

TRIAL MATERIAL WORK IN PROGRESS

Differentiated plans for Years 7 & 8 for Whole Numbers & Integers

Ian Lowe, MAV Professional Officer, 2007

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THIS WILL QUALIFY YOU
FOR AN IMPROVED VERSION
WHEN AVAILABLE

Materials are recommendations only; suitable substitutions may be made.

MAV materials may be bought from www.mav.vic.edu.au/shop

Download the Curriculum Corporation catalogue from

http://www.curriculum.edu.au/catalogue/downloads/pc2007_pages39-54.pdf

and look at pages 48 and 49.

For Learning Federation materials (Learning Objects),

check out 'Digital Learning Resources' on your laptop, or download them from the new education website
www.education.vic.gov.au/studentlearning/teachingresources/elearning/digilearn.htm.

Differentiated plans for Years 7 & 8

Whole numbers and integers

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Whole number concepts and skills are the basis of most other mathematical ideas. They are a major focus for VELS Standard 1 to 4 -- primary school for the average child. Ideas of integers are introduced and calculations with negatives begin in Standard 5. So extra effort is required to create a rich learning environment that can help children to understand and to achieve at their own level. This topic can only be given 3 weeks Years 7 and 8, because of the demand for time from Fractions, decimals, percentage and ratio and associated ideas.

This set of units – one per semester for Years 7 & 8 – could achieve this goal. It matches the specifications for VELS, but recognises that there will be a wide spread of achievement in each class. So children are differentiated into working groups by need, for some of the time only. There may be more than one group at any Standard, or some Standards may need to be combined. Plan a stimulating set of activities for homework review, such as Interactive Learning spreadsheets.

It also balances the *toolbox* requirements – concepts and skills – with the need to learn to apply those tools in *problem solving* situations. Hence there are whole class lessons (often from Maths300 or RIME) punctuating the toolbox development, at regular intervals. These are on the same topic, but do not attempt to mesh with the work done by each 'standard' group. They ensure that *Working Mathematically* is always part of the learning process, integrated into each dimension.

The mix of activities will provide a stimulating and rich learning environment, with students learning from and helping one another. Connections between topics will be made and reinforced, and the variety of learning styles will accommodate learners with different needs.

How does it work?

In Years 7 and 8 the spread will be from Standard 3 up to 6, with the majority working towards Standard 4 or 5. At regular intervals whole class lessons are taught to 'mixed ability' groups. Between these are cycles of a fixed pattern of lessons. In Years 7 and 8, the cycle has four parts: teaching, worksheet or games, problem solving (choice from a set of tasks) and computer use (a variety).

On any day all are taking place in the same classroom, so only a fraction of the resources are needed. But the cycle also works for the students: they follow the pattern – teaching, worksheet, (problem solving) and computer. As a consequence, teaching is to a different group each day in a regular pattern. Teaching will be for a concentrated 20 minutes or so, and then the teacher will supervise the rest of the class. Instructions on the board will inform the other groups of what they are to do. Encourage students to help each other.

What resources are needed?

Access to 4 or 5 computers daily is expected. Computer pods or laptop trolleys might be the best solution. Membership of Maths300 is a requirement; many schools have membership – here is how to use it.

The pages in the resources are listed for each day's lesson, but are summarised here. Sources are: MAV (Mathematical Association of Victoria), CC (Curriculum Corporation), LF (Learning Federation).

- *Teaching*: Guidelines in Number (MAV), Maths Continuum (DE&T), People count (MAV)
- *Worksheets & games*: Active Learning 1 (Number & Algebra), Active Learning 2 (N&A), Card Capers, Dice Dazzlers, Tackling tables (all MAV)
- Active Learning 2 (all 3 books) contains 'Quickmaths', very useful for homework and review
- *Computer*: Interactive Learning (MAV), Learning Objects (LF),
- *Problem solving*: Problem Solving Task Centre (CC), Maths300 (CC), RIME (MAV), RIME 5&6 (MAV)

How could it be adapted to different situations?

If your class does not have the range predicted, or you cannot manage three or four groups, you should adapt by ignoring columns. You may substitute other learning tasks at any time. If you run out of time, leave stuff out. In this rich environment you will be surprised how much is learned outside the 'planned' activities.

How do I assess the learning?

At the end of the tables are sets of questions based on *understanding* at each VELS standard that will allow you to place children into groups and monitor progress at selected times. However your observations, digital photographs and copies of children's work will be more useful than any external 'test'.

Year 7 Semester 1 Whole numbers and integers

Day	Yr 7 sem 1: Std 2&3	Std 4 group(s)	Std 5 group(s)	Std 6 group(s)
1	RIME #8 Line up or Maths300 #10 Bob's buttons			
2	<p align="center">Teach</p> <p align="center">Place value, effect of multiplying or dividing by 10</p> <p align="center">Guidelines in Number p53-58</p> <p align="center">People count #3, 9</p>	<p align="center">Computer</p> <p>Interactive Learning Money by 10 or 100, 10 or 100 times what? Powers of 10(x), Powers of 10 (+), Multiply with powers of 10, Divide with powers of 10</p> <p>Learning Objects Wishball, Decimaster</p>	<p align="center">Problem Solving Task Centre</p> <p>4 Window Frames, 7 Consecutive Sums, 9 Row Points, 15 Domino Trails, 35 Crosses, 39 Criss-Cross Numbers, 52 Which Floor, 56 Challenge, 98 Martian Maths, 99 How Many Beans? 120 Nim, 127 Highest Number 1,</p>	<p align="center">Multiplying integers</p> <p>Active Learning 1 (N&A) N29 Factors and products</p> <p>Active Learning 2 (N&A) Quickmaths Sets 1-8</p>
3	RIME #7 Checkmath			
4	<p align="center">Worksheet/games</p> <p>Active Learning 1 (N&A) N2 Building the greatest</p> <p align="center">Card Capers (J or M)</p> <p align="center">Dice Dazzlers</p>	<p align="center">Teach</p> <p align="center">Place value, adding and subtracting</p> <p align="center">Guidelines in Number p127-131, 175-177</p> <p align="center">People count #9, 5</p>	<p align="center">Computer</p> <p>Interactive Learning Aliquot, Bob's buttons, Lockers, Billiard ball paths, Factor tree, Factorgrams, Lockers, Multiples, Prime factors to 1000, Square numbers, Units digits of powers, Biorhythms</p>	<p align="center">Problem Solving Task Centre</p> <p>47 Red/Black Card Game, 4 Window Frames, 7 Consecutive Sums, 9 Row Points, 15 Domino Trails, 35 Crosses, 39 Criss-Cross Numbers, 52 Which Floor, 56 Challenge, 98 Martian Maths, 99 How Many Beans? 120 Nim, 127 Highest Number 1,</p>
5	RIME #9 Liquorice factory or MCTP p441 Licorice factory			
6	<p align="center">Problem Solving Task Centre</p> <p>4 Window Frames, 7 Consecutive Sums, 9 Row Points, 15 Domino Trails, 35 Crosses, 39 Criss-Cross Numbers,</p>	<p align="center">Worksheet/games</p> <p>Active Learning 1 (N&A) N3 Number sentences</p> <p>Active Learning 2 (N&A) Quickmaths Sets 1-8, N1 Sum games, N7 Number puzzles</p> <p align="center">Card Capers (J or M)</p> <p align="center">Dice Dazzlers</p>	<p align="center">Teach</p> <p align="center">Factors, multiples, primes</p> <p align="center">People count #8</p>	<p align="center">Computer</p> <p>Interactive Learning Walk to add or subtract, Add integers, Subtract integers, Multiply integers, Multiplication nomogram, Multiplying any numbers</p> <p>Learning Objects Integer cruncher</p>
7	<p align="center">Computer</p> <p>Interactive Learning Money by 10 or 100, 10 or 100 times what? Powers of 10(x), Powers of 10 (+)</p> <p>Learning Objects The multiplier, Pebble array, Arrays, The divider, Divide it up, Number laws, The multiplier</p>	<p align="center">Problem Solving Task Centre</p> <p>3 Doug's Tablecloth, 33 Dominoes, 43 Number Tiles, 62 4 & 20 Blackbirds, 80 A Dollar To Spend, 89 Doctor Dart, 91 Pick A Box,</p>	<p align="center">Worksheet/games</p> <p>Active Learning 1 (N&A) N13 Card games for factors, or N14 Investigating primes</p> <p>Active Learning 2 (N&A) Quickmaths Sets 1-8, N3 Multiply and divide, N6 Dividing, N11 Mixed bag</p>	<p align="center">Teach</p> <p align="center">Scientific notation, exponent laws intro</p>
8	RIME #10 Factorgrams			

Year 7 Semester 2 Whole numbers and integers

Day	Yr 7 sem 2: Std 2&3	Std 4 group(s)	Std 5 group(s)	Std 6 group(s)
1	Maths300 #103 Palindromes or RIME N1 Palindromes			
2	<p align="center">Teach</p> <p align="center">Mentally adding and subtracting to 100</p> <p align="center">Guidelines in Number p47-48, 63, 70</p> <p align="center">People count #4</p>	<p align="center">Computer</p> <p align="center">Interactive Learning Long multiplication, Estimate to multiply, Single digit multiply, Two digit multiply, Estimate multiplying, Distributive multiply</p> <p align="center">Learning Objects Divide it up, Integer cruncher, Hopper, School canteen, The divider</p>	<p align="center">Problem Solving Task Centre</p> <p>4 Window Frames, 7 Consecutive Sums, 9 Row Points, 15 Domino Trails, 35 Crosses, 39 Criss-Cross Numbers, 52 Which Floor, 56 Challenge, 98 Martian Maths, 99 How Many Beans? 120 Nim, 127 Highest Number 1,</p>	<p align="center">Worksheet/text on interpreting scientific notation for large numbers</p> <p align="center">Active Learning 2 (N&A) Quickmaths Sets 9-16</p>
3	RIME N2 Estimating multiplication			
4	<p align="center">Worksheet/games</p> <p align="center">Active Learning 1 (N&A) N4 Number facts through card games</p> <p align="center">Number grids games p29-43</p>	<p align="center">Teach</p> <p align="center">Multiplying by two-digit numbers</p> <p align="center">Guidelines in Number p131-133, 178</p> <p align="center">People count #11</p> <p align="center">Tackling tables</p>	<p align="center">Computer</p> <p align="center">Interactive Learning Units digits of powers, Base 5, Base 2, Roman, Exponent laws</p>	<p align="center">Problem Solving Task Centre</p> <p>4 Window Frames, 7 Consecutive Sums, 9 Row Points, 15 Domino Trails, 35 Crosses, 39 Criss-Cross Numbers, 52 Which Floor, 56 Challenge, 98 Martian Maths 99 How Many Beans? 120 Nim, 127 Highest Number 1,</p>
5	Maths300 #76 Protons and anti-protons			
6	<p align="center">Problem Solving Task Centre</p> <p>4 Window Frames, 7 Consecutive Sums, 9 Row Points, 15 Domino Trails, 35 Crosses, 39 Criss-Cross Numbers,</p>	<p align="center">Worksheet/games on long multiplication</p> <p align="center">Active Learning 1 (N&A) N11 Checkmath</p> <p align="center">Active Learning 2 (N&A) Quickmaths Sets 9-16, N8 More patterns</p>	<p align="center">Teach</p> <p align="center">Powers and base 2, exponent laws</p> <p align="center">People count #3</p>	<p align="center">Computer</p> <p align="center">Interactive Learning Base 5, Base 2, Roman, Exponent laws, Scientific notation</p>
7	<p align="center">Computer</p> <p align="center">Interactive Learning Subtract hundreds, Three circles puzzle, Checking change</p> <p align="center">Learning Objects Part-adder, Take-away bars, Difference bars, Number partner</p>	<p align="center">Problem Solving Task Centre</p> <p>3 Doug's Tablecloth, 33 Dominoes, 43 Number Tiles, 62 4 & 20 Blackbirds, 80 A Dollar To Spend, 89 Doctor Dart, 91 Pick A Box,</p>	<p align="center">Worksheets</p> <p align="center">Active Learning 1 (N&A) N17 Games using powers of 2</p> <p align="center">Active Learning 2 (N&A) Quickmaths Sets 9-16, N18 Maths@work: Who uses exponents?</p>	<p align="center">Teach</p> <p align="center">Calculation with scientific notation</p>
8	Maths300 #32 Walk the plank			

Year 8 Semester 1 Whole numbers and integers

Day	Yr 8 sem 1: Std 2&3	Std 4 group(s)	Std 5 group(s)	Std 6 group(s)
1	Maths300 #101 Odds and evens or RIME #4 Odds and evens			
2	<p align="center">Teach</p> <p align="center">Multiplication tables</p> <p>Guidelines in Number p47, 49, 65, 67, 92, 123, 168-172</p> <p>People count #6</p> <p>Tackling tables</p>	<p align="center">Computer</p> <p>Interactive Learning Single digit divide, Estimate one-digit divide, Distributive divide, Multiply with powers of 10, Divide with powers of 10,</p> <p>Learning Objects Divide it up, Integer cruncher, Hopper, School canteen, The divider, The multiplier</p>	<p align="center">Problem Solving Task Centre</p> <p>3 Doug's Tablecloth, 33 Dominoes, 43 Number Tiles, 62 4 & 20 Blackbirds, 80 A Dollar To Spend, 89 Doctor Dart, 91 Pick A Box, 92 Magic Squares, 144 Pascal's Triangle In Asia, 165 Change, 172 Cover Up, 212 Monkeys & Bananas, 225 Add The Pack</p>	<p align="center">Worksheet/text on calculating with scientific notation for large numbers</p> <p>Active Learning 2 (N&A) Quickmaths Sets 17-24</p>
3	RIME N13 Russian multiplication			
4	<p align="center">Worksheet/games</p> <p>Active Learning 1 (N&A) N5 Patterns in the multiplication table</p>	<p align="center">Teach</p> <p align="center">'Short' division (by one digit)</p> <p>Guidelines in Number p88-91, 180-183</p> <p>People count #12</p>	<p align="center">Computer</p> <p>Interactive Learning Walk to add or subtract, Add integers, Subtract integers,</p> <p>Learning Objects Integer cruncher</p>	<p align="center">Problem Solving Task Centre</p> <p align="center">See Std 5 lesson 2</p>
5	RIME #15 Happy numbers			
6	<p align="center">Problem Solving Task Centre</p> <p>52 Which Floor, 56 Challenge, 99 How Many Beans? 120 Nim, 127 Highest Number 1, 98 Martian Maths</p>	<p align="center">Worksheet</p> <p>Active Learning 1 (N&A) N11 Checkmath</p> <p>Active Learning 2 (N&A) Quickmaths Sets 17-24, N6 Dividing, N8 More patterns</p>	<p align="center">Teach</p> <p align="center">Add and subtract integers</p> <p align="center">People count #30</p>	<p align="center">Computer</p> <p>Interactive Learning Walk to add or subtract, Add integers, Subtract integers, Multiply integers, Multiplication nomogram, Multiplying any numbers,</p>
7	<p align="center">Computer</p> <p>Interactive Learning Groups of (small), Groups of, Tables, Multiplication facts, Missing numbers, Multiplying, Number line multiplying, Multo random, Multiple patterns,</p> <p>Learning Objects Part-adder, Take-away bars, Difference bars, Number partner, The multiplier, Pebble array, Arrays</p>	<p align="center">Problem Solving Task Centre</p> <p>92 Magic Squares, 109 Number Game, 144 Pascal's Triangle In Asia, 165 Change, 172 Cover Up, 212 Monkeys & Bananas, 225 Add The Pack</p>	<p align="center">Worksheet/games</p> <p>Active Learning 1 (N&A) N21 Games for adding integers, N25 Games for subtracting integers</p> <p>Active Learning 2 (N&A) Quickmaths Sets 17-24</p>	<p align="center">Teach</p> <p align="center">Exponent laws</p> $a^m \times a^n = a^{m+n}$ $(a^m)^n = a^{mn}$
8	RIME N18 "1089"			

Year 8 Semester 2 Whole numbers and integers

Day	Yr 8 sem 2: Std 2&3	Std 4 group(s)	Std 5 group(s)	Std 6 group(s)
1	RIME #14 Estimating division			
2	<p align="center">Teach</p> <p align="center">Division facts (reverse multiplication facts)</p> <p align="center">Guidelines in Number p26, 66</p> <p align="center">People count #7</p> <p align="center">Tackling tables</p>	<p align="center">Computer</p> <p align="center">Interactive Learning Single digit divide, Estimate one-digit divide, Division fact rounding, Distributive divide</p> <p align="center">Learning Objects The multiplier, Divide it up, Integer cruncher, Hopper, School canteen, The divider</p>	<p align="center">Problem Solving Task Centre</p> <p align="center">3 Doug's Tablecloth, 33 Dominoes, 43 Number Tiles, 62 4 & 20 Blackbirds, 80 A Dollar To Spend, 89 Doctor Dart, 91 Pick A Box, 92 Magic Squares, 144 Pascal's Triangle In Asia, 165 Change, 172 Cover Up, 212 Monkeys & Bananas, 225 Add The Pack</p>	<p align="center">Worksheet/game on Exponent laws</p> <p align="center">Multiplication or division of powers of ten (add or subtract zeros)</p> <p align="center">Active Learning 2 (N&A) Quickmaths Sets 25-32</p>
3	RIME N16 Magic squares			
4	<p align="center">Worksheet/games</p> <p align="center">Active Learning 1 (N&A) N9 Remainder game</p> <p align="center">Number boards: middle primary p43-45</p>	<p align="center">Teach</p> <p align="center">Order of operations, estimating and calculator use</p> <p align="center">Guidelines in Number p178-183</p> <p align="center">People count #10</p>	<p align="center">Computer</p> <p align="center">Interactive Learning Walk to add or subtract, Add integers, Subtract integers, Multiply integers, Multiplication nomogram, Multiplying any numbers,</p> <p align="center">Learning Objects Integer cruncher</p>	<p align="center">Problem Solving Task Centre</p> <p align="center">See Std 5 lesson 2</p>
5	RIME #5 Readability			
6	<p align="center">Problem Solving Task Centre</p> <p align="center">52 Which Floor, 56 Challenge, 99 How Many Beans? 120 Nim, 127 Highest Number 1, 98 Martian Maths</p>	<p align="center">Worksheet/games</p> <p align="center">Active Learning 1 (N&A) N3 Number sentences, N20 Dividing by whole numbers in your head</p> <p align="center">Active Learning 2 (N&A) Quickmaths Sets 25-32, N2 Order of operations</p>	<p align="center">Teach</p> <p align="center">Integer multiplication</p>	<p align="center">Computer</p> <p align="center">Interactive Learning Ratios of squares, Pythagorean spiral, Square roots, Surd operations, Fractional exponents, Exponent laws,</p>
7	<p align="center">Computer</p> <p align="center">Interactive Learning Dividing up to 100, Division facts, Backwards multiplying, Spirolaterals, Common factor, Finding half, Remainders, Renaming numbers, Dividing with remainders, Order of operations, Biggest number</p> <p align="center">Learning Objects Divide it up, Integer cruncher, Hopper, School canteen, The divider</p>	<p align="center">Problem Solving Task Centre</p> <p align="center">92 Magic Squares, 109 Number Game, 144 Pascal's Triangle In Asia, 165 Change, 172 Cover Up, 212 Monkeys & Bananas, 225 Add The Pack</p>	<p align="center">Worksheet/games</p> <p align="center">Active Learning 1 (N&A) N24 Mystery squares, N29 Factors and products</p> <p align="center">Active Learning 2 (N&A) Quickmaths Sets 25-32</p>	<p align="center">Teach</p> <p align="center">Exponent laws</p> $a^m \div a^n = a^{m-n}$ $a^0 = 1$ $a^{-n} = \frac{1}{a^n}$
8	RIME #11 Add the numbers 1 to 100			