Mathematics and numeracy: Number

Catalogue of digital curriculum resources
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Introduction

This catalogue contains details about digital curriculum resources for the Mathematics and numeracy strand Number available from The Learning Federation (TLF). The content has either been created by TLF or licensed from other sources and made available by TLF to all schools in Australia and New Zealand.

The Number digital content supports and enhances students' understanding of key Mathematics concepts in a range of contexts for the P–12 years.

TLF-created content

Mathematics and numeracy digital curriculum resources created by TLF are interactive multimedia learning objects. The learning objects are based on current research findings in Mathematics education and pedagogy. They focus on concepts that are often the most difficult for students to learn and for teachers to teach, and encourage higher-order thinking and problem-solving approaches.

The learning objects make use of the digital environment in innovative ways to enhance student learning. For example, some objects allow teachers to set up learning opportunities in Mathematics that are normally too complex in a standard classroom; others allow students to visualise and apply Mathematics concepts in new ways; others provide opportunities for repeated use by students through randomisation of learning activities; relevant and authentic contexts for exploration and skill application are a feature of others.

Scaffolding of student learning and feedback in various multimodal formats are incorporated into all the learning objects.

The learning objects are generally published in series and some learning objects within a series are aggregated into single learning objects. Aggregated learning objects are identified with the symbol.

Some learning objects contain non-TLF content. See the acknowledgements and conditions of use in the learning objects for details.

Content from other sources

TLF also licenses digital content from other sources to include in the pool of online curriculum content available to Australian and New Zealand schools. Mathematics and numeracy content licensed from the National Library of Virtual Manipulatives, USA, and from Alberta Education, Canada, is now available.

Other catalogues

You can download catalogues for each of the Mathematics and numeracy strands at:

www.ndlrn.edu.au

A comprehensive Index of Mathematics and numeracy digital curriculum content is available for download.

Accessing and viewing the content

Government and non-government education authorities in each Australian state and territory and in New Zealand have responsibility for facilitating access to the pool of digital content. Full details about how to access the content, including the necessary technical and software requirements for viewing it, can be found at:

www.ndlrn.edu.au
**Number: exploring number**

**Number trains series (Years P–5)**

Students arrange train carriages according to numbers on their sides to form patterns. For example, count in fives to arrange four carriages into the sequence 12, 17, 22, 27.

**Features include:**
- means to develop and consolidate counting forwards and backwards skills that are fundamental to addition and subtraction skills
- challenges for students to develop strategies as they predict, test and confirm, or change the sequencing of numbers
- a 'hundred chart' to provide support for 'skip counting' while students develop appropriate thinking and test ideas
- randomised number generation that encourages repeated use
- a printable report of the student’s performance in the two assessment resources.

**Students:**
- identify the numbers that come before and after starting numbers
- construct number patterns where additive strategies or multiplicative strategies are most likely to be used
- connect number words and numerals to the quantities they represent using dice dots, ten-frames and base 10 blocks
- recognise one-digit to three-digit number 'names' and values in a variety of representations.

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**Number trains: numbers 1 to 10**

L2318 – Years P–1

Students work with whole numbers up to 10. Numbers are represented as words, numerals and dots.

**Number trains: numbers 1 to 20**

L2319 – Years P–1

Students work with whole numbers up to 20. Numbers are represented as words, numerals and dots.

**Number trains: numbers 30 to 50**

L2320 – Years 1–2

Students work with whole numbers from 30 to 50. Numbers are represented as words and numerals and MAB Blocks.
## Number trains: numbers 90 to 120

**L2321 — Years 1–2**

Students work with whole numbers from 90 to 120. Numbers are represented as numerals only.

## Number trains: skip counting

**L2322 — Years 1–3**

Students use skip counting by twos, fives and tens. Numbers are represented as numerals only. A 'hundred chart' provides support for 'skip counting' while students develop appropriate thinking and test ideas.

## Number trains

**L2317 — Years P–3**

This is an aggregated learning object combining the five other learning objects in a sequence.

## Number trains: patterns: assessment

**L8275 — Years 3–5**

Students create sequences of whole numbers from 1 to 120.

**Number trains: patterns: assessment: teacher guide**

R11148

## Number trains: counting on: assessment

**L8276— Years 3–5**

Students sequence whole numbers by identifying the number before and after a given number. They recognise whole numbers in a variety of representations, including number words, numerals, dice dots and ten-frames.

**Number trains: counting on: assessment: teacher guide**

R9720
Scale matters series (Years P–8)
Students explore a variety of experiences in the use of scale on a number line.

Features include:
- scales shown as diagrammatic representations reflecting the placement of unit lengths along a line
- feedback provided to the student about accuracy of placement or identification of the number
- random generation of points and numbers that supports repeated use.
- a printable report with the student's corrected answers and a summary of achievement for each set attempted in the three assessment resources.

Students:
- locate numbers on a continuous scale
- select an appropriate scale for placing a number on a number line
- rename numbers by assigning place values for single digits or groups of digits
- identify how variations in unit size relate proportionally to the number of units that will fit into a given space.

Scale matters: ones
L2003 – Years P–2
This learning object makes use of a scale of ones.

Scale matters: tens
L2004 – Years 2–4
This learning object makes use of a scale of tens.

Scale matters: hundreds
L2005 – Years 2–4
This learning object makes use of a scale of hundreds.

Scale matters: simple units
L2002 – Years P–4
This is an aggregated learning object combining 'Scale matters: ones, tens and hundreds'.
<table>
<thead>
<tr>
<th>Scale matters: tenths</th>
<th>L1998 – Years 4–6</th>
</tr>
</thead>
<tbody>
<tr>
<td>This learning object makes use of a tenths scale.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale matters: hundredths</th>
<th>L2000 – Years 2–4</th>
</tr>
</thead>
<tbody>
<tr>
<td>This learning object makes use of a hundredths scale.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Scale matters: tens of thousands</th>
<th>L1999 – Years 4–6</th>
</tr>
</thead>
<tbody>
<tr>
<td>This learning object makes use of a tens of thousands scale.</td>
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</table>

<table>
<thead>
<tr>
<th>Scale matters: negatives</th>
<th>L2001 – Years 6–8</th>
</tr>
</thead>
<tbody>
<tr>
<td>This learning object makes use of negative numbers.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale matters: range of numbers</th>
<th>L1997 – Years 4–8</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is an aggregated learning object combining four other learning objects: hundredths, tenths, tens of thousands and negatives.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale matters: whole numbers: assessment</th>
<th>L8631 – Years 1–4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students place numbers on a number line. They look at two numbers on a line and choose the best type of ruler to add markers to the number line and find the</td>
<td></td>
</tr>
</tbody>
</table>
Scale matters: decimal numbers: assessment
L8630 – Years 5–7
Students use scales ranging from hundreds and tens down to tenths or hundredths. (Image shows report format used in all three Scale matters assessment resources.)

Scale matters: all numbers: assessment
L8629 – Years 7–8
Students demonstrate their understanding of the use of scales, ranging from tens of thousands or thousands through to ones, tenths or hundredths.
What's the problem series (Years 3–8)

Students solve one- and two-step mathematical problems presented in worded form. The structure of the learning objects aims to develop a routine for solving problems.

Features include:

- a set of worded problems for students to read and interpret
- a list of standard problem-solving steps to assist students in developing a structured approach
- panel member suggestions and scaffolded feedback to help students focus on the words in each problem
- a bank of six problems to support repeated use.

Students:

- solve problems by selecting appropriate calculations or mathematical procedures for each step
- interpret and evaluate solutions by identifying the context of each problem
- think about and focus on the steps involved in solving mathematical problems.

What's the problem: nature: level 1
L8154 – Years 3–4

Students select worded mathematical problems about nature, from two categories: 'plants' or 'animals'. They identify the correct answer for each step in the problem-solving process.

What's the problem: planets: level 1
L8155 – Years 3–4

Students select worded mathematical problems, about planets, from two categories: 'Earth and Moon' or 'solar system'. They identify the correct answer for each step in the problem-solving process.

What's the problem: sports: level 1
L8156 – Years 3–4

Students select worded mathematical problems, about sports, from two categories: 'school sport' or 'world sport'. They identify the correct answer for each step in the problem-solving process.

What's the problem: nature: level 2
L8157 – Years 5–6

Students select worded mathematical problems, about nature, from two categories: 'plants' or 'animals'. They identify the correct answer for each step in the problem-solving process.
What's the problem: planets: level 2
L8158 – Years 5–6

Students select worded mathematical problems, about planets, from two categories: 'Earth and Moon' or 'solar system'. They identify the correct answer for each step in the problem-solving process.

What's the problem: sports: level 2
L8159 – Years 5–6

Students select three worded mathematical problems, about sports, from two categories: 'school sport' or 'world sport'. They identify the correct answer for each step in the problem-solving process.

What's the problem: nature: level 3
L8160 – Years 7–8

Students select three worded mathematical problems, about nature, from two categories: 'plants' or 'animals'. They identify the correct answer for each step in the problem-solving process.

What's the problem: planets: level 3
L8161 – Years 7–8

Students select three worded mathematical problems, about planets, from two categories: 'Earth and Moon' or 'solar system'. They identify the correct answer for each step in the problem-solving process.

What's the problem: sports: level 3
L8162 – Years 7–8

Students select three worded mathematical problems, about sports, from two categories: 'school sport' or 'world sport'. They identify the correct answer for each step in the problem-solving process.
Kick the goal: assessment series (Years 5–8)

Students complete fractions they are given, so they add up to a target number. Each object has a different set of questions and target numbers. In the beginner versions the student is presented with target numbers that are whole or proper fractions. In the more advanced level objects the student is presented with target numbers that contain larger whole or mixed numbers (up to 4) or improper fractions (less than 4).

Features include:
- a framework for students to make and test predictions
- a mechanism for the teacher to comment on the student’s learning progress
- randomised tasks
- allowance for more than one correct response to many questions
- a printable report of the student’s performance.

Students:
- identify equivalent fractions
- identify pairs of fractions with related denominators that add up to a target number
- identify pairs of fractions with the same denominators that add up to a target number
- identify pairs of fractions (proper and/or improper) that add up to a target number.

Kick the goal: add proper fractions 1: assessment
L9811 – Years 5–7

Students create pairs of proper fractions to add up to a target number. Target numbers can be whole numbers, or proper fractions.

Kick the goal: add improper fractions 1: assessment
L9812 – Years 6–8

Students create pairs of improper fractions to add up to a target number. Target numbers can be whole numbers, mixed numbers or improper fractions.

Kick the goal: add proper fractions 2: assessment
L10287 – Years 5–7

Students create pairs of proper fractions to add up to a target number. Target numbers can be whole numbers or proper fractions.

Kick the goal: add improper fractions 2: assessment
L10288 – Years 6–8

Students create pairs of improper fractions that add up to a target number. Target numbers can be whole numbers, mixed numbers or improper fractions.
Task 3
Choose the answer to make the trick play untill it达到 3.
Then select OK.
Number: calculation

Counting beetles series (Years P–1)

Students solve addition and subtraction problems using a range of counting strategies. They can also create their own addition and subtraction word problems by using numbers in the range from 2 to 10.

Features include:
- opportunities to develop addition and subtraction strategies (from count-by-one strategies to counting-on and counting-back)
- number line modelling that allows students to explore the directionality of addition and subtraction operations
- the connection of word problems, number line models and equations
- audio to support understanding of the tasks.

Students:
- solve addition and subtraction problems using a range of counting strategies
- model addition and subtraction facts by using a number line
- construct and solve addition and subtraction number sentences.

Counting beetles: level 1
L8281 – Year P

Students count the number of beetles in the garden – taking note of any that might be hiding under the leaves.

Counting beetles: level 2
L8282 – Years P–1

Students count the number of beetles in the garden – taking note of any that might be hiding under the leaves.

Counting beetles: level 3
L8283 – Year 1

Students count the number of beetles in the garden including those hiding under leaves and under rocks (representing a given number of beetles).
Counting beetles
L8280 – Years P–1

This is an aggregated object combining levels 1, 2 and 3.

Counting beetles: making word problems
L8284 – Years 1–2

Students make a word problem using beetles. They decide whether to add or subtract and select the number of beetles to include in the problem. Students make a number sentence to match the number line.

Counting beetles: solving word problems
L8285 – Years 1–2

Students look at a word problem that uses beetles. They use the number line to show how to solve the problem and make a number sentence to match the number line.

This series contains non-TLF content. See Acknowledgements in the learning objects.
The number partner series (Years 2–4)

Students develop efficient mental arithmetic strategies by exploring part-whole relationships of numbers and using these to investigate strategies such as 'make to 10', 'doubling' and 'counting on from the larger number'.

Features include:
- a printout of the student's work in solving the equations
- an interactive tutorial.

Students:
- investigate the commutative principle
- investigate the strategy of 'counting on' for addition and establish that it is preferable to count on from the larger number
- establish that larger numbers can be broken up into many pairs of smaller numbers
- apply their knowledge of partitioning numbers to calculating sums mentally.

The number partner
L103 – Years 2–4

Students are presented with a bar model to assist with addition. They are able to partition or extend numbers to use known addition facts to assist their mental computation. Addition exercises are presented to students or they can choose to create their own.

The number partner: go figure
L105 – Years 2–4

This is a tutorial designed for use by the student or as a demonstration tool for the teacher. It covers information on number pairs as well as counting on from a number to work out number pairs.
The array series (Years 2–4)

'The array' is a tool that allows students to create arrays to learn their basic multiplication facts.

Features include:
- an introductory tutorial
- exploration of the notion of commutativity, for example, that \(3 \times 4 = 4 \times 3\).

Students:
- are encouraged to develop mental strategies for multiplication by 'imagining' the use of 'the array'
- use arrays to work out products mentally
- investigate the commutative principle
- investigate multiplication facts.

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The array
L106 – Years 2–4

An equation of up to 10 x 10 presented as an equation and in array format. Students work out the answer with the visual support of the array then supply the answer twice more with progressively less visual support. Students are able to see the work they have done in table format using 'finished facts'.

The array: go figure
L108 – Years 2–4

This is a tutorial designed for use by the student or as a demonstration tool for the teacher. The tutorial describes the different strategies that can be employed for solving multiplication calculations. It includes a number of multiplications questions for the student. It is amenable to a screen reader.
Pobble arrays series (Years 2–4)

Students are introduced to the shift from additive to multiplicative thinking. The use of the array model of equal rows and equal columns allows the exploration of factors and multiples, and the associated number properties that underlie effective multiplicative strategies.

Features include:
- an introduction to the commutative property of multiplication
- an automated array construction that provides a visual model to support understanding of the multiplicative relationship between factors.

Students:
- recognise and apply the commutative property of multiplication
- make a prediction, test their prediction and then make adjustments, if necessary, based on feedback.

Pobble arrays: find a factor
L2057 – Year 2

Students see a given number of pobbles and a set number of gates (columns) then have to predict how many rows are required. They check their prediction by seeing if it enables the Pobbles to line up correctly and march through the gates. Audio instructions are provided.

Pobble arrays: find two factors
L2058 – Years 2–3

Students see a given number of Pobbles and must firstly select the number of gates that will enable equal rows and equal columns then predict how many rows are required. Audio instructions are provided.

Pobble arrays: make multiples
L2056 – Years 3–4

Students are able to vary the number of Pobbles as well as select the number of gates (columns) and the number of rows to line up the Pobbles correctly into equal numbers of rows and columns. This is the most complex object in the series.
Pobble arrays: assessment series (Years 3–5)

Students test their knowledge of factors and multiples by finding arrays for composite numbers, or by first creating a composite number by adding to or subtracting from a given prime number.

Features include:
- assessment of knowledge of basic number facts that underlie effective multiplicative thinking
- a practice task with scaffolded feedback
- a printable report of the student's performance.

Students:
- apply the commutative property of multiplication
- find sets of factors for a number
- apply knowledge of factors and multiples to solve problems.

Pobble arrays: find factors: assessment
L9832 – Years 3–4

Students demonstrate their understanding of arrays by arranging pobbles into equal columns and rows. They look at the given number of pobbles, and enter the number of gates and rows. For example, decide how many equal rows of pobbles are needed to fit 24 of them through four gates.

Pobble arrays: make multiples: assessment
L9833 – Years 4–5

Students demonstrate their understanding of arrays by arranging pobbles into equal columns and rows. For example, start with 19 pobbles. Decide whether the number can be divided into an equal number of rows. If not, add or subtract pobbles to make a number that will work.
Divide it up series (Years 2–4)

Students are encouraged to think multiplicatively to solve division problems. The learning objects involve sharing division and grouping (repeated subtraction) division in different contexts.

Features include:
- problems involving sharing and/or grouping division (repeated subtraction)
- a framework for students to make and test predictions.

Students:
- interpret a division word problem and its solution
- interpret remainders (as whole numbers) in relation to the context of a problem.

Divide it up: kittens
L2812 – Years 2–3
Students share the toys amongst a specific number of cats. Remainders are dealt with as whole numbers.

Divide it up: hardware
L2811 – Years 2–3
Students predict the number of groups of hardware items. Remainders are dealt with as fractions of the group.

Divide it up: puppies
L2808 – Years 2–4
Students predict the number of toys or biscuits each dog will get. They then check their prediction and decide what to do with the leftover. Remainders are dealt with as either fractions or whole numbers, depending on whether the item can be subdivided.

Divide it up: grouping tool
L2810 – Years 2–4
This is an open-ended interactive tool for modelling grouping division with whole number remainders only. Students make their own equation to solve. The printout shows how the student solved the equation.

Divide it up: sharing tool
L2809 – Years 2–4
This is an open-ended interactive tool for modelling sharing division with whole number remainders only.
Thinking addition: assessment series (Years 2–6)

Students create addition equations to match given word problems. They use a partitioning tool to solve each equation and then identify the partitioning strategy they used.

Features include:
- structured support in the form of an interactive model
- new problems based on student performance on previous problems to cater for individual abilities
- randomised problem-generation to support repeated use
- a printable report of the student's performance.

Students:
- demonstrate their ability to interpret mathematical word problems
- write addition equations from word problems
- use partitioning strategies to solve addition problems
- identify the strategy used to solve addition problems.

Thinking addition: 2-digit plus 1-digit: assessment L9927 – Years 2–4

Students turn a word problem into a 2-digit plus 1-digit equation and solve the equation without a calculator.

Thinking addition: 2-digit plus 2-digit: assessment L9926 – Years 4–6

Students turn a word problem into an equation and solve the equation without a calculator.

Thinking addition: assessment: teacher guide R10778
Arrays series (Years 3–5)

Students are supported in making the shift from additive to multiplicative thinking. The use of the array model of equal rows and equal columns allows the exploration of factors and multiples and the associated number properties that underlie effective multiplicative strategies.

Features include:

- opportunities to develop and consolidate knowledge of basic number facts that underlie effective multiplicative thinking
- opportunities to consider and record the relationship between multiplication and division
- an automated array construction to provide a visual model to support understanding of the multiplicative relationship between factors
- a facility to print a report.

Students:

- identify factors of numbers
- apply knowledge of factors of numbers to solve problems
- apply the commutative property of multiplication.

Arrays: factor families
L2059 – Years 3–4

Students make equal rows and columns to explore how numbers can be broken up into factors. For example, the number 24 can be expressed as 12 x 2 or 2 x 12, and it can be divided equally using its factors 12 and 2. Students identify a missing factor to complete a factor family.

Arrays: word problems with products from 10 to 30
L2054 – Years 4–5

This object requires the application of knowledge of multiplication facts whose products range between 10 and 30.

Arrays: word problems with products from 30 to 50
L2055 – Years 4–5

This object requires the application of knowledge of multiplication facts whose products range between 30 and 50.

Arrays: word problems with products from 35 to 64
L2053 – Years 4–5

This object requires the application of knowledge of multiplication facts whose products range between 35 and 64.
Arrays: explore factors
L2060 – Years 4–5

Students explore how numbers can be broken up with factors. For example, the number 9 can be expressed as 9 x 1 or 3 x 3. Students select a set of 9 numbers between 1 and 50 and then identify the factors of a number in the set by choosing a statement that describes how many factors the number has.

The part-adder series (Years 3–6)

Students work out how to break up numbers so they can calculate addition mentally. Students use a linear model and part–whole relationships to find their answer.

Features include:
- a partitioning model so students can see the effect of breaking up numbers to solve a problem using known facts
- an animation to demonstrate addition strategies, which are also available as 'hints' while students work
- a printout showing how the student solved each equation.

Students:
- use the 'tens and ones' strategy (add the 'tens' and the 'ones')
- 'compensate' by making one number larger and then subtracting the number they have added on
- focus on their knowledge of the two times multiplication table in the 'doubling' strategy
- break up one or both numbers so they are adding to a multiple of ten with 'make a ten'.

The part-adder: generate easy sums
L93 – Years 3–6

Students solve problems that add a single-digit number to a double-digit number.

The part-adder: make your own easy sums
L91 – Years 3–6

Students create their own sums, adding a single-digit number to a double-digit number.
The part-adder: generate hard sums
L94 – Years 3–6

Students solve problems that add together two double-digit numbers.

The part-adder: make your own hard sums
L92 – Years 3–6

Students create their own sums, adding together two double-digit numbers.

The part-adder: go figure
L96 – Years 3–6

The ‘go figure’ learning object is a tutorial that covers the various strategies briefly explained in the learning objects. It is amenable to a screen reader.
The difference bar series (Years 3–6)

Students explore mental strategies to calculate the difference between two numbers. The basic strategy employed is that the difference can be found by addition.

**Features include:**
- a partitioning model to help students see the value of strategies such as rounding to 10, or compensating to the next 10 to help find the difference
- a printout showing how the student solved each equation.

**Students:**
- use a linear model to solve differences mentally
- partition numbers and investigate strategies to solve differences mentally
- apply the associative principle to solve differences mentally.

<table>
<thead>
<tr>
<th>The difference bar: generate easy subtractions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L111 – Years 3–6</strong></td>
</tr>
</tbody>
</table>

Students need to find the difference between two double-digit numbers. The difference is always less than 10.

<table>
<thead>
<tr>
<th>The difference bar: make your own easy subtractions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L109 – Years 3–6</strong></td>
</tr>
</tbody>
</table>

Students create their own sums to find the difference between a single-digit and a double-digit number.

<table>
<thead>
<tr>
<th>The difference bar: generate hard subtractions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L112 – Years 3–6</strong></td>
</tr>
</tbody>
</table>

The sums generated enable students to find the difference between two double-digit numbers. The difference is usually greater than 10.

<table>
<thead>
<tr>
<th>The difference bar: make your own hard subtractions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L110 – Years 3–6</strong></td>
</tr>
</tbody>
</table>

Students create their own sums to find the difference between two double-digit numbers.

<table>
<thead>
<tr>
<th>The difference bar: go figure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L114 – Years 3–6</strong></td>
</tr>
</tbody>
</table>
This tutorial is designed for use by the student or as a demonstration tool for the teacher. It covers the strategies for solving differences, including rounding to 10 or compensating to the next 10 to help find the difference. It is amenable to a screen reader.
The take-away bar series (Years 3–6)

Students explore effective mental strategies for performing subtractions. Strategies include: 'round to the nearest 10', 'subtract tens then ones', 'subtract ones then tens' and the 'compensate' strategy.

Features include:
- a partitioning model to show students the effect of breaking up numbers to solve a problem using known facts
- an animation demonstrating subtraction strategies
- printouts showing how the student solved each equation.

Students:
- partition numbers and use a linear model to solve subtractions mentally
- apply the associative property to solve subtractions mentally.

The take-away bar: generate easy subtractions
L99 – Years 3–6

Students solve problems that take away a single-digit number from a double-digit number.

The take-away bar: make your own easy subtractions
L97 – Years 3–6

Students create their own problems, taking away a single-digit number from a double-digit number.

The take-away bar: generate hard subtractions
L100 – Years 3–6

Students solve problems that take away a double-digit number from a double-digit number.

The take-away bar: make your own hard subtractions
L98 – Years 3–6

Students create their own problems, taking away a double-digit number from a double-digit number.

The take-away bar: go figure
L102 – Years 3–6
This is a tutorial that is designed for use by the student or as a demonstration tool for the teacher. The tutorial covers various strategies for subtraction. It is amenable to a screen reader.
Wishball whole number series (Years 3–6)

Students explore place value in a game-like environment.

Features include:
- opportunities for mental addition and subtraction
- the Wishball option, which can be used only once, to allow the students to choose the final digit required to finish the game
- a number line and counting frame to dynamically display the moves the students make.

Students:
- try to reach a target number by adding or subtracting in fewer than 20 moves. The Spinner randomly serves up a digit. Students choose a place value to assign to the digit then either add or subtract it to the base number
- realise that the same strategies for calculation apply regardless of where the decimal point is placed
- can choose to add or subtract digits to reach the target number in the Wishball challenge subseries.

Wishball: tens
L8458 – Years 2–4
Students work with whole numbers up to 99. A printout showing student place value decisions is available.

Wishball: hundreds
L8456 – Years 2–4
Students work with whole numbers up to hundreds. A printout showing student place value decisions is available.

Wishball: whole numbers
L867 – Years 3–4
Students work with whole numbers up to thousands.

Wishball challenge: tens
L8459 – Years 2–4
Students work with whole numbers up to 99. A printout showing student place value decisions is available.
| Wishball challenge: hundreds  
| L8457 – Years 2–4  
| Students work with whole numbers up to hundreds. A printout showing student place value decisions is available.  
| Wishball challenge: whole numbers  
| L871 – Years 3–4  
| Students work with whole numbers up to thousands. |
The multiplier series (Years 3–6)

Students develop strategies for multiplication. They are invited to partition numbers so they can use known facts to help them calculate ‘in their head’.

Features include:
- strategies such as ‘making to 10’ and ‘doubling’
- a partitioning tool for students to see the effect of breaking up numbers to solve the problem using known multiplication facts
- multiplication tables up to 10 x 10
- an animation to explain the strategies used
- printouts showing how the student solved each equation.

Students:
- apply the distributive property to calculate products mentally
- use known multiplication facts to calculate products in their head
- partition numbers to find products that are easy to calculate mentally
- investigate and apply strategies that make calculating products easier.

The multiplier: generate easy multiplications
L83 – Years 3–6

Students solve sums involving a single-digit and double-digit number.

The multiplier: make your own easy multiplications
L61 – Years 3–6

Students create then solve sums involving a single-digit and double-digit number.

The multiplier: generate hard multiplications
L84 – Years 3–6

Students solve sums involving two double-digit numbers.

The multiplier: make your own hard multiplications
L82 – Years 3–6

Students create then solve sums involving two double-digit numbers.
The multiplier: go figure
L90 – Years 3–6

This is a comprehensive tutorial that could be used by students individually or in small groups, or as a demonstration tool by the teacher. This tutorial is amendable to screen readers, making it accessible to visually impaired students.

Thinking multiplication: assessment series (Years 3–8)

Students create multiplication equations to match given word problems. They use a partitioning tool to solve each equation and then identify the partitioning strategy they used.

Features include:
- structured support in the form of an interactive array model for multiplication
- presents new problems which are based on student performance on previous problems
- randomised problem-generation to support repeated use
- a printable report of the student's performance.

Students:
- write multiplication equations from word problems
- use partitioning strategies to solve multiplication problems
- identify the strategy used to solve multiplication problems.

Thinking multiplication: 2-digit by 1-digit: assessment
L9923 – Years 3–6

Students turn a word problem into a 2-digit times 1-digit equation and solve the equation without a calculator.

Thinking multiplication: 2-digit by 2-digit: assessment
L9919 – Years 6–8

Students turn a word problem into a 2-digit times 2-digit equation and solve the equation without a calculator.

Thinking multiplication: assessment: teacher guide
R10775
The divider series (Years 4–8)

Students use multiplicative partitioning strategies to solve division problems.

Features include:
- animation that provides ‘hints’ while students work
- times tables available to consult during learning activities
- printouts to show how the student solved each equation
- a flexible division tool that supports repeated use.

Students:
- use known division facts to solve division problems.
- use multiplicative partitioning strategies to solve division problems.

The divider: without remainders
L2007 – Years 4–6

These divisional equations have answers without remainders. Numbers up to 199 are divided by one-digit numbers.

The divider: whole number remainders
L2008 – Years 4–6

These divisional equations have answers with whole number remainders. Numbers up to 199 are divided by one-digit numbers.

The divider: solve your own problem
L2009 – Years 4–8

Students input their own divisional problem to solve. The answer may or may not contain remainders. Students can enter sums up to 999 divided by a one-digit number.

The divider: with or without remainders
L2006 – Years 6–8

These divisional equations have answers with or without remainders. Numbers up to 999 are divided by one-digit numbers.
School canteen series (Years 5–9)

Students are responsible for purchasing stock online for the school canteen. The focus is on the mathematical skills and calculations associated with shopping, including purchase of goods in multiples of fixed units and determining best buys to minimise total costs.

Features include:
- calculations that require recognition and use of ratio, factors, and multiples of whole numbers and measures, and recall of multiplication and division facts
- encouragement to use efficient multiplicative strategies to solve arithmetic problems
- two levels of objects that reflect two different levels of difficulty in the calculations
- randomised quantities and costs that support repeated use.

Students:
- use halving and doubling, thirding and trebling strategies in multiplicative situations
- solve problems by selecting and applying efficient multiplicative strategies
- solve problems using or involving ratios and rates
- solve problems in a shopping context.

School canteen: restock: level 1
L1927 – Years 5–9

Students choose how to order school canteen items available in a range of packaging sizes. In these examples, the unit price of the item remains the same regardless of the quantity purchased.

Strategies are displayed at the end of each order.

School canteen: restock: level 2
L1931 – Years 7–9

The range of numbers is greater and the packaging size varies from level 1 but the unit price remains the same.

Strategies are displayed at the end of each order.

School canteen: best buy: level 1
L1928 – Years 5–9

Students need to calculate the unit prices for each different pack size to find the lowest price. There are up to four pack sizes for each item.

Strategies are displayed at the end of each order.

School canteen: best buy: level 2
L1932 – Years 7–9

The calculations for level 2 are more difficult than those required for level 1.

Strategies are displayed at the end of each order.
School canteen: two traders: level 1
L1929 – Years 5–9
For each item, students must calculate the total price from two traders. The package sizes and package sizes vary.

School canteen: two traders: level 2
L1933 – Years 7–9
The calculations for level 2 are more difficult than those required for level 1.

School canteen: estimate and check: level 1
L1930 – Years 5–9
Students check the prices and package sizes from the price catalogues of two traders. They identify the lowest price per item then estimate which trader will supply all the goods for the lowest total cost.
Students then test their estimates by calculating the total cost of the items from each trader.

School canteen: estimate and check: level 2
L1934 – Years 7–9
The calculations for level 2 are more difficult than those required for level 1.
**Integer cruncher series (Years 7–8)**

Students use counters to model the addition or subtraction of two integers. For example \(-2 + 5 = 3\) or \(-5 - 1 = -6\).

**Features include:**
- an introduction explaining the use of the workspace
- representations of the calculations on a number line once answers have been given
- an onscreen summary of the solved equations once six equations have been completed.

**Students:**
- are introduced to the general concepts of integer calculations
- place positive and negative counters in a workspace to match pairs of integers and work out solutions.

### Integer cruncher: addition
L1100 – Years 7–8

Students add positive and negative integers.

### Integer cruncher: subtraction
L1101 – Years 7–8

Students subtract positive and negative integers.

### Integer cruncher: addition and subtraction
L585 – Years 7–8

This is an aggregated learning object combining the two other learning objects in the series.
In proportion series (Years 8–9)

Students complete customer orders for a large hardware store by interpreting the ratios.

Features include:
- a practical setting to develop students’ multiplicative thinking with respect to ratios
- opportunity for students to write symbolic representations for visual representations of ratios
- scaffolded feedback.

Students:
- construct representations (both verbal and symbolic) for ratios by interpreting the amounts from contextual settings
- formulate equations that represent a proportional relationship between two or more ratios
- apply mathematical skills to solve and interpret equations that represent a proportional relationship between two (or more) ratios
- generate visual representations from symbolic representations for ratios.

<table>
<thead>
<tr>
<th>In proportion: ratios</th>
<th>L8098 – Years 8–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students work in the gardening department of a hardware store to fill orders for fertiliser, to the strength requested by customers. Students set ratios for water: concentrate.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In proportion: rates and scales</th>
<th>L8099 – Years 8–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students work in the gardening department to fill orders for mulch (expressed as rates) and help out with scale plans in the timber department.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In proportion: variables in ratios</th>
<th>L8101 – Years 8–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students work in the gardening department to fill orders for liquid fertiliser (expressed as ratios). They examine the equations suggested by their colleagues then choose and solve the correct equation to complete each order.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In proportion: variables in rates and scales</th>
<th>L8102 – Years 8–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students work in the gardening department to fill orders for mulch (expressed as rates), and help out with scale plans in the timber department. They examine the equations suggested by their colleagues then choose and solve the correct equation to complete each order.</td>
<td></td>
</tr>
</tbody>
</table>
In proportion: graphs of ratios, rates and scales
L8103 – Years 8–9

Students work in the manager’s office and discover how ratios, rates and scales can be represented as graphs. They use the graphs to discover quantities for garden fertiliser ingredients, the cost of mulch, and for finding lengths of timber in relation to plans with scales.
Content from other sources

Number manipulatives (Years P–9)

These learning objects are manipulatives that allow students to explore and practise a range of numerical concepts and operations.

Features include:
- visual representations of a range of numerical concepts
- a template format with a description and instructions.

Students:
- investigate the process and effect of mathematical operations.

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Numberline arithmetic
L3536 – Years P–4

Watch as simple number calculations are solved using a numberline. Choose from any of the four basic operations: addition, subtraction, multiplication and division.

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Numberline bars
L3537 – Years 2–8

Place different number bars on the numberline and use them to see how number operations are made. Choose any of the four basic operations: addition, subtraction, multiplication and division.

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Diffy
L4159 – Years 3–9

Choose a number type to practise subtraction: positive whole numbers, fractions, integers, decimals or money. Work out the differences between four starting numbers. Then work out the differences between the four answers. Repeat this process twice more to find all 16 answers. Or choose your own group of starting numbers and solve the differences.

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Rectangle division
L3704 – Years 3–9

Use a rectangular grid to solve a division problem. Link division to multiplication. Investigate what happens as the dividend changes for a particular divisor. For example, find the answer when dividing 39 by 9. Dividends range from 2 to 99 and divisors from 2 to 19. Use the grid for investigating the meaning of factors too.

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Rectangle multiplication
L3503 – Years 3–9
### Rectangle multiplication: integers
L3504 – Years 5–9

Use a rectangular grid to investigate the meaning of the long multiplication algorithm and its application to positive and negative integers. Colour-coding is used to explain the different components of the algorithm.

### Sieve of Eratosthenes
L3545 – Years 5–9

Remove multiples from a grid of numbers. For example, remove 2 and all its multiples to find the smallest prime number. Investigate and predict number patterns. Examine prime numbers.

### Circle 99
L3508 – Years 5–9

Practise the addition of whole numbers up to 99 by solving a number puzzle. Move whole numbers into the blank areas of interlocking circles so that the circle has a total of 99.

### Circle 0
L3506 – Years 6–9

Find out about the addition of positive and negative integers. Choose from a selection of nine integers to complete blank areas of interlocking circles so that the circle has a total of zero. For example, select two integers that give the sum of zero when added to a circle with a value of –4. Make all seven circles display a sum of zero.

### Circle 3
L3507 – Years 6–9

Practise the addition of decimals involving tenths by solving a number puzzle. Move decimals into the blank areas of interlocking circles so that the circle has a
Pascal's triangle
L3538 – Years 6–9

Explore patterns in Pascal's triangle. View how number sets create different patterns. Create your own number rule and view the pattern. For example, see how multiples of 10 are represented on Pascal's triangle.

Party time: assessment (Years 5–8)

Students are assessed on their ability to fulfil a shopping list for a class party within a set budget.

Features include:
- a practical situation to assess students' calculation skills
- a mechanism for the student and teacher to comment on the student's learning progress
- a printable report showing the student's selection of party goods, the correct selection of party goods for the cheapest total cost, as well as the student's reflection on future improvement areas.

Students:
- are given a shopping list of three items (lemonade, cupcakes and party hats) to purchase for their class party
- calculate the cheapest unit price for the three items and the quantity of each item required, taking into account the special discounts available as well as the total cost of the party goods.
Exploring number (Years 6–9)
These learning objects are short digital activities that allow students to explore and practise a range of numerical concepts and operations.

Features include:
- a template format with a description and instructions
- two or more separate activities or games
- short videos providing everyday examples of the mathematical principles featured in the learning object.

Students:
- perform mathematical operations to explore a range of numerical concepts.

Exploring order of operations
L6543 – Years 6–9
Work through mathematical operations in an algorithm. Perform calculations with integers where the order of operations is important. Start with two-step operations such as 6+10 x 2. Move on to numerical expressions involving several operations and notation such as parentheses and indices. Solve numerical expressions quickly to earn a time bonus for a point-scoring game.

Exploring integers
L6544 – Years 6–9
Calculate the change in temperature between two days. Notice that the temperature difference may be positive or negative. For example, if the temperature is 17°C one day and 14°C the next day, then the temperature change is -3°C. Watch a video showing how temperature is expressed using integers. Find out why temperature variation is important in places such as an ice hockey rink.

Exploring exponents and scientific notation
L6550 – Years 6–9
Examine a group of eight numbers expressed using scientific notation. Sort them into positive and negative numbers. Group them according to whether they are greater or less than -1, 0 and 1. Arrange the numbers within each group in ascending order.

Exploring number patterns
L6551 – Years 6–9
Find an addition or subtraction pattern relating to four numbers on a grid. Predict the next three numbers in the pattern. For example, predict the next three numbers in the following sequence: 60, 53, 46, 39...
Watch a video showing animals feeding at a zoo. See how linear equations are used to calculate daily feeding costs. For example, daily costs of meat for tigers is \((\$9.90 \text{ per kg} \times 36\text{ kg}) + \$10 \text{ delivery} = \$366.40\). Adjust three variables on sliding scales to produce a given number.

Exploring powers of 10
L6548 – Years 7–9

Examine a table of numbers expressed using base 10 exponents. Look at their equivalents expressed in other numeric formats such as expanded values and fractional exponents. Arrange the numbers within each group in descending order of magnitude. Use a scalable viewer to examine a scene within a valley in Canada. Look at the scene from a range of scales from 10 million kilometres to one tenth of a nanometre.

Vitality drinks: assessment (Years 8–9)

Students make drinks in a machine by performing calculations to solve problems about ratios and quantities.

Features include:
- assessment of students' calculation skills using ratios and quantities in a practical situation
- feedback in student report on calculated volumes of juice for given ratios
- a printable report showing the student's performance, as well as the correct answers.

Students:
- perform calculations to solve problems requiring the use of ratios and quantities
- estimate and represent values and quantities that lie between marked graduations or scales of measuring instruments.

Vitality drinks: assessment
L8867 – Years 8–9

Students make drinks from a menu to match customer orders. They calculate the volume of each juice type required when given the ratio of juices for a drink of a particular total volume. Then they pour the correct volume of ingredients into a graduated container.
Number: fractions

Comparing fractions: assessment (Years 3–8)

Students compare fraction sets to demonstrate their understanding of fraction size.

Features include:
- a dynamic pathway, with the next set of questions seen by the student being dependent on the number of correct responses to the previous set
- information to assist teachers in identifying the level at which the student is able to successfully compare fractions
- a mechanism for the student and teacher to comment on the student's learning progress
- a printable report of the student's performance.

Students:
- decide which one of a pair of fractions is larger, or if they are the same.

Comparing fractions: assessment
L7736 – Years 3–6
Students compare a set of fractions and determine which is larger, or if they are equal.

Comparing fractions: assessment: teacher guide
R9721

Comparing fractions: strategies: assessment
L9771 – Years 5–8
Students decide which one of a pair of fractions is larger, or if they are the same. They identify which strategy they used to compare the two fractions.

R11075
FRACTIONS LEARNING OBJECTS

Fraction fiddle series (Years 3–6)
Students use dynamic tools to solve problems involving fractions. Problems include comparison of the relative size of two fractions, the ordering of fractions from smallest to biggest and adding fractions.

Features include:
- dynamic tools to generate models
- visual, sound and textual feedback
- guided support for students experiencing difficulty
- randomisation of activities to support repeated use
- a notebook that automatically records the problems solved
- an option to print the completed notebook.

Students:
- explore the effect of changing the numerator and denominator on the type and size of a fraction
- find or explore equivalent fractions
- see the results of their problem-solving in different formats including an area model, the fraction's position on a number line and the symbolic fraction.

Fraction fiddle: matching cake fractions
L2801 – Years 2–3
Fran is filling orders for cakes. Not everyone wants a whole cake so she needs to match the cake orders to the cakes. Students use a circular region representation tool to find the matching symbolic fraction.

Fraction fiddle: comparing unit fractions
L2802 – Years 3–4
The hungry kiwis each ate a fraction of a worm. Students predict who ate more or who ate less. Using the fraction-making tool, students make the fractions and watch the parts of the worm appear and observe the fractions on the number line to see which one is bigger. The fractions presented are unit fractions such as \( \frac{1}{2} \) and \( \frac{1}{3} \).

Fraction fiddle: comparing non-unit fractions
L2803 – Years 3–4
The greedy birds each ate a fraction of a worm. Students predict who ate more or who ate less. They then make the fractions and watch the parts of the worm appear and observe the fractions on the number line to see which one is bigger. The fractions presented are non-unit fractions such as \( \frac{3}{4} \) and \( \frac{2}{3} \).

Fraction fiddle: hit the apple
L2804 – Years 3–4
To help an archer hit an apple target, students use a number line tool to find two fractions that will add together to make one whole. With a given denominator (1 or both) students...
Students can build and compare two fractions.

Fraction fiddle: tool
L2800 – Years 3–6

Students use an open-ended interactive tool that allows them to create a fraction (up to 3). They then view the symbolic notation dynamically represented both as building blocks and on a number line. Students can build and compare two fractions.

Fraction fiddle: shoot the hoop
L2805 – Years 4–5

Students use a number line tool to find two fractions that will add together to make one whole to help shoot a ball into the hoop. Students can repeat the problem to find different solutions.

Fraction fiddle: reach the target
L2806 – Years 5–6

Students use a number line tool to find two fractions that will add together to make the target number to make the plane hit the target.

With a given denominator (no given numbers) students manipulate relative size of fractions to make a given total. They need to reach a given target less than 2 (not 1).
Dynamic tools series (Years 3–6)
Students use exploration tools to learn about fractions.

Features include:
- exploration tools representing fractions less than or equal to one
- a 'how to use' guide
- a teacher guide (available from the 'how to use' page).

Students:
- explore the direct relationship between the spatial, symbolic and written representations of a fraction.

**Shape fractions**
L135 – Years 3–6

Students divide simple shapes into equal parts. They can select regions, then express the area selected as a fraction (or equivalent). Students also select fractions or choose other options to set variables displayed. Fractions are represented by creating equal-sized regions within a two-dimensional shape, and naming these parts using words and numerals in fraction notation.

**Dynamic fractions**
L134 – Years 3–6

This shows the direct relationship between the spatial, symbolic and written representations of a fraction. The alternative representations change dynamically, emphasising the equivalence between the various representations.

There are three modes of display and interaction:
- Mode 1: Grid that the user can set between 1 and 10 in each of the text fields.
- Mode 2: Grid with number line, including fractions.
- Mode 3: Number line and grid, including fractions and equivalents.

If the grid is set to auto, the numerator changes automatically when regions are selected. Setting the mode to manual allows students to enter the numerator themselves. The equivalent fractions can also change automatically or be entered manually.

The fractions section is split into two parts. The first part displays the fraction developed from the visual representation, while the second part displays the equivalent simplified fraction.
Decimaster series (Years 3–6)

Students experiment with representing decimal fractions in a variety of ways. Students are presented with a decimal fraction shown both as a number and in words. They manipulate a range of representations to match the given fraction.

Features include:
- representations of a counting frame, number line, odometer dial, common fraction, rectangular area model and circular area model.

Students:
- recognise and use decimal fractions in representations, some of which are modelled on real objects
- read decimal notations and manipulate a range of visual representations to match given decimal fractions
- interpret, compare, match and manipulate a range of decimal fraction representations, including pictorial and symbolic forms.

Decimaster: match-up 1
L1076 – Years 3–4

Students adjust units on an area representation and a common fraction to match the decimal fraction. Students deal with numbers from zero to one: parts of a whole.

Decimaster: match-up 2
L1077 – Years 3–5

Students match to up to six representations of a fraction. Students may choose to work on all representations or to focus on one or two representations to improve understanding. Students deal with numbers from zero to one: parts of a whole.

Decimaster: match-up 3
L586 – Years 4–6

Students manipulate two randomly chosen representations to match a decimal fraction. Students deal with numbers from zero to one: parts of a whole.

Decimaster plus: match-up 1
L1078 – Years 3–4

Students manipulate the number line and the common fraction to match the decimal fraction. Students deal with numbers from zero to four: whole and parts of a whole.
**Decimaster plus: match-up 2**  
L1079 – Years 3–5  

Students work through these representations in any order: common fraction, number line, counting frame and dial. They may work on all representations or focus on one or two representations. Students deal with numbers from zero to four: whole and parts of a whole.

**Decimaster plus: match-up 3**  
L1080 – Years 3–5  

Students manipulate two of a random selection of these representations: common fraction, number line, counting frame and dial. Students deal with numbers from zero to four: whole and parts of a whole.

**Decimaster collections: match-up 1**  
L1081 – Years 3–4  

Students manipulate a collection (represented by fish bowls) and a common fraction to match the decimal fraction presented. Students deal with numbers from zero to four: whole and parts of a whole.

**Decimaster collections: match-up 2**  
L1082 – Years 4–5  

Students work through these representations in any order: common fraction, number line, counting frame, dial and a collection (represented by fishbowls). Students deal with numbers from zero to four: whole and parts of a whole.

**Decimaster collections: match-up 3**  
L1083 – Years 5–6  

Students work with two randomly chosen representations including common fraction, number line, counting frame, dial and a collection (represented by fishbowls). Students deal with numbers from zero to four: whole and parts of a whole.
**Wishball series** (Years 3–7)

Students explore place value in a game-like environment. There are opportunities for mental addition and subtraction.

**Features include:**
- a 'Spinner' that randomly serves up a digit
- a number line and counting frame dynamically display the moves the students make
- the Wishball option, which can be used only once, allowing the students to choose the final digit required to finish the game
- wishball objects dealing with whole numbers from units to thousands have also been published – details can be found under 'Wishball whole numbers series' in the 'Calculation' section of this catalogue.

**Students:**
- try to reach a target number by adding or subtracting in fewer than 20 moves
- choose a place value to assign to the digit then either add or subtract it to the base number
- realise that the same strategies for calculation apply regardless of where the decimal point is placed.

### Wishball: tenths
L868 – Years 4–5

Students work with tenths up to 999.9.

### Wishball: hundredths
L869 – Years 5–6

Students work with hundredths up to 99.99.

### Wishball: thousandths
L495 – Years 5–6

Students work with thousandths up to 9.999.

### Wishball: ultimate
L870 – Year 6

The decimal point is positioned randomly to display any number from whole numbers through to thousandths.
Wishball challenge: tenths
L872 – Years 4–5
Students work with tenths up to 999.9.

Wishball challenge: hundredths
L873 – Years 5–6
Students work with hundredths up to 99.99.

Wishball challenge: thousandths
L874 – Years 5–6
Students work with thousandths up to 9.999.

Wishball challenge: ultimate
L875 – Year 6
The decimal point is positioned randomly to display whole numbers through to thousandths.

Wishball tournament
L8460 – Year 5–7
Students work with whole numbers and decimal fractions, from 0.001 to 9999. They can either add or subtract numbers to reach a target number. Students are able to play a random game, play a previous game again or play a game with the same target number as
someone else.
Design briefs series (Years 3–8)

Students explore the relationship between and representation of all forms of fractions using an area model and an interactive number line by designing a park, a city, a school, a farm or a neighbourhood.

Features include:
- a grid of various sizes ranging from 2 x 4 to 10 x 20
- a ‘how to use’ guide
- an option to print the student’s work.

Students:
- design various communities on a grid according to a brief
- learn about common fractions, decimal fractions and percentages.

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**Design a park**  
L120 – Years 3–5

The grid provided is 2 x 4 and the fractions include denominators of 2, 4 and 8. The design choices in this object are simple.

**Design your own park**  
L121 – Years 4–6

Students choose a grid size (up to 6 x 6) appropriate to the two fractions already selected by the guide. Times tables up to 10 x 10 are available to assist them. Students place the five components of the playground on their grid then calculate the fraction of the total site used for each region. The fractions include denominators from 2 to 9.

**Design a school**  
L127 – Years 5–8

Students place the eight components of a playground on a 10 x 10 grid then calculate the percentage of the total site used for each region. The size of most components is already provided as a percentage: students decide the size of two components. Students convert one type of written fraction to another, using percentages and tenths.

**Park fractions**  
L126 – Years 4–6

This is an aggregated learning object combining the park learning objects.

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**Design your own school**  
L128 – Years 5–8
Students place the eight components of a playground on a 10 x 10 grid then calculate the percentage of the total site used for each region. The size of two components is already provided as a percentage. Students decide the size of six components and identify the percentage of each region.

Playground percentages
L133 – Years 5–8

This is an aggregated learning object combining the school learning objects in this series.

Design a neighbourhood
L122 – Years 5–8

Students represent eight components, presented variously as decimals, fractions and percentages on a 10 x 20 neighbourhood grid. The size of most components is already provided; students decide the size of two components. The number line displays fractions in tenths, percentages and decimal equivalents.

Design a city
L123 – Years 5–8

Students represent eight city components on a 10 x 20 grid. The size of two components is already provided as a percentage; students decide the size of six components, identifying the size of the regions in percentages. The number line displays fractions in tenths and decimal equivalents.

Design a farm
L124 – Years 5–8

Students represent eight farm components on a 10 x 20 grid. The size of two components is already provided as decimals; the student decides the size of six components, identifying the size of the regions in decimals. The number line displays fractions in tenths and percentage equivalents.

Neighbourhood fractions
L125 – Years 5–8

This is an aggregated learning object combining the neighbourhood, farm and city learning objects. Navigation is by boxes at the bottom of the page.
Swamp survival series (Years 3–8)

Students make a path of stepping stones by sequencing decimal fractions in a skip-counting pattern to help a boy cross a dangerous swamp.

Features include:
- sequencing tasks that focus on place value with decimal fractions
- opportunities for experimentation and practice in ordering decimals and identifying patterns
- randomised presentation of sets of decimals with more than one 'hidden' sequence
- three levels of difficulty and supportive feedback
- objects that progressively increase in difficulty.

Students:
- compare and order decimal fractions
- identify patterns of counting and skip-counting.

Swamp survival: hundredths counting
L7901 – Years 3–5

Students place decimal fractions in an ascending, consecutive order to form a path across the swamp. They count by either tenths or hundredths.

Swamp survival: hundredths patterns
L7902 – Years 3–5

Students place decimal fractions in an ascending, skip-counting pattern to form a path across the swamp. They count by either tenths or hundredths.

Swamp survival: hundredths challenge
L7903 – Years 3–5

Students place decimal fractions (between two given whole numbers) in an ascending order to form a path across the swamp. They count by either tenths or hundredths.
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<th>Swamp survival: thousandths counting</th>
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This series contains non-TLF content. See Acknowledgements in the learning objects.
Cassowary fractions series (Years 4–6)
In the context of a cassowary sanctuary, students develop their understanding of common fractions.

Features include:
- graphic representations of the effects of students' decisions.

Students:
- represent fractions as parts of shapes
- model equivalent fractions
- add fractions informally
- apply understanding of fractions, measurements and graphs to interpret and process factual reports
- explore the physical characteristics and ecology of cassowaries.

Cassowary fractions
L155 – Years 4–6

Students are presented with a scenario in the form of an incident report such as 'four cassowaries sick with a virus'. Students select a geometric shape to form their pens, then choose a radial or rectangular tool to divide the shape into appropriate sections. The idea of equivalent fractions is introduced at the end of the incidents.

Cassowary ecology quiz
L119 – Years 4–6

This provides a set of information about the cassowary, such as its height compared to other birds and the number of eggs it commonly lays compared to other birds. Students complete quizzes about the facts presented, with the answers to each question being a common fraction.

Cassowary sanctuary
L86 – Years 4–6 🦩

This is an aggregated learning object combining the other two learning objects.

*Cassowary sanctuary* and *Cassowary ecology quiz* contain non-TLF content. See Acknowledgements in the learning objects.
Design: assessment series (Years 6–7)

Students relate given percentages to simple number lines and a series of three different grids (10 by 10, 5 by 10 and 5 by 5).

Features include:
- assessment of students' ability to relate percentages to a given grid
- assessment of students' knowledge and understanding of the relationship between percentages and tenths through required use of a number line
- a printable report of the student's performance
- a mechanism for the teacher to comment on the student's learning progress.

Students:
- interpret an area model in relation to percentages
- interpret number line models in relation to fractions and percentages
- use the relationship between fractions and percentages to solve problems
- identify fractions and percentages that total 1 whole.

Design a school: 10 by 10 grid: assessment
L9928 – Years 6–7

Students represent given percentages on a 10 by 10 grid and a number line marked in tenths. They allocate squares on the grid to match the given percentages for different parts of the school. For example, show 15% of the grid as classrooms.

Design a farm: 5 by 10 grid: assessment
L9929 – Years 6–7

Students represent given percentages on a 5 by 10 grid and a number line marked in tenths. They allocate squares on the grid to match the given percentages for different parts of the farm. For example, show 18% of the grid as grazing land.

Design a park: 5 by 5 grid: assessment
L9930 – Years 6–7

Students represent given percentages on a 5 by 5 grid and on a number line marked in tenths. They allocate squares on the grid to match the given percentages for different parts of the park. For example, show 24% of the grid as bushland.
Content from other sources

Fraction manipulatives series (Years P–6)

These learning objects are manipulatives that allow students to explore and practise a range of concepts and operations relating to fractions.

Features include:
- visual representations of a range of fractions
- a template format with a description and instructions.

Students:
- discover the meaning of equivalent fractions.

**Fraction pieces**
L3520 – Years P–3

Students place fractions of a circle or square on a whole and investigate equivalence.

**Fractions: visualising**
L3526 – Years P–3

Students manipulate a rectangle or circle to represent given fractions.

**Fractions: naming**
L3523 – Years 1–3

Students name a fraction that is represented visually.

**Fractions: parts of a whole**
L3524 – Years 1–3

Students divide a shape into parts to create a fraction then read the name of the fraction. They then create a visual representation of a given fraction.

**Fractions: equivalent**
L3651 – Years 2–6
Students manipulate a visual representation of a fraction to find and name an equivalent fraction.

**Fractions: comparing**  
L3521 – Years 3–8  
Students find common denominators for two given fractions then plot the new (equivalent) fractions on a number line.

**Fractions: rectangle multiplication**  
L3525 – Years 3–8  
Students explore an interactive model to find the product of two fractions including proper and improper fractions.

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(http://nlvm.usu.edu).
Exploring fractions and percentages (Years 5–9)

These learning objects are short digital activities that allow students to explore and practise a range of concepts and operations relating to fractions and percentages.

Features include:
- a template format with a description and instructions
- two or more separate activities or games
- short videos which provide everyday examples of the mathematical principles featured in the learning object.

Students:
- explore and practise a range of concepts and operations relating to fractions and percentages.

Exploring fractions
L6542 – Years 5–9

Use partially filled measuring cups to explore fractions: improper, mixed and equivalent fractions. For example, select six cups which are one-quarter full to balance one and a half cups. Or achieve an equivalent result by selecting three cups, which are half full.

Exploring combined percentages
L6545 – Years 7–9

Examine sports statistics for successfully completed passes in a gridiron match. Adjust the number of completions and passes needed in a second match to produce a given combined percentage. Watch a video showing how performance statistics change during a match.

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