Conjecture on the period of the rational number P÷d + d÷P where P is a 2-Poulet number and d its least prime factor

Abstract. In this paper I state the following conjecture: let P be a 2-Poulet number, d its least prime factor and q the other one; then the lenght of the period of the rational number P/d + d/P is equal to (q – 1)/n, where n positive integer.

Conjecture:

Let P be a 2-Poulet number, d its least prime factor and q the other one; then the lenght of the period of the rational number P/d + d/P is equal to (q – 1)/n, where n positive integer.

Note:

The sequence of 2-Poulet numbers: 341, 1387, 2047, 2701, 3277, 4033, 4369, 4681, 5461, 7957, 8321, 10261, 13747, 14491, 15709, 18721, 19951, 23377, 31417, 31609, 31621, 35333, 42799, 49141, 49981, 60701, 60787, 65077, 65281, 80581, 83333, 85489, 88357, 90751, 104653, 123251, 129889, 130561 (...). See the sequence A214305 that I submitted on OEIS.

Verifying the conjecture:
(true for the first n 2-Poulet numbers)

: for P = 341 = 11*31, the period of P/d + d/P is equal to 322580645161290, which has the lenght 15 = (31 – 1)/2;
: for P = 1387 = 19*73, the period of P/d + d/P is equal to 13698630, which has the lenght 8 = (73 – 1)/9;
: for P = 2047 = 23*89, the period of P/d + d/P has the lenght 44 = (89 – 1)/2;
: for P = 2701 = 37*73, the period of P/d + d/P has the lenght 8 = (73 – 1)/9;
: for P = 3277 = 29*113, the period of P/d + d/P has the lenght 112 = 113 - 1;
: for P = 4033 = 37*109, the period of P/d + d/P has the lenght 108 = 109 - 1;
: for P = 4369 = 17*257, the period of P/d + d/P has the lenght 256 = 257 - 1;
: for P = 4681 = 31*151, the period of P/d + d/P has the lenght 75 = (151 – 1)/2;
: for P = 5461 = 43*127, the period of P/d + d/P has the lenght 42 = 43 – 1;

: for P = 7957 = 73*109, the period of P/d + d/P has the lenght 108 = 109 – 1;
: for P = 8321 = 53*157, the period of P/d + d/P has the lenght 78 = (157 – 1)/2;
: for P = 10261 = 31*331, the period of P/d + d/P has the lenght 110 = (331 – 1)/3;
: for P = 13747 = 59*233, the period of P/d + d/P has the lenght 232 = 233 – 1;
: for P = 14491 = 43*337, the period of P/d + d/P has the lenght 336 = 337 – 1;
: for P = 15709 = 23*683, the period of P/d + d/P has the lenght 341 = (683 – 1)/2;
: for P = 18721 = 97*193, the period of P/d + d/P has the lenght 192 = 193 – 1;
: for P = 19951 = 71*281, the period of P/d + d/P has the lenght 28 = (281 – 1)/10;
: for P = 23377 = 97*241, the period of P/d + d/P has the lenght 30 = (241 – 1)/8;
: for P = 31417 = 89*353, the period of P/d + d/P has the lenght 32 = (353 – 1)/11;
: for P = 31609 = 73*433, the period of P/d + d/P has the lenght 432 = 433 – 1;
: for P = 31621 = 103*307, the period of P/d + d/P has the lenght 153 = (307 – 1)/2;
: for P = 35333 = 89*397, the period of P/d + d/P has the lenght 99 = (397 – 1)/4;
: for P = 42799 = 127*337, the period of P/d + d/P has the lenght 336 = 337 – 1;
: for P = 49141 = 157*313, the period of P/d + d/P has the lenght 312 = 313 - 1;
: for P = 49981 = 151*331, the period of P/d + d/P has the lenght 110 = (331 – 1)/3;
: for P = 60701 = 101*601, the period of P/d + d/P has the lenght 300 = (601 – 1)/2;
: for P = 60787 = 89*683, the period of P/d + d/P has the lenght 341 = (683 – 1)/2;
: for P = 65077 = 59*1103, the period of P/d + d/P has the lenght 1102 = 1103 – 1;
: for P = 65281 = 97*673, the period of P/d + d/P has the lenght 224 = (673 – 1)/3;
: for P = 80581 = 61*1321, the period of P/d + d/P has the lenght 55 = (1321 – 1)/24;
: for P = 83333 = 167*499, the period of P/d + d/P has the lenght 498 = 499 – 1;
: for P = 85489 = 53*1613, the period of P/d + d/P has the lenght 403 = (1613 – 1)/4;
: for P = 88357 = 149*593, the period of P/d + d/P has the lenght 592 = 593 – 1;
: for P = 90751 = 151*601, the period of P/d + d/P has the lenght 300 = (601 – 1)/2.