance as intended. We would encourage parent leaders to mobilise with other parents. Parents and schools should work together to ensure a good balance between the old school and new school ways of teaching maths. You can also join the facebook group ‘Bring Back Column Addition to NZ’s early primary maths curriculum’ here, run by Audrey Tan, an expert maths teacher. Or, check out Khan Academy, an excellent free online resource for learning maths.