Duke Math Meet 2013-14
Relay Round Question 1

1A. Find the unique positive integer n such that $n, n+4, n+6, n+10, n+12, n+16, n+22$ are all primes.

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1B. Let $k = TNYWR$. The integers are colored red and blue so that any two integers differing by k have opposite colors. How many such colorings are possible?

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1C. Let $n = TNYWR/8$. How many ways are there to write n as a sum of powers of 2, where repetition is allowed but order does not matter? (For example, there are 4 ways to write 4 as such a sum: 4, $2+2$, $2+1+1$, and $1+1+1+1$.)

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Relay Round Question 2

2A. A 3×3 cube has 1×1 holes drilled through it centered in the middle of each face. What is the surface area of the resulting solid?

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2B. Let $k = TNYWR/8$. Professor Kraines has found himself in New York dealing with a street hustler. The hustler (who is very trustworthy) informs Professor Kraines that he has k fair coins and one coin that has both sides heads. Professor Kraines takes one of the coins at random and flips it five times; each time the coin lands heads. What is the probability that Professor Kraines has selected a fair coin?

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2B. Let $k = TNYWR$. Professor Kraines has found himself in New York dealing with a street hustler. The hustler (who is very trustworthy) informs Professor Kraines that he has k fair coins and one coin that has both sides heads. Professor Kraines takes one of the coins at random and flips it five times; each time the coin lands heads. What is the probability that Professor Kraines has selected a fair coin?

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2C. Let $s = TNYWR$. What is the side length of the largest possible square that can fit inside a regular hexagon of side length s?

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