The Wilkie Way
Newsletter August 2025
www.wilkieway.co.nz

Using Representatives to Explore Numbers

I have started to use the term “representatives” rather than “materials” to make it explicit what the materials are used for. Teachers often think materials are required because young children need hands on activities so materials have long been used in junior classrooms but have virtually disappeared from senior classrooms.
The use of materials is not much to do with kinesthetic learning. Just one of the uses is they give students something to do when they are attempting efferent listening.

Efferent listening - is listening to learn - this type of listening can only be sustained for a very short period of time (a matter of minutes) without the listener actively doing something.

An often cited down side of using materials is students “play” with the materials so the teacher takes the materials away and resorts to verbal explanation around written equations and expressions.
This does not lead to students developing an understanding about numbers and number relationships and generally leads to students learning a procedure to calculate. This allows them to get right answers in the short term but does not provide the foundation for thinking mathematically, developing number sense and using algebra.

So what do the materials represent? At the simplest level the materials represent numbers. Numbers are abstract, in order to make sense of a number it must be represented by something. Two only exists if there are two of something.

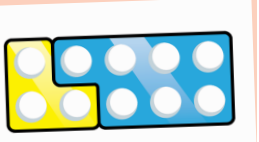
Zero can only be accepted as a number if it represents “nothing of something”

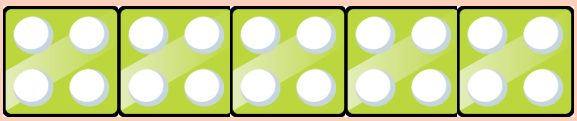
In the classroom we must use a variety of number representatives:

Counters: - limits students to counting - an essential first step for gaining 1 - 1 correspondence and understanding the count - the last number said tells you how many and the next counting number is the result of adding one more.

Double sided counters: Useful for exploring relationships between number bonds. Four red and one yellow becomes 3 red and 2 yellow by turning over one counter. Useful for the development in the understanding of equivalence and the inverse relationship between addition and subtraction.

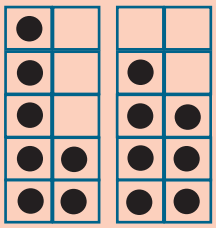
Number shapes:- (Numicon) Useful to support students to subitise numbers *(see without counting).* They are designed to encourage students to notice and talk about relationships between numbers by contrasting, comparing, combining. ordering, and exploring quantity and equivalence. They can also be used for supporting student understanding of multiplication as repeated addition.



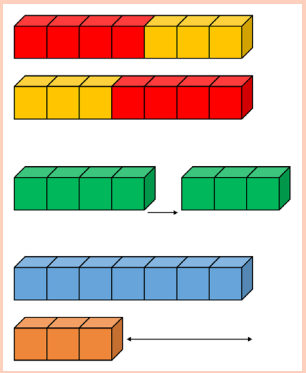


They can also support student understanding of division as grouping by making the number they are dividing then place the number shape they are dividing by over the top of the number to find out how many groups. This supports the inverse relationship between multiplication and division.

Tens frames:- a set pattern assisting students to subitise and notice relationships. For example seven is 5 + 2 on a quinary tens frame.
Using a doubles tens frame a different relationship is exposed 4 + 3 = 7
leading to using doubles (known facts) to reason unknown facts. 3 + 3 + 1 or 4 + 4 - 1



Unifix cubes:- Useful for exploring part/part whole relationships making use of colour - joining two numbers, partitioning a number and comparing to find the difference between two numbers.

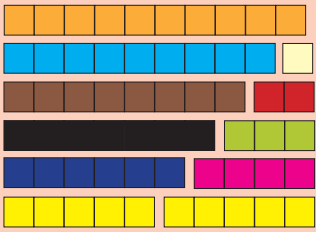


These last three representatives can also be used for exploring larger numbers using a group of ten.

15 as ten and five 25 as two tens and five etc

The relationship between 5 + 2 and 15 + 2 and 25 + 2 , 50 + 20 etc

Number strips /rods:- While number rods (cuisinaire) can be useful they are dependent on students assigning a number to a colour and while some students have no problem with this there are some for whom this representative makes little sense. A linear model of numbers is very useful (as per unifix cubes) I prefer to use a number strip, (like numeracy project animal strips). A set of number strips is available in the equipment resources section in the members area of the Wilkie Way website.



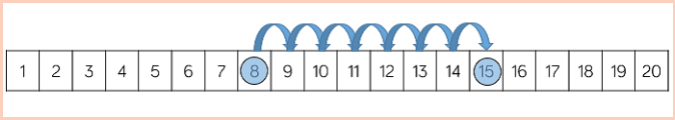
Number strips while providing a linear model for addition and subtraction can be arranged in an array model to represent multiplication leading to the understanding of the commutative property of multiplication.

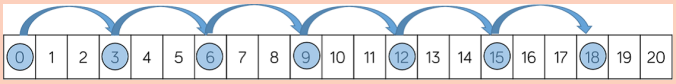
4 + 4+ 4

3 + 3+ 3 + 3

3 x 4 = 4 x 3

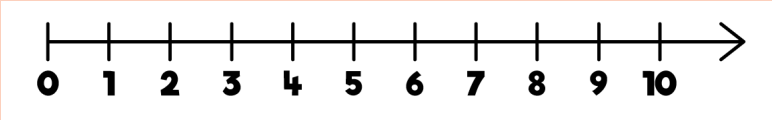
Number tracks:-



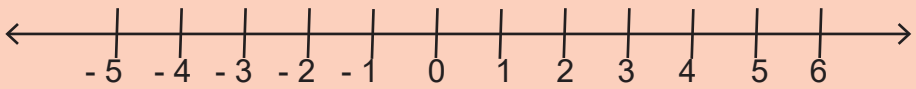


Useful to assist students in counting on to find a total, by placing a counter (or peg) on the starting number and count on to find the total (end number). This develops the understanding of addition as "adding some more" rather than joining two sets.
(The same understanding is used when playing board games like snakes and ladders)
Useful for supporting students to count in multiples forwards and backwards.

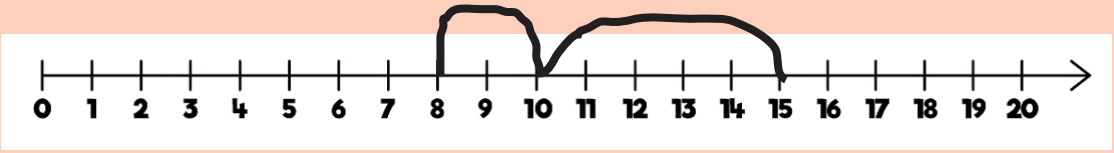
Number Lines:-



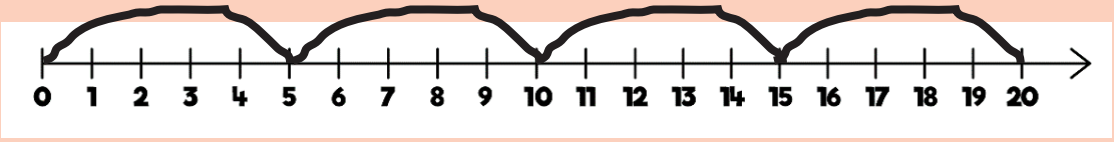
The number line is far more sophisticated than a number track. The quantity is represented by the distance between the numbers (a measurement). This allows for zero and the possibility of fractions between the whole numbers. Counting on a number line involves counting the number of "jumps". Counters cannot be used.
Extending the number line to the left of zero allows for the representation of negative integers.



The number line representation assists students in seeing numbers in a sequence so they can see the closest decade: e.g. 8 + 7 = 8 + 2 + 5

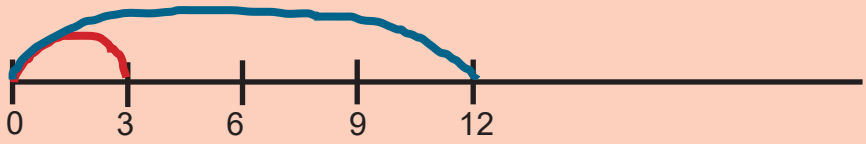


It supports skip counting sequences.



A double number line supports proportional thinking.

Blank number lines:- provide a structure for students to add and subtract numbers in smaller parts.
They can be effectively used to find the difference between two numbers.
They can be used to represent scaling as multiplication or division. 3 x 4

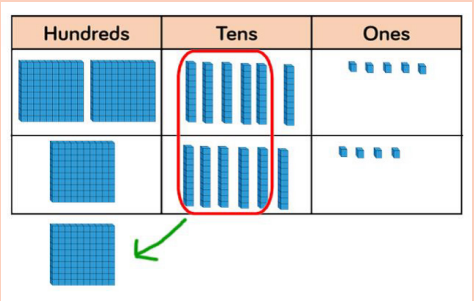


Blank number lines can be used with any size number, but to understand the place value structure of groups of ten then further representatives are required.

Initially materials that can be actively grouped into tens - for example **straws, iceblock sticks, unifix.** These representatives assist students in making sense of the rules of the number system. Everytime you make a group of ten you move one column to the left.

I use 10 beans in a small plastic bag, 10 small plastic bags into a larger plastic bag (100), ten large plastic bags into a bucket (1000)

Dienes (base 10):- once students understand the number system is based on the repeated groupings of ten then Dienes representations become the representation of choice for modeling calculations.

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 2 6 5
+1 6 4
 4 2 9
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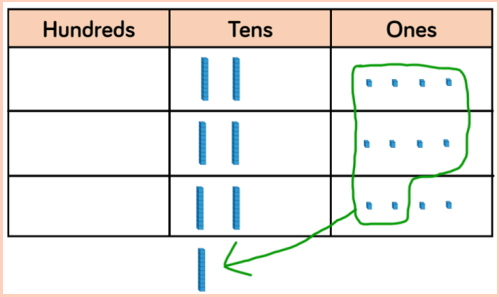


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 2 4
x  3
 7 2
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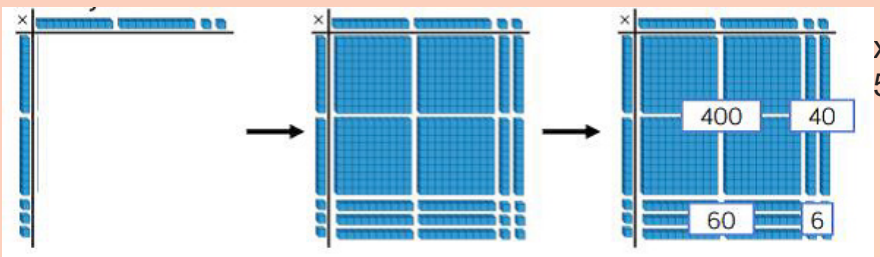


```
 2 2
x 2 3
5 0 6
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Supports the area model of multiplication linked to the grid method and the formal column method for double digit multiplication.

New Resources for Wilkie Way Members

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

Individual $60 - paid via paypal

NZ School paid via invoice - complete form at online store

Under 30 Students $65 + GST 31 to 100 students $180+GST

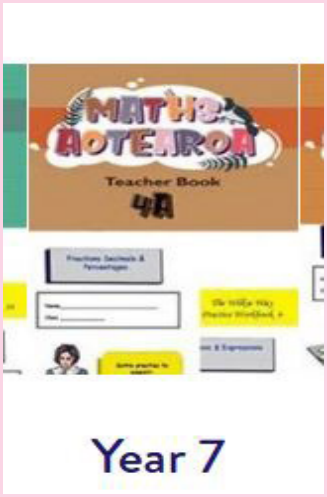
101 - 300 students $290 + GST 301- 500 students $400 +GST

501 - 700 Students $520 + GST 701+ Students $630 + GST

Non NZ School $750 - paid via paypal

Under the new section Equipment Resources you can find:

- Digit cards
- Fraction Cards
- Function machines
- Number cards
- Place value houses
- Place value money
- Bead frames
- Decimats
- Doubles tens frames
- Hundred array board
- Hundreds board (4 versions)
- Month wheel
- Multiplication circles
- Number strips
- Twenties frames
- Week wheel



Year 7 Maintenance sheets have been added.
10 sheets to revise learning from year 6.
(Answers provided)

(Year 3 - 6 previously uploaded)

The Wilkie Way Teacher Challenge

Find the rule to complete the missing number in the last triangle.