

# Problems for the Web

## P4W1: Magic Squares

**Curriculum Areas:** Number Sense, Pattern, Problem Solving.

### Introduction:

Many children are familiar with Magic Squares. In a Magic Square, different numbers are placed in each cell so that the sum of any three numbers in a row (horizontally, vertically, or diagonally) is constant.

In the example shown, the sum of each row, column, or diagonal is 15. This number (15) is called the "Magic Constant" for this particular Magic Square.

8	3	4
1	5	9
6	7	2

Example 1

Use the Magic Square in Example 1 as a sample.

### For the Teacher:

#### P4W1 a): Completing Magic Squares

Four partially completed Magic Squares are given. Have students complete them individually, or assign different Squares to different groups, and have them present their solutions to the class.

*Hint:* Ask "What is the Magic Constant? How can you figure out what it is?"

#### Solutions:

8	1	6
3	5	7
4	9	2

12	5	10
7	9	11
8	13	6

2	7	6
9	5	1
4	3	8

9	2	7
4	6	8
5	10	3

*Comments:* Each Square is derived from Example 1. Some use the same numbers, in different places, while others have a constant added to each number. Ask students to decide how each one was obtained from Example 1, i.e. a flip or a turn?, (or both?), or what was added?

#### P4W1 b): Creating Magic Squares

Two blank magic squares are given, along with a set of numbers. Have students create their own Magic Square. If you have already discussed the *comments* in P4W1 a), they may use the 'addition' idea. Otherwise, they may use trial-and-adjustment techniques.

*Solutions:* There will be more than one for each. Have students check their own by addition of rows, columns (or check one another's).

*Comments:* Some students may have noticed that the Magic Constant is three times the number in the centre cell; others may have noticed that if the numbers are listed in order of size, then the middle number in the list goes in the middle of the Magic Square. Raise

these points in discussing the solutions.

**For the Students:**

**P4W1: Magic Squares**

a) Complete the following Magic Squares:

		6
4	9	2

12		
7	9	
8		

		6
9		1
		8

9	2	7
	10	

b) Use the numbers given below each diagram to design each Magic Square:


12, 13, 14, 15, 16, 17, 18, 19, 20


6, 7, 8, 9, 10, 11, 12, 13, 14

