Lesson 3 Magic Square

1 In a magic square, the sum of the cells in each vertical column, in each horizontal row, and along each diagonal is the same. The square shown below is a magic square. Two of the numbers have been taken out, and three were covered with the letters A, B, and C. Find the sum of $A + B + C$. (1999 Math Kangaroo Problem, Level 5-6, Question #19)

16	3	A
C	10	
B		4

A. 30
B. 41
C. 14
D. 25
E. It is impossible to determine.

2 Fill in each box with a number so that the sum of 3 numbers in each row, column and two main diagonals is the same. Each number cannot be used more than once. Which number should we fill in the question mark?

5		9
?	6	

A. 4
B. 10
C. 8
D. 7

3 Fill in each box with a number so that the sum of 3 numbers in each row, column and two main diagonals is the same. Each number cannot be used more than once. Which number should A represent?

9	2	A
	6	8

4 In the magic square shown, the sums of the numbers in each row, column, and diagonal are the same. Five of these numbers are represented by v, w, x, y, and z. Find $y + z$. (2001 AMC 10 problem, Question #22)

v	24	w
18	x	y
25	z	21

A. 43 B. 44 C. 45 D. 46 E. 47

5 Fill in each box with a number so that the sum of 3 numbers in each row, column and two main diagonals is the same. Each number cannot be used more than once. What is the value of $x + y + a + b + c + d$?

15	a	b
4	c	d
x	12	y

A. 11 B. 68 C. 33 D. 43 E. 99

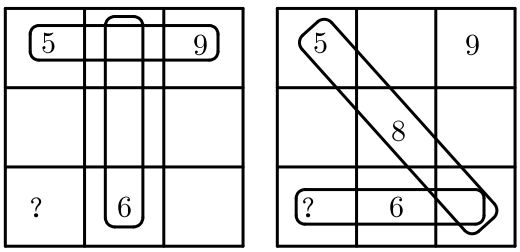
Lesson 3 Solutions

1. D

The sum of three numbers in each row, column and diagonal is $10 \times 3 = 30$. Then, we know $A = 30 - 16 - 3 = 11$, $B = 30 - 10 - 11 = 9$ and $C = 30 - 16 - 9 = 5$.

2. D

From the first figure, we can find the middle number is $5 + 9 - 6 = 8$. From the second figure, we can find $5 + 8 = ? + 6$. Thus, the number we should fill in the question mark is $5 + 8 - 6 = 7$.



3. 7

The magic sum is $6 \times 3 = 18$, so $A = 18 - 9 - 2 = 7$.

9	**2**	**7**
4	**6**	**8**
5	**10**	**3**

4. D

$24 + x = 25 + 21$

$x = 22$

Thus, the sum of the three numbers in each row, column and two main diagonals is $22 \times 3 = 66$.

$y = 66 - 18 - 22 = 26$.

$z = 66 - 25 - 21 = 20$.

$y + z = 26 + 20 = 46$.

5. B

$15 + 4 + x = x + 12 + y$,

$y = 7$,

$15 + 7 = 2c \Rightarrow c = 11$.

Thus, the sum of the nine numbers is $= 11 \times 9 = 99$,

and $x + y + a + b + c + d = 99 - 15 - 4 - 12 = 68$.