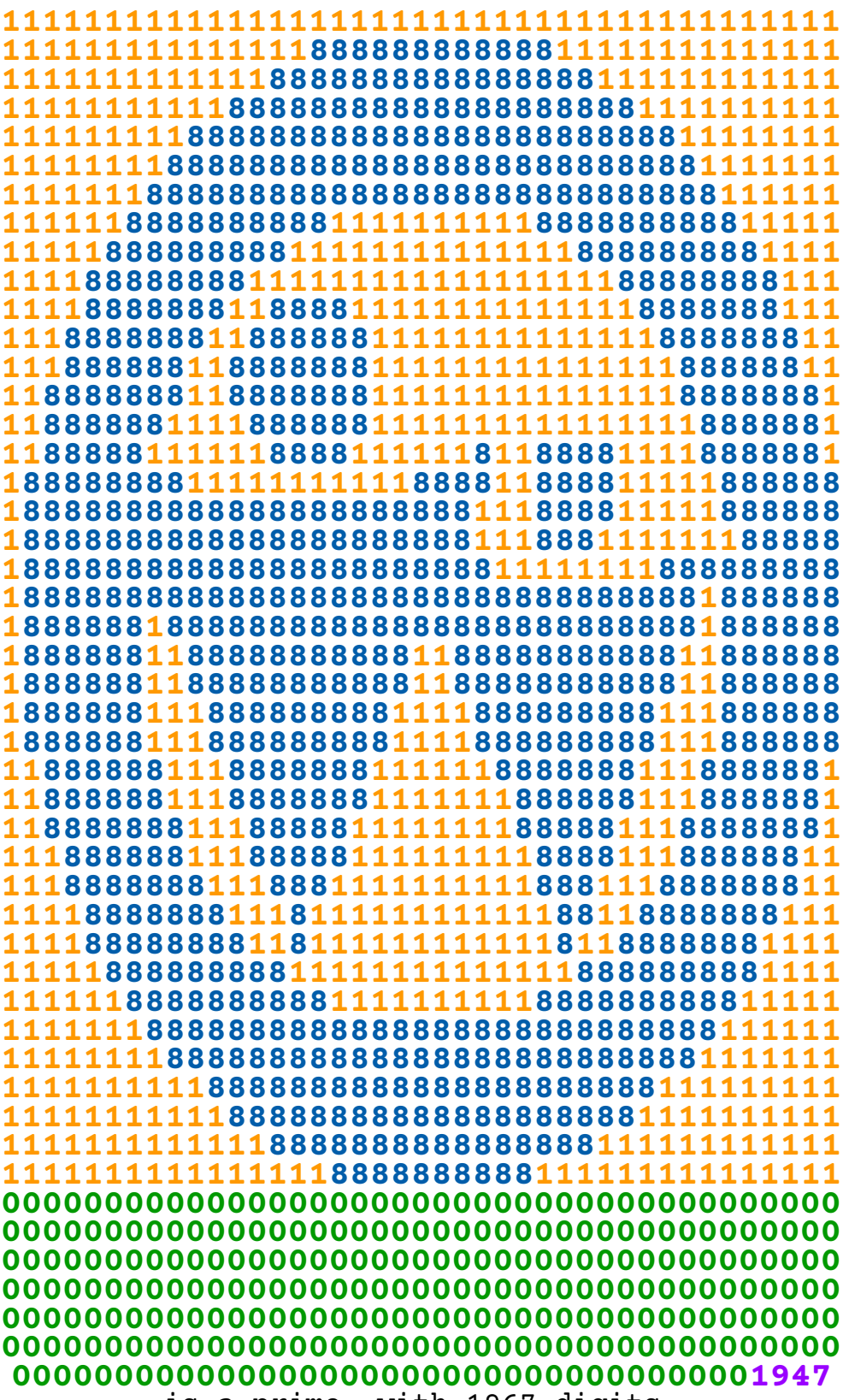
1's are Orange, 8's are Blue, 0's are Green, Imperfections are Purple



is a prime, with 1967 digits.

Created by Matthew Liu, Russell Morland, and Jerry Wang of room 8C7.

About this Number

On October 7th, 2020, the three of us discovered a massive prime number. This number is not only a prime number, which is rare itself for a number this large, but it also looks like the logo for the Waterloo Region District School Board. This number also has 1967 digits, and 1967 is the year this school (Centennial Public School). This project was started by Matthew, who was inspired by a Numberphile video called “The Trinity Hall Prime”, which was a prime number that looks like the coat of arms for Trinity Hall. This took around three hours of doing the math and programming, and four hours to run on Russell’s Linux computer. Here is the method that we used to find this large prime.

How we found this number

The method that we used is a modified version of Fermat’s Little Theorem, which is about 90% accurate. We also used the prime finder “Primo” to help us verify the number. Primo is a combination of many different prime tests, some of which we don’t understand, but we have been told that it is 100% accurate. This acts as a double-check if the number passes the Fermat test, because the Fermat test is not 100% accurate.

Here is the original Fermat test:
If $a^{p-1} \equiv 1 \pmod{p}$, then p is a prime number.

Here is how the Fermat test was modified:
If $a^{\frac{p-1}{2}} \equiv \pm 1 (mod\ p)$, then p is prime.
This is slightly more accurate than the original Fermat Test, increasing the likelihood of Primo saying it works while not making the computer running speed of this program that much slower.

Because the likelihood of finding a prime from the unmodified picture was unlikely, we fixed this problem by modifying the last few digits of the number until we got a prime number. The funny thing is that the first prime number we found happened to have the last four digits as “1947” and not “1967”, but it's okay. If the last four digits were indeed “1967”, that would be absolutely incredible. On the next day, we tried to replace four consecutive 0’s anywhere in the picture with 1967, but none of them turned out to be prime. Still, the fact that we found a prime number that looks like this is still amazing to us.