era 2015 WINNER

numicon

Introducing Numicon 6

Build a secure future in mathematics for every child

OXFORD

Award-winning whole curriculum Maths resources

Preparation for Formal Testing: self-assessment, fluency and problem-solving strategies

Investigations: inspiring mathematical investigations to deepen understanding and stretch your highest achievers

With resources and professional development from Early Childhood to Level 4 NZ Curriculum Level plus support for Intervention and Inclusion, *Numicon* provides all you need to create confident mathematicians throughout your whole school.

- Embodies the NZ Curriculum Levels pre Level 1 – 4 by developing fluency, mathematical reasoning and problem-solving
- Structured apparatus and imagery ensures children master the skills needed to gain deep understanding
- Ensures every child meets end of year expectations and National Standards with robust and reliable assessment tracking
- Professional learning is built in, however *Numicon* is supported by professional development courses for sustained school improvement

Supporting you in teaching the NZ curriculum

With resources for Numeracy, Algebra, Geometry, Statistics and Measurement, you can teach right across the NZ Curriculum Level 4 with confidence. Typically this is in Years 7 and 8. If your whole school is using *Numicon* as your programme, then your Year 6 students will be working at this level with success and confidence.

Numicon 6 also introduces two new features:

Self assessment in preparation for formal assessments, fluency in problem-solving strategies
Investigations: Inspiring mathematical investigations to deepen understanding and stretch your highest achievers

Autumn 2016

Numicon 6

Covering key topics such as algebra, ratio and proportion, calculating with fractions, long division, coordinates in four quadrants, finding the mean and pie charts, the **Activity Groups** have careful progression and adaptable, easy-to-follow steps built in.

For assessment, the **Explorer Progress Books** allow you to gather evidence of each child's understanding, and the regular **Milestones** enable you to track their progress throughout the year. The **Explore More Copymasters** provide fun activities for children to practise and discuss maths at home.

All you need for Numicon 6:

Number, Pattern and Calculating 6 Easy Buy Pack

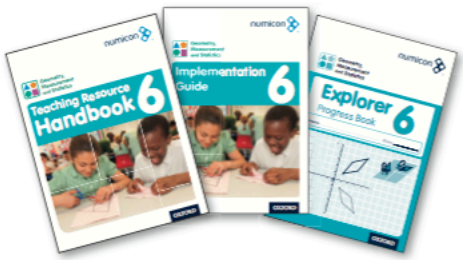
Contains:

- Number, Pattern and Calculating 6 Teaching Resource Handbook and Implementation Guide
- Number, Pattern and Calculating 6 Explorer Progress Books A, B and C (30 copies of each)
- Number, Pattern and Calculating 6 Explore More Copymasters

Geometry, Measurement and Statistics 6 Easy Buy Pack

Contains:

- Geometry, Measurement and Statistics 6 Teaching Resource Handbook (includes Explore More Copymasters) and Implementation Guide
- Geometry, Measurement and Statistics 6 Explorer Progress Book (Pack of 30)



Starter Apparatus Pack C

Contains a new selection of apparatus ready for every element of the Year 6 curriculum.

Numicon Online

Online support to introduce and implement *Numicon* in your school. Find editable planning documents, assessment tracking and video guidance on implementation.

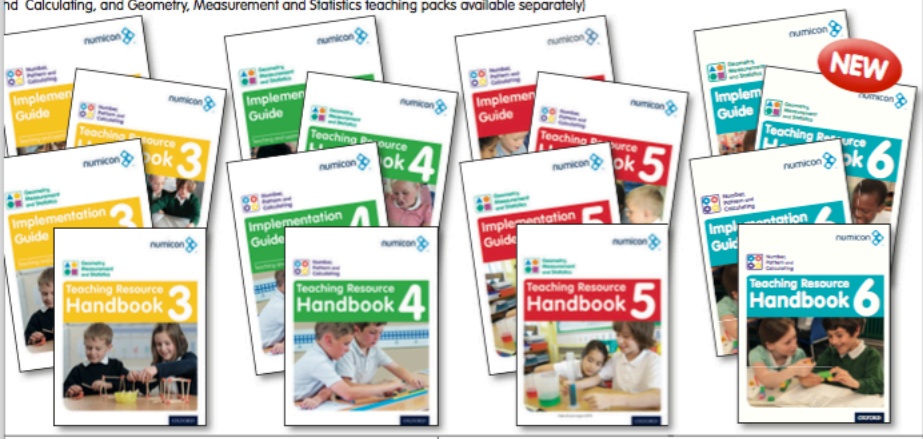
Numicon overview chart

	NURSERY	FOUNDATION	AGE 5–6	AGE 6–7
TEACHING SUPPORT	1ST STEPS WITH NUMICON IN THE NURSERY KIT	NUMICON FIRM FOUNDATIONS KIT	Teachin (Number, Pattern a	
APPARATUS			STARTER APPARATUS PACK A	
ASSESSMENT			(Three Explorer Progress Books for Nu	
ACTIVITIES FOR HOME	1ST STEPS WITH NUMICON AT HOME KIT			

AGE 7–8 | AGE 8–9 | AGE 9–10 | AGE 10–11

g Resource Handbook and Implementation Guide

nd Calculating, and Geometry, Measurement and Statistics teaching packs available separately)

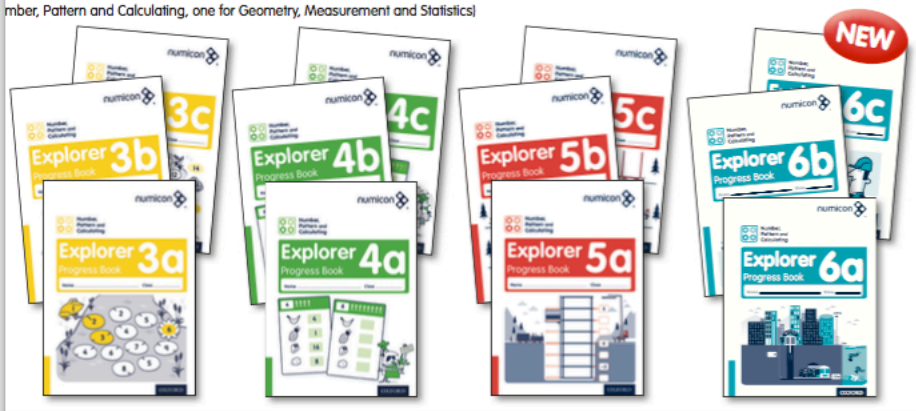


STARTER APPARATUS PACK B

STARTER APPARATUS PACK C

Explorer Progress Books

mber, Pattern and Calculating, one for Geometry, Measurement and Statistics)



Explore More Copymasters

NUMICON ONLINE ONLINE PLANNING AND ASSESSMENT SUPPORT

ALSO AVAILABLE

Investigations with Numicon:

A supplementary teaching manual and apparatus pack to stretch children in Level 2

ALSO AVAILABLE

Breaking Barriers

Designed specifically for students with High Learning Needs or those experiencing learning difficulties with maths requiring long-term intervention

Number, Pattern and Calculating 6 Teaching Resource Handbook

Sample activity group

Key mathematical ideas Generalizing, Pattern and algebra, Functions, Inverse, Equivalence, Mathematical thinking and reasoning

Pattern and Algebra

Using symbols and letters for variables and unknowns

4

Educational context

In this activity group, children continue to explore how to describe general situations and rules mathematically. They are supported to express patterns numerically, e.g. as sequences and functions, and to identify and describe relationships between numbers, e.g. as formulae. This links to children's work with formulae in the *Geometry, Measurement and Statistics 6 Teaching Resource Handbook*, Measurement 3. This leads into describing general rules which apply in any instance of the same type of situation, and, building on their work in Pattern and Algebra 3, to expressing these rules concisely using algebra, with letters standing for unknown values and variables. For example, in Activity 6 they work out how to describe the commutative property of adding two numbers – the property that the order in which the numbers are added doesn't matter – more succinctly, as $a + b = b + a$.

Connecting with the work of Pattern and Algebra 2, we explore general rules of divisibility for help in finding factors.

Learning opportunities

- To describe a numerical pattern or general relationship in words and algebraically, as a formula.
- To recall and use tests of divisibility by 2, 3, 5, 9 and 10.
- To describe and explain the commutative property of adding and multiplying.

Words and terms for use in conversation

algebra, algebraic notation, symbol, generalize, reasoning, logic, systematic, show, prove, pattern, sequence, constant difference, term, first term, term-to-term rule, predict, relationship, general rule, general term, *n*th term, unknown, variable, value, expression, equation, equivalent, inverse, function, function machine, input, output, divisibility, test of divisibility, factor, multiple, prime, composite, commutative property, associative property, number trio, part–whole relationship

Assessment opportunities

Look and listen for children who:

- Use the words and terms for use in conversation effectively.
- Can identify the term-to-term rule in a linear sequence, e.g. in the sequence 38, 43, 48, 53, … the term-to-term rule is 'add 5'.
- Describe a rule for finding the general term of a linea sequence and express this with an algebraic expres e.g. $5n + 33$ in Activity 1.
- Can explain algebraically how 'think of a number' problems work.
- Can explain the general relationship between an 'inp (*x*) and an 'output' (*y*) for a particular function (e.g. fo function described by $y = 3x$, *y* is always three times is always one third of *y*).
- Can identify a missing input or output for a given function machine, and a missing instruction, e.g. '× 3' for a given set of inputs and outputs.
- Can write an equation to show the general relationship between input and output for a given function, represented as *x* and *y* respectively, e.g. $y = 3x$.
- Use tests of divisibility to sort numbers.
- Describe the commutative properties of adding and of multiplying in general terms, including algebraically, e.g. $a + b = b + a$, $ab = ba$.
- Can explain why adding and multiplying are commutative, while subtracting and dividing are not.

Explorer Progress Book 6b, pp. 20–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.
Children will also have the opportunity to complete their Learning Log (pp. 22-23) where they can reflect on the mathematics they have done so far.

Explore More Copymaster 4: Secret Function Machine

After completing work on Activity 4, give children Explore More Copymaster 4: Secret Function Machine to take home.

Clear assessment opportunities for every activity group.

Explorer Progress Book pages help you assess children's understanding of the central ideas from the activity group.

A clear outline of the content covered in the activity group and how it connects with other activity groups.

Explore More Copymasters give children a further opportunity to practise at home what they have been learning in class.

Focus activities are broken down into easy-to-follow steps.

'Look and listen for…' points help you to assess how children are responding to activities.

Concrete materials help illustrate children's thinking and reasoning.

Geometry, Measurement and Statistics 6 Teaching Resource Handbook

Sample activity group

Key mathematical ideas provide a summary of important concepts children will meet in the activity group.

Key mathematical ideas Representing and interpreting data, Speed and Distance **Measurement**

Statistics and graphs 1

Educational context

This activity group involves children working with data to calculate the mean, or average, of the set. This allows them to compare different data within the same context, for example growing green beans. They move on to looking at estimated values in the context of packaging food, and how the mean is affected by different values in the set. They also consider 'outliers' and how they can skew an average to be higher or lower.

This activity group builds on the work on charts and graphs in the *Geometry, Measurement and Statistics 5 Teaching Resource Handbook*, Measurement 2.

Later in the activity group, they consider average speed and how to plot distance-time graphs to show speed. They extend this to plotting more data points for distance and time, and discuss how the gradient of the graph shows the speed. These activities develop work in the *Number, Pattern and Calculating 6 Teaching Resource Handbook*, Pattern and Algebra 2, where children plot graphs showing fuel used and distance travelled, and discuss how this relates to speed.

Learning opportunities

- To become familiar with the mean as an average of a set of data.
- To know how to calculate the mean (sum of all data divided by the number of data points).
- To work with different units for speed and convert between them (e.g. m/s to km/h).
- To convert between metric and imperial units (kilometres and miles).
- To plot distance-time graphs and understand how they can be used to work out speed.

Words and terms for use in conversation

data, data set, survey, sample, sample size, value, maximum, minimum, range, spread, statistic, statistician, average, mean, outlier, skewing, central, rate, conversion, rate, speed, metre, kilometre, mile, second, minute, hour

Assessment opportunities

Look and listen for children who:

- Use the words and terms for use in conversation effectively.
- Calculate the mean from a given data set.
- Explain that an outlier can skew a data set.
- Present, interpret and read data on distance-time graphs.
- Use distance-time graphs to calculate average speed.

Explorer Progress Book 5, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

Explore More Copymaster 4: Finding The Mean

After completing work on Activity 2, give children Explore More Copymaster 4: Finding The Mean to take home.

Important words and terms are highlighted for use in mathematical conversation.

Topics are introduced through real-life scenarios. In this activity group, children learn about fractions, e.g. finding the mean size of a set of beans.

The learning opportunities come from real classroom experiences and are designed to help children develop their understanding of the key ideas in each activity group.

A clear list of the apparatus used to support learning is provided at the start of every focus activity.

Careful progression is built into every activity group, and across the whole teaching programme, helping children to become fluent through understanding.

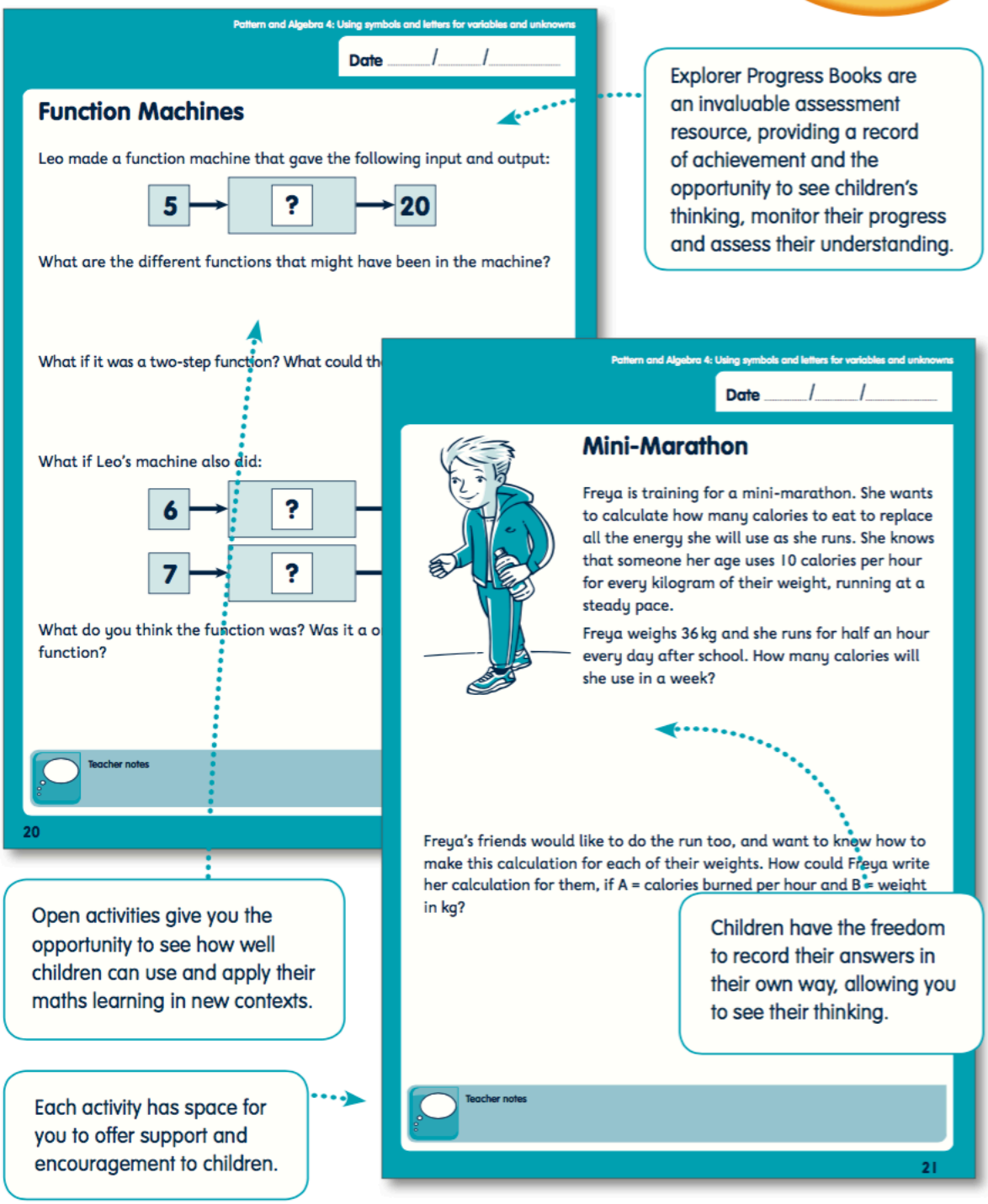
Opportunities for whole-class, paired and individual practice activities are included in every activity group to give children the opportunity to build on their knowledge, deepen their thinking and develop their mathematical conversations with others.

Practice and discussion

Using and applying is supported through use of real-life contexts.

Number, Pattern and Calculating 6
Explorer Progress Book 6b
Sample pages

FOR ASSESSMENT



Explorer Progress Books are an invaluable assessment resource, providing a record of achievement and the opportunity to see children's thinking, monitor their progress and assess their understanding.

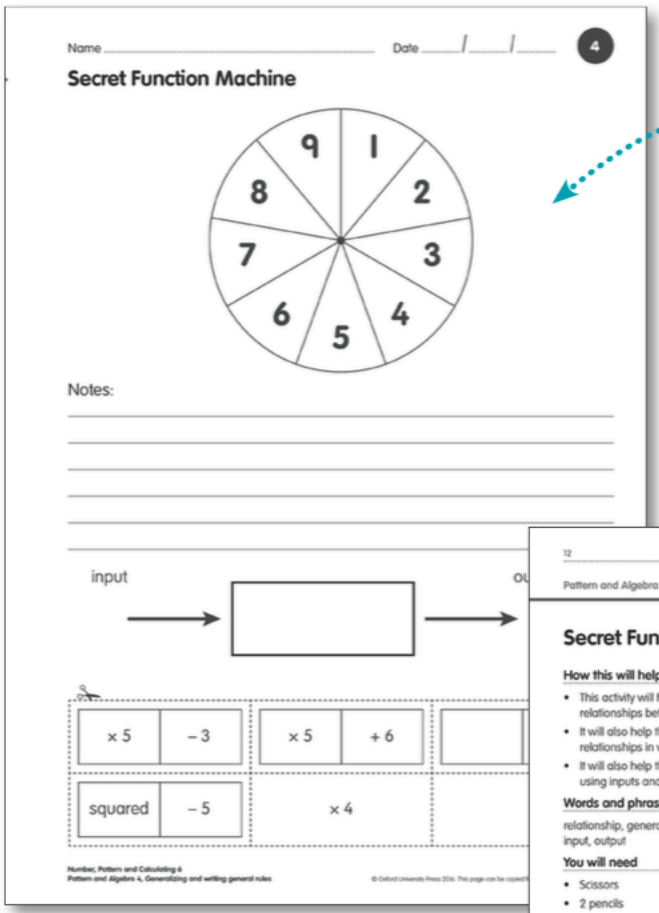
Open activities give you the opportunity to see how well children can use and apply their maths learning in new contexts.

Children have the freedom to record their answers in their own way, allowing you to see their thinking.

Each activity has space for you to offer support and encouragement to children.

Number, Pattern and Calculating 6
Explore More Copymasters
Sample pages

FOR HOME


Name _____ Date ___/___/___ 4

Secret Function Machine

9 1 2 3 4 5 6 7 8

Notes:

input

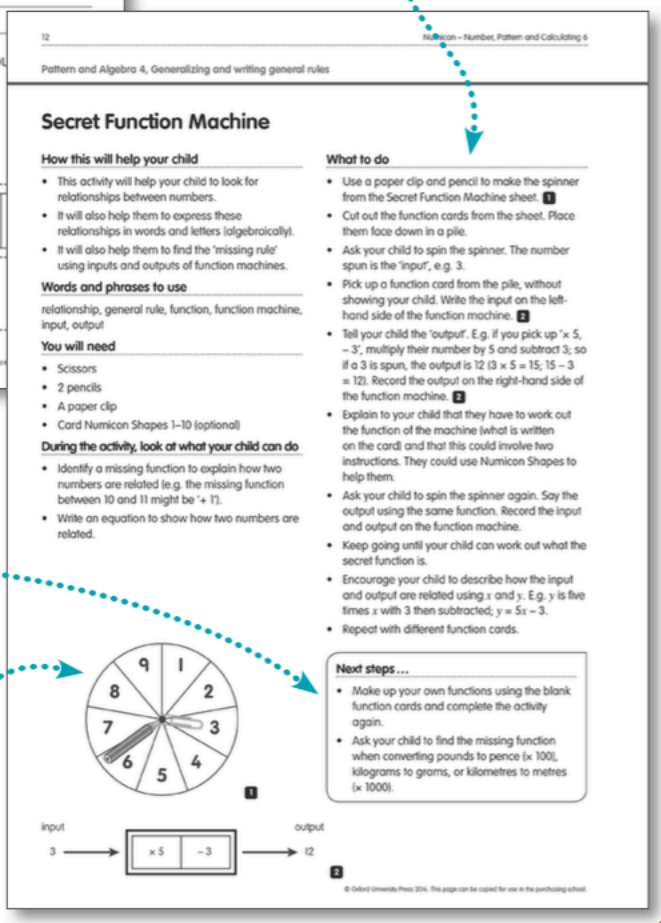
× 5 | − 3 | × 5 | + 6 |

squared | − 5 | × 4 |

Number, Pattern and Calculating 6
Pattern and Algebra 4, Generalizing and writing general rules

Activities for home offer further opportunities for children to explore maths in an engaging way.

Short, simple instructions guide parents through the activity.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Pattern and Algebra 4, Generalizing and writing general rules

Secret Function Machine

How this will help your child

- This activity will help your child to look for relationships between numbers.
- It will also help them to express these relationships in words and letters (algebraically).
- It will also help them to find the 'missing rule' using inputs and outputs of function machines.

Words and phrases to use

relationship, general rule, function, function machine, input, output

You will need

- Scissors
- 2 pencils
- A paper clip
- Card Numicon Shapes 1–10 (optional)

During the activity, look at what your child can do

- Identify a missing function to explain how two numbers are related (e.g. the missing function between 10 and 11 might be '+ 1').
- Write an equation to show how two numbers are related.

What to do

- Use a paper clip and pencil to make the spinner from the Secret Function Machine sheet. 1
- Cut out the function cards from the sheet. Place them face down in a pile.
- Ask your child to spin the spinner. The number spun is the 'input', e.g. 3.
- Pick up a function card from the pile, without showing your child. Write the input on the left-hand side of the function machine. 2
- Tell your child the 'output'. E.g. if you pick up '× 5, − 3', multiply their number by 5 and subtract 3; so if a 3 is spun, the output is 12 (3 × 5 = 15; 15 − 3 = 12). Record the output on the right-hand side of the function machine. 2
- Explain to your child that they have to work out the function of the machine (what is written on the card) and that this could involve two instructions. They could use Numicon Shapes to help them.
- Ask your child to spin the spinner again. Say the output using the same function. Record the input and output on the function machine.
- Keep going until your child can work out what the secret function is.
- Encourage your child to describe how the input and output are related using x and y. E.g. y is five times x with 3 then subtracted; $y = 5x - 3$.
- Repeat with different function cards.

Next steps ...

- Make up your own functions using the blank function cards and complete the activity again.
- Ask your child to find the missing function when converting pounds to pence (× 100), kilograms to grams, or kilometres to metres (× 1000).

9 1 2 3 4 5 6 7 8

1

input 3 → × 5 | − 3 → output 12

2

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Practical links to real life help children think about how maths can be used and applied.

Simple illustrations help to explain the purpose of activities.

Your next steps . . .

To find out how you can make a difference in your school, contact us

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Email: info@numicon.co.nz
Phone: 09 520 4022

Learn more about Numicon professional development

Visit our website to find out more and to book on a FREE Taster workshop