

## On the numbers of the form $pq+10^k$ where $p$ and $q$ are emirps

**Abstract.** In this paper I make the following observation: there are many primes among the numbers of the form  $p*q + 10^k$ , where  $p$  and  $q$  are emirps (reversible primes but different one from the other) and  $k$  is a positive integer; to highlight the observation I will search the least  $k$  for which the number  $p*q + 10^k$  is prime, for few pairs of emirps  $[p, q]$ .

### Observation:

There are many primes among the numbers of the form  $p*q + 10^k$ , where  $p$  and  $q$  are emirps (reversible primes but different one from the other) and  $k$  is a positive integer.

To highlight the observation I will search the least  $k$  for which the number  $p*q + 10^k$  is prime, for few pairs of emirps  $[p, q]$ . Of course, if there are many low values of  $k$ , the observation is verified.

The sequence of emirps:

13, 17, 31, 37, 71, 73, 79, 97, 107, 113, 149, 157, 167, 179, 199, 311, 337, 347, 359, 389, 701, 709, 733, 739, 743, 751, 761, 769, 907, 937, 941, 953, 967, 971, 983, 991, 1009, 1021, 1031, 1033, 1061, 1069, 1091, 1097, 1103, 1109, 1151, 1153, 1181, 1193, 1201, 1213, 1217, 1223, 1229, 1231, 1237, 1249, 1259, 1279, 1283 (...)

(for more terms see A006567 in OEIS)

- :  $13*31 + 100 = 503$ , prime, so the least  $k$  is 2;
- :  $17*71 + 100 = 1307$ , prime, so the least  $k$  is 2;
- :  $37*73 + 10 = 2711$ , prime, so the least  $k$  is 1;
- :  $79*97 + 10 = 7673$ , prime, so the least  $k$  is 1;
- :  $107*701 + 10 = 75017$ , prime, so the least  $k$  is 1;
- :  $113*311 + 100 = 35153$ , prime, so the least  $k$  is 1;
- :  $149*941 + 1000 = 141209$ , prime, so the least  $k$  is 3;
- :  $157*751 + 10 = 117917$ , prime, so the least  $k$  is 1;
- :  $167*761 + 10000 = 137087$ , prime, so the least  $k$  is 4;
- :  $179*971 + 10 = 173819$ , prime, so the least  $k$  is 1;
- :  $337*733 + 10 = 247031$ , prime, so the least  $k$  is 1;
- :  $347*743 + 100 = 257921$ , prime, so the least  $k$  is 2;
- :  $359*953 + 1000 = 343127$ , prime, so the least  $k$  is 3;
- :  $389*983 + 100000 = 482387$ , prime, so the least  $k$  is 5;
- :  $709*907 + 10 = 643073$ , prime, so the least  $k$  is 1;

:  $739 \cdot 937 + 10 = 692453$ , prime, so the least  $k$  is 1;  
 :  $1009 \cdot 9001 + 100000000 = 109082009$ , prime, so the  
 least  $k$  is 8;  
 :  $1021 \cdot 1201 + 100 = 1226321$ , prime, so the least  $k$  is  
 2;  
 :  $1031 \cdot 1301 + 100000 = 1441331$ , prime, so the least  $k$   
 is 5;  
 :  $1033 \cdot 3301 + 1000 = 3410933$ , prime, so the least  $k$  is  
 3;  
 :  $1061 \cdot 1601 + 1000000000 = 1001698661$ , prime, so the  
 least  $k$  is 9;  
 :  $1069 \cdot 9601 + 10 = 10263479$ , prime, so the least  $k$  is  
 1;  
 :  $1091 \cdot 1901 + 100 = 2074091$ , prime, so the least  $k$  is  
 2;  
 :  $1097 \cdot 7901 + 100 = 8667497$ , prime, so the least  $k$  is  
 2;  
 :  $1103 \cdot 3011 + 100 = 3321233$ , prime, so the least  $k$  is  
 2;  
 :  $1109 \cdot 9011 + 10 = 9993209$ , prime, so the least  $k$  is  
 1;  
 :  $1153 \cdot 3511 + 100 = 4048283$ , prime, so the least  $k$  is  
 2;  
 :  $1181 \cdot 1811 + 10000 = 2148791$ , prime, so the least  $k$   
 is 4;  
 :  $1193 \cdot 3911 + 10 = 4665833$ , prime, so the least  $k$  is  
 1;  
 :  $1213 \cdot 3121 + 10000 = 3795773$ , prime, so the least  $k$   
 is 4;  
 :  $1217 \cdot 7121 + 1000 = 8667257$ , prime, so the least  $k$  is  
 3;  
 :  $1229 \cdot 9221 + 100 = 11332709$ , prime, so the least  $k$  is  
 2;  
 :  $1237 \cdot 7321 + 10000000 = 19056077$ , prime, so the least  
 $k$  is 7;  
 :  $1249 \cdot 9421 + 100 = 11766929$ , prime, so the least  $k$  is  
 2;  
 :  $1259 \cdot 9521 + 10000 = 11996939$ , prime, so the least  $k$   
 is 4;  
 :  $1279 \cdot 9721 + 1000000 = 13433159$ , prime, so the least  
 $k$  is 6;  
 :  $1283 \cdot 3821 + 10 = 4902353$ , prime, so the least  $k$  is  
 1.