

Resources for a VELS Maths Curriculum STRUCTURE

STANDARD 3

a Language (and, or, not) for two attributes (Venn diagrams)

- ***Toolbox: concepts and skills***

Chance and Data Investigations: Volume 2 Data (CC) Lesson plans

Groups and sorting,

The Learning Federation www.thelearningfederation.edu.au/tlf2/ Free software from the internet

Musical number patterns, Monster choir

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives Free software from the internet

- ***Mathematical problem-solving***

standards.nctm.org/document/eeexamples/index.htm Free software from the internet

4.1 Creating, Describing, and Analyzing Patterns to Recognize Relationships and Make Predictions

- ***Real problem-solving***

Chance and Data Investigations: Volume 2 Data (CC) Lesson plans

Database debut,

b Language of sets and subsets

- ***Toolbox: concepts and skills***

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives Free software from the internet

- ***Mathematical problem-solving***

- ***Real problem-solving***

c Complete number sentences

- ***Toolbox: concepts and skills***

People Count: book and/or CD (MAV) Text for teachers, with spreadsheets for students.

86 Missing values,

Interactive learning for concepts & skills (MAV) Demo on whiteboard or student use

Guess and check,

- ***Mathematical problem-solving***

- ***Real problem-solving***

STANDARD 4

a Use conditions to find members of sets

- ***Toolbox: concepts and skills***

- ***Mathematical problem-solving***

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives Free software from the internet

- ***Real problem-solving***

b Use Venn diagrams or grids to consider statements with language (*none, some, all*)

- ***Toolbox: concepts and skills***

<http://illuminations.nctm.org/Activities.aspx> Free software from the internet

Shape sorter,

- **Mathematical problem-solving**

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives Free software from the internet

- **Real problem-solving**

c Describe and complete patterns (using recursion or formulas)

- **Toolbox: concepts and skills**

People Count: book and/or CD (MAV) Text for teachers, with spreadsheets for students.

83 Number patterns

Interactive learning for concepts and skills (MAV) Demo on whiteboard or student use

Order and powers, Step size – lines, Step size – curves, Square numbers, Triangle numbers, Match shapes, Recursion graphs,

The Learning Federation www.thelearningfederation.edu.au/tlf2/ Free software from the internet

Musical number patterns, Hopper, Bridge-builder, Circus tower

- **Mathematical problem-solving**

Maths300 (CC) Lesson plans

0 Learning to Write a Report, 14 The Farmer's Puzzle, 16 Garden Beds, 18 Addition Totals, 20 Unseen Triangles, 21 Lining Up, 23 Crossing The River, 27 Game of 31, 34 What's My Rule? 39 Painted Rods, 40 Four-Arm Shapes, 41 Heads & Legs, 42 Jumping Kangaroos, 54 Cracked Tiles, 55 Billiard Ball Bounces, 56 Simple, Elegant, Elusive, 57 Crazy Animals, 63 Arithmagons, 64 Snail Trail, 75 Walking With Children, 114 Find My Pattern, 115 Staircases, 117 Colour Spots on a Number Line

Problem Solving Task Centre (CC)

2 Cars In A Garage, 5 Make A Snake, 8 Addition Totals, 10 Find My Pattern, 11 Lining Up, 14 Heads And Legs, 27 Can Stack, 28 Plate Triangles, 38 The Mushroom Hunt, 44 Latin Squares, 48 How Many Triangles? 51 Staircase, 65 Shape Algebra, 82 Snail Trail, 86 Thirty-one, 102 Crazy Animals, 108 How Many Squares? 111 Square Numbers, 118 Ice-cream Flavours, 137 Training For Maths, 140 Time For Tiling, 141 Flags From A Ship, 142 Tower Of Hanoi, 145 Land Of ET, 147 Garden Beds, 149 A Stacking Problem, 152 Painted Rods, 154 Four-Arm Shapes, 159 Mirror Patterns 2, 160 Painted Cubes, 173 Crossing The River 1, 178 Match Triangles, 179 Unseen Triangles, 180 Making Monuments, 181 Pointy Fences, 182 Jumping Kangaroos, 183 Pizza Toppings, 188 Arithmagons 1, 220 Smooth Edge Tiles, 221 Triangles & Colours

- **Real problem-solving**

RIME 5/6 (MAV) Lesson plans

Paper folding

d Draw informal graphs to show relationships between two variables

- **Toolbox: concepts and skills**

People Count: book and/or CD (MAV) Text for teachers, with spreadsheets for students.

1 Numbers for identification, 2 Counting,

Interactive learning for concepts & skills (MAV) Demo on whiteboard or student use

Graph stories, Walking, Filling bottles,

The Learning Federation www.thelearningfederation.edu.au/tlf2/ Free software from the internet

Filling glasses, Mobile phones, Triathlon

- **Mathematical problem-solving**

- **Real problem-solving**

e Form equations and solve by trial and error

- **Toolbox: concepts and skills**

People Count: book and/or CD (MAV) Text for teachers, with spreadsheets for students.

86 Missing values,

Interactive learning for concepts and skills (MAV) *Demo on whiteboard or student use*

Guess and check,

The Learning Federation www.thelearningfederation.edu.au/tlf2/ *Free software from the internet*

Squirt, Hopper

• **Mathematical problem-solving**

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives *Free software from the internet*

• **Real problem-solving**

STANDARD 5

a Use Venn diagrams and two-way grids (using *and*, *or*, *not*) and language (*none*, *some*, *all*), subsets including power sets

• **Toolbox: concepts and skills**

Chance and Data Investigations: Volume 2 Data (CC) *Lesson plans*

Groups and sorting,

• **Mathematical problem-solving**

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives *Free software from the internet*

• **Real problem-solving**

Chance and Data Investigations: Volume 2 Data (CC) *Lesson plans*

Database debut

b Create functions (linear and simple quadratic, reciprocal, exponential) as tables, graphs and formulas

• **Toolbox: concepts and skills**

People Count: book and/or CD (MAV) *Text for teachers, with spreadsheets for students*

82 Using formulas, 83 Number patterns, 84 Describing with formulas, 85 Graphs show relationships, 87 Linear relationships

Interactive learning for concepts and skills (MAV) *Demo on whiteboard or student use*

One-day cricket, Table tennis, Tennis, Formula guessing, Graph guessing, Equivalent formulas, Expanding, Strips and squares, Think-number puzzles, Three-circles puzzle,

Finding a linear rule, Quadratic graphs, Tickets,

The Learning Federation www.thelearningfederation.edu.au/tlf2/ *Free software from the internet*

Mobile phones, Lifting loads, Bridge builder

Sample units of work (free from www.vcaa.vic.edu.au/prep10/csf/support/sampleunits/sample_units.html)

Building algebra experience, Extending algebra experience, Working with linear expressions,

[<standards.nctm.org/document/eexamples/index.htm>](http://standards.nctm.org/document/eexamples/index.htm) *Free software from the internet*

6.2 Learning about Rate of Change in Linear Functions Using Interactive Graphs

7.5 Exploring Linear Functions: Representational Relationships

<http://illuminations.nctm.org/Activities.aspx> *Free software from the internet*

Chairs

• **Mathematical problem-solving**

Maths300 (CC) *Lesson plans*

16 Garden Beds, 18 Addition Totals, 19 Back Tracking, 20 Unseen Triangles, 21 Lining Up, 22 Algebra Walk, 23 Crossing The River, 25 Sphinx, 27 Game of 31, 34 What's My Rule? 39 Painted Rods, 40 Four-Arm Shapes, 41 Heads & Legs, 64 Snail Trail, 94 Trial, Record & Improve, 117 Colour Spots on a Number Line

Problem Solving Task Centre (CC)

8 Addition Totals, 11 Lining Up, 38 The Mushroom Hunt, 45 Eric The Sheep, 65 Shape Algebra, 71 Algebra Through Geometry, 82 Snail Trail, 111 Square Numbers, 140 Time For Tiling, 147 Garden Beds, 152 Painted Rods, 154 Four-Arm Shapes, 159 Mirror Patterns 2, 166 Sphinx, 173 Crossing The River 1, 178 Match Triangles, 179 Unseen Triangles, 180 Making Monuments, 181 Pointy Fences, 182 Jumping Kangaroos, 220 Smooth Edge Tiles

RIME: Algebra (MAV) *Lesson plans*

Linear: 5 Painting prisms, 9 Pick's rule, 13 Chains of polygons, 14 The 3:45 mile – when? 15 Car rental, 16 Tell me a story, 23 Billiard ball bounces

Quadratic and exponential functions are in Standard 6.

Active Learning: Number and Algebra (MAV) Worksheets

Linear: A1 Arranging trapezium tables, A2 Tiling patterns, A3 Remainder patterns, A4 Match puzzles, A5 Adding neighbour numbers, A6 Formulas and patterns in tables, A7 Walking the line, A8 Picture patterns, A9 Football graphs, A10 Growth graphs, A15 Stretching a rubber band, A18 Crossing the river, A19 Algebra walks, A21 Borders of triangles, A22 Match rectangles, A29 A big stretch, A31 Divisible by 3 or 9, A33 Pick's rule,
Quadratic and exponential functions are in Standard 6.

Working Mathematically: Investigations (CC)

Unit 10: Analysing games, Unit 19: Bouncing balls, Unit 20: Quadratic functions

<http://illuminations.nctm.org/Activities.aspx> *Free software from the internet*

Paper pool (Billiard ball),

• **Real problem-solving**

Active Learning: Number and Algebra (MAV) Worksheets

A34 Volume and surface area of prisms

Maths at Work (MAV)

24 Modelling change, 25 Rates of change (gradients), 26 Steady change (linear), 27 Statistical change (lines of fit), 28 Varying change (quadratic), 29 Exponential change

The Learning Federation <www.thelearningfederation.edu.au/tlf2/> *Free software from the internet*

Mobile phone plans, Triathlon,

c Use inverses to solve equations and inequalities, and transform formulas

• **Toolbox: concepts and skills**

People Count: book and/or CD (MAV) *Text for teachers, with spreadsheets for students*

86 Missing values,

Interactive learning for concepts and skills (MAV) *Demo on whiteboard or student use*

Inequalities, Backtracking, Equations by program, Equivalent equations, Equivalent formulas, Expanding, Exponent rules, Forward and backtracking,

RIME: Algebra (MAV) *Lesson plans*

7 Backtracking,

<http://illuminations.nctm.org/Activities.aspx> *Free software from the internet*

Pan balance – shapes, numbers, expressions

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives *Free software from the internet*

• **Mathematical problem-solving**

Maths300 (CC) *Lesson plans*

19 Back Tracking,

Active Learning: Number and Algebra (MAV) Worksheets

A23 The three circles puzzle, A24 Solving with graphs, A25 Pyramid puzzles, A26 More puzzles, A30 Strips and squares,

• **Real problem-solving**

Active Learning: Number and Algebra (MAV) Worksheets

A27 Walking and running,

STANDARD 6

a Venn diagrams and symbols to three overlapping sets

• **Toolbox: concepts and skills**

• **Mathematical problem-solving**

<http://nlvm.usu.edu/en/nav/vlibrary.html>: National Library of Virtual Manipulatives *Free software from the internet*

Venn diagrams

• **Real problem-solving**

b Use functions and graphs

• **Toolbox: concepts and skills**

People Count: book and/or CD (MAV) Text for teachers, with spreadsheets for students.

88 Quadratic relationships and multiplying integers, 89 Exponential relationships, 90 Other relationships

Interactive learning for concepts and skills (MAV) Demo on whiteboard or student use

Formula guessing, Graph guessing, Simple interest, Quadratic graphs, Ball toss, Projectiles, Paper folding, Exponential growth, Interest, Credit card, Annuity, Depreciation, Exponential decay, Cooling, Mortgage, Constant area – rectangles, Swing, Sound waves

The Learning Federation www.thelearningfederation.edu.au/tlf2/ Free software from the internet

Mobile phones, Triathlon, Lifting loads, Filling glasses, Biscuit factory

Active Learning: Number and Algebra (MAV) Worksheets

Linear functions are in Standard 5.

Quadratic: A16 Cutting the pie, A17 More patterns, A20 Non-linear graph, A28 Mathematical curves, A29 A big stretch, A30 Strips and squares, A31 Divisible by 3 or 9, A32 Patterns in squares and triangles, A41 Ways of drawing a parabola, A42 The parabola and calculation, A43 The parabola and curve stitching, A44 The parabola and number patterns, A58 Quadratic modelling by differences, A59 Finding quadratic rules,

Exponential: A35 Odds, evens and powers of 2, A36 Nim, or the power of two, A37 Match the graph to the functions,

<http://illuminations.nctm.org/Activities.aspx> Free software from the internet

Spreadsheet and graphing calculator, Square graphs,

• **Mathematical problem-solving**

RIME: Algebra (MAV) Lesson plans

Linear functions are in Standard 5.

Quadratic: 6 Consecutive numbers, 8 How many matches? 10 Enlargements, 11 Squares on a chessboard, 12 Next square number, 17 Triangle numbers, 18 One-way tickets, 19 Jumping, 20 Handshakes, 21 Three quadratic problems, 22 Quadratic assignment,

Maths300 (CC) Lesson plans

Linear functions are in Standard 5.

Quadratic: 38 Painted Cubes (including cubic) , 42 Jumping Kangaroos, 57 Crazy Animals, 114 Find My Pattern, 115 Staircases, 138 Pyramid Puzzle, 154 Triangles & Colours, 160 Algebra Charts

Problem Solving Task Centre (CC)

Linear functions are in Standard 5.

Quadratic: 24 Squares Around Squares, 27 Can Stack, 42 Triangles Around Triangles, 48 How Many Triangles? 51 Staircase, 55 Fold Up Houses, 57 Two Squares, 61 Double Staircase, 64 Difference Between Two Squares, 101 Pyramid Puzzle, 108 How Many Squares? 132 Red To Blue, 160 Painted Cubes, 182 Jumping Kangaroos, 186 Tetrahedron Triangles, 206 Intersections, 208 Cube Numbers, 221 Triangles & Colours, 233 Money, Money, Money
Exponential: 142 Tower Of Hanoi,

Sample units of work www.vcaa.vic.edu.au/prep10/csf/support/sampleunits/sample_units.html Free software from the internet

Graphical approach to modelling with quadratics,

• **Real problem-solving**

Active Learning: Number and Algebra (MAV) Worksheets

A38 Applications of growth and decay, A39 Paper sizes, A40 Garden hose and suspension bridge, A64 Bungy jumping

Sample units of work www.vcaa.vic.edu.au/prep10/csf/support/sampleunits/sample_units.html Free software from the internet

Taking the world's temperature,

standards.nctm.org/document/examples/index.htm Free software from the internet

7.2 Using Graphs, Equations, and Tables to Investigate the Elimination of Medicine from the Body

<http://illuminations.nctm.org/Activities.aspx> Free software from the internet

Flowing through mathematics,

<<http://nlvm.usu.edu/en/nav/vlibrary.html>> National Library of Virtual Manipulatives Free software from the internet

c Many methods for the solving of equations

• *Toolbox: concepts and skills*

People Count: book and/or CD (MAV) *Text for teachers, with spreadsheets for students.*

83 Number patterns

Interactive learning for concepts and skills (MAV) *Demo on whiteboard or student use*

Equations by program, Two equal expressions, Equivalent equations, Forward and backtracking, Tickets, Diophantine equations,

SimGraph, Intersecting curves, Cramer's rule, Integer inequalities,

Active Learning: Number and Algebra (MAV) *Worksheets*

A61 Solving equations from graphs, A62 Intersecting curves, A63 Linear programming,

• *Mathematical problem-solving*

• *Real problem-solving*

d Many techniques for equivalent expressions

• *Toolbox: concepts and skills*

People Count: book and/or CD (MAV) *Text for teachers, with spreadsheets for students.*

83 Number patterns

Interactive learning for concepts and skills (MAV) *Demo on whiteboard or student use*

Strips and squares, Expanding, Factorising, Common factors, Equivalent expressions, Equivalent formulas, Quadratic factors, Think-number puzzles, Difference of squares,

Exponent rules,

Active Learning: Number and Algebra (MAV) *Worksheets*

Linear: A11 Using strips and squares, A12 Expanding using strips and squares, A13 Using strips and squares — expanding and collecting, A14 Making rectangles with strips and squares,

Quadratic: A45 Expanding brackets, A46 Finger multiplication and quadratics, A47 Sketching parabolas, A48 A number chart, A49 Yes, but can you prove it? A50 Expanding brackets, A51 Rectangles and cars, A52 Factorising, A53 Factorising practice, A54 Patterns in factorizing, A55 Carpet areas and bricks, A56 Difference of squares,

<http://illuminations.nctm.org/Activities.aspx> *Free software from the internet*

A geometric investigation of $(a + b)^2$

Completing the square

<<http://nlvm.usu.edu/en/nav/vlibrary.html>> National Library of Virtual Manipulatives *Free software from the internet*

• *Mathematical problem-solving*

• *Real problem-solving*