Lesson 3

Magic Squares – Practising the Ground Rules

What teachers say

> It is worth spending a few minutes going through the ground rules. It is a good idea to have these on display where the children can see them. It helps if you ask children to explain what the rules mean and why each one is important.

> The talk cards make a big difference. They act as prompts and give children phrases which help them to use the ground rules. One group suggested sticking them round the edge of the computer screen, so that they could be seen easily.

Note

The aim of this lesson is to give the children an opportunity to practise using the ground rules for talk. The rules that the class has agreed on in Lesson 2 should be revised, and then displayed during the lesson. Any extra ground rules for using the computer that have been agreed should also be recalled and displayed.

Resources

Talk cards – one set cut up for each group.
'Magic Square' computer files (these use Word 97 or 2000).
The ground rules for talk need to be displayed.

Objectives

To use the ground rules for talk on mathematical problems
Derive quickly decimals with a total of 1 (NNS 39)
Add mentally several small numbers (NNS43)
Solve mathematical problems or puzzles (NNS 79)

Whole-class work (direct teaching)

Begin by asking the children to recall their ground rules for talk (see 'What teachers say' about this lesson).

Now explain the objectives of the lesson, emphasising that this lesson is to give the children a chance to begin to use their ground rules for talk to think together about a maths puzzle.

Introduce/revise Magic Squares. You could use the Magic Square opposite to do this (taken from *Bridging Units from SMILE Mathematics*, p. 6).

11	3	10
7	8	9
6	13	5

Discuss the sum of each row, column and diagonal. They all equal 24. This is the magic number. Can they see a relationship between the centre number and the magic number?

Now show the following incomplete Magic Square:

8		
	5	7
		2

Ask the children to discuss a strategy to solve this Magic Square. Remind them to give reasons for their suggestions. When they have had a chance to share their ideas, ask for feedback, again asking for reasons.

Now demonstrate how to choose numbers in the file Magic Square 1 to the class. This one uses the magic number 12 (use different files as appropriate). When

Magic Square

Can you change then unbers in the square to mo be as many nows, coloums and diaganails odd ipto 1.5?

4	9	2
1 ▾	5	1
	1	6

1
2
3
4
5
6
7
8
9

When you have d... ...any as you can.

add your names h...

Now pint out the... ...klicking on the prcture of the picture at the top left of The screen.

you click on a number in the grid a drop-down list appears. Drag the mouse until the number you want is highlighted and let go. There is also a space for children to add their names before printing out the form.

Group Work

Explain that the objective of the group work is to talk together in order to agree a strategy to use to solve the magic square. Give each group a set of talk cards to use to help them to stick to the ground rules. They should use the cards in the order given. Once they have a solution they should add their names and print it out.

Plenary

Ask each group to give an example of a problem and explain their strategy for solving the problem.

Identify with the pupils the types of strategies used and how they organised their group. How did they arrive at a solution?

Ask the groups how they used the ground rules for talk. Do they think the aim of the lesson was achieved?

Extension activities

One general solution for Magic Squares is for any given total $3n$ (plus rotations and reflections of this). A key strategy is to identify the three sequential numbers that form one diagonal – that is, the centre number is the total of the square divided by 3.

n-1	n+4	n-3
n-2	n	n+2
n+3	n-4	n+1

Use your ground rules for talk to try 'Multicultural Magic' in *Bridging Units from SMILE Mathematics* (p. 16). This explores Magic Squares from different cultures and Magic Squares which use different number scripts.

What do you think?

Why do you think that?

Talk card 1

I agree with because …

I disagree with because …

Talk card 2

Any more ideas to share?

Do we all agree? (Or shall we talk more?)

Talk card 3