Matt's Maths Mat Matters

Doug. Williams
Project Manager, Mathematics Centre
http://www.blackdouglas.com.au/mathematicscentre ... doug@blackdouglas.com.au

Acknowledgment

This article was first published in:
Perry, A. & Perry, C., (Editors), *The Classroom Connection*, Vol.3 No.2, April-June 1995, The Education Support Group, pp.10-12

Past History

We learn a lot from each other. When I was leading an EMIC course (Exploring Mathematics in Classrooms) a few years ago, This Works For Me really worked for me. One of the participants (and for the life of me I can't remember who, so if you read this let me know so I can acknowledge you in the next issue) demonstrated how she used a polythene sheet about 2m x 2m which was marked in squares to do sorting and graphing exercises with her infants. For example, jumpers which were taken off after running around at recess could be sorted into colours. A column was labelled with a colour card and one jumper was neatly folded into each cell. This was an instant graph and encouraged counting and difference activities.

In my own training as an EMIC leader I had become hooked on kinaesthetic learning through involving the whole body in the mathematics activity. (See Williams, [1990])

Sometimes the juxtaposition of two ideas results in a brainwave (rather than a headache) and that's what developed from these two experiences. Thought - what about making a mat with cells large enough for the children (not neatly folded) to sit in the cells and become part of the graph?

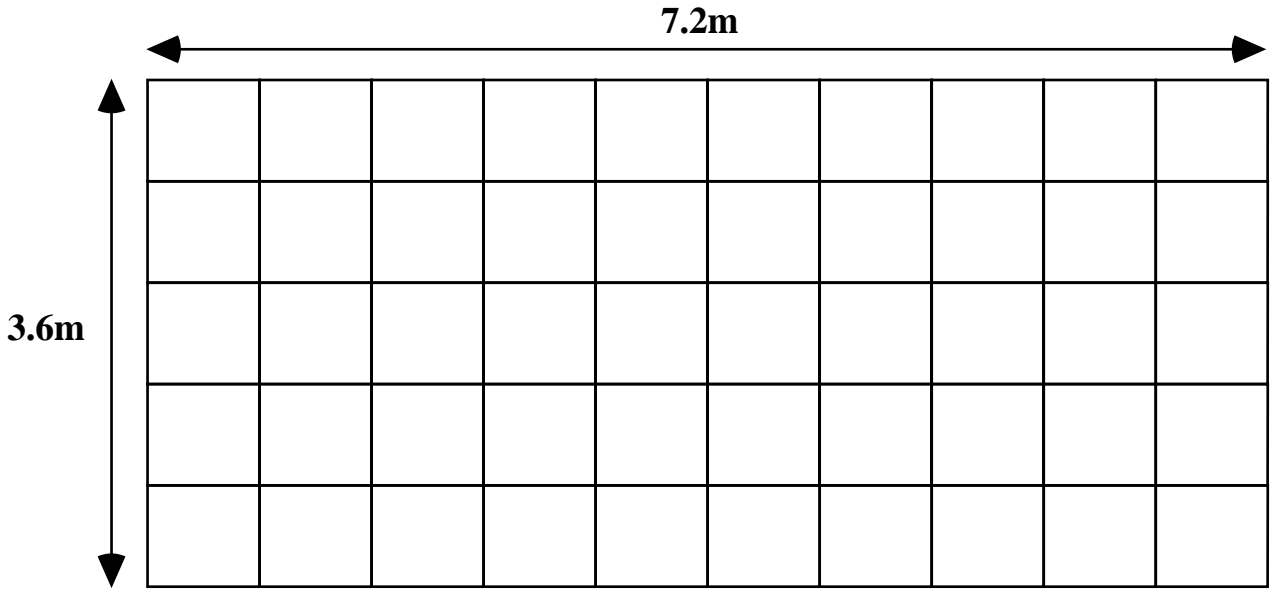
The Maths

I introduced teachers to these initial ideas through an article and workshop at the 1993 December Conference of the MAV. The article, (See Williams, [1993]) begins:

> Have you ever considered just how much mathematics involves the use of grids?
>
> - data is represented by assigning value to cells of a grid.
> - graphs are drawn using the co-ordinates which label the intersections of a grid.
> - the concept of multiplication (and its inverse) can be modelled as a rectangular array which can be represented on a grid.
> - the place value aspect of number can be modelled as an abacus and this can be represented on a grid with 9 (or 10) rows in each column. Once numbers are represented by this model, operations on those numbers can also be represented.
> - geometric shapes can be represented on a geoboard which is a grid where the line intersections are the focus.
> - grids provide the playing board for many games and puzzles. Chess is obvious and the grains of rice on the chess board problem (1 on the first cell, 2 on the second, 4 on the third...) is well known.
> - a spreadsheet/database depends on a grid for its existence.
> - we ask children to learn multiplication tables which are arranged as a grid.
> - the area of a rectangle is measured by a grid of squares.

The Mat

The article goes on to describe the mat. The dimensions shown here make a mat large enough to fit comfortably into a school's multi-purpose room.



Shade cloth (Sarlon Polyshade) is extremely durable and is purchased in 180cm widths. For a cost of $80-100 (which is a tiny component of a school's maths budget) two widths 7.2m long can be bought and taped together with packing tape. Using clear tape means the join can be taped on both sides without producing a distracting tape line down the middle. Then, two hours work with a ruler, a spirit based permanent marker, a long plank and a colleague (knee pads help too!) produces one of the most useful teaching aids a school can possess.

The Matt

The article goes on to offer some classroom uses and Matt Skoss, currently Mathematics Project Officer in Alice Springs, read them all voraciously and immediately made a mat to use in his consultant's role. Like me, he drew red circles about 10cm in diameter at each intersection. The following ideas result from his recent contacts with schools and teachers. These colleagues are acknowledged at the end of this composition. Kerry Kasmira from Bradshaw Primary School suggested using raised numbers (as on restaurant tables) to identify the lines or cells along the axes of the grid, so these activities assume this is done.

1. I'm Walkin'

- Put children on grid to experience it. Let them walk along the lines in any direction. They must not step off the lines or they might be eaten by crocodiles. If passing another child, they must go under legs or leap frog to continue. Stop on a whistle or clap. Choose particular children to say where they are, eg: (2, 7).

2. Smartie Co-ordinates

- Put 'secret co-ordinates' plus small prize in a secret tin. Ask the children to stand on a point where lines cross. Pull out a 'secret co-ordinate' from the tin. Whoever is standing on it wins a small prize such as a mini box of Smarties. Repeat several times and provide stickers of some sort for those who missed the Smarties.

3. Calendar Maths

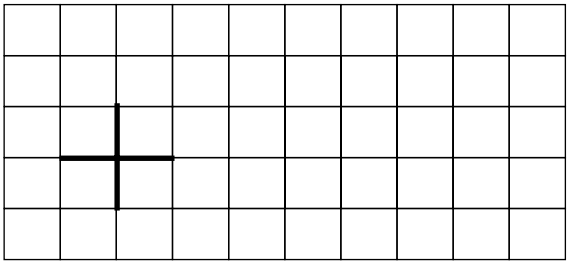
- *Preparation*: On cardboard squares (about 15cm x 15cm) write the numbers 1-31 and on another set of cards write the days of the week. Fold over some of the cells on your plastic mat to expose a 7 x 5 grid.

  Activity: Give out numbers to each student - in classes of 31 this is one per child. Give just one clue, eg. The 14th of this month is on a Wednesday. Can we make a calendar for this month? This activity leads to investigation of number relationships within a calendar, and research into the last (or next) month and year in which the 14th is a Wednesday.

4. Algebra Walk Variations (Lovitt & Clarke, [1988])

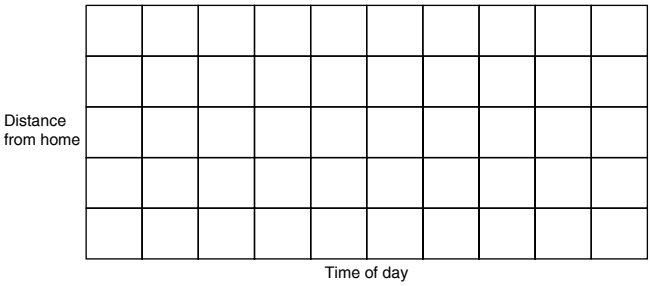
- *Preparation*: 2 lengths of wood joined to represent the origin of a Cartesian plane.

  Activity: As in Algebra Walk, but with the possibility of the axes being rescaled by agreeing a new convention, and the origin moving, to reflect what is possible using a graphical calculator or ANUGraph.



5. Travel Graphs

- *Preparation*: Write stories for each group such as:
  Bert and Ernie left home at 9 am on their push bikes. By 11 am, they had travelled 17km. They stopped for morning tea for 30 minutes. Bert encouraged Ernie to speed up, and they average 10 km/h until they stopped for lunch at 12:30pm. They started riding again at 2pm. In the next 3 hours they covered 27km. Bert and Ernie stopped for the night at the Youth Hostel.



  Activity: Using elastic, challenge groups to represent Bert and Ernie's travel graph on the plastic mat. Challenge students to make up their own graph stories and represent them on the plastic mat. (See Lovitt & Clarke, [1988], pp. 247-256)

6. City Blocks

- How many ways from (4, 5) to (7, 1)? Shortest route? How many ways of this length? Generalise?

7. Grid Bingo

- *Preparation*: 10-spinner or 10-sided dice, 6-sided dice (large if possible), cards with numbers to go along each axis.

  Activity: Divide class into 2 - 3 teams. Children choose a square to stand in. Spin spinner and roll dice to find the co-ordinates of a winner. Vary by standing on intersections rather than in cells.

8. Addition Bingo

- *Preparation*: Write addition fact answers on cards.

Activity: Hand out 1 - 2 cards to each child. Ask them to put each card in its 'home', ie: in the cell which is the intersection of a column and row which adds to this total. Some cards may have more than one 'home'. Vary activity using multiplication facts, or mixing up the numbers along each axis. Use negative numbers if appropriate.

9. Logo Instructions

- *Preparation*: Write instructions for students to follow., eg: FD 4 RT 90 FD 3 LT 90 FD 6 RT 90 BK 2 ...

  Activity: Students start from different positions, and follow the instructions (works with about 10 students on the mat at one time). Challenge students to make up their own instructions. Try the same activity using grid paper or with Logo on a computer.

This last activity contains a very important subtlety. In the previous issue of *The Classroom Connection* I introduced you to Recording as a Fundamental Reasoning Strategy and Representing as a Fundamental Mathematical Strategy. Whenever possible invoke these as part of a mat activity by asking:

> *Now when we go back to the classroom I want you to make a table top model of what we have just done. You can use anything in the room to help you.*

What Matters

Rich, flexible learning tasks shared by enthused, creative teachers lead to exciting teaching and learning which is consistent with any imposed curriculum document. Maths on a plastic mat is a clear example of the benefits of professional development which fosters such opportunity. And that is why Matt's Math Mat Matters.

References

Williams, D.[1990], *Walking With Children*, Prime Number 5 [3], August 1990, Mathematical Association of Victoria

Williams, D. [1993], *Maths On A Plastic Mat*, Mathematics: Of Prime Importance, edited by Mousley, J. & Rice, M., Mathematical Association of Victoria

Lovitt, C. & Clarke, D. [1988], *MCTP Activity Banks Volumes 1 & 2*, Curriculum Corporation

Hammond, P., Vincent, J. & Williams, D. [1995], *Mathematics Learning For Life 2*, Oxford University Press, pp. 9 - 12

Acknowledgments

Matt Skoss, Lucy Skoss and Bruce Nulty, Kerry Kasmira and other teachers from Bradshaw Primary School, teachers from Araluen Primary School and teachers involved in the Orientation Recall Workshop for Bush Teachers.