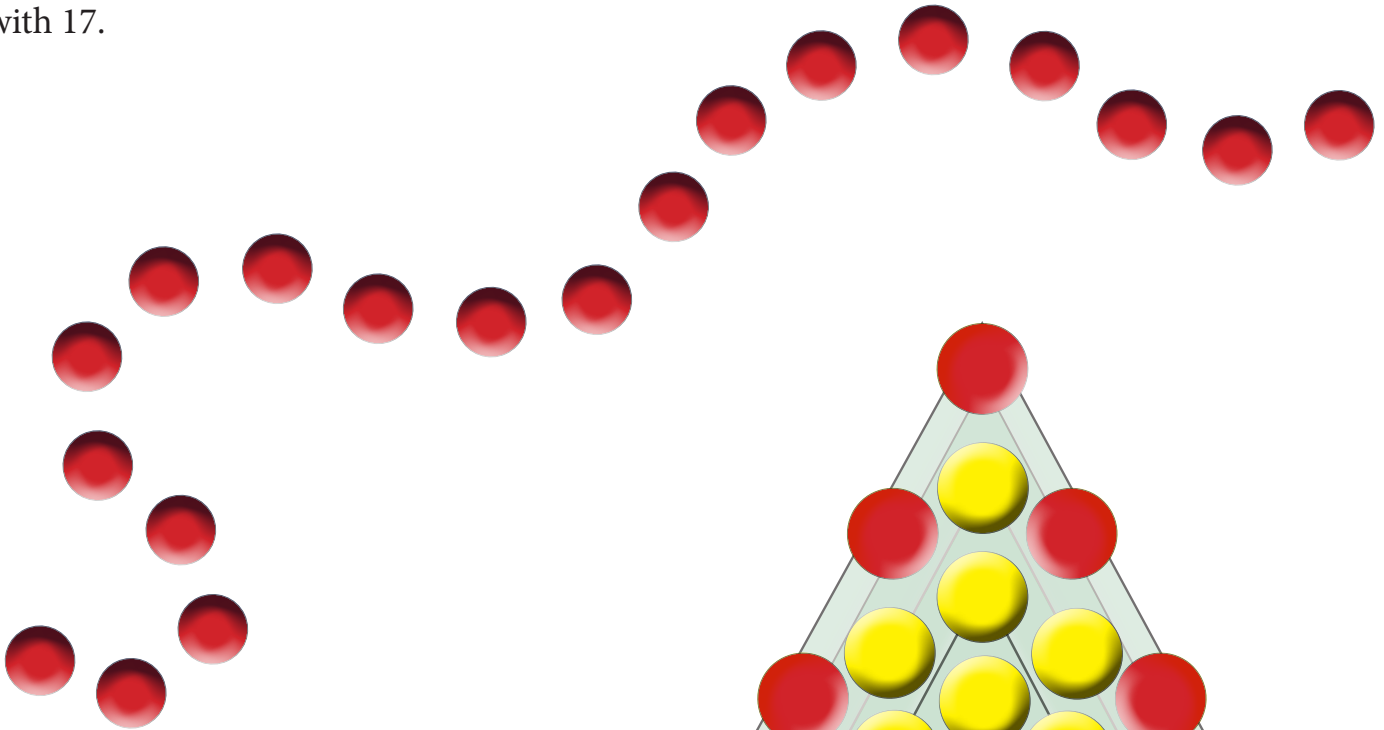
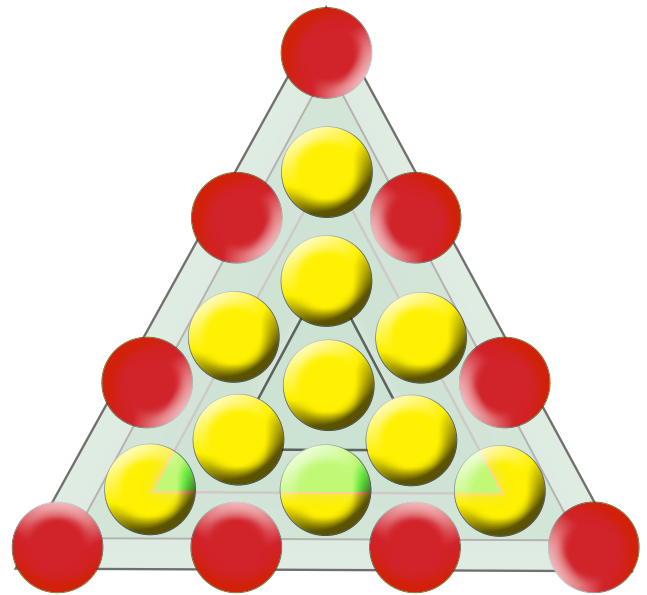


Nineteen

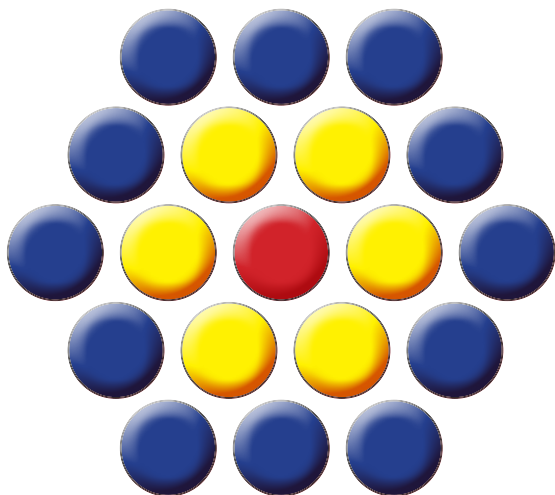
Nineteen is a prime number, twins with 17.



There are centered triangular numbers, not the same as triangular numbers.



And there are centered hexagonal numbers, not the same as hexagonal numbers.



Nineteen is a centered triangular number and a centered hexagonal number.

Prime Grid

Note several sets of twin primes

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	34	35	36

All the prime numbers, (except 2 and 3) are below the 1 and the 5. Not every number in those lines is prime, but all the primes are in those places. You can see why: everything below 2, 4, and 6, is even; everything below 3 is divisible by 3. It's a bit like the sieve of Eratosthenes, but in that sieve, you don't see this pattern. That's why it's valuable.

Later on, (in the book, not tonight,) I will be talking about Ulam's Spiral; some of the questions it raises are answered here.

Ulam was a very famous and interesting Polish mathematician. He knew from childhood that he would do math, and when he was 10, he signed his school notebooks: "Stan Ulam, astronomer, physicist, and mathematician."

Sometimes children know. Sometimes it comes later. But it won't come unless children play with numbers; that is how you make friends with them.