The Wilkie Way

Newsletter March 2021

www.wilkieway.co.nz

Making Maths Un-boring

Last week I read an interesting opinion piece in Stuff regarding Maths and the headlines that our students are not doing as well as they should.

I have to agree with the concern that the group of experts put together to advise on the problem are all mathematicians and/or teaching academics and the group is light on current “coalface” teachers. (Totally absent)
Teaching is a practical skill as well as an academic pursuit -Fiddling around with the curriculum is unlikely to make any difference to the practical aspects of knowing how to teach the content better.

For most students (and many adults) mathematics is seen as a pursuit of getting right answers to problems. They are assessed on getting answers and most mathematics time is spent in practicing how to get right answers. They very quickly fail to see the relevance of mathematics to their lives or to the world around them.

Students need to see mathematics as relevant to them. We need to go beyond setting problems “in meaningful contexts” but help them to see and understand a fuller story of mathematics.
What if we share with students how mathematics has shaped the world we live in, and continues to shape our world - what is the mathematics in the social studies curriculum?

Did you know:

The word calculate comes from the latin word calculus meaning a small stone
(which was what was used to represent quantities)

An example shared in the article was the encrypting of credit cards is based on knowledge of prime numbers and a 350 year old theorem. (I didn’t know that - immediately there is a reason to know about prime numbers)
What could we make relevant to the primary age student to bring mathematics alive?

Exploring number systems - there have been many number systems used and abandoned throughout history. Understanding our base ten number system is dependent on an understanding of zero as a number. A number is a representation of a quantity of something. Zero must then represent nothing of something.
It is therefore more than just a place holder.
Its position in a number represents nothing of something. The something being the column or its place in the number. (hence the term place value)

How did systems manage without a zero?

The development of number systems closely followed how numbers were used and manipulated in society.

Computers don’t use the base ten number system - they use the binary system (Groups of two so the only digit are 0 or 1)

Did you know?

Decimals were invented as a business tool (about 500 years ago) as fractions were too difficult to work with.

Discover why memory storage on computers only come in specifc numbers: 1, 2, 4, 8, 16, 32, 64 (These numbers are the “tidy numbers” in binary)

As technology develops the base ten number system is insufficent so new number systems have been invented and are used that are not yet used in everyday life but already exist.and used by certain professions.

Where did the symbols come from? The addition symbol came from the Latin word et meaning “and” t becoming +

The Arithmetic Operations handbook, *(available from the online store at www.wilkieway.co.nz)* chapter 4 will give you the historical background for the symbols.

The equals symbol = is based on two parallel lines as the inventor could think of nothing more equal than a pair of parallel lines.

Did you know?

A letter x, a dot . and an asterisk * are all symbols used today to mean multiply.

Alot of mathematics developed from observations of the world and pondering the question why? Much of this mathematics is tied up with scientific principles. Why do you get different sounds from tapping bottles or glasses with different levels of water or changing the length of a vibrating string. Even the ancient Greeks knew about producing different musical notes. It was much later before humans predicted the existence of radio waves and later still before the first radio communication was made.

Explore the use of mathematics in everyday activities - beyond operations with numbers. Explore the mathematics used in kicking a ball in a particular direction or shooting a goal in netball or basketball. Find out about the mathematics used in everyday jobs.

I am not convinced thie advice from the academics given in the venn diagrams at the beginning of each curriculum level, that our programmes in the primary years should be predominantly number based with little weighting given to geometry and measure, has had the desired effect of making our students more proficent in mathematics. I strongly suspect it has made mathematics very boring and less relevant to the world we live in. How we move around our world, everything we see or visualise requires spatial awareness, knowledge of spatial attributes, understanding of what can be measured, understanding of spatial properties and spatial reasoning.

Geometry and measure are the most language dense areas of the mathematics curriculum - without developing the vocabulary and ability to articulate, comprehend and think, how can we begin to understand and appreciate the world around us and have the inclination to apply mathematics in its number and algebraic language form.

Teachers need to change their thinking at the planning stage. Doing a two week block on strand and an eight week block on number to get the 80% number quota as recommended is not working.

I have created an overview plan for curriculum coverage for years 3 & 4 and for Years 5 & 6. (This would work equally well for years 7 & 8)

There are 8 sections as it is a two year rolling plan - each term can be repositioned. Within each term number and algebra and time are ongoing. The only suggestion I would make is for year 5 - 8 term one should have a number focus on multiplication and division, year 3 & 4 the focus in term one is addition and subtraction. Each term also includes a fraction focus rather than fractions being left to one term (or forgotten entirely). There are so many different concepts to connect in fractions that they crop up easily when you use geometry and measurement or statistics as a context.

Each term also has a unit plan to be altered as required for specific classes and for you to add the resources you are going to use.

New Resources for Wilkie Way Members

Subscriptions purchased at the online store at www.wilkieway.co.nz

Individual $45 - paid via paypal

NZ School paid via invoice - complete form at online store

Up to 100 students $150+GST

101 - 300 students $250 + GST

300+ students $350 +GST

Non NZ School $400 - paid via paypal

Planning:

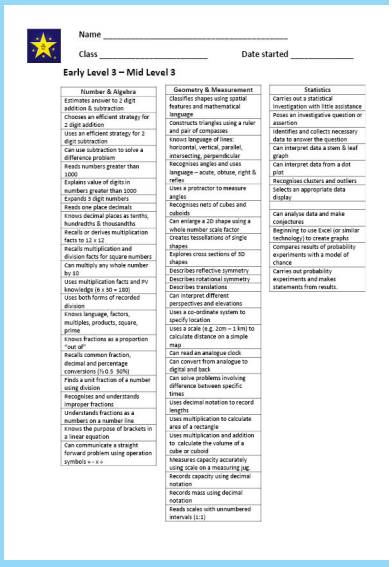
Planning folders: Year 3 & 4 (level 2) Year 5 & 6 (level 2 and 3)

1. Overview plan (two year coverage)
2. Eight unit plans
3. Curiculum content
4. Student tracking

Assessment:

Student tracking sheets are available for levels 1, 2 and 3 can also be found under the assessment heading.

Please make sure you **Become a member** BEFORE you create an account or your account will not be activated (Unless your school has a school subscription.


Name _____

Class _____ Date started _____

Early Level 3 – Mid Level 3

Number & Algebra	Geometry & Measurement	Statistics
Estimates answer to 2 digit addition & subtraction	Classifies shapes using spatial features and mathematical language	Carries out a statistical investigation with little assistance
Chooses an efficient strategy for 2 digit addition	Constructs triangles using a ruler and pair of compasses	Poses an investigative question or assertion
Uses an efficient strategy for 2 digit subtraction	Knows language of lines: horizontal, vertical, parallel, intersecting, perpendicular	Identifies and collects necessary data to answer the question
Can use subtraction to solve a difference problem	Recognises angles and uses language – acute, obtuse, right & reflex	Can interpret data a stem & leaf graph
Reads numbers greater than 1000	Uses a protractor to measure angles	Can interpret data from a dot plot
Explains value of digits in numbers greater than 1000	Recognises nets of cubes and cuboids	Recognises clusters and outliers
Expands 5 digit numbers	Can enlarge a 2D shape using a whole number scale factor	Selects an appropriate data display
Reads one place decimals	Creates tessellations of single shapes	Can analyse data and make conjectures
Knows decimal places as tenths, hundredths & thousandths	Explores cross sections of 3D shapes	Beginning to use Excel (or similar technology) to create graphs
Recalls or derives multiplication facts to 12 x 12	Describes reflective symmetry	Compares results of probability experiments with a model of chance
Recalls multiplication and division facts for square numbers	Describes rotational symmetry	Carries out probability experiments and makes statements from results.
Can multiply any whole number by 10	Describes translations	
Uses multiplication facts and PV knowledge (6 x 30 = 180)	Can interpret different perspectives and elevations	
Uses both forms of recorded division	Uses a co-ordinate system to specify location	
Knows language, factors, multiples, products, square, prime.	Uses a scale (e.g. 2cm = 1 km) to calculate distance on a simple map	
Knows fractions as a proportion "out of"	Can read an analogue clock	
Recalls common fraction, decimal and percentage conversions (½ 0.5 50%)	Can convert from analogue to digital and back	
Finds a unit fraction of a number using division	Can solve problems involving difference between specific times	
Recognises and understands improper fractions	Uses decimal notation to record lengths	
Understands fractions as a numbers on a number line	Uses multiplication to calculate area of a rectangle	
Knows the purpose of brackets in a linear equation	Uses multiplication and addition to calculate the volume of a cube or cuboid	
Can communicate a straight forward problem using operation symbols + – x ÷	Measures capacity accurately using scale on a measuring jug	
	Records capacity using decimal notation	
	Records mass using decimal notation	
	Reads scales with unnumbered intervals (1:1)	

March Featured Resource

The Wilkie Way

Problems with Dragons

Sam's pet dragon eats 2 mice and 4 worms for breakfast every day.

How many worms does he eat in a week?

How many mice does he eat in a week?

Use your answer to problem 1

Every week the dragon doubles what he eats for breakfast.

How many mice does he eat for breakfast in week 6?
How many worms does he eat for breakfast in week 6?

The pet dragon is learning to fly.
He took off at 3.45pm and flew for 28 minutes before taking a rest for 10 minutes.
He flew for another hour before returning home.

What time did he get home?

The pet dragon can fly at a speed of 20km per hour.

How far could he fly in six and a half hours?

How long will it take him to fly a distance of 48km?

Graduated Problems on a Theme

Each of the 24 themes has four problems - approximately equating to levels 1 - 4 of the NZ currciulum.

The mathematical content of the problems could come from anywhere in the curriculum - deliberately widening not narrowing the focus and provide much evidence of gaps in student knowledge. Some can be filled immediately - a teaching moment or you might choose to leave to another lesson or mentally store the information for another unit of work.

No answers are given - don't panic this is deliberately done to move teachers away from being answer focused. Ask students to explain and justify their solutions - prove their answers are correct or that they have every possible answer as many of the problems have multiple solutions.

If you give students the whole sheet (maybe not the year 1 & 2 students but give them at least the first 2 questions) then you give no ceiling to what they might achieve. They do not have to solve all the problems but having an attempt is the first step in developing perserverance and raising challenge and therefore achievement.

The Wilkie Way Teacher Challenge

Here is a challenge you could share with your students:

Using a calculator the only buttons you can use are the numbers 1, 2, 3 & 4 and the function buttons: memory, = + - x ÷ square root

Can you make the numbers from 1 to 20 using all four numbers each time and your choice of function buttons.

For example to get you started: 4 x 2 x 1 - 3 = 5
4 ÷ 2 x 3 x 1 = 6

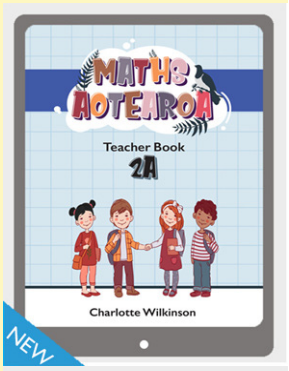
Teacher Guides and Students Texts have an important role to play in the classroom

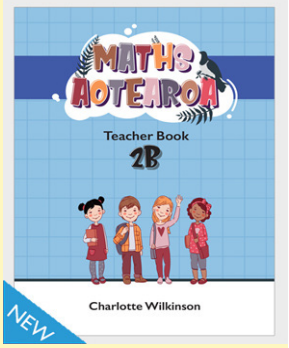
Maths Aotearoa is a programme of work that is intended to be the skeletal guide to ensure

- Full coverage of the NZ curriculum content
- Continuity and consistency across and between classes
- Confident and knowledgeable teachers of primary mathematics

Teacher books provide teacher professional knowledge building by identifying key concepts being developed and key knowledge to be built as well as specific learning outcomes.

Teaching guidance is given but the teacher books are NOT scripted. As teachers build their own knowledge they are able to listen attentively to their students to respond appropriately with questions to assist students to understand the mathematics being learnt.





Activities involve students in some practice of key knowledge but there are alot of opportunities to use or create new knowledge through short word problems and longer mini projects.

For those students who need more practice there are downloadable workbooks in the members area of www.wilkieway.co.nz

Level 2 and above are linked to the Figure Out Resources which enables teachers to plan a very rich classroom programme with a purpose rather than a series of activities.

Level 2 Teacher Books and Student Books 2a and 2b are available now.
Level 1 Teacher Books 1a and 1b and Boxes of 100 Activity Cards 1a and 1b will be available shortly.

www.edify.co.nz to contact your Primary Education Consultant

Level 3 and 4 are available as Pearson Mathematics but new editions as Maths Aotearoa will be available in the not too distant future.

