The Wilkie Way
Newsletter March 2026
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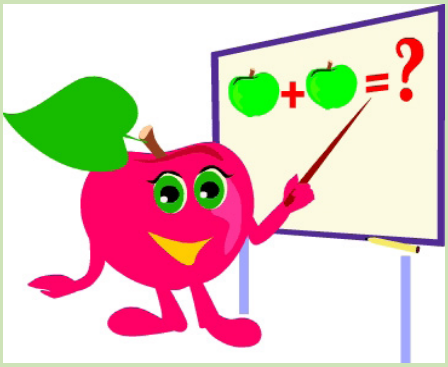
Memorise or Number Sense

This month's professional reading is based on Fluency without Fear: Research Evidence on the Best Ways to learn Maths Facts by Jo Boaler

A few years ago a British politician, Stephen Byers, made a harmless error in an interview. The right honorable minister was asked to give the answer to 7 x 8 and he gave the answer of 54, instead of the correct 56. His error prompted widespread ridicule in the national media, accompanied by calls for a stronger emphasis on 'times table' memorization in schools. The Conservative education minister for England, a man with no education experience, insisted that all students in England memorize all their times tables up to 12 x 12 by the age of 9. This requirement has now been placed into the UK's mathematics curriculum and is likely to cause a rise in levels of math anxiety and students turning away from mathematics in record numbers.

Mathematics facts are important but the memorization of math facts through times table repetition, practice and timed testing is unnecessary and damaging. The English minister's mistake when he was asked 7 x 8 prompted calls for more memorization. This was ironic as his mistake revealed the limitations of memorization without 'number sense'. People with number sense are those who can use numbers flexibly.
When asked to solve 7 x 8 someone with number sense may have memorized 56 but they would also be able to use recall of 7 x 7 is 49 and then add 7 to make 56, or they may use recall of ten 7's and subtract two 7's (70-14). They would not have to totally rely on a distant memory. Math facts, themselves, are a small part of mathematics and **they are best learned through the use of numbers in different ways and situations.**



Unfortunately many classrooms focus on math facts in unproductive ways, giving students the impression that math facts are the essence of mathematics, and, even worse that the fast recall of math facts is what it means to be a strong mathematics student. Both of these ideas are wrong and it is critical that we remove them from classrooms, as they play a large role in the production of math anxious and disaffected students.

Some students are not as good at memorizing math facts as others. That is something to be celebrated, it is part of the wonderful diversity of life and people. In a recent brain study scientists examined students' brains as they were taught to memorize math facts. They saw that some students memorized them much more easily than others. This will be no surprise to readers and many of us would probably assume that those who memorized better were higher achieving or "more intelligent" students. But the researchers found that the students who memorized more easily were not higher achieving, they did not have what the researchers described as more "math ability", nor did they have higher IQ scores (Supekar et al, 2013). The only differences the researchers found were in a brain region called the hippocampus, which is the area of the brain that is responsible for memorized facts (Supekar et al, 2013). Some students will be slower when memorizing but they still have exceptional mathematics potential. Math facts are a very small part of mathematics but unfortunately students who don't memorize math facts well often come to believe that they can never be successful with maths and turn away from the subject.

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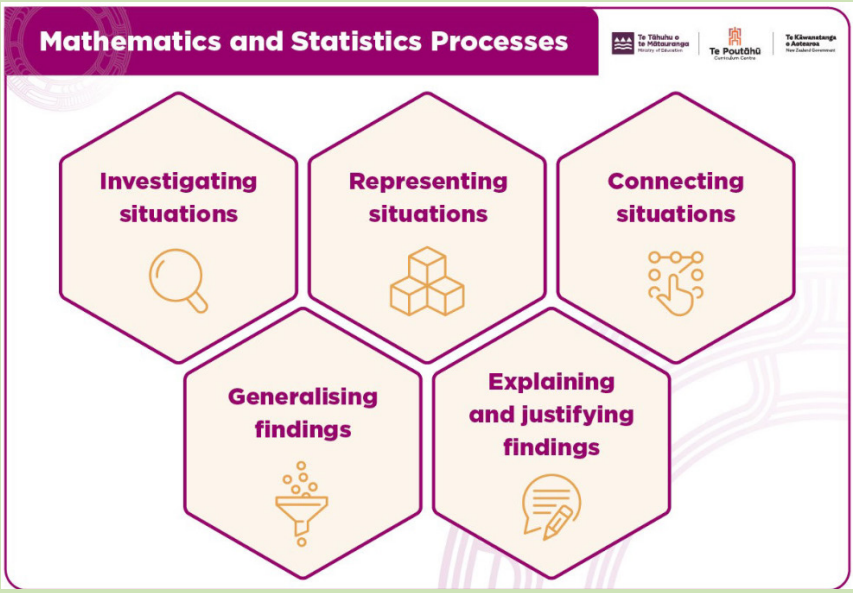
My own daughter came home in year 5 and stated she was no good at maths because she couldn't recall her divisions quick enough - she is now a very successful Financial Manager at a very large institution and a chartered accountant. What could have happened to her potential if I had let her believe that speed of recall was a measure of mathematical success? Another interesting fact is she has an inverted hippocampus (discovered during a brain scan) and was asked by the medical personnel if she had learning difficulties.

When teachers emphasize the memorization of facts, and give tests to measure number facts students suffer in two important ways. For about one third of students the onset of timed testing is the beginning of math anxiety (Boaler, 2014). Sian Beilock and her colleagues have studied people's brains through MRI imaging and found that math facts are held in the working memory section of the brain. But when students are stressed, such as when they are taking math questions under time pressure, the working memory becomes blocked and students cannot access math facts they know (Beilock, 2011; Ramirez, et al, 2013). As students realize they cannot perform well on timed tests they start to develop anxiety and their mathematical confidence erodes. The blocking of the working memory and associated anxiety particularly occurs among higher achieving students and girls. Conservative estimates suggest that at least a third of students experience extreme stress around timed tests, and these are not the students who are of a particular achievement group, or economic background. When we put students through this anxiety provoking experience we lose students from mathematics. Math anxiety has now been recorded in students as young as 5 years old (Ramirez, et al, 2013) and timed tests are a major cause of this debilitating, often life-long condition. Timed tests evoke such strong emotions that students can come to believe that being fast with math facts is the essence of mathematics. There is a second equally important reason that timed tests should not be used – they prompt many students to turn away from mathematics.

In order to learn to be a good English student, to read and understand novels, or poetry, students need to have memorized the meanings of many words. But no English student would say or think that learning about English is about the fast memorization and fast recall of words. This is because we learn words by using them in many different situations – talking, reading, and writing. English teachers do not give students hundreds of words to memorize and then test them under timed conditions. All subjects require the memorization of some facts, but mathematics is the only subject in which teachers believe they should be tested under timed conditions. Why do we treat mathematics in this way?

It is important when teaching students number sense and number facts never to emphasize speed. In fact this is true for all mathematics. There is a common and damaging misconception in mathematics – the idea that strong math students are fast math students. Many mathematicians are rather slow with numbers - this is not a bad thing, they are slow because they think deeply and carefully about mathematics.

The New Zealand 2025 curriculum the potential to cause many students harm, by increasing maths anxiety, creating mathematically disengaged students who's future will be significantly influenced by lack of confidence with mathematics. It is essential schools and teachers fully understand the curriculum. They need to develop policies that focus on delivering the curriculum in a least harmful way.



Memorisation is listed as a practice. The practices are the skills, strategies and applications to teach. You cannot teach memorisation - you can only teach in a way to help students develop the recall of maths facts - by providing the opportuity to use the facts in many different situation. Teachers and students use the mathematical and statistical processes to learn knowledge and practices and develop understanding of the big ideas.

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During first six months
- Memorising addition and subtraction facts up to 5

During the first year
- Memorising addition and subtraction facts up to 10,
- Memorising doubles and halves to 10

During the second year
- Memorising addition and subtraction facts up to 20
- Memorising doubles and halves to 20
- Memorising multiplication and corresponding division facts for 2s, 5s, and 10s

During the third year
- Memorising multiplication and corresponding division facts for 2s, 3s, 4s, 5s, 8s, and 10s

During year 4
- Memorising multiplication and corresponding division facts for 2s to 10s
- Memorising and using the decimal equivalent of ½ and fractions with denominators of 10

During year 5
- Memorising multiplication and corresponding division facts for 2s to 12s
- Memorising and using decimal equivalents of ½, ¼, and ¾ and fractions with denominators or 10 or 100

During year 6
- Memorising decimal and percentage equivalents of common fractions (½, ¼, ¾, 1/5, 2/5, 3/5, 4/5) including fractions with denominators that are 10 or 100

Teachers should help students develop math facts, not by emphasizing facts for the sake of facts or using 'timed tests' but by encouraging students to use, work with and explore numbers. as set out under the Mathematical Processes. (Follow the link on the Mathematics & Statistics curriculum overview page on Tahurangi). As students work on meaningful number activities they will commit math facts to heart at the same time as understanding numbers and math. They will enjoy and learn important mathematics rather than memorize, dread and fear mathematics.
Research tells us that the best mathematics classrooms are those in which students learn number facts and number sense through engaging activities that focus on mathematical understanding rather than rote memorization.

In conclusion:
As educators we all share the goal of encouraging powerful mathematics learners who think carefully about mathematics as well as use numbers with fluency.
Unfortunately unproductive and counter-productive classroom practices continue that often accompany the teaching of math facts – speed pressure, timed testing and blind memorization. High achieving students use number sense and it is critical that lower achieving students, instead of working on drill and memorization, also learn to use numbers flexibly and conceptually. Memorization and timed testing stand in the way of number sense, giving students the impression that sense making is not important.
We need to ensure the teaching of early number focuses on developing number sense.

If we do not then failure and drop out rates already at record highs will escalate. When we emphasize memorization and testing in the name of fluency we are harming children, we are risking the future of our ever-quantitative society and we are threatening the discipline of mathematics.

Implementing the 2025 curriculum means you must ensure you have all the parts of the curriculum which are unfortunately scattered around Tahurangi rather than in a succinct document as were previous curriculums. Progress??

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301- 500 students $400 +GST
501 - 700 students $520 + GST
701+ students $630 + GST
Non NZ School $750 - paid via paypal

Individual Membership
$60.00
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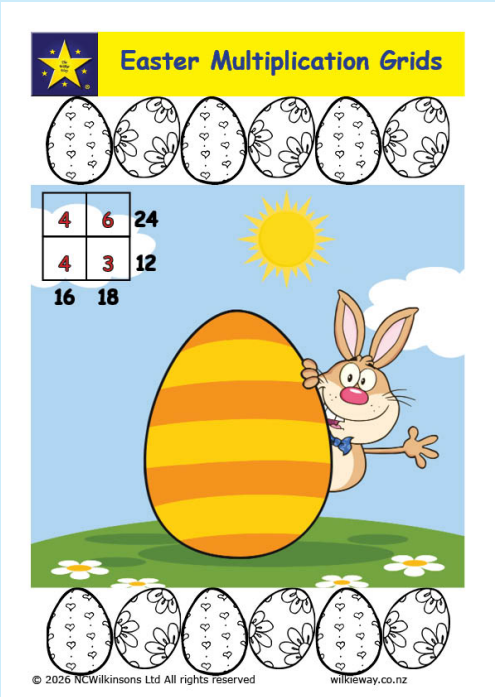
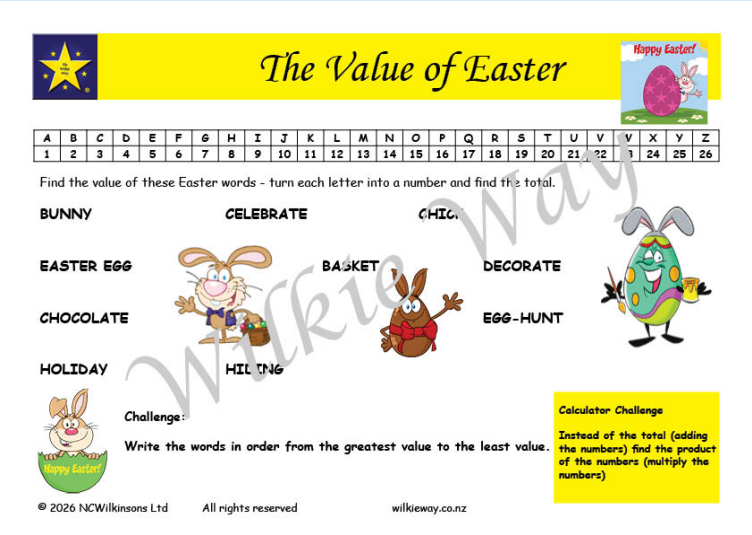
Recently uploaded resources

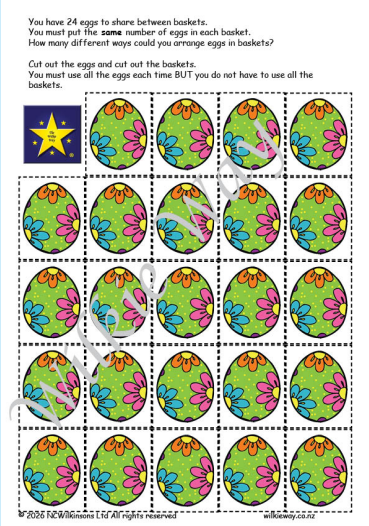
Just in time for Easter themed maths



These resources join the already uploaded Easter themed numeracy resources:
1 set of graduated problems (Phases 1 - 3)
3 extended problems (Phase 2 - 3)
2 dice and counter games (Phase 1)
2 dice and counter games (Phase 1 - 2)
1 Challenge (Phase 1 - 2)

Find these resources under the Special Occassions Icon on the directory page





Join the Facebook group:
Wilkie Way & Maths Aotearoa - a place to share how you are using these resources and inspire other teachers or to ask questions about how you could use a resource.

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