

TRIAL MATERIAL WORK IN PROGRESS

Differentiated plans for Years 3 & 4

Space

Ian Lowe, MAV Professional Officer, 2008

**IF YOU USE ANY OF THIS
PLEASE PROVIDE FEEDBACK TO IAN AT**

ilowe@mav.vic.edu.au

**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 3 & 4 Space

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What do we have here?

Space is a neglected part of the mathematics curriculum, but it has special appeal to students who might be weak in number. 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 needs to be achieved in just two weeks per semester

This set of units – one per semester for Years 3 & 4 – 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 (from Maths300) 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 3 & 4 it is assumed that children will be working largely in Standard 2 to Standard 4.

At regular intervals whole class lessons are taught to 'mixed ability' groups.

Between these are cycles of a fixed pattern of lessons. In Years 3 and 4, the cycle has four parts: teaching, worksheet or games, computer use and problem solving tasks.

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, computer and problem solving. 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 Measurement (MAV), Maths Continuum (DEECD), People count (MAV)
- *Worksheets*: Active Learning 1: Space, Active Learning 2: Space & Logic, Geometry Everywhere (all MAV)
- *Computer*: Interactive Learning (MAV), Learning Objects (LF)
- *Problem solving*: Problem Solving Task Centre (CC), RIME (MAV), Maths300 (CC),

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 3 Semester 1 Space

Day	Yr 3 sem 1 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
1	RIME S19 Three-piece puzzles (1 of 2)			
2	<p style="text-align: center;">Teach</p> <p style="text-align: center;">Classifying shapes (2D/3D, straight/curved sides, number of sides)</p> <p style="text-align: center;">People count #51 Polygons, #57 Solid shapes,</p> <p style="text-align: center;">Continuum 0.5 Recognising, comparing, sorting and matching shapes</p>	<p style="text-align: center;">Problem Solving Task Centre</p> <p style="text-align: center;"><i>Students choose one & work on it in pairs</i></p> <p>Back-to-back building, Cross & square, Farmyard views, Hearts & loops, In the bag, Leading the blind, Making solids, McMahon's triangles 1, McMahon's triangles 2, Mirror patterns 1, Racetrack, Soma cube 1, Sphinx, Symmetric shapes, Tangram teasers</p>	<p style="text-align: center;">Computer</p> <p>Interactive Learning Estimating angles, Compass walks, Hunting quadrilaterals</p> <p>Learning Objects Shape maker</p> <p>Free software http://standards.nctm.org/document/eexamples/index.htm 4.1, 4.2, 4.3</p> <p>http://illuminations.nctm.org/ActivitySearch.aspx Shape sorter</p> <p>www.mathcats.com/explore/polygons.html</p>	<p style="text-align: center;">Worksheets</p> <p>Active Learning 1: Space S10-15</p> <p>Active Learning 2: Space & Logic S1, S3, S6</p> <p>Geometry Everywhere p 2, worksheet 3</p>
3	<p style="text-align: center;">Worksheets</p> <p>See group B day 4</p>	<p style="text-align: center;">Teach</p> <p style="text-align: center;">see group A day 2</p>	<p style="text-align: center;">Problem Solving Task Centre</p> <p>See Group D day 4</p>	<p style="text-align: center;">Computer</p> <p>See group C day 2</p>
4	<p style="text-align: center;">Computer</p> <p>Learning Objects Shape maker</p> <p>Free software http://standards.nctm.org/document/eexamples/index.htm 4.1, 4.2, 4.3</p> <p>http://illuminations.nctm.org/ActivitySearch.aspx Shape sorter</p> <p>www.mathcats.com/explore/polygons.html</p>	<p style="text-align: center;">Worksheets</p> <p>Tuning in with task cards – lower primary (see contents p6-11)</p>	<p style="text-align: center;">Teach properties of angles, triangles and quadrilaterals</p> <p>Guidelines in Measurement p248-254, 278-281</p> <p>People count #48 Angles, #51 Polygons, #54 Quadrilaterals</p> <p>Continuum 2.5 From appearance to properties, 3.25 Angles, 3.5 Classifying shapes</p>	<p style="text-align: center;">Problem Solving Task Centre</p> <p>107 McMahon's Triangles 2, 148 McMahon's Triangles 1, 166 Sphinx, 196 Cross & Square, 60 Back To Back Building, 67 Making Solids, 73 In The Bag, 105 Soma Cube 1, 121 Farmyard Views, 143 Hearts And Loops, 23 Two Colour Game, 70 Symmetric Shapes, 79 Tangram Teasers, 100 Mirror Patterns 1</p>
5	<p style="text-align: center;">Problem Solving Task Centre</p> <p>See group B day 2</p>	<p style="text-align: center;">Computer</p> <p>See group A day 4</p>	<p style="text-align: center;">Worksheets</p> <p>See group D day 2</p>	<p style="text-align: center;">Teach</p> <p style="text-align: center;">See group C day 4</p>
6	RIME S19 Three-piece puzzles (2 of 2)			
7	<p style="text-align: center;">Teach</p> <p style="text-align: center;">2D shapes (drawing, congruent, enlarging/reducing)</p> <p style="text-align: center;">People count #51 Polygons, #44 Scale</p> <p style="text-align: center;">Continuum</p>	<p style="text-align: center;">Problem Solving Task Centre</p> <p>See group B day 2</p>	<p style="text-align: center;">Computer</p> <p>See group C day 2</p>	<p style="text-align: center;">Worksheets</p> <p>Use Geoshapes</p> <p>Hands-on Space cards for use with Geofix/Geoshapes</p> <p>Geometry Everywhere worksheet 5</p>

Day	Yr 3 sem 1 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
	0.5 Recognising, comparing, sorting and matching shapes			
8	Worksheets See group B day 9	Teach see group A day 7	Problem Solving Task Centre See Group D day 4	Computer See group C day 2
9	Computer Learning Objects Shape maker Free software http://standards.nctm.org/document/eexamples/index.htm 4.1, 4.2, 4.3 http://illuminations.nctm.org/ActivitySearch.aspx Shape sorter www.mathcats.com/explore/polygons.htm	Worksheets Use Geoshapes Hands-on Space cards for use with Geofix/Geoshapes	Teach properties of common solids (spheres, prisms, pyramids) inc. edges, faces, vertices People count #57 Solid shapes Continuum 3.5 Visualisation in 2D and 3D Use Geoshapes	Problem Solving Task Centre See group D day 2
10	Problem Solving Task Centre See group B day 2	Computer See group A day 9	Worksheets See group D day 7	Teach see group C day 9

Year 3 Semester 2 Space

Day	Yr 3 sem 2 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
1	Maths300 #53 Spirolaterals (1 of 2)			
2	Teach Mirror symmetry & tessellations (pattern making) with stencils using flips turns, slides People count #49 Mirror symmetry & reflection, #50 Turn symmetry and rotation Continuum 1.5 Folding & symmetry	Problem Solving Task Centre <i>Students choose one & work on it in pairs</i> Back-to-back building, Cross & square, Farmyard views, Hearts & loops, In the bag, Leading the blind, Making solids, McMahon's triangles 1, McMahon's triangles 2, Mirror patterns 1, Racetrack, Soma cube 1, Sphinx, Symmetric shapes, Tangram teasers	Computer Interactive Learning Spirograph, Spirolaterals, Reflection symmetry, Turn symmetry Learning Objects Shapemaker Free internet software http://illuminations.nctm.org/WebLinks.aspx http://www.arcytech.org/java/patterns/patterns.jshtml Create tessellations on screen	Worksheets Hands-on Space cards for use with Geofix/Geoshapes Active Learning 1: Space S8, 19, 20 Active Learning 2: Space & Logic S7, S10 Geometry Everywhere p 31, worksheet 51
3	Worksheets See group B day 4	Teach See group A day 2	Problem Solving Task Centre See group D day 4	Computer See group C day 2

Day	Yr 3 sem 2 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
4	<p>Computer</p> <p>Interactive Learning Spirograph, Spirolaterals, Reflection symmetry, Turn symmetry</p> <p>Learning Objects Shapemaker</p> <p>Free internet software http://illuminations.nctm.org/WebLinks.aspx http://www.arcytech.org/java/patterns/patterns_j.shtml Create tessellations on screen</p>	<p>Worksheets</p> <p>Tuning in with task cards – lower primary (see contents p6-11)</p>	<p>Teach making tessellations with regular polygons</p> <p>Use Geoshapes</p> <p>People count #52 Tessellations</p> <p>Continuum 3.5 Line symmetry</p>	<p>Problem Solving Task Centre</p> <p>107 McMahon's Triangles 2, 148 McMahon's Triangles 1, 166 Sphinx, 196 Cross & Square, 60 Back To Back Building, 67 Making Solids, 73 In The Bag, 105 Soma Cube 1, 121 Farmyard Views, 143 Hearts And Loops, 23 Two Colour Game, 70 Symmetric Shapes, 79 Tangram Teasers, 100 Mirror Patterns 1</p>
5	<p>Problem Solving Task Centre</p> <p>See group B day 2</p>	<p>Computer</p> <p>See group A day 4</p>	<p>Worksheets</p> <p>See group D day 2</p>	<p>Teach</p> <p>See group C day 2</p>
6	Maths300 #53 Spirolaterals (2 of 2)			
7	<p>Teach reading and sketching simple maps e.g. classroom</p> <p>Guidelines in Measurement p290-295</p>	<p>Problem Solving Task Centre</p> <p>See group B day 2</p>	<p>Computer</p> <p>See group C day 2 plus Size change</p> <p>Free internet software http://illuminations.nctm.org/WebLinks.aspx http://www.learner.org/teacherslab/math/geometry/space/</p>	<p>Worksheets</p> <p>Geometry Everywhere worksheet 18</p>
8	<p>Worksheets</p> <p>See group B day 9</p>	<p>Teach</p> <p>see group A day 7</p>	<p>Problem Solving Task Centre</p> <p>See group D day 4</p>	<p>Computer</p> <p>See group C day 7</p>
9	<p>Computer</p> <p>Interactive Learning Spirograph, Spirolaterals, Reflection symmetry, Turn symmetry</p> <p>Free internet software http://illuminations.nctm.org/WebLinks.aspx http://www.arcytech.org/java/patterns/patterns_j.shtml Create tessellations on screen</p>	<p>Worksheets</p> <p>Tuning in with task cards – lower primary (see contents p6-11)</p>	<p>Teach use of maps and diagrams to identify places</p> <p>Guidelines in Measurement p290-295</p> <p>People count #44 Scale: effect on lengths</p> <p>Active Learning 2: Space & Logic Quickmaths Space O</p>	<p>Problem Solving Task Centre</p> <p>See group D day 4</p>
10	<p>Problem Solving Task Centre</p> <p>See group B day 2</p>	<p>Computer</p> <p>See group A day 9</p>	<p>Worksheets</p> <p>See group D day 7</p>	<p>Teach</p> <p>see group C day 9</p>

Year 4 Semester 1 Space

Day	Yr 4 sem 1 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
1	Maths300 #48 String shapes (1 of 2)			
2	<p>Teach 2D shapes (sorting using Venn diagrams, subsets, same/different properties)</p> <p>People count #51 Polygons</p> <p>Continuum 1.75 Identifying shapes</p>	<p>Problem Solving Task Centre</p> <p><i>Students choose one & work on it in pairs</i></p> <p>Back-to-back building, Cross & square, Farmyard views, Hearts & loops, In the bag, Leading the blind, Making solids, McMahon's triangles 1, McMahon's triangles 2, Mirror patterns 1, Racetrack, Soma cube 1, Sphinx, Symmetric shapes, Tangram teasers</p>	<p>Computer</p> <p>Interactive Learning Hunting quadrilaterals</p> <p>Free software http://illuminations.nctm.org/ActivitySearch.aspx 4.2, 5.3</p> <p>http://standards.nctm.org/document/examples/index.htm Shape sorter</p> <p>http://www.boxermath.com/plp/modules/online/workshop/toolbox/mosaic/tool.html</p>	<p>Worksheets</p> <p>Active Learning 1: Space S16. 17. 18</p> <p>Geometry Everywhere worksheets 26, 27</p> <p>Hands-on Space cards for use with Geofix/Geoshapes</p>
3	<p>Worksheets</p> <p>See group B day 4</p>	<p>Teach</p> <p>See group A day 2</p>	<p>Problem Solving Task Centre</p> <p>See group D day 4</p>	<p>Computer</p> <p>See group C day 2</p>
4	<p>Computer</p> <p>Free software http://illuminations.nctm.org/ActivitySearch.aspx 4.2, 5.3</p> <p>http://standards.nctm.org/document/examples/index.htm Shape sorter</p>	<p>Worksheets</p> <p>Tuning in with task cards – lower primary (see contents p6-11)</p>	<p>Teach properties of polygons, inc. regular ones</p> <p>Use Geoshapes</p> <p>Guidelines in Measurement p278-281</p> <p>People count #51 Polygons</p> <p>Continuum 2.5 From appearance to properties</p>	<p>Problem Solving Task Centre</p> <p>107 McMahon's Triangles 2, 148 McMahon's Triangles 1, 166 Sphinx, 196 Cross & Square, 60 Back To Back Building, 67 Making Solids, 73 In The Bag, 105 Soma Cube 1, 121 Farmyard Views, 143 Hearts And Loops, 23 Two Colour Game, 70 Symmetric Shapes, 79 Tangram Teasers, 100 Mirror Patterns 1</p>
5	<p>Problem Solving Task Centre</p> <p>See group B day 2</p>	<p>Computer</p> <p>See group A day 4</p>	<p>Worksheets</p> <p>See group D day 2</p>	<p>Teach</p> <p>See group C day 4</p>
6	Maths300 #48 String shapes (2 of 2)			
7	<p>Teach 3D shapes (classify [boxes, prisms, pyramids, cylinders, cones], corners, faces, edges, nets of cubes)</p> <p>People count #57 Solid shapes,</p>	<p>Problem Solving Task Centre</p> <p>See group B day 2</p>	<p>Computer</p> <p>Interactive Learning Open box nets, Cube nets</p> <p>Learning Objects Building site</p> <p>http://illuminations.nctm.org/WebLinks.aspx</p>	<p>Worksheets</p> <p>Use Geoshapes</p> <p>Hands-on Space cards for use with Geofix/Geoshapes</p> <p>Active Learning 2: Space & Logic S2, S5, S9</p>

Day	Yr 4 sem 1 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
	#58 Nets Continuum		Geometric Solids http://www.cs.mcgill.ca/~sgrt/unfold/unfolding.html from net to solid and back http://www.learner.org/teacherslab/math/geometry/space/ http://www.mathsnet.net/geometry/solid/index.html	Geometry Everywhere worksheet 8
8	Worksheets See group B day 9	Teach See group A day 7	Problem Solving Task Centre See group D day 4	Computer See group C day 7
9	Computer See group C day 7	Worksheets Use Geoshapes Hands-on Space cards for use with Geofix/Geoshapes	Teach making solids from nets, and drawing the solids People count #57 Solid shapes, #58 Nets and skeletons of solids Continuum 3.5 Visualisation in 2D and 3D	Problem Solving Task Centre See group D day 4
10	Problem Solving Task Centre See group A day 1	Computer See group C day 7	Worksheets See group D day 7	Teach See group C day 9

Year 4 Semester 2 Space

Day	Yr 4 sem 2 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
1	Maths300 #82 Knight's tour (1 of 2)			
2	Teach 2D patterns and symmetry, using slides, flips, turns People count #49 Mirror symmetry and reflection, #50 Turn symmetry & rotation Continuum 2.0 Simple transformations	Problem Solving Task Centre <i>Students choose one & work on it in pairs</i> Back-to-back building, Cross & square, Farmyard views, Hearts & loops, In the bag, Leading the blind, Making solids, McMahon's triangles 1, McMahon's triangles 2, Mirror patterns 1, Racetrack, Soma cube 1, Sphinx, Symmetric shapes, Tangram teasers	Computer Learning Objects Shapemaker Free internet software http://www.tygh.co.uk/index.html Tangram movie http://standards.nctm.org/document/eexamples/index.htm Isometric drawing tool http://nlvm.usu.edu/en/nav/vlibrary.html http://www.kidscom.com/games/tangram/tangram	Worksheets Active Learning 1: Space S4, S6 Active Learning 2: Space & Logic S4 Geometry Everywhere p2, worksheet 3

Day	Yr 4 sem 2 Towards Std 2 Group A	Towards Std 2 group B	Towards Std 3 group C	Towards Std 3 group D
			html http://britton.disted.camos.un.bc.ca/jbsymtesik.htm A rich collection of links	
3	Worksheets See group B day 4	Teach See group A day 2	Problem Solving Task Centre See group D day 4	Computer See group C day 2
4	Computer Free internet software http://standards.nctm.org/document/eexamples/index.htm Isometric drawing tool http://nlvm.usu.edu/en/nav/vlibrary.html http://www.kidscom.com/games/tangram/tangram.html http://britton.disted.camos.un.bc.ca/jbsymtesik.htm	Worksheets Tuning in with task cards – lower primary (see contents p6-11)	Teach making and solving tangram puzzles People count #51 Polygons Active Learning 1: Space S16	Problem Solving Task Centre 107 McMahon's Triangles 2,148 McMahon's Triangles 1, 166 Sphinx, 196 Cross & Square, 60 Back To Back Building, 67 Making Solids, 73 In The Bag, 105 Soma Cube 1, 121 Farnyard Views, 143 Hearts And Loops, 23 Two Colour Game, 70 Symmetric Shapes, 79 Tangram Teasers, 100 Mirror Patterns 1
5	Problem Solving Task Centre See group B day 2	Computer See group A day 4	Worksheets See group D day 2	Teach See group C day 4
6	Maths300 #82 Knight's tour (2 of 2) or MCTP Volume 2 p336 Photo sort			
7	Teach reading maps & giving directions Guidelines in Measurement p290-295	Problem Solving Task Centre See group B day 2	Computer See group C day 2; also http://illuminations.nctm.org/WebLinks.aspx	Worksheets Geometry Everywhere worksheet 19
8	Worksheets See group B day 9	Teach See group A day 7	Problem Solving Task Centre See group D day 4	Computer See group C day 4
9	Computer See group A day 4	Worksheets Tuning in with task cards – lower primary (see contents p6-11)	Teach using a street directory, inc simple compass directions Use local directory Guidelines in Measurement p290-295	Problem Solving Task Centre See group D day 4
10	Problem Solving Task Centre See group B day 2	Computer See group A day 9	Worksheet See group C day 7	Teach See group C day 9