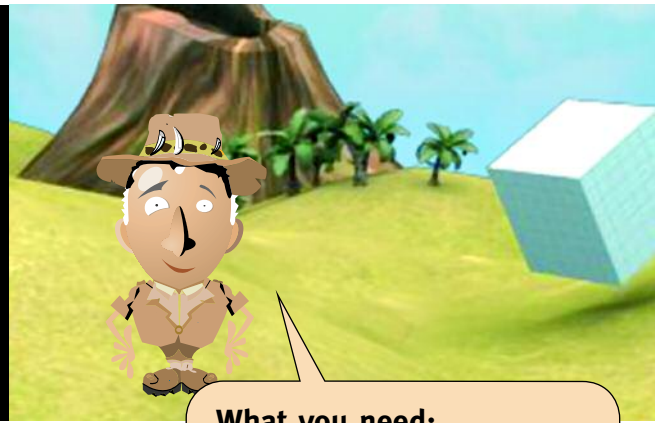


The Mersenne mystery



What you need:

- a computer
- access to the Internet

Your chance to win \$100,000.

A prime number is a number only divisible by itself and 1, such as 17 and 23. The sequence starts with 2, 3, 5, 7, 11, 13, 17, 19, 23, 29... and we can prove that it continues forever. The biggest prime known at the moment is a huge number that is over 9.8 million digits long, but it isn't the last one to be found. Mathematicians are always looking for the next biggest prime, and you can join in on the hunt!

An organisation called the Electronic Freedom Foundation is offering a prize of one hundred thousand dollars to the first person to find a prime number which has over 10 million digits, and you can download a free program from the internet that will help you to look for one. Read on to find out how.

WHAT IS A MERSENNE PRIME?



Primes that are found by this formula are called Mersenne primes, in honour of their discoverer – a French monk called Marin Mersenne (1588-1648), who is associated with the alchemy and astrology at that time. He was trying to find a formula that would represent all prime numbers. He failed in that, but his name became associated with these rare primes for ever afterwards...

The Mersenne mystery



There are some primes which are very special. Can you spot what is special about the following prime numbers?

3, 7, 31, 127, 8191

The answer is that they are all one less than a prime power of two. For example: 3 is one less than 4 (2×2) and 7 is one less than 8 (which is $2 \times 2 \times 2$). This leads to the famous Mersenne formula:

$$2^p - 1$$

This means that you times 2 by itself 'p' times, where p is a prime number, and then take away one. This formula **doesn't always give you prime numbers** (there is no known formula for generating primes), but it **does** work quite a lot of the time. This means that mathematicians can use this as a guess to look for big primes.

HOW TO GET INVOLVED

- 1) Visit <http://www.mersenne.org/freesoft.htm> and download the file called [p95v2414.exe](#) (Windows 95/98/Me/NT/2000/XP)
- 2) Install the program and run it!
- 3) Make sure that when setting up the program you ask it to search for 10 million digit primes (rather than checking other peoples!)

WHAT ELSE DO I NEED TO KNOW?

There is a full list of terms and conditions here:
<http://www.mersenne.org/prize.htm>