Pairing, Factorizing and Linking Prime Numbers

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See the extraordinary tables and modular arithmetic formulas below.

Introduction: Cryptography in Number Theory.

Understanding prime numbers and how they relate to one another has long been the holy grail of mathematicians - predicting the next one a "Eureka" moment. Part of the fascination revolves around computers, message encryptions and security systems. Should someone create a formula to evaluate prime numbers and semiprimes, then servers, mainframes and even the Internet might be severely disrupted around the world.

It is difficult to ascertain whether a very large number might or might not be a Prime Number. Even more difficult is the task of identifying semi-primes and their divisors. Prime factorization is big business. It can be done, but it takes an awful lot of number crunching in most cases by dedicated high-speed computers. Mathematicians back in the 60s devised a method of encrypting financial transactions for cyber security: Secret codes to keep hackers at bay. They used semiprimes (pseudoprimes) and split them to give public-key numbers to the different parties in communication - for example, a bank liaising with their client. It is what makes your ATM card secure. So later mathematicians sat back with the comfortable knowledge that Prime Numbers were infallible, as they have with Special Relativity and other corner-stones of our technological empire.

However, there often comes a time when a rock is over-turned, and what is then revealed beneath not always as pleasant nor as trustworthy as one might have hoped.

Mathematicians are hardly at fault for being unable to represent the world around us with any solid reality. They work with numbers, they create erroneous points with dimensions and infinity paradoxes and then calmly dismiss the obvious (see Infinity: part 3. of the paper, Time's Paradigm). So too, do they use a system of decimalization to express the world around us. But what if our decimal system were flawed, or giving us false impressions? All mathematical equations are based on the decimal system we first created in the Western World eons ago because, presumably, we have 10 fingers.

The development of the Binary System saw leaps and bounds, not in the world of Prime Numbers but in the speed with which computers and their components can now operate. Yes or No, was the simplicity behind the Binary System of 0s and 1s. Perhaps it is time we looked further into numerical base systems and what they can offer.

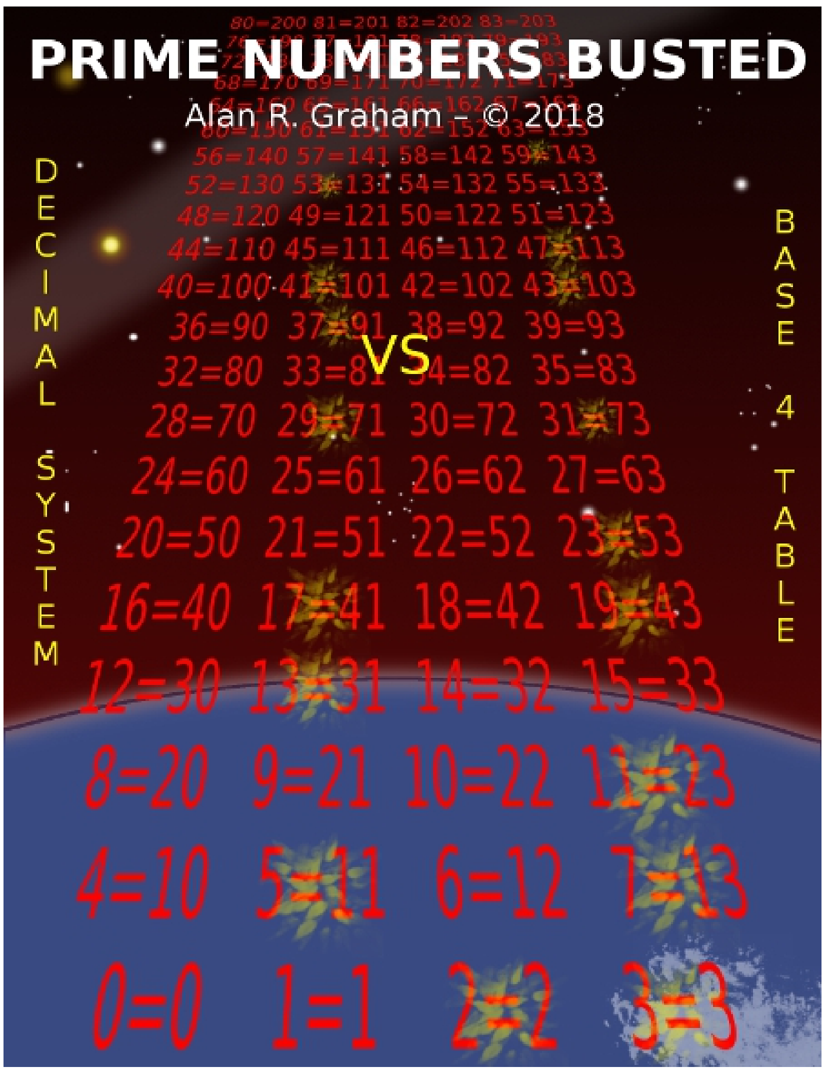
Prime Numbers Busted:

You will now see below a simple math table amalgamating our decimal system with a Base 4 (Quaternary) system, to reveal the extraordinary fact that every prime number from one to infinity will be paired with either a prime or semiprime, making their identities and factorization as we progress upward through the table towards very large numbers, quite easy. It is a pseudoprime test. Even the special semi-primes like 25 are identified.

Numbers in the Billions can be identified on a simple laptop in seconds.

A Base 4 numerical table that instantly identifies its counterpart primes in the decimal system by pairing with them. A number theory conundrum? What is going on? No complicated formulas required, although you will see below a modular arithmetic expression to cross reference prime number identities as the integers rise. Hence the unnerving thought of a computer capable of picking out all primes and their derivatives more swiftly, in the not too distant future.

It is too simple for words. Even a child could have drawn this table. More to the point, why is it happening? Why has this simple relationship not been spotted before? What it means for the decimal system could be an early grave. We have been working for thousands of years with a system that was devised out of the necessity for trading and bartering with fingers, without considering what implications this might have. Prime Numbers thus surfaced and to this day we see no correlation nor meaning in them other than by the application of various formulas such as "Fermat's Little Theorem". Now we can, instantly, using a simple Base 4 Quaternary System. However, what this table below is actually implying remains to be seen...



The numbers on the left of each pair represent our decimal system as they sequentially rise through the table from left to right. Those numbers paired on the right of the equals signs are Quaternary based, having only 4 sequential integers before continuing in the row above with the next set.

We know that the single digit integers 2, 3, 5 and 7 are Prime Numbers. From them we see that 5 pairs with 11 and 7 pairs with 13 to identify these new numbers as primes while the table progresses revealing more. None are missed, every Prime Number is accounted for.

Taking these two new Prime Numbers, 11 and 13 on the Base 4 columns, we can then cross-reference them with the decimal columns and discover new primes of higher value - 11 now being paired with 23 and 13 with 31.

Now for the Formula to ID **Really Large Numbers:**

This is where it gets fun. How to use a formula to link prime numbers together between base 4 (NQ) and decimal base 10 (ND) anywhere up the ladder. You probably haven't the time nor patience to produce a table running into the thousands - you don't have to.

First we take a number, such as 30,181 and place it in the correct row for pairing. The formula must only be applied to the first pairs in each row. So, 30,181 would sit in the row starting NQ 30,180 (the first NQ numbers of each row all end in 0, of course - like 4 with 10 and 8 with 20, etc.). Now use the formula below and find that its ND pair is 12,072. Because we subtracted one from 30,181 to place it at the beginning of the row, we must now do the reverse and add one to 12,072 (12,073). Both are pure primes, and you can follow any up or down the table by simply repeating the math as shown below.

going down... NQ / 2 – (NQ / 10) = ND

Prime Examples in modular notation:

(subtract 1 from 31) Now NQ: 30 / 2 - 3 = 12 (add on the one you took away) ND 13

NQ 30181: 30180 / 2 - 3018 = 12072 (then add the one) ND 12073

Follow the trail of primes up or down the table: 1933=4831=12073=30181

While the above modular arithmetic expression is similar in simplicity to Fermat's Little Theorem, **a^p - a (mod p)** for identifying a prime number, the above formula is based on a link of pairings that become part of a huge, multi-faceted table which includes all pseudoprimes with enormous consequences.

Going up the table to find larger numbers has its modular expression as follows:

Subtract to first in row: ND x 2 + (ND / 2) = NQ with equivalent added

Example 32803: 32800 x 2 + (16400) = 82000 thus NQ 82003

Note. (As ND numbers in the first column do not always begin with a 0, care should be taken to consider the second last digit in any number evaluated: Those that are even digits end with 0, 4 and 8;

odd with 2 and 6; though odd with a 1 following drops back to the earlier even with 8 - example being 71 to 68.)

Though certain Prime Numbers ending in seven or nine, like 17, 47 and 59, may not be identified earlier in the table due to the Quaternary Base 4 system only producing numbers below 4s, there is another table extracting pairings of the numbers ending in 7 and 9. Likewise, it is a base 4 versus base 10 setup. Just as simple. Example below:

5=17	6=18	7=19	8=20
9=27	10=28	11=29	12=30
13=37	14=38	15=39	16=40
17=47	and so on...		

The formula for pairing integers on this table is by adding to an NQ to reach the positive pair at the end of each row, rather than subtraction on the first table. We can also identify integers like 47 as being primes on the first table because its NQ pair is 113.

NQ 47: 50 / 2 - 5 = 20 (then subtract the three) ND 17

Looking at an alternative, reduced Base 4 (RB4) table below - that is, a table whose multiple digit numbers do not go beyond the 30s (as one might think should really be the case, anyway) - we see that 113 is paired with 23. Following 23 back down the table we see that it is paired with 11, and lower still the Prime Number 5. We already know that 17 and 19 are primes, so now we know that their pairs below, 101 and 103 are at the very least, pseudoprimes, semiprimes (green) or more than likely proper primes (as they are).

0=0	1=1	2=2	3=3
4=10	5=11	6=12	7=13
8=20	9=21	10=22	11=23
12=30	13=31	14=32	15=33
16=100	17=101	18=102	19=103
20=110	21=111	22=112	23=113
24=120	25=121	26=122	27=123
28=130	29=131	30=132	31=133
32=200	33=201	34=202	35=203
36=210	37=211	38=212	39=213

Interestingly, In the 1-3 table 17=41 and then further up 41 pairs with 101. In this RB4 table, 17 pairs immediately with 101.

Semi-primes and their derivatives are easily identified. If you want to find out if a number on the tables is a prime or a semiprime, link its pair further down and divide. For example, 91 is a semiprime whose claim to fame is that it can only be divided by the two lower primes, 7 and 13, both being paired with each other. 91 is paired with ND 37 in the 1-3 table, whereas in the 7-9 table NQ 37 is paired with 13.

203 is a good example, paired with 83. Further down 83=35 (5 x 7). 203 is not divisible by 5 but is it by 7? Yes, thus discovering that it is a semiprime, product of 7 and 29.

Furthermore, many numbers ending in 5 are semiprimes products of the prime 5. We just saw that on the 1-3 table, 35 is paired with prime number, 83. There are plenty of ways to cross-reference these tables and their columns to provide answers to a multitude of questions.

But the real question is, WHY?

It seems there is some secret code between prime numbers: they sniff each other out using a base 4 Quaternary table, whether a pure prime or a semiprime with its two pure prime divisors hidden within.

Some other Extraordinary **Links and Pairings**:

The work so far undertaken to understand these tables is still in its infancy. There is much to discover. I have tried many base representations paired with the Decimal System, with poor results. It appears the Quaternary base is key!

Let's take a number like 99251, a known prime, but we are going to pretend we don't know. We apply our formula above and get pairings such as 39701, then on down through 15881, 6353, 2543, 1019, all being primes except one semi-prime, concluding that the number we first started with, 99251, is a pseudoprime, likely a pure prime. Once a prime has been established anywhere along a chain of numbers using this formula, all paired numbers that arise are always with primes or semiprimes.

For example, in the above paragraph the semiprime is 39701, being a product of 29 and 37. Semiprimes may pair with each other.

There are many subtle ways in which these tables work to pair primes. Take 353. On the 1-3 table it is linked to a semi-prime, 11x13=143. Below on the table 143 is again linked and to a smaller prime number, 59. Yet, remarkably, when you use the formula to reduce 359 on the 7-9 table, you get the same result, it links to 143. 353 also pairs up to NQ 881, a pure prime.

5 x 359 (a known prime) = 1795. The formula above shows that this resulting number pairs with the prime number 4483.

Numbers in the Millions:

Now let's look at a real biggy in the millions..! 62,437,991. We have no idea if it is a prime, we picked it out of the blue. It links down using our formula to 24,975,197. Then on down four more times until it hits 639365. Here is a number that ends in 5, so has a likely chance of being a semi-prime whose derivatives (other than itself and one) will only be the prime number 5 and another prime. A quick flash on my calculator shows that indeed the other divisor is a prime number, 127873, suggesting that our million dollar number we first started with is a pseudoprime and possibly a prime number.

Well, actually, it is not a prime! Continuing on down from 127873 through the numbers with our above formula seven or eight more times, we pass through five primes and eventually pair 41 with 17. That 65 million number above divides perfectly by 17 to produce 3672823.

That is how to test for primes and semiprimes.

Suppose we want to find the prime derivatives of a semi-prime? Take 91 for example, then reduce with the formula to 35. This new number is a product of 7 and 5, two primes. Because dividing 91 by 5 would obviously not produce a whole number, we simply divide it by the other, number 7 and get the second prime derivative, 13. Case closed.

Let's try with 403, a semi-prime, to find its roots. Reduced with the above formula we get 163, then again to 67, both primes. One more reduction and we reach 31 paired with 13. This looks like a good pair of candidates, and on multiplying them together we get, 403.

There are, of course, millions of semiprimes which are positive integers, composites regarded. You can see some pairing of these on the tables, like 10 and 22, though I have not spent much time on them. Equally, odd numbers like 15 and 33 are semi-primes each. They are all tucked closely together at the beginning of the table, however as the numbers increase in size so too does the distance between them - and the intrigue.

As to the question, "Why is this happening?" My thoughts at present are these:

In musical arithmetic annotation, the oscillating frequency intervals of thirds are often semiprimes, which first attracted my attention back in 1993 when considering the base 8 configuration of Doe, Ray, Me. In this particular association of numbers the overriding integer is 3.

I have still to fully consider these implications on Prime Numbers and the tables presented above. Suffice to say, I believe music has more to do with cosmic relevance than 10 fingers.

FOR COMMENTS or QUESTIONS: Please find my contact information below.

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Snail-mail is too slow and untrustworthy.

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