= Wieferich prime =

In number theory , a Wieferich prime is a prime number p such that p2 divides 2p ? 1 ? 1 , therefore connecting these primes with Fermat 's little theorem , which states that every odd prime p divides 2p ? 1 ? 1 . Wieferich primes were first described by Arthur Wieferich in 1909 in works pertaining to Fermat 's last theorem , at which time both of Fermat 's theorems were already well known to mathematicians .

Since then , connections between Wieferich primes and various other topics in mathematics have been discovered , including other types of numbers and primes , such as Mersenne and Fermat numbers , specific types of pseudoprimes and some types of numbers generalized from the original definition of a Wieferich prime . Over time , those connections discovered have extended to cover more properties of certain prime numbers as well as more general subjects such as number fields and the abc conjecture .

As of October 2014 , the only known Wieferich primes are 1093 and 3511 (sequence A001220 in the OEIS) .

= = Equivalent definitions = =

The stronger version of Fermat 's little theorem , which a Wieferich prime satisfies , is usually expressed as a congruence relation 2p ? 1 ? 1 (mod p2) . From the definition of the congruence relation on integers , it follows that this property is equivalent to the definition given at the beginning . Thus if a prime p satisfies this congruence , this prime divides the Fermat quotient <formula> . The following are two illustrative examples using the primes 11 and 1093 :