The Wilkie Way
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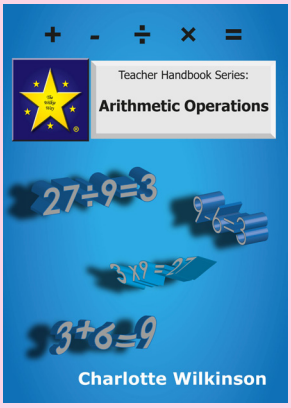
Curriculum Refresh

The long awaited information on the curriculum refresh of the Mathematics and Statistics learning area is now available. **(https://curriculumrefresh.education.govt.nz/)** All changes will be on this dedicated site so you should have it bookmarked and check regularly. Follow the **Get Involved** link to find the draft mathematics and statistics learning area.
The curriculum is designed to be cumulative (so was the last one) but instead of levels and achievement objectives we will have progressions. We already have progressions for mathematics on the curriculum progress website and mathematics in particular is hierarchical so these progressions will not significantly change. However the curriculum is organised into five phases of learning with each phase containing progress outcomes that describe what students should understand, know and do. (UKD)

The phases are organsied as Years 0 - 3 Years 4 - 6 Year 7 - 8 Years 9 - 10 Years 11 - 13

The “know” and “know how to” sections give the curriculum content. The progress outcomes for end of each phase have been published and pleased to see a slightly higher expectation set for phase one. Gone are multiple ways to get an answer but place value and basic facts are still essential knowledge.
Effectively in transitioning our thinking

Year 0 - 3	level 1 and much of level 2 (Proficient with addition and subtraction by end of this phase)
Year 4 - 6	remaining level 2 and all of level 3 (proficient with multiplication and division by end of this phase)
Year 7 - 8	level 4 - extending number knowledge to include positive and negative integers



I am really pleased to see that rational numbers (fractions & decimals) are clearly identified to cover the multiple representations. No more two week topic on fractions - fractions are an extension of numbers not a topic and the fraction symbol must be understood in all it representations - fractions every term.
Arithmetic properties (conceptual ideas) are much more apparent - even using the terminology commutative, associative and distributive properties, multiplicative identity (1), additive identify (0), inverse relationship. (Chapter 5 Arithmetic Properties from this book has been uploaded to members area of wilkieway.co.nz. Book available from online strore)

I have been informed that progress outcomes for the intervening years are being written although if you understand and use the progressions (which don’t fit nicely into the phases) it is likely you will get from A to B with consistency and continuity.
Using progressions makes assessment for learning an ongoing process integral to teaching and learning which of course is the primary purpose of assessment.
However if the end of phase (year) progress outcomes are used as a summative measure for setting targets or any form of summative reporting we are right back at National Standards.

Understand: This section is the same for all phases and identify the “Big Ideas”
Mathematics and Statistics:

- helps us make sense of the word
- have a continuous, evolving human history
- are elegant, explorative, creative and powerful
- help us in our everyday lives and decisions and are key to many areas of knowledge and practice
- reward persistence and positivity

K**now:** Six contexts for what students should know, these are expanded in the progress outcomes currently by phase: Number, Algebra, Measurement, Space, Statistics , Probability (*Why we have to have the word Space instead of Geometry I do not know as most students would automatically think astronauts and outer space given the topic heading Space.*

Do: Focuses on the mathematical and statistical practices
- Modelling and investigating
- Representing
- Connecting
- Generalising
- Reasoning
- Communicating

(I shall look at these in more detail in newsletters next year - they are well written, I can't disagree with any of the practices but I know many people (teachers, students and other stakeholders) will be struggling with a big mindshift in attitude and long held beliefs about mathematics.

Looking a little wider than New Zealand; Maths expert groups from PISA has four main categories to describe what constitutes mathematics. Reading these helps you to think about your beliefs on what constitutes mathematics and how mathematics exists outside of the classroom and the next lesson for your students.

1. Quantity:
This overarching idea focuses on the need for quantification to organise the world.
Important aspects include:
- understanding of relative size,
- recognition of number patterns
- ability to use numbers to represent quantifiable attributes (measures)
- processing and understanding numbers that are represented in various ways
- quantity reasoning, developing and using number sense
- understand the meaning of operations (addition, subtraction, multiplication & division)
- writing and understanding equations and expressions
- estimation and mental arithmetic

2: Shape & Space
Patterns are encountered everywhere around us: in spoken words, music, video, traffic, art etc. Shapes can be regarded as patterns: houses, office buildings crystals etc. Geometric patterns can serve as simple models of many kinds of phenomena, we look for similarities and differences as we analyse the components of different forms.
Important aspects include:
- understand properties of objects and their relative positions
- be aware of how we seek things and why we see them as we do
- learn to navigate through space and through constructions and shapes
- understand the relationship between shapes and images (visual representations)
- understand how 3D objects can be represented in 2 dimensions
- how shadows are formed and interpreted
- know what is perspective and how it functions

3. Change and Relationships
Every natural phenomen is a manifestation of change, and in the world around us a multitude of temporary and permanent relationships are observed: organisms changing as they grow (COVID) cycle of the seasons etc. Many relationships fall into different categories requiring data analysis to determine the kind of relationship present. Mathematical relationships often take the shape of equations or inequalities. Functional thinking - thinking in terms of and about relationships is one of the fundamental aims of teaching mathematics.
Relationships can take a variety of different representations including symbolic, algebraic, graphic, tabular and geometric. As a result translation between representations is often of key importance in dealing with mathematical situation.

4. Uncertainty
Our information driven society offers an abundance of data, often presented as accurate and scientific with a degree of certainty. But in daily life we are confronted with unreliable weather forecasts, poor predictions of economic growth and many other demonstrations of the uncertainty of our world. Specific mathematical concepts and activities that are important in this area include collecting data, data analysis, data display and visualization, probability and inference.

There has been a slight price increase for subscription.
The individual subscription is now $50 payable via paypal
School subscriptions have for most schools remained the same except for small schools (under 30 students) and for larger schools (over 500 students)

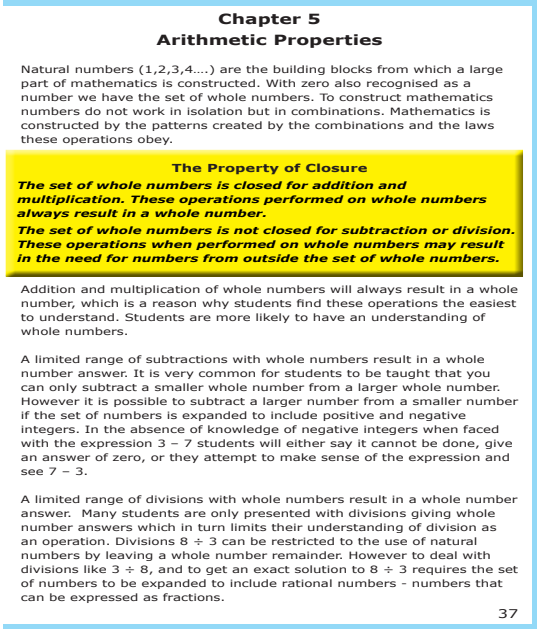
Subscribe during November or December and your renewal will be February 2024 (3 months free) Schools who have closed budgets can request invoice for February 2023 but have access to the website from date of request.

Use the planning overview and unit plans to simplify your planning for 2023. Don't spend every weekend planning maths.
Student resources from Wilkie Way and NZMaths provide sufficent resources to design a classroom programme.

New Resources for Wilkie Way Members

Subscriptions purchased at the online store at www.wilkieway.co.nz
Individual $50 - paid via paypal
NZ School paid via invoice - complete form at online store
Under 30 Students $50 + GST 30 to 100 students $150+GST
101 - 300 students $250 + GST 301- 500 students $350 +GST
501 - 700 Students $450 + GST 701+ Students $550 + GST
Non NZ School $650 - paid via paypal

Teacher Professional Resources: Professional Reading
Arithmetic Properties



Chapter 5
Arithmetic Properties

Natural numbers (1,2,3,4....) are the building blocks from which a large part of mathematics is constructed. With zero also recognised as a number we have the set of whole numbers. To construct mathematics numbers do not work in isolation but in combinations. Mathematics is constructed by the patterns created by the combinations and the laws these operations obey.

The Property of Closure

The set of whole numbers is closed for addition and multiplication. These operations performed on whole numbers always result in a whole number.

The set of whole numbers is not closed for subtraction or division. These operations when performed on whole numbers may result in the need for numbers from outside the set of whole numbers.

Addition and multiplication of whole numbers will always result in a whole number, which is a reason why students find these operations the easiest to understand. Students are more likely to have an understanding of whole numbers.

A limited range of subtractions with whole numbers result in a whole number answer. It is very common for students to be taught that you can only subtract a smaller whole number from a larger whole number. However it is possible to subtract a larger number from a smaller number if the set of numbers is expanded to include positive and negative integers. In the absence of knowledge of negative integers when faced with the expression 3 – 7 students will either say it cannot be done, give an answer of zero, or they attempt to make sense of the expression and see 7 – 3.

A limited range of divisions with whole numbers result in a whole number answer. Many students are only presented with divisions giving whole number answers which in turn limits their understanding of division as an operation. Divisions 8 ÷ 3 can be restricted to the use of natural numbers by leaving a whole number remainder. However to deal with divisions like 3 ÷ 8, and to get an exact solution to 8 ÷ 3 requires the set of numbers to be expanded to include rational numbers - numbers that can be expressed as fractions.

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This reading will explain all the terminology of arithmetic properties in simple classroom based contexts (with representations) so you will recognise what these properties actually look like in student learning experiences. This knowledge enables you to be better able to plan for, and ask the right questions and model appropropriate representations to assist them to notice the properties.

Students don't need to be able to recite the names of the properties they need to generalise the properties so they become transferable knowledge when students are workIng with numbers in any context.

It is time to order your assessment screens for 2023

Students have many more gaps than usual due to two years of interrupted education.
Many schools are now screening students for known knowledge, gaps in knowledge and next learning steps. These assessments screen for the essential knowledge students need inorder to make progress. Use the screen at the beginning of the year and reuse the same screen at the end of the year for students to notice (as well as you) just how much new knowledge they have learnt over the school year.

The primary purpose of this assessment is teaching and learning and while set against curriculum levels these are a guide only and giving students a summary level is not a necessary part of the assessement but means they can be used for reporting purposes if required.

Order your screens using the attached order form (rather than through the online store) gives you a 15% discount and payable on an invoice sent with the screens at the beginning of term 1. (Unless requested, some schools opt to pay in advance)

Forms must be returned by the end of term 4 to allow for bulk printing in time for delivery at the beginning of term 1. (Yes the printers have a summer break too!)

These screens identify the key knowledge students need to be acquiring in order to progress successfully across all the progressions not just the progressions listed below. The signposts, taken from the learning progressions (curriculum progress tools) are indicative.

Screen	Level 1	Level 2	Level 3	Level 4
Whole Number Place Value	Additive Thinking Signpost 3 - 4	Additive Thinking Signpost 4 & 5	Additive Thinking Signpost 6 & 7	Additive Thinking Signpost 8
Addition & Subtraction	Additive Thinking Signpost 3 - 4 Symbols & Expressions Signpost 2	Additive Thinking Signpost 4 & 5	Additive Thinking Signpost 6 & 7 Symbols & Expressions Set 4	Additive Thinking Signpost 7 & 8
Multiplication & Division	Multiplicative Thinking Signpost 2 - 3 Symbols & Expressions Signpost 2 - 3	Multiplicative Thinking Signpost 3 & 4 Symbols & Expressions Signpost 3	Multiplicative Thinking Signpost 4, 5 & 6 Symbols & Expressions Signpost 4	Multiplicative Thinking Signpost 6, 7 & 8
Fractions		Multiplicative Thinking Signpost 3 & 4	Multiplicative Thinking Signpost 5 & 6	Multiplicative Thinking Signpost 6 & 7
Decimals & Percentages			Multiplicative Thinking Signpost 5 & 6	Additive Thinking Signpost 7 & 8 Multiplicative Thinking Signpost 8

