Maths on a Plastic Mat

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Mathematics and Grids

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 list goes on.

Maths and Kinaesthetic Learning

Learning is not a brain only experience. You know that personally. Recall learning to drive. There was a stage where you had to think about every action and you relied almost entirely on external sensory cues such as your teacher's voice, what was in the mirror, taking to yourself, the traffic which appeared to be attacking you, actually looking to see where the gear stick or indicator stalk was before using it, and so on. These things seemed to go in your head simultaneously and that is exactly where you felt the pressure. Information overload may even have occurred which left you wishing that you could some how; it perhaps even found you taking your hands off the wheel or turning off the engine to escape.

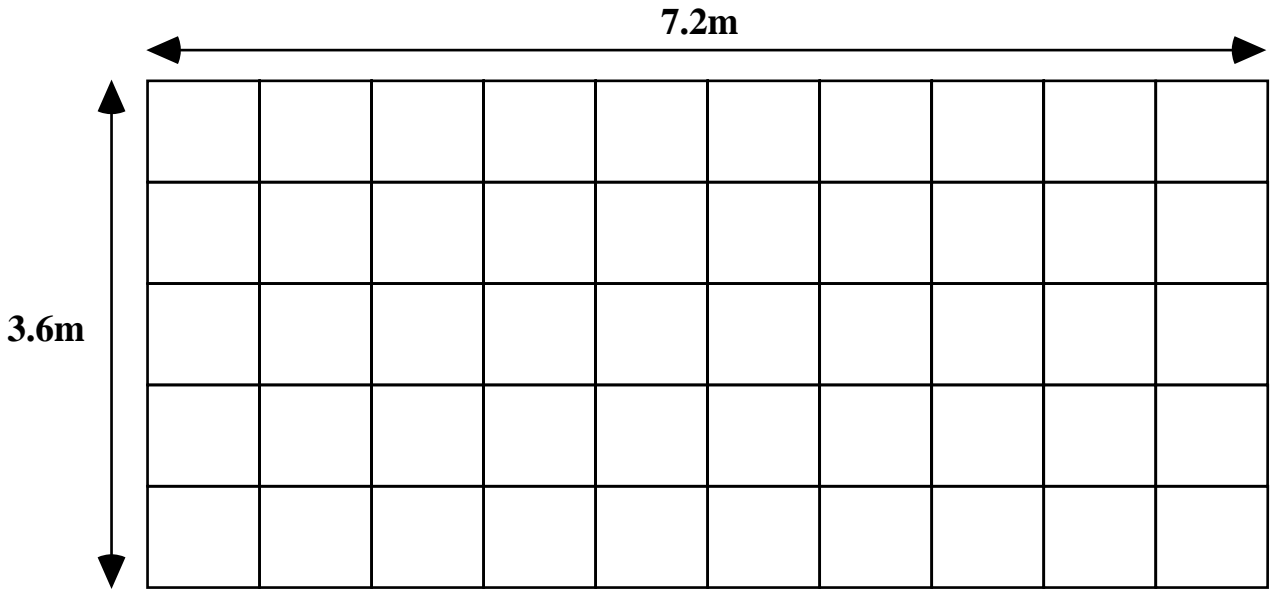
Clearly, more than your brain was involved at this stage. You sweated, your heart rate was up, your body was tense and you probably had 'butterflies' Your physiology was involved in the learning and, even now, remembering key episodes in the process may elicit a response which you can actually feel somewhere in your body. The involvement of the kinaesthetic sense in learning can leave a powerful impression.

Teachers aware of this physical contribution to learning look for opportunities to involve the whole of the student's body in the learning task. A rationale for this teaching/learning strategy is provided in Lovitt & Clarke (1988, pp. 185-188).

Maths on a Plastic Mat

Preparation of a grid large enough to accommodate a seated child in each cell, is an excellent way of involving the whole of the children's bodies in a huge proportion of the mathematics curriculum. Such a grid could be painted on the asphalt of the playground, but then it could only be used in appropriate weather. However for a reasonable cost, and two hours work, a large scale grid can be prepared on a shade cloth. Such a grid is easy to store, durable and usable both inside and outside.

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



Shade cloth 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.

Making Use of the Mat

The following smorgasbord of ideas shows the potential of maths on a plastic mat. In addition to the mat, teachers will have to prepare cards as shown to label rows, columns or cells. In some activities, part of the mat has to be 'masked'. This can be done by seating children (shoes off please) around the border of the required space, or by using cover paper or its equivalent.

All of the activities shown here can be adapted and varied. They can also be extended by using two mats (not taped together because they are too awkward to handle), although the double size mat no longer fits in a multi-purpose room.

It is also vital that the children are frequently asked to design and make use of 'desktop' models of the large size task.

1. Four In A Row

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										

- The class divides into teams of about 10.
- The teacher has a small pack of cards which are the answers to all the column/row additions on the grid.
- The first member of each team selects the top card from the teachers' pack. Players consult and then send the person who drew the card to a chosen cell.
- The aim is to make four in a row of your team
- If a team can't find an appropriate cell, the player who drew the card goes to the back of the team.

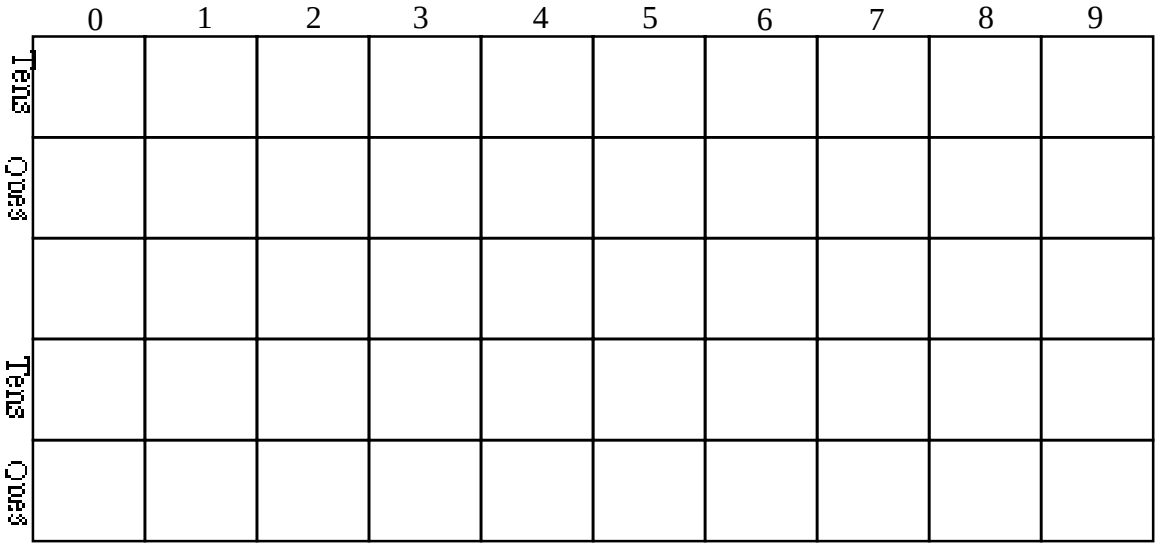
2. How Many Pets?

	0	1	2	3	4	5	6	7	8	9
0 Pets										
1 Pet										
2 Pets										
3 Pets										
4 Pets										

- Children sit or stand in the appropriate cell.
- The teacher asks questions about the result. For example, suppose the result showed four children had 2 pets and 5 children had 3 pets.
- Are there more children who have two pets or more children who have three pets?
- Stand up the children who show how many more.
- It is also important for the children to view the result 'from the outside'. To achieve this, ask the children to leave something of theirs behind in their spot and then step off the mat.

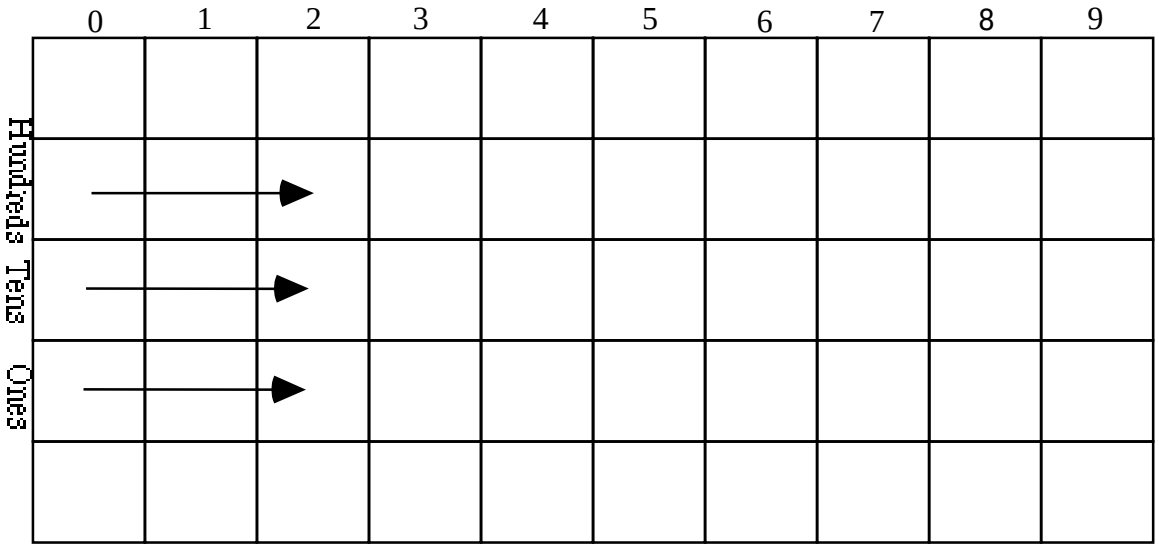
Children should also be asked to produce a 'desktop' model of the graph when they return to the classroom.

3. Highest Number



- Two players make a team. One is the tens part of a number and one is the ones part.
- The teacher has pack of cards numbered from 0 to 9 for each team.
- Team A selects a card, decides whether they will use it in the tens column or the ones column and one of the players steps out to the appropriate cell.
- Team B does the same from their pack of cards.
- The second player in each team then makes a selection and moves to the correct cell.
- The team displaying the higher number wins the round and challenges a new opposing team.
- An interesting variation is to play with one card pack between the two teams.

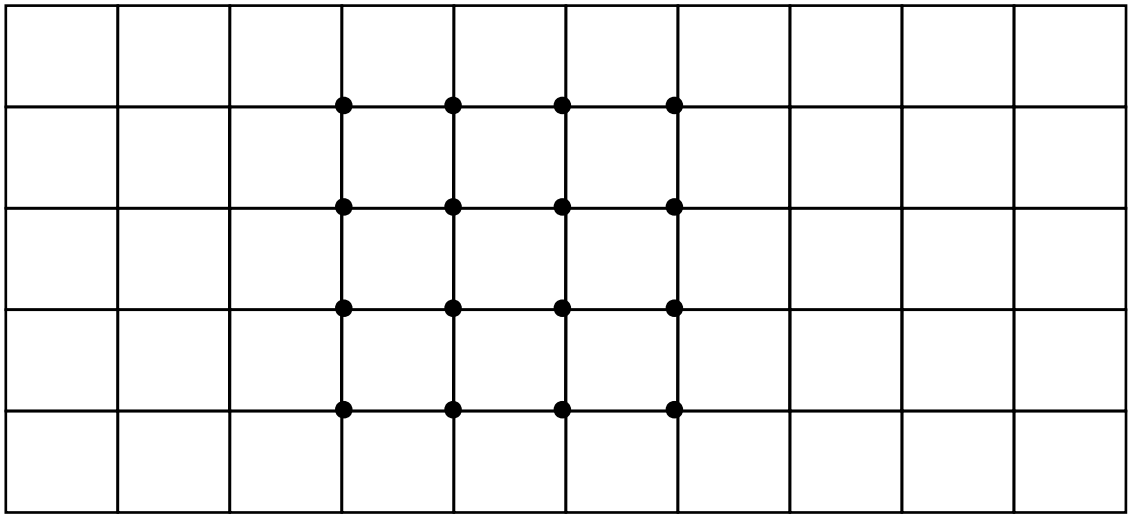
4. Human Computer



- Three children are used as demonstrators. They have a column each in which to operate and begin standing on zero.
- The other children sit around the mat and observe. They have a calculator to check the human computer.
- Begin by asking the human computer to display particular numbers. After each exercise, the computer resets to 0.

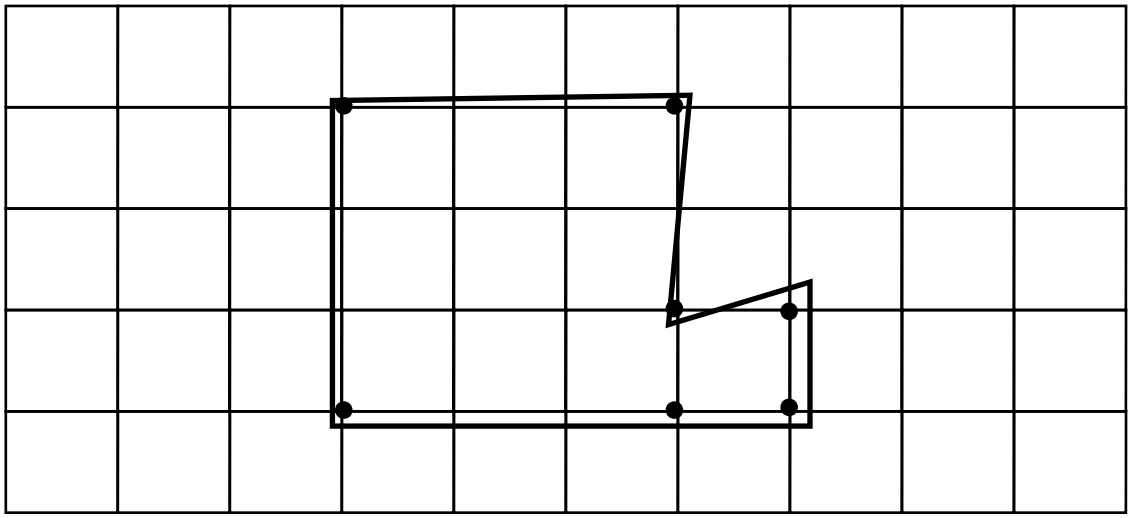
- Ask the computer to display additions and subtractions. e.g. 34 + 76. This should involve considerable discussion.
- What will be shown first? Who will move next? What happens when someone reaches the top of their column?
- Make a comparison with the odometer in the car which measures distance travelled, or with a video counter which winds on from a given number.

5. Human Geoboard



- Ask sixteen children to kneel on the intersections as shown. They become the pegs of a human geoboard. The rest of the class sits around the geoboard.
- Using knicker elastic, volunteers from the watchers carry out geometric tasks such as making all the possible squares, or finding shapes with an area of 5.

6. Big Toe Noughts & Crosses



- Use 'kneelers' and knicker elastic to mark out a big toe board like this.
- Two teams, sleeves up and sleeves down, play noughts and crosses rules on this board.
- Children model the game on paper and work in groups to search for winning strategies.

Maths Matters

Most people will tell you that maths matters (usually this is the statement that precedes the qualification "...but I never was any good at it"). What matters more however, in fact, what is of

primary importance, is how it is taught. Using a plastic mat as a learning aid is a teaching technique that matters.

Make one and start using it. You and your children will soon build an extensive library of suitable tasks.

References

Lovitt, C. & Clarke, D. (1988). Mathematics Curriculum and Teaching Project Activity Bank 1, Melbourne, Curriculum Corporation