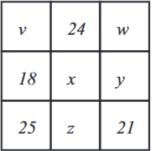12

SOLVE FOR X

2001

22. 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 $y + z$.

(A) 43   (B) 44   (C) 45   (D) 46   (E) 47

v	24	w
18	x	y
25	z	21

2005A   21. For how many positive integers n does $1 + 2 + \cdots + n$ evenly divide $6n$?

        (A) 3   (B) 5   (C) 7   (D) 9   (E) 11

2005A   22. Let S be the set of the 2005 smallest positive multiples of 4, and let T be the set of the 2005 smallest positive multiples of 6. How many elements are common to S and T?

        (A) 166   (B) 333   (C) 500   (D) 668   (E) 1001

2007A   23. How many ordered pairs (m, n) of positive integers, with $m > n$, have the property that their squares differ by 96?

        (A) 3   (B) 4   (C) 6   (D) 9   (E) 12

2015B

23. Let n be a positive integer greater than 4 such that the decimal representation of $n!$ ends in k zeros and the decimal representation of $(2n)!$ ends in $3k$ zeros. Let s denote the sum of the four least possible values of n. What is the sum of the digits of s?

(A) 7   (B) 8   (C) 9   (D) 10   (E) 11

2005A

24. For each positive integer $m > 1$, let $P(m)$ denote the greatest prime factor of m. For how many positive integers n is it true that both $P(n) = \sqrt{n}$ and $P(n+48) = \sqrt{n+48}$?

(A) 0   (B) 1   (C) 3   (D) 4   (E) 5

2005B

24. Let x and y be two-digit integers such that y is obtained by reversing the digits of x. The integers x and y satisfy $x^2 - y^2 = m^2$ for some positive integer m. What is $x + y + m$?

(A) 88   (B) 112   (C) 116   (D) 144   (E) 154

2012A

24. Let $a, b,$ and c be positive integers with $a \geq b \geq c$ such that

$$a^2 - b^2 - c^2 + ab = 2011 \text{ and}$$
$$a^2 + 3b^2 + 3c^2 - 3ab - 2ac - 2bc = -1997.$$

What is a ?

(A) 249 (B) 250 (C) 251 (D) 252 (E) 253

2014A

25. The number 5^{867} is between 2^{2013} and 2^{2014}. How many pairs of integers (m, n) are there such that $1 \leq m \leq 2012$ and

$$5^n < 2^m < 2^{m+2} < 5^{n+1} ?$$

(A) 278 (B) 279 (C) 280 (D) 281 (E) 282