

TWENTY-FIFTH STATE MATHEMATICS CONTEST – CROSS NUMBER PUZZLE – APRIL 24, 2003

1	2			3		4	5	6
7			8		9		10	
		11			12			
13	14		15	16			17	
	18					19		
20			21		22		23	24
		25			26			
27	28		29	30			31	
32						33		

**Across**

- The number of 4-card hands from a deck of 9 cards.
- The area of the isosceles trapezoid with sides 11, 13, 21, and 13.
- The area of an isosceles right triangle with hypotenuse 12,
- The product of  $12 + 5i$  and its complex conjugate
- The number of positive integer factors of 25920.
- The number of whole years it takes for \$2003 to double at 5% compounded continuously.
- The sum of the squares of the first six positive integers.
- The 7<sup>th</sup> Fibonacci number if  $f_1 = 1, f_2 = 1$ .
- The area of a triangle with sides 25, 29, 36.
- The only 2-digit perfect number.
- The number of trailing zeros of 264!
- The multiplier of pi for the area of the circle  $x^2 + y^2 - 4x + 6y - 12 = 0$ .
- The area of the triangle that joins the vertex and zeros of the parabola  $7x^2 - 14x + 4y - 21 = 0$ .
- Eight times the sum of 25 and 26 across.
- The product of the amplitude and the period of the sine wave  $y = 8\sin\left(\frac{p \cdot x}{4}\right) + 1$ .
- The length of the interval defined by the domain of  $f(x) = \sqrt{60 + 7x - x^2}$ .
- The length of the median to the 38-length side in a 20, 30, 38 triangle.
- The area of the largest rhombus inscribed in the ellipse  $\frac{x^2}{36} + \frac{y^2}{16} = 1$
- The fifth smallest positive integer with exactly 9 positive integer factors.
- $25^2 - 24^2$ .
- The average speed for a round trip flight if the first leg is 450 mph, the return leg is 550 mph.
- The sum of the first 6 terms of the series  $\sum_{n=1}^N n(n+1)(n+2)$

**Down**

- The volume of a cube with sides 11.
- Twice the 6<sup>th</sup> prime number.
- When three distinguishable dice are tossed, there are 216 possible outcomes, but there are only 16 different sums. The number of sums of spots that are greater than 12.
- The largest prime less than 100.
- The sum of the first 39 terms of the arithmetic series  $-5 - 2 + 1 + 4 + \dots$
- Eleven times 13 across.
- Twice 32 across.
- The sum of the first 6 terms of the geometric series  $1 + 3 + 9 + \dots$
- The sum of the numerator and denominator of the exact sum of the first 212 terms of the series  $\frac{2}{1 \cdot 2} + \frac{2}{2 \cdot 3} + \frac{2}{3 \cdot 4} + \dots + \frac{2}{n \cdot (n+1)}$
- The sum of the numbers in the 9<sup>th</sup> row of Pascal's Triangle.
- The sum of the coefficients in the expansion of  $(x-5)(x-7)(x-8)(x-9)$
- 21 across read backwards.
- The square of the length of an interior diagonal of the rectangular solid with sides 6, 6, and 12.
- The number of bytes in 4 Kilobytes.
- $1011001_2$  written in base 10.
- The number of degrees in one radian (rounded to the nearest whole degree).
- The geometric mean of 25 and 81.

- You **must** work with two students whom you do not know from schools other than your own.
- Complete this puzzle and turn in anytime between 12:00 noon and 1:00 PM to the Registration Table
- Prizes will be awarded to each member of the first three teams.
- Score = number of correct squares. Ties broken by order of submission.
- Name: \_\_\_\_\_, School \_\_\_\_\_
- Name: \_\_\_\_\_, School \_\_\_\_\_
- Name: \_\_\_\_\_, School \_\_\_\_\_

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