Riesel problems

Definition

For the original Riesel problem, it is finding and proving the smallest *k* such that $k \times b^n - 1$ is not prime for all integers *n* ≥ 1 and GCD(*k*-1, *b*-1)=1.

Extended definiton

Finding and proving the smallest *k* such that $(k \times b^n - 1)/\mathrm{GCD}(k-1, b-1)$ is not prime for all integers *n* ≥ 1.

Notes

All *n* must be >= 1.

k-values that make a full covering set with all or partial algebraic factors are excluded from the conjectures.

k-values that are a multiple of base (*b*) and where (*k*-1)/gcd(*k*-1,*b*-1) is not prime are included in the conjectures but excluded from testing.

Such *k*-values will have the same prime as *k* / *b*.

Table

Base	Conjectured smallest Riesel *k*	Covering set	*k*'s that make a full covering set with all or partial algebraic factors	Remaining *k* to find prime (*n* testing limit)	Top 10 *k*'s with largest first primes: *k* (*n*) (sorted by *n* only)	Comments

2	509203	3, 5, 7, 13, 17, 241		2293, 9221, 23669, 31859, 38473, 46663, 67117, 74699, 81041, 93839, 97139, 107347, 121889, 129007, 143047, 161669, 192971, 206039, 206231, 215443, 226153, 234343, 245561, 250027, 315929, 319511, 324011, 325123, 327671, 336839, 342847, 344759, 351134, 362609, 363343, 364903, 365159, 368411, 371893, 384539, 386801, 397027, 409753, 444637, 470173, 474491, 477583, 478214, 485557, 494743 (k = 351134 and 478214 at n=6.63M, other k at n=11.3M)	146561 (11280802) 273809 (8932416) 502573 (7181987) 402539 (7173024) 40597 (6808509) 304207 (6643565) 398023 (6418059) 252191 (5497878) 353159 (4331116) 141941 (4299438)	

3	12119	2, 5, 7, 13, 73		1613, 1831, 1937, 3131, 3589, 5755, 6787, 7477, 7627, 7939, 8713, 8777, 9811, 10651, 11597 (all at n=50K)	8059 (47256) 11753 (36665) 6119 (28580) 7511 (26022) 313 (24761) 11251 (24314) 9179 (21404) 997 (20847) 6737 (17455) 7379 (16856)	
4	361	3, 5, 7, 13	All k = m^2 for all n; factors to: (m*2^n - 1) * (m*2^n + 1)	none - proven	106 (4553) 74 (1276) 219 (206) 191 (113) 312 (51) 247 (42) 223 (33) 274 (22) 234 (18) 91 (17)	k = 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 256, 289, and 324 proven composite by full algebraic factors.
5	13	2, 3		none - proven	2 (4) 1 (3) 11 (2) 8 (2) 12 (1) 9 (1) 7 (1) 6 (1) 4 (1) 3 (1)	

6	84687	7, 13, 31, 37, 97		1597, 6236, 9491, 37031, 49771, 50686, 53941, 55061, 57926, 76761, 79801, 83411 (k = 1597 at n=5.4M, other k at n=40K)	36772 (1723287) 43994 (569498) 77743 (560745) 51017 (528803) 57023 (483561) 78959 (458114) 59095 (171929) 48950 (143236), 29847 (141526) 9577 (121099)	
7	457	2, 3, 5, 13, 19		none - proven (with probable primes that have not been certified: k = 197 and 367)	197 (181761) 367 (15118) 313 (5907) 159 (4896) 429 (3815) 419 (1052) 391 (938) 299 (600) 139 (468) 79 (424)	
8	14	3, 5, 13	All k = m^3 for all n; factors to: (m*2^n - 1) * (m^2*4^n + m*2^n + 1)	none - proven	11 (18) 5 (4) 12 (3) 7 (3) 2 (2) 13 (1) 10 (1) 9 (1) 6 (1) 4 (1)	k = 1 and 8 proven composite by full algebraic factors.

9	41	2, 5	All k = m^2 for all n; factors to: (m*3^n - 1) * (m*3^n + 1)	none - proven	11 (11) 24 (8) 14 (8) 38 (3) 18 (3) 39 (2) 34 (2) 32 (2) 29 (2) 27 (2)	k = 1, 4, 9, 16, 25, and 36 proven composite by full algebraic factors.
10	334	3, 7, 13, 37		none - proven	121 (483) 109 (136) 98 (90) 230 (60) 289 (35) 89 (33) 32 (28) 233 (18) 324 (17) 100 (17)	
11	5	2, 3		none - proven	1 (17) 3 (2) 2 (2) 4 (1)	

12	376	5, 13, 29	(Condition 1): All k where k = m^2 and m = = 5 or 8 mod 13: for even n let k = m^2 and let n = 2*q; factors to: (m*12^q - 1) * (m*12^q + 1) odd n: factor of 13 (Condition 2): All k where k = 3*m^2 and m = = 3 or 10 mod 13: even n: factor of 13 for odd n let k = 3*m^2 and let n=2*q-1; factors to: [m*2^(2q-1)* 3^q - 1] * [m*2^(2q-1)* 3^q + 1]	none - proven	298 (1676) 157 (285) 46 (194) 304 (40) 259 (40) 94 (36) 292 (30) 147 (28) 301 (27) 349 (25)	k = 25, 64, and 324 proven composite by condition 1. k = 27 and 300 proven composite by condition 2.
13	29	2, 7		none - proven	25 (15) 28 (14) 20 (10) 1 (5) 22 (3) 17 (3) 16 (3) 27 (2) 21 (2) 12 (2)	
14	4	3, 5		none - proven	2 (4) 1 (3) 3 (1)	

15	622403	2, 17, 113, 1489		47, 203, 239, 407, 437, 451, 889, 893, 1945, 2049, 2245, 2487, 2507, 2689, 2699, 2863, 2940, 3059, 3163, 3179, 3261, 3409, 3697, 3701, 3725, 4173, 4249, 4609, 4771, 4877, 5041, 5243, 5425, 5441, 5503, 5669, 5857, 5913, 5963, 6231, 6447, 6787, 6879, 6999, 7386, 7407, 7459, 7473, 7527, 7615, 7683, 7687, 7859, 8099, 8610, 8621, 8671, 8839, 8863, 9025, 9267, 9409, 9655, 9663, 9707, 9817, 9955 (for k <= 10K) (all at n=1.5K)	2940 (13254) 8610 (5178) 2069 (1461) 3917 (1427) 1145 (1349) 1583 (1330) 7027 (1316) 8831 (1296) 5305 (1273) 4865 (1265)	
16	100	3, 7, 13	All k = m^2 for all n; factors to: (m*4^n - 1) * (m*4^n + 1)	none - proven	74 (638) 78 (26) 48 (15) 58 (12) 31 (12) 95 (8) 46 (8) 88 (6) 44 (6) 39 (6)	k = 1, 4, 9, 16, 25, 36, 49, 64, and 81 proven composite by full algebraic factors.

17	49	2, 3		none - proven	44 (6488) 29 (4904) 13 (1123) 36 (243) 10 (117) 26 (110) 5 (60) 11 (46) 46 (25) 35 (24)	
18	246	5, 13, 19		none - proven	151 (418) 78 (172) 50 (110) 79 (63) 237 (44) 184 (44) 75 (44) 215 (36) 203 (32) 93 (32)	
19	9	2, 5	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*19^q - 1) * (m*19^q + 1) odd n: factor of 5	none - proven	1 (19) 7 (2) 3 (2) 8 (1) 6 (1) 5 (1) 2 (1)	k = 4 proven composite by partial algebraic factors.
20	8	3, 7		none - proven	2 (10) 1 (3) 6 (2) 5 (2) 7 (1) 4 (1) 3 (1)	

21	45	2, 11		none - proven	29 (98) 34 (17) 43 (10) 32 (4) 5 (4) 6 (3) 1 (3) 44 (2) 37 (2) 31 (2)	
22	2738	5, 23, 97		208, 211, 898, 976, 1036, 1885, 1933, 2050, 2161, 2278, 2347, 2434 (all at n=13K)	1013 (26067) 185 (11433) 1335 (11155) 2719 (9671) 2083 (8046) 883 (5339) 2529 (3700) 2116 (3371) 2230 (3236) 1119 (2849)	
23	5	2, 3		none - proven	3 (6) 2 (6) 4 (5) 1 (5)	

24	32336	5, 7, 13, 73, 577	(Condition 1): All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*24^q - 1) * (m*24^q + 1) odd n: factor of 5 (Condition 2): All k where k = 6*m^2 and m = = 1 or 4 mod 5: even n: factor of 5 for odd n let k = 6*m^2 and let n=2*q-1; factors to: [m*2^(3q-1)* 3^q - 1] * [m*2^(3q-1)* 3^q + 1]	389, 461, 1581, 1711, 2094, 2606, 3006, 3754, 4239, 5356, 5784, 5791, 6116, 6579, 6781, 6831, 7321, 7809, 10219, 10399, 10666, 11101, 11516, 12326, 12429, 12674, 13269, 13691, 15019, 15151, 15614, 15641, 16124, 16234, 16616, 17019, 17436, 18054, 18454, 18964, 19116, 20026, 20576, 20611, 20879, 21004, 21464, 21524, 21639, 21809, 23549, 24404, 25046, 25136, 25349, 25389, 25419, 25646, 25731, 26176, 26229, 26661, 27049, 27154, 28001, 28384, 28849, 28859, 29211, 29531, 29569, 29581, 31071, 31466, 31734, 31854, 31994, 31996, 32099 (k = 1 mod 23 at n=12.4K, other k at n=260K)	10171 (259815) 11906 (252629) 23059 (252514) 21411 (252303) 28554 (239686) 20804 (233296) 8894 (210624) 2844 (203856) 25379 (175842) 22604 (169372)	k = 2^2, 3^2, 7^2, 8^2, 12^2, 13^2, 17^2, 18^2 (etc. pattern repeating every 5m) proven composite by condition 1. k = 6*1^2, 6*4^2, 6*6^2, 6*9^2, 6*11^2, 6*14^2, 6*16^2, 6*19^2 (etc. pattern repeating every 5m) proven composite by condition 2.

25	105	2, 13	All k = m^2 for all n; factors to: (m*5^n - 1) * (m*5^n + 1)	none - proven	86 (1029) 58 (26) 72 (24) 67 (24) 79 (21) 37 (17) 38 (14) 92 (13) 57 (10) 98 (9)	k = 1, 4, 9, 16, 25, 36, 49, 64, 81, and 100 proven composite by full algebraic factors.
26	149	3, 7, 31, 37		none - proven	115 (520277) 32 (9812) 121 (1509) 73 (537) 80 (382) 128 (300) 124 (249) 37 (233) 25 (133) 65 (100)	
27	13	2, 7	All k = m^3 for all n; factors to: (m*3^n - 1) * (m^2*9^n + m*3^n + 1)	none - proven	9 (23) 11 (10) 12 (2) 7 (2) 6 (2) 3 (2) 10 (1) 5 (1) 4 (1) 2 (1)	k = 1 and 8 proven composite by full algebraic factors.

28	3769	5, 29, 157	(Condition 1): All k where k = m^2 and m = = 12 or 17 mod 29: for even n let k = m^2 and let n = 2*q; factors to: (m*28^q - 1) * (m*28^q + 1) odd n: factor of 29 (Condition 2): All k where k = 7*m^2 and m = = 5 or 24 mod 29: even n: factor of 29 for odd n let k = 7*m^2 and let n=2*q-1; factors to: [m*2^(2q-1)* 7^q - 1] * [m*2^(2q-1)* 7^q + 1]	233, 376, 943, 1132, 1422, 2437 (k = 233 and 1422 at n=1M, other k at n=20.3K)	2319 (65184) 3232 (9147) 3019 (7073) 460 (5400) 1688 (4760) 2406 (4634) 2464 (4324) 849 (3129) 1507 (2938) 472 (2414)	k = 144, 289, 1681, and 2116 proven composite by condition 1. k = 175 proven composite by condition 2.
29	4	3, 5		none - proven	2 (136) 1 (5) 3 (1)	

30	4928	13, 19, 31, 67	k = 1369: for even n let n=2*q; factors to: (37*30^q - 1) * (37*30^q + 1) odd n: covering set 7, 13, 19	659, 1024, 1580, 1936, 2293, 2916, 3719, 4372, 4897 (all at n=500K)	1642 (346592) 239 (337990) 2538 (262614) 249 (199355) 3256 (160619) 225 (158755) 774 (148344) 1873 (50427) 3253 (43291) 1654 (38869)	
31	145	2, 3, 7, 19		5, 19, 51, 73, 97 (all at n=6K)	123 (1872) 124 (1116) 113 (643) 49 (637) 115 (464) 21 (275) 39 (250) 70 (149) 142 (140) 33 (107)	
32	10	3, 11	All k = m^5 for all n; factors to: (m*2^n - 1) * (m^4*16^n + m^3*8^n + m^2*4^n + m*2^n + 1)	none - proven	3 (11) 2 (6) 9 (3) 8 (2) 5 (2) 7 (1) 6 (1) 4 (1)	k = 1 proven composite by full algebraic factors.

33	545	2, 17	(Condition 1): All k where k = m^2 and m = = 4 or 13 mod 17: for even n let k = m^2 and let n = 2*q; factors to: (m*33^q - 1) * (m*33^q + 1) odd n: factor of 17 (Condition 2): All k where k = 33*m^2 and m = = 4 or 13 mod 17: [Reverse condition 1] (Condition 3): All k where k = m^2 and m = = 15 or 17 mod 32: for even n let k = m^2 and let n = 2*q; factors to: (m*33^q - 1) * (m*33^q + 1) odd n: factor of 2	257, 339 (both at n=12K)	186 (16770) 254 (3112) 142 (2568) 370 (1628) 272 (1418) 222 (919) 108 (360) 213 (233) 387 (191) 277 (187)	k = 16, 169, and 441 proven composite by condition 1. k = 528 proven composite by condition 2. k = 225 and 289 proven composite by condition 3.

34	6	5, 7	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*34^q - 1) * (m*34^q + 1) odd n: factor of 5	none - proven	1 (13) 5 (2) 3 (1) 2 (1)	k = 4 proven composite by partial algebraic factors.
35	5	2, 3		none - proven	1 (313) 3 (6) 2 (6) 4 (1)	

36	33791	13, 31, 43, 97	All k = m^2 for all n; factors to: (m*6^n - 1) * (m*6^n + 1)	1148, 1555, 2110, 2133, 3699, 4551, 4737, 6236, 6883, 7253, 7362, 7399, 7991, 8250, 8361, 8363, 8472, 9491, 9582, 11014, 12320, 12653, 13641, 14358, 14540, 14836, 14973, 14974, 15228, 15687, 15756, 15909, 16168, 17354, 17502, 17946, 18203, 19035, 19646, 20092, 20186, 20630, 21880, 22164, 22312, 23213, 23901, 23906, 24236, 24382, 24645, 24731, 24887, 25011, 25159, 25161, 25204, 25679, 25788, 26160, 26355, 27161, 29453, 29847, 30970, 31005, 31634, 32302, 33047, 33627 (all at n=10K)	13800 (9790) 20485 (9140) 19389 (9119) 20684 (8627) 19907 (8439) 11216 (7524) 28416 (7315) 32380 (7190) 27296 (7115) 10695 (6672)	k = 1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 7^2, 8^2, 9^2, 10^2, 11^2, 12^2, 13^2, 14^2, 15^2, 16^2, etc. proven composite by full algebraic factors.
37	29	2, 5, 7, 13, 67		none - proven	5 (900) 19 (63) 18 (14) 1 (13) 8 (4) 25 (3) 23 (3) 14 (3) 6 (3) 4 (3)	

38	13	3, 5, 17		none - proven	11 (766) 9 (43) 7 (7) 1 (3) 12 (2) 8 (2) 5 (2) 2 (2) 10 (1) 6 (1)	
39	9	2, 5	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*39^q - 1) * (m*39^q + 1) odd n: factor of 5	none - proven	1 (349) 7 (2) 3 (2) 2 (2) 8 (1) 6 (1) 5 (1)	k = 4 proven composite by partial algebraic factors.

40	25462	3, 7, 41, 223	(Condition 1): All k where k = m^2 and m = = 9 or 32 mod 41: for even n let k = m^2 and let n = 2*q; factors to: (m*40^q - 1) * (m*40^q + 1) odd n: factor of 41 (Condition 2): All k where k = 10*m^2 and m = = 18 or 23 mod 41: even n: factor of 41 for odd n let k = 10*m^2 and let n=2*q-1; factors to: [m*2^(3q-1)* 5^q - 1] * [m*2^(3q-1)* 5^q + 1]	157, 490, 520, 534, 618, 709, 739, 787, 862, 955, 1067, 1114, 1174, 1242, 1352, 1544, 1559, 1762, 1795, 1805, 2254, 2290, 2830, 2887, 3033, 3034, 3156, 3342, 3361, 3418, 3650, 3750, 3830, 3859, 3922, 4006, 4132, 4183, 4219, 4297, 4582, 4673, 4724, 4771, 5218, 5233, 5308, 5431, 5629, 6107, 6192, 6220, 6436, 6463, 6582, 6618, 6682, 6684, 6709, 6946, 7089, 7094, 7126, 7258, 7282, 7381, 7504, 7602, 7678, 7702, 7795, 8032, 8035, 8173, 8461, 8572, 8899, 8959, 9121, 9226, 9347, 9424, 9472, 9511, 9716, 9748, 9874, 9964, 10003, 10060, 10285, 10615, 10744, 11030, 11470, 11479, 11560, 11847, 11971, 12178, 12193,	23977 (982) 13072 (982) 20952 (963) 8749 (962) 18103 (957) 22759 (939) 220 (939) 23795 (935) 8113 (918) 13654 (905)	k = 81, 1024, 2500, 5329, 8281, 12996, 17424, and 24025 proven composite by condition 1. k = 3240 and 5290 proven composite by condition 2.

				12226, 12250, 12256, 12299, 12301, 12422, 12505, 12544, 12547, 12568, 12709, 12742, 12750, 12873, 13005, 13022, 13039, 13165, 13191, 13212, 13624, 13666, 13777, 13894, 13939, 14146, 14262, 14272, 14362, 14494, 14513, 14636, 14766, 14802, 14980, 15046, 15154, 15271, 15374, 15376, 15388, 15417, 15496, 15579, 15661, 15730, 15907, 15967, 16108, 16235, 16579, 16705, 16728, 16891, 16897, 16932, 17014, 17137, 17275, 17287, 17344, 17536, 17653, 17707, 17801, 17860, 17896, 17923, 17998, 18114, 18292, 18397, 18697, 18787, 18818, 18853, 18949, 19117, 19310, 19510, 19606, 19722, 19751, 19756, 19761, 19780, 19825, 19927, 20158, 20212, 20253, 20428, 20458, 20479, 20491, 20583, 20632, 20747,		

				20788, 20809, 21058, 21082, 21276, 21321, 21403, 21493, 21731, 21817, 21895, 21975, 22114, 22130, 22262, 22263, 22303, 22344, 22570, 22706, 22879, 23371, 23615, 23851, 24184, 24189, 24268, 24337, 24397, 24421, 24448, 24483, 24519, 24805, 24979 (all at n=1K)		
41	8	3, 7		none - proven	7 (153) 5 (10) 1 (3) 6 (2) 2 (2) 4 (1) 3 (1)	
42	15137	5, 43, 353		603, 1049, 1600, 2538, 4299, 4903, 5118, 5978, 6836, 6964, 6971, 7309, 8297, 8341, 9029, 9201, 9633, 9848, 11267, 11781, 11911, 11996, 12125, 12127, 12213, 12598, 13288, 13347, 14884 (k = 1600, 6971 and 14884 at n=8K, other k at n=200K)	7051 (188034) 5417 (179220) 13898 (152983) 1633 (128734) 13757 (126934) 7913 (108747) 15024 (104613) 8453 (89184) 7658 (79316) 10923 (61071)	

43	21	2, 11		13 (50K)	4 (279) 12 (203) 17 (79) 3 (24) 1 (5) 19 (4) 15 (4) 7 (4) 11 (2) 10 (2)	
44	4	3, 5		none - proven	1 (5) 2 (4) 3 (1)	
45	93	2, 23		none - proven	24 (153355) 53 (582) 70 (167) 29 (146) 76 (102) 85 (82) 91 (50) 77 (26) 1 (19) 33 (11)	
46	928	3, 7, 103		281, 436, 800 (k = 800 at n=500K, other k at n=28K)	870 (51699) 86 (26325) 93 (24162) 561 (5011) 576 (3659) 100 (2955) 386 (2425) 338 (1478) 597 (950) 121 (935)	
47	5	2, 3		none - proven	4 (1555) 1 (127) 2 (4) 3 (2)	

48	3226	5, 7, 461		313, 384, 708, 909, 916, 1093, 1457, 1686, 1877, 1896, 1898, 2071, 2148, 2172, 2402, 2589, 2682, 2927, 2939, 3044, 3067 (all at n=200K)	2157 (169491) 2549 (169453) 1478 (167541) 2822 (129611) 2379 (116204) 118 (107422) 692 (103056) 1842 (87175) 953 (81493) 2582 (75696)	
49	81	2, 5	All k = m^2 for all n; factors to: (m*7^n - 1) * (m*7^n + 1)	none - proven	79 (212) 44 (122) 69 (42) 30 (24) 59 (16) 53 (15) 70 (14) 24 (14) 31 (9) 74 (6)	k = 1, 4, 9, 16, 25, 36, 49, and 64 proven composite by full algebraic factors.
50	16	3, 17		none - proven	14 (66) 13 (19) 5 (12) 11 (6) 6 (6) 1 (3) 8 (2) 2 (2) 15 (1) 12 (1)	

51	25	2, 13		none - proven	1 (4229) 23 (96) 3 (8) 12 (4) 14 (3) 4 (3) 22 (2) 19 (2) 18 (2) 15 (2)	

52	25015	3, 7, 53, 379	(Condition 1): All k where k = m^2 and m = = 23 or 30 mod 53: for even n let k = m^2 and let n = 2*q; factors to: (m*52^q - 1) * (m*52^q + 1) odd n: factor of 53 (Condition 2): All k where k = 13*m^2 and m = = 7 or 46 mod 53: even n: factor of 53 for odd n let k = 13*m^2 and let n=2*q-1; factors to: [m*2^(2q-1)* 13^q - 1] * [m*2^(2q-1)* 13^q + 1]	82, 139, 233, 239, 349, 363, 372, 472, 476, 478, 547, 557, 607, 613, 654, 657, 796, 813, 902, 931, 991, 1012, 1069, 1104, 1161, 1167, 1231, 1234, 1271, 1357, 1502, 1534, 1589, 1591, 1651, 1669, 1711, 1801, 1881, 1909, 1966, 2035, 2049, 2113, 2227, 2364, 2384, 2437, 2492, 2557, 2578, 2643, 2722, 2725, 2767, 2769, 3022, 3073, 3106, 3128, 3163, 3199, 3229, 3277, 3298, 3418, 3423, 3550, 3559, 3607, 3637, 3656, 3764, 3788, 3847, 3870, 3921, 4003, 4036, 4043, 4117, 4195, 4239, 4294, 4329, 4347, 4348, 4366, 4534, 4561, 4582, 4597, 4665, 4754, 4762, 4824, 4876, 4894, 4975, 4981, 5037, 5056, 5107, 5142, 5158,	13298 (1000) 19006 (994) 10592 (993) 427 (992) 10687 (989) 14621 (982) 20044 (980) 8959 (980) 19084 (977)	k = 529, 900, 5776, 6889, 16641, and 18496 proven composite by condition 1. k = 637 proven composite by condition 2.

				5236, 5239, 5246, 5299, 5541, 5575, 5672, 5836, 5882, 6190, 6193, 6256, 6308, 6361, 6394, 6424, 6434, 6442, 6462, 6493, 6568, 6589, 6619, 6628, 6697, 6732, 6835, 6873, 6962, 6981, 6997, 7252, 7288, 7386, 7399, 7408, 7594, 7603, 7631, 7633, 7727, 7797, 7799, 7847, 7879, 7894, 7936, 8008, 8032, 8138, 8161, 8163, 8201, 8248, 8257, 8377, 8389, 8422, 8488, 8587, 8637, 8641, 8691, 8693, 8713, 8744, 8903, 8932, 8958, 9053, 9055, 9144, 9148, 9187, 9223, 9382, 9400, 9421, 9433, 9436, 9472, 9624, 9647, 9654, 9667, 9682, 9699, 9753, 9769, 9782, 9799, 9802, 9808, 9854, 9859, 9892, 9907, 9928,		

				9967, 10056, 10069, 10129, 10134, 10173, 10174, 10237, 10243, 10306, 10429, 10462, 10489, 10546, 10618, 10645, 10792, 10806, 10917, 10919, 10954, 10984, 10996, 11161, 11164, 11290, 11297, 11299, 11326, 11355, 11371, 11394, 11401, 11500, 11656, 11677, 11698, 11722, 11767, 11826, 11827, 11833, 11854, 11926, 12064, 12074, 12133, 12148, 12186, 12212, 12239, 12304, 12352, 12401, 12405, 12423, 12449, 12454, 12668, 12688, 12694, 12719, 12827, 12889, 12928, 12931, 13025, 13031, 13045, 13196, 13198, 13264, 13297, 13306, 13324, 13357, 13372, 13392, 13461, 13551, 13673, 13687, 13719, 13786, 13856, 13999, 14044, 14065, 14101, 14116, 14179, 14234, 14266, 14309, 14453, 14584, 14589, 14647,		

				14682, 14692, 14698, 14736, 14759, 14786, 14827, 14833, 14947, 14968, 14998, 15007, 15010, 15022, 15051, 15109, 15124, 15139, 15154, 15181, 15212, 15244, 15265, 15316, 15370, 15574, 15677, 15688, 15733, 15899, 15928, 15937, 16007, 16039, 16087, 16096, 16111, 16216, 16227, 16293, 16308, 16324, 16342, 16388, 16429, 16535, 16614, 16714, 16726, 16729, 16748, 16836, 16854, 16884, 16897, 16906, 16927, 16963, 17092, 17102, 17182, 17197, 17224, 17229, 17277, 17311, 17418, 17423, 17438, 17489, 17714, 17734, 17754, 17782, 17821, 17882, 17911, 17916, 17989, 18604, 18670, 18709, 18757, 18761, 18787, 18871, 18883, 18899, 18903, 19024, 19026, 19028, 19079, 19098, 19102, 19132, 19142, 19163,		

				19189, 19282, 19357, 19363, 19549, 19556, 19558, 19594, 19609, 19672, 19678, 19821, 19876, 19946, 19982, 20008, 20088, 20094, 20139, 20212, 20267, 20308, 20318, 20359, 20395, 20417, 20616, 20649, 20793, 20821, 20881, 20883, 20983, 21013, 21016, 21049, 21092, 21148, 21151, 21235, 21307, 21316, 21368, 21403, 21404, 21413, 21464, 21526, 21537, 21572, 21676, 21684, 21729, 21757, 21784, 21796, 21803, 21804, 21837, 21859, 21866, 21898, 22096, 22146, 22180, 22216, 22308, 22312, 22324, 22383, 22406, 22429, 22447, 22456, 22459, 22471, 22528, 22566, 22643, 22688, 22704, 22723, 22738, 22744, 22771, 22789, 22842, 22846, 22874, 22887, 23056, 23191, 23215, 23268, 23315, 23344, 23377, 23427,		

				23518, 23531, 23533, 23584, 23692, 23759, 23773, 23829, 23924, 23991, 24042, 24175, 24244, 24331, 24403, 24412, 24448, 24503, 24553, 24557, 24591, 24646, 24671, 24763, 24911 (all at n=1K)		
53	13	2, 3		none - proven	12 (71) 10 (71) 2 (44) 7 (11) 1 (11) 8 (8) 11 (6) 9 (3) 5 (2) 6 (1)	

54	21	5, 11	(Condition 1): All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*54^q - 1) * (m*54^q + 1) odd n: factor of 5 (Condition 2): All k where k = 6*m^2 and m = = 1 or 4 mod 5: even n: factor of 5 for odd n let k = 6*m^2 and let n=2*q-1; factors to: [m*2^q*3^(3q -1) - 1] * [m*2^q*3^(3q -1) + 1]	none - proven	20 (8) 19 (6) 10 (4) 17 (3) 1 (3) 14 (2) 7 (2) 3 (2) 18 (1) 16 (1)	k = 4 and 9 proven composite by condition 1. k = 6 proven composite by condition 2.
55	13	2, 7		none - proven	3 (76) 1 (17) 11 (8) 9 (3) 7 (2) 6 (2) 12 (1) 10 (1) 8 (1) 5 (1)	

56	20	3, 19		none - proven	14 (26) 10 (23) 1 (7) 18 (4) 17 (4) 7 (3) 11 (2) 8 (2) 5 (2) 2 (2)	
57	144	5, 13, 29	All k where k = m^2 and m = = 3 or 5 mod 8: for even n let k = m^2 and let n = 2*q; factors to: (m*57^q - 1) * (m*57^q + 1) odd n: factor of 2	none - proven	87 (242) 54 (157) 100 (109) 59 (83) 115 (34) 124 (31) 88 (27) 63 (22) 139 (20) 38 (20)	k = 9, 25, and 121 proven composite by partial algebraic factors.
58	547	3, 7, 163		71, 130, 169, 178, 319, 456, 493, 499 (k = 71 and 456 at n=100K, other k at n=14K)	382 (7188) 400 (5245) 421 (4526) 176 (2854) 473 (1641) 487 (1412) 312 (1079) 334 (724) 53 (645) 457 (492)	
59	4	3, 5		none - proven	3 (8) 1 (3) 2 (2)	

60	20558	13, 61, 277	(Condition 1): All k where k = m^2 and m = = 11 or 50 mod 61: for even n let k = m^2 and let n = 2*q; factors to: (m*60^q - 1) * (m*60^q + 1) odd n: factor of 61 (Condition 2): All k where k = 15*m^2 and m = = 22 or 39 mod 61: even n: factor of 61 for odd n let k = 15*m^2 and let n=2*q-1; factors to: [m*2^(2q-1)* 15^q - 1] * [m*2^(2q-1)* 15^q + 1]	36, 1770, 4708, 5317, 5611, 6101, 6162, 6274, 7060, 7870, 8722, 9212, 9454, 9881, 10249, 11101, 12061, 12072, 12098, 12479, 12996, 13297, 13480, 14275, 14851, 15800, 16167, 17185, 17620, 18055, 18965, 18972, 19336, 19394, 19397 (k = 16167 and 18055 at n=8K, other k at n=100K)	1024 (90701) 12121 (84208) 15227 (80625) 15185 (79350) 8649 (79159) 20131 (71977) 19457 (68854) 16333 (61172) 18776 (60164) 1486 (58932)	k = 121, 2500, 5184, 14641, and 17689 proven composite by condition 1. k = 7260 proven composite by condition 2.
61	125	2, 31		37, 53, 100 (all at n=10K)	13 (4134) 77 (3080) 10 (1552) 41 (755) 42 (174) 22 (117) 57 (89) 109 (86) 103 (78) 93 (60)	

62	8	3, 7		none - proven	3 (59) 4 (9) 1 (3) 6 (2) 5 (2) 2 (2) 7 (1)	
63	857	2, 5, 397		37, 65, 93, 129, 139, 177, 211, 231, 237, 251, 271, 281, 291, 333, 417, 457, 471, 473, 491, 493, 497, 513, 587, 599, 633, 669, 677, 679, 687, 691, 695, 717, 733, 771, 817, 819, 821, 831, 853 (all at n=1K)	64 (1483) 372 (1320) 839 (940) 495 (916) 183 (904) 97 (851) 39 (848) 277 (835) 775 (710) 411 (678)	
64	14	5, 13	All k = m^2 for all n; factors to: (m*8^n - 1) * (m*8^n + 1) -or- All k = m^3 for all n; factors to: (m*4^n - 1) * (m^2*16^n + m*4^n + 1)	none - proven	11 (9) 12 (6) 5 (2) 13 (1) 10 (1) 7 (1) 6 (1) 3 (1) 2 (1)	k = 1, 4, 8, and 9 proven composite by full algebraic factors.
65	10	3, 11		none - proven	1 (19) 8 (10) 4 (9) 2 (4) 5 (2) 9 (1) 7 (1) 6 (1) 3 (1)	

66	63717671	7, 67, 613, 4423		681, 1056, 1205, 1575, 1669, 1944, 2182, 2916, 2949, 3014, 3083, 3148, 3221, 3526, 3684, 3911, 3946, 4423, 5329, 5361, 5897, 5898, 5959, 5972, 6096, 6189, 6263, 6451, 6768, 6796, 7168, 7237, 7357, 7572, 7614, 7927, 8156, 8173, 8348, 8432, 8510, 8825, 8866, 9017, 9111, 9406, 9409, 9781, 9801, 9906, 9998 (for k <= 10K) (all at n=1K)	7578 (988) 1252 (956) 2746 (918) 5248 (916) 5476 (873) 5929 (795) 6699 (790) 8843 (780) 5435 (762) 2946 (748)	
67	33	2, 17	All k where k = m^2 and m = = 4 or 13 mod 17: for even n let k = m^2 and let n = 2*q; factors to: (m*67^q - 1) * (m*67^q + 1) odd n: factor of 17	none - proven	25 (2829) 2 (768) 23 (42) 21 (27) 1 (19) 31 (10) 19 (8) 18 (7) 13 (7) 11 (6)	k = 16 proven composite by partial algebraic factors.

68	22	3, 23		none - proven	7 (25395) 5 (13574) 11 (198) 8 (62) 10 (53) 3 (10) 1 (5) 14 (4) 2 (4) 9 (3)	
69	6	3, 5	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*69^q - 1) * (m*69^q + 1) odd n: factor of 5	none - proven	5 (4) 1 (3) 3 (1) 2 (1)	k = 4 proven composite by partial algebraic factors.
70	853	13, 29, 71		811 (50K)	729 (28625) 376 (6484) 496 (4934) 434 (3820) 489 (2096) 278 (1320) 550 (764) 31 (545) 174 (441) 778 (356)	
71	5	2, 3		none - proven	2 (52) 1 (3) 3 (2) 4 (1)	

72	293	5, 17, 73		none - proven	4 (1119849) 79 (28009) 291 (26322) 116 (13887) 118 (4599) 67 (4308) 197 (3256) 24 (2648) 11 (2445) 18 (1494)	
73	112	5, 13, 37	(Condition 1): All k where k = m^2 and m = = 6 or 31 mod 37: for even n let k = m^2 and let n = 2*q; factors to: (m*73^q - 1) * (m*73^q + 1) odd n: factor of 37 (Condition 2): All k where k = m^2 and m = = 3 or 5 mod 8: for even n let k = m^2 and let n = 2*q; factors to: (m*73^q - 1) * (m*73^q + 1) odd n: factor of 2	none - proven (with probable primes that have not been certified: k = 79)	79 (9339) 101 (2146) 105 (102) 48 (73) 54 (63) 42 (50) 26 (50) 97 (47) 61 (39) 89 (32)	k = 36 proven composite by condition 1. k = 9 and 25 proven composite by condition 2.
74	4	3, 5		none - proven	2 (132) 1 (5) 3 (2)	

75	37	2, 19		none - proven	35 (1844) 16 (119) 18 (54) 30 (41) 3 (16) 22 (15) 5 (9) 17 (5) 4 (5) 23 (4)	
76	34	7, 11		none - proven	1 (41) 27 (40) 20 (22) 25 (11) 15 (11) 30 (7) 21 (4) 19 (4) 13 (4) 10 (4)	
77	13	2, 3		none - proven	2 (14) 1 (3) 12 (2) 11 (2) 8 (2) 5 (2) 3 (2) 10 (1) 9 (1) 7 (1)	

78	90059	5, 79, 1217		274, 302, 631, 1816, 2292, 2381, 3872, 3949, 4344, 4383, 4489, 4937, 5057, 5766, 5782, 6077, 6436, 7032, 7800, 8469, 8499, 8649, 8758, 10263, 10924, 10928, 10942, 11044, 11936, 12167, 12187, 12244, 12286, 12332, 12622, 13212, 13287, 13668, 13824, 14059, 14456, 14526, 14932, 15722, 15799, 16451, 16688, 17029, 17039, 17221, 17271, 17732, 17886, 18013, 18663, 19614, 19846, 19909, 19986, 20027, 20182, 20462, 20879, 21197, 21631, 21961, 23052, 23079, 23801, 23899, 24214, 24949, 25061, 25532, 25901, 26377, 26385, 26804, 27021, 27096, 27175, 27256, 27399, 27439, 27842, 29073, 29389, 29668, 29863, 30444, 31046, 31053, 31742, 31836, 31917, 31994, 32705, 33298, 33412,	3633 (94500) 68571 (91386) 51476 (88677) 78053 (84433) 58412 (83824) 45661 (73022) 11412 (72798) 72638 (70230) 23462 (69162) 23543 (62677)	

				33671, 33888, 33892, 34728, 35179, 35568, 36233, 36344, 36609, 37024, 38354, 38438, 38711, 38886, 39173, 39901, 40131, 40239, 40289, 40437, 40998, 41079, 41316, 41711, 41748, 42106, 42337, 42896, 43331, 43842, 43886, 44038, 44374, 44634, 44871, 45214, 45221, 45466, 46012, 46187, 46593, 46922, 47004, 47562, 47573, 47636, 47657, 47986, 48004, 48112, 48371, 48973, 48979, 49386, 49611, 49988, 51430, 52042, 52929, 53719, 53761, 54188, 54936, 55245, 55491, 55617, 56563, 56721, 56757, 56904, 57234, 57317, 57611, 57786, 57842, 58402, 58455, 58696, 58854, 59093, 59536, 59774, 60187, 60919, 60978, 61762, 61783, 61937, 62481, 62646, 62854, 63043, 63281, 63351, 64309, 64384, 64744, 65157,		

				65814, 65885, 66102, 66249, 66991, 67386, 67588, 67593, 67706, 67880, 68027, 68573, 68804, 69630, 69914, 71254, 71338, 72003, 72916, 72997, 73706, 73708, 73734, 73787, 74757, 74823, 75307, 75482, 75857, 75888, 76056, 76392, 76781, 77057, 77594, 78135, 78604, 78835, 78959, 79630, 79633, 79674, 80421, 80725, 80788, 80976, 81208, 81369, 83186, 83739, 84484, 85218, 85506, 85886, 86137, 86164, 86329, 86353, 86446, 86692, 88718, 88817, 88866, 89314, 89538, 89664, 89846 (k = 1 mod 7 and k = 1 mod 11 at n=1K, other k at n=100K)		

79	9	2, 5	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*79^q - 1) * (m*79^q + 1) odd n: factor of 5	none - proven	1 (5) 7 (4) 3 (4) 6 (3) 8 (1) 5 (1) 2 (1)	k = 4 proven composite by partial algebraic factors.
80	253	3, 37, 173		10, 31, 214 (all at n=400K)	170 (148256) 106 (16237) 154 (9753) 46 (5337) 232 (2997) 157 (2613) 169 (1959) 45 (1156) 218 (776) 244 (653)	
81	74	7, 13, 73	All k = m^2 for all n; factors to: (m*9^n - 1) * (m*9^n + 1)	none - proven	53 (268) 42 (99) 23 (68) 18 (15) 35 (14) 30 (12) 71 (4) 60 (4) 40 (4) 24 (4)	k = 1, 4, 9, 16, 25, 36, 49, and 64 proven composite by full algebraic factors.

82	22326	5, 83, 269		118, 133, 290, 331, 334, 439, 625, 649, 667, 748, 757, 763, 829, 878, 883, 898, 997, 1163, 1252, 1279, 1327, 1348, 1351, 1531, 1741, 1827, 1936, 1991, 2050, 2157, 2263, 2278, 2419, 2431, 2539, 2543, 2588, 2635, 2668, 2797, 2836, 2896, 2929, 2971, 2974, 3079, 3121, 3156, 3293, 3319, 3436, 3653, 3796, 3817, 4068, 4078, 4083, 4118, 4372, 4399, 4447, 4481, 4483, 4780, 4801, 4867, 4898, 4972, 5053, 5182, 5230, 5311, 5329, 5401, 5560, 5562, 5713, 5893, 5899, 5975, 6028, 6122, 6124, 6143, 6178, 6186, 6226, 6296, 6343, 6418, 6427, 6571, 6631, 6925, 6994, 7054, 7056, 7303, 7386, 7388, 7396, 7474, 7615,	15978 (99999) 21429 (96772) 18989 (96049) 17592 (83837) 22233 (75716) 12912 (74869) 5811 (72615) 16091 (65850) 18576 (64927) 4482 (63245)	

				7723, 7801, 7813, 7822, 7884, 7892, 7969, 8065, 8314, 8368, 8384, 8499, 8629, 8761, 8830, 8878, 8891, 8941, 9124, 9166, 9304, 9409, 9461, 9712, 9739, 9967, 9988, 10000, 10036, 10075, 10147, 10162, 10448, 10542, 10891, 10957, 11056, 11086, 11119, 11123, 11271, 11372, 11485, 11533, 11553, 11665, 11728, 11827, 11884, 11929, 12079, 12169, 12202, 12211, 12283, 12547, 12562, 12587, 12791, 13126, 13141, 13358, 13531, 13613, 13768, 13779, 13792, 13862, 13891, 14095, 14109, 14161, 14188, 14242, 14257, 14275, 14349, 14441, 14524, 14531, 14563, 14614, 14687, 14855, 14939, 14941, 14986, 15046, 15136, 15271, 15343, 15349, 15403, 15493, 15508, 15634, 15679, 15682,		

				15852, 15997, 16024, 16103, 16131, 16242, 16312, 16534, 16633, 16753, 16756, 16767, 16954, 17011, 17401, 17512, 17518, 17761, 17803, 17833, 17878, 18058, 18061, 18431, 18448, 18514, 18538, 18550, 18757, 19093, 19237, 19309, 19372, 19414, 19444, 19519, 19672, 19678, 19930, 19946, 20002, 20050, 20113, 20218, 20251, 20413, 20491, 20578, 20581, 20708, 20773, 20980, 21052, 21088, 21215, 21282, 21334, 21382, 21398, 21433, 21449, 21453, 21454, 21466, 21514, 21541, 21631, 21683, 21762, 21862, 21871, 21913, 22012, 22132, 22162, 22243, 22245 (k = 1 mod 3 at n=1K, other k at n=100K)		
83	5	2, 3		none - proven	2 (8) 1 (5) 3 (2) 4 (1)	

84	16	5, 17	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*84^q - 1) * (m*84^q + 1) odd n: factor of 5	none - proven	1 (17) 14 (8) 11 (7) 8 (4) 12 (3) 15 (1) 13 (1) 10 (1) 7 (1) 6 (1)	k = 4 and 9 proven composite by partial algebraic factors.
85	173	2, 43		61 (8K)	169 (6939) 64 (1253) 105 (403) 112 (394) 97 (287) 109 (230) 16 (171) 27 (160) 93 (90) 145 (77)	
86	28	3, 29		none - proven	23 (112) 14 (38) 18 (26) 27 (14) 1 (11) 2 (10) 25 (9) 11 (8) 22 (5) 19 (5)	
87	21	2, 11		none - proven	19 (372) 9 (91) 16 (17) 18 (15) 5 (15) 13 (11) 11 (10) 1 (7) 7 (6) 12 (5)	

88	571	3, 7, 13, 19	k = 400: for even n let n=2*q; factors to: (20*88^q - 1) * (20*88^q + 1) odd n: covering set 3, 7, 13	46, 94, 277, 508 (all at n=10K)	464 (20648) 444 (19708) 544 (8904) 380 (8712) 79 (7665) 477 (5816) 212 (5511) 179 (4545) 346 (2969) 68 (2477)	
89	4	3, 5		none - proven	2 (60) 3 (5) 1 (3)	
90	27	7, 13	All k where k = m^2 and m = = 5 or 8 mod 13: for even n let k = m^2 and let n = 2*q; factors to: (m*90^q - 1) * (m*90^q + 1) odd n: factor of 13	none - proven	6 (20) 11 (10) 10 (10) 13 (6) 15 (5) 12 (4) 7 (4) 24 (3) 1 (3) 20 (2)	k = 25 proven composite by partial algebraic factors.
91	45	2, 23		none - proven (with probable primes that have not been certified: k = 27)	27 (5048) 1 (4421) 37 (159) 15 (14) 43 (6) 39 (6) 31 (6) 24 (5) 20 (4) 36 (3)	

92	32	3, 31		none - proven	1 (439) 29 (272) 28 (99) 13 (35) 14 (32) 18 (26) 22 (25) 20 (6) 6 (6) 17 (4)	
93	189	2, 47		33, 69, 109, 113, 125, 149, 177 (all at n=8K)	97 (1179) 29 (496) 92 (476) 46 (434) 121 (271) 141 (262) 101 (142) 122 (126) 85 (86) 166 (66)	
94	39	5, 19	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*94^q - 1) * (m*94^q + 1) odd n: factor of 5	29 (1M)	16 (21951) 37 (254) 13 (163) 14 (154) 7 (95) 34 (54) 25 (41) 24 (12) 26 (9) 36 (7)	k = 4 and 9 proven composite by partial algebraic factors.
95	5	2, 3		none - proven	1 (7) 3 (2) 2 (2) 4 (1)	

96	38995	7, 67, 97, 1303	(Condition 1): All k where k = m^2 and m = = 22 or 75 mod 97: for even n let k = m^2 and let n = 2*q; factors to: (m*96^q - 1) * (m*96^q + 1) odd n: factor of 97 (Condition 2): All k where k = 6*m^2 and m = = 9 or 88 mod 97: even n: factor of 97 for odd n let k = 6*m^2 and let n=2*q-1; factors to: [m*2^(5q-1)* 3^q - 1] * [m*2^(5q-1)* 3^q + 1]	431, 591, 701, 831, 872, 956, 1006, 1126, 1648, 1681, 1810, 2036, 2386, 2424, 2878, 3001, 3431, 3461, 3671, 3856, 3881, 3956, 3996, 4261, 4351, 4366, 4406, 4451, 4461, 5046, 5836, 5918, 6031, 6261, 6481, 6586, 6670, 6786, 7091, 7116, 7121, 7131, 7249, 7274, 7461, 7801, 8016, 8202, 8291, 8546, 8816, 9022, 9131, 9156, 9326, 9441, 9463, 9476, 9677, 9681, 9921, 10036, 10204, 10375, 10453, 10551, 10651, 10721, 11056, 11156, 11196, 11458, 11553, 11766, 11831, 12676, 12901, 13216, 13231, 13288, 13571, 14011, 14061, 14276, 14517, 14551, 14646, 15341, 15461, 15573, 15596, 16176, 16306, 16392, 16586, 16641, 16645, 17116, 17421, 17636,	3769 (92879) 28907 (89447) 13528 (86114) 19882 (82073) 37155 (76817) 9160 (71178) 5179 (66965) 32960 (60312) 7565 (59052) 4754 (56909)	k = 484, 5625, 14161, and 29584 proven composite by condition 1. k = 486 proven composite by condition 2.

				17653, 17792, 18311, 19136, 19191, 19246, 19486, 19681, 20091, 20396, 20464, 20502, 20936, 21488, 21776, 22541, 22811, 22846, 22931, 23010, 23161, 23271, 23301, 23570, 23766, 24076, 24216, 24386, 24506, 24831, 24916, 24929, 25306, 25706, 25966, 26038, 26161, 26183, 26571, 26772, 26801, 26846, 27045, 27106, 27126, 27450, 27646, 27700, 27741, 28365, 28558, 28774, 28776, 28921, 29093, 29196, 29561, 29681, 30086, 30120, 30151, 30421, 30581, 30662, 31021, 31136, 31936, 32205, 32881, 33099, 33141, 33391, 33406, 33501, 33621, 33701, 33711, 33951, 33986, 34116, 34236, 34436, 34531, 34921, 35016, 35113, 35271, 35406, 35446, 35781, 35966, 36158, 36551, 36945, 36981, 37031, 37036, 37166,		

				37222, 37471, 37991, 38156, 38301, 38316, 38986 (k = 1 mod 5 and k = 1 mod 19 at n=1K, other k at n=100K)		
97	43	3, 5, 7, 37, 139		22 (35.8K)	8 (192335) 16 (1627) 4 (621) 28 (184) 1 (17) 34 (16) 32 (9) 27 (8) 37 (5) 31 (5)	
98	10	3, 11		none - proven	1 (13) 5 (10) 7 (3) 4 (3) 8 (2) 2 (2) 9 (1) 6 (1) 3 (1)	
99	9	2, 5	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*99^q - 1) * (m*99^q + 1) odd n: factor of 5	none - proven	5 (135) 3 (4) 1 (3) 7 (2) 8 (1) 6 (1) 2 (1)	k = 4 proven composite by partial algebraic factors.

100	211	7, 13, 37	All k = m^2 for all n; factors to: (m*10^n - 1) * (m*10^n + 1)	none - proven (with probable primes that have not been certified: k = 133)	74 (44709) 133 (5496) 102 (209) 193 (155) 203 (133) 95 (96) 109 (68) 55 (56) 98 (45) 37 (36)	k = 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, and 196 proven composite by full algebraic factors.
101	13	2, 3		none - proven	5 (350) 8 (112) 2 (42) 11 (24) 12 (11) 4 (3) 1 (3) 6 (2) 10 (1) 9 (1)	
102	1635	7, 19, 79		191, 207, 1082, 1369 (all at n=500K)	1451 (188973) 1208 (178632) 653 (117255) 1607 (82644) 254 (58908) 1527 (49462) 1037 (43460) 32 (43302) 1296 (37715) 142 (22025)	

103	25	2, 13		none - proven	19 (820) 22 (442) 23 (216) 14 (189) 16 (57) 11 (54) 24 (32) 15 (32) 1 (19) 20 (5)	
104	4	3, 5		none - proven	1 (97) 2 (68) 3 (1)	
105	297	2, 37, 149	All k where k = m^2 and m = = 3 or 5 mod 8: for even n let k = m^2 and let n = 2*q; factors to: (m*57^q - 1) * (m*57^q + 1) odd n: factor of 2	73, 137 (both at n=8K)	148 (3645) 265 (1666) 162 (294) 255 (222) 154 (139) 145 (119) 80 (91) 68 (56) 66 (47) 223 (21)	k = 9, 25, 121, and 169 proven composite by partial algebraic factors.

106	13624	3, 19, 199		64, 81, 163, 332, 391, 400, 429, 511, 526, 582, 596, 643, 676, 841, 862, 897, 913, 1024, 1223, 1261, 1283, 1294, 1417, 1428, 1546, 1597, 1713, 1869, 2056, 2116, 2248, 2389, 2458, 2605, 2623, 2656, 2674, 2719, 2743, 2780, 2781, 2813, 2888, 2965, 3047, 3073, 3130, 3136, 3142, 3241, 3277, 3336, 3425, 3427, 3478, 3481, 3617, 3622, 3646, 3655, 3694, 3746, 3883, 4045, 4067, 4096, 4153, 4162, 4177, 4219, 4336, 4339, 4416, 4628, 4662, 4666, 4696, 4713, 4722, 4801, 5135, 5283, 5359, 5395, 5468, 5485, 5623, 5692, 5707, 5752, 5776, 5777, 5872, 5878, 5937, 5971, 5992, 5993, 6040, 6094, 6100, 6103, 6181,	8272 (998) 508 (998) 13417 (994) 4908 (970) 5179 (969) 3700 (968) 577 (947) 3583 (943) 9814 (935) 1321 (913)	

				6220, 6376, 6421, 6505, 6547, 6613, 6716, 6736, 6832, 6955, 7069, 7156, 7202, 7246, 7273, 7297, 7331, 7336, 7345, 7356, 7398, 7402, 7496, 7540, 7561, 7744, 7771, 7894, 7906, 7915, 8023, 8181, 8266, 8323, 8329, 8371, 8386, 8428, 8521, 8561, 8572, 8637, 8779, 8788, 8861, 8950, 8956, 8962, 8975, 9031, 9096, 9190, 9238, 9294, 9366, 9415, 9469, 9589, 9634, 9736, 9774, 9787, 9790, 9796, 9808, 9859, 9877, 9973, 9976, 10033, 10072, 10117, 10150, 10166, 10186, 10271, 10273, 10446, 10451, 10627, 10646, 10651, 10660, 10699, 10816, 10876, 10894, 11097, 11173, 11278, 11299, 11419, 11420, 11426, 11506, 11639, 11671, 11833,		

				11884, 11901, 12066, 12076, 12090, 12145, 12252, 12269, 12321, 12352, 12361, 12490, 12627, 12851, 12856, 12910, 12916, 12970, 12978, 12991, 13023, 13027, 13162, 13174, 13269, 13366, 13374, 13378, 13387, 13497, 13511, 13516, 13528, 13543, 13553, 13558, 13567 (all at n=1K)		
107	5	2, 3		none - proven (with probable primes that have not been certified: k = 3)	2 (21910) 3 (4900) 4 (251) 1 (17)	

108	13406	7, 13, 61, 109	(Condition 1): All k where k = m^2 and m = = 33 or 76 mod 109: for even n let k = m^2 and let n = 2*q; factors to: (m*108^q - 1) * (m*108^q + 1) odd n: factor of 109 (Condition 2): All k where k = 3*m^2 and m = = 20 or 89 mod 109: even n: factor of 109 for odd n let k = 3*m^2 and let n=2*q-1; factors to: [m*2^(2q-1)* 3^(3q-1) - 1] * [m*2^(2q-1)* 3^(3q-1) + 1]	137, 411, 437, 873, 1634, 1769, 1782, 1961, 2508, 2617, 2962, 2963, 3002, 3029, 3474, 3499, 3596, 3646, 4007, 4066, 4084, 4121, 4184, 4328, 4468, 4499, 4744, 4904, 5015, 5142, 5212, 5351, 5625, 5821, 5892, 5923, 5994, 6212, 6284, 6432, 6528, 6570, 6614, 6866, 7107, 7211, 7302, 7304, 7419, 7848, 8037, 8144, 8374, 8383, 8503, 8524, 8638, 8986, 9346, 9852, 10052, 10129, 10136, 10245, 10699, 10926, 11089, 11164, 11278, 11619, 11881, 11918, 12262, 12861, 12863, 13162, 13291, 13297 (k = 5351, 6528, and 13162 at n=2K, other k at n=100K)	10322 (88080) 1999 (85188) 7557 (84180) 11882 (81547) 3439 (79524) 4686 (79010) 1159 (77107) 3573 (76352) 1465 (75209) 2148 (75018)	k = 1089 and 5776 proven composite by condition 1. k = 1200 proven composite by condition 2.

109	9	2, 5	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*109^q - 1) * (m*109^q + 1) odd n: factor of 5	none - proven	8 (19) 1 (17) 5 (2) 2 (2) 7 (1) 6 (1) 3 (1)	k = 4 proven composite by partial algebraic factors.
110	38	3, 37	All k where k = m^2 and m = = 6 or 31 mod 37: for even n let k = m^2 and let n = 2*q; factors to: (m*110^q - 1) * (m*110^q + 1) odd n: factor of 37	none - proven	23 (78120) 17 (2598) 37 (1689) 9 (77) 11 (42) 10 (17) 2 (16) 31 (9) 5 (6) 22 (5)	k = 36 proven composite by partial algebraic factors.
111	13	2, 7		none - proven	2 (24) 7 (6) 6 (4) 1 (3) 12 (2) 11 (2) 3 (2) 10 (1) 9 (1) 8 (1)	

112	1357	5, 13, 113	All k where k = m^2 and m = = 15 or 98 mod 113: for even n let k = m^2 and let n = 2*q; factors to: (m*112^q - 1) * (m*112^q + 1) odd n: factor of 113	31, 79, 310, 340, 421, 424, 451, 529, 703, 940, 1018, 1051, 1204 (all at n=7.5K)	948 (173968) 1268 (50536) 758 (35878) 1353 (7751) 187 (7524) 498 (6038) 9 (5717) 1024 (5681) 619 (5441) 981 (2858)	k = 225 proven composite by partial algebraic factors.
113	20	3, 19		none - proven	14 (308) 1 (23) 7 (15) 19 (11) 5 (8) 16 (5) 3 (5) 12 (3) 4 (3) 18 (2)	
114	24	5, 23	All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*114^q - 1) * (m*114^q + 1) odd n: factor of 5	none - proven	3 (63) 1 (29) 11 (27) 18 (21) 22 (20) 20 (3) 19 (2) 17 (2) 14 (2) 10 (2)	k = 4 and 9 proven composite by partial algebraic factors.

115	57	2, 29		13, 43 (both at n=8K)	45 (5227) 4 (4223) 51 (2736) 23 (1116) 53 (165) 21 (127) 35 (50) 15 (38) 39 (28) 32 (28)	
116	14	3, 13		none - proven	9 (249) 5 (156) 11 (118) 1 (59) 2 (32) 13 (15) 10 (11) 12 (2) 8 (2) 7 (1)	
117	149	2, 5, 37		5, 17, 33, 141 (all at n=8K)	83 (442) 59 (352) 19 (336) 110 (232) 143 (222) 41 (209) 87 (177) 129 (165) 118 (136) 92 (129)	
118	50	7, 17		43 (37K)	27 (860) 29 (599) 18 (393) 6 (210) 22 (191) 8 (85) 19 (72) 7 (52) 42 (30) 37 (27)	
119	4	3, 5		none - proven	2 (28) 3 (6) 1 (3)	

120	166616308	11, 13, 1117, 14281		384, 386, 419, 483, 551, 672, 824, 846, 890, 901, 991, 1024, 1077, 1095, 1132, 1134, 1255, 1309, 1385, 1394, 1693, 1797, 1921, 2036, 2133, 2177, 2258, 2354, 2386, 2410, 2452, 2650, 2696, 2716, 3004, 3025, 3123, 3178, 3189, 3214, 3290, 3343, 3347, 3400, 3407, 3433, 3596, 3786, 3994, 4003, 4082, 4320, 4399, 4423, 4460, 4500, 4577, 4676, 4685, 4819, 4830, 4839, 4936, 5105, 5125, 5255, 5378, 5630, 5686, 5730, 6112, 6241, 6332, 6357, 6425, 6581, 6676, 6678, 6755, 6821, 6852, 6951, 6982, 6997, 7008, 7413, 7470, 7523, 7545, 7549, 7789, 7803, 7820, 7910, 7985, 8100, 8205, 8464, 8647, 8810, 8812,	8063 (997) 6434 (976) 2980 (958) 5180 (938) 164 (878) 4234 (876) 7085 (843) 4390 (833) 9354 (829) 2726 (822)	

				8869, 8922, 8964, 8966, 8997, 9010, 9019, 9057, 9070, 9395, 9564, 9626, 9712, 9889, 9921, 9954, 9993 (for k <= 10K) (all at n=1K)		
121	100	3, 7, 37	All k = m^2 for all n; factors to: (m*11^n - 1) * (m*11^n + 1)	none - proven	62 (13101) 79 (4545) 43 (68) 7 (60) 30 (24) 60 (12) 87 (11) 39 (11) 57 (10) 50 (10)	k = 1, 4, 9, 16, 25, 36, 49, 64, and 81 proven composite by full algebraic factors.
122	14	3, 5, 13		none - proven	13 (43) 8 (26) 11 (10) 2 (6) 12 (5) 1 (5) 10 (3) 6 (2) 5 (2) 3 (2)	
123	13	2, 5, 17		11 (8K)	1 (43) 3 (8) 2 (8) 12 (7) 6 (7) 9 (5) 7 (2) 10 (1) 8 (1) 5 (1)	

124	92881	3, 5, 7, 5167	(Condition 1): All k where k = m^2 and m = = 2 or 3 mod 5: for even n let k = m^2 and let n = 2*q; factors to: (m*124^q - 1) * (m*124^q + 1) odd n: factor of 5 (Condition 2): All k where k = 31*m^2 and m = = 1 or 4 mod 5: even n: factor of 5 for odd n let k = 31*m^2 and let n=2*q-1; factors to: [m*2^(2q-1)* 31^q - 1] * [m*2^(2q-1)* 31^q + 1]	101, 136, 146, 175, 179, 199, 204, 236, 259, 271, 301, 328, 364, 389, 434, 441, 459, 469, 561, 586, 589, 599, 604, 614, 616, 631, 661, 741, 766, 806, 844, 894, 901, 922, 931, 951, 971, 974, 1013, 1016, 1019, 1021, 1039, 1043, 1046, 1061, 1081, 1114, 1123, 1149, 1156, 1186, 1229, 1231, 1237, 1246, 1249, 1269, 1288, 1336, 1375, 1376, 1384, 1399, 1461, 1496, 1498, 1499, 1509, 1511, 1519, 1522, 1542, 1636, 1654, 1664, 1711, 1719, 1724, 1731, 1741, 1743, 1754, 1766, 1779, 1783, 1784, 1789, 1814, 1824, 1834, 1861, 1904, 1924, 1926, 1931, 1941, 1954, 1969, 1989, 2029, 2041, 2095, 2101, 2109, 2124, 2131, 2161, 2166, 2191,	1194 (998) 1611 (989) 659 (986) 3996 (985) 6314 (984) 6101 (983) 4903 (978) 3941 (977) 6011 (975) 6179 (972)	k = 2^2, 3^2, 7^2, 8^2, 12^2, 13^2, 17^2, 18^2 (etc. pattern repeating every 5m) proven composite by condition 1. k = 31*1^2, 31*4^2, 31*6^2, 31*9^2, 31*11^2, 31*14^2, 31*16^2, 31*19^2 (etc. pattern repeating every 5m) proven composite by condition 2.

				2194, 2212, 2296, 2306, 2307, 2344, 2364, 2366, 2377, 2416, 2419, 2436, 2479, 2491, 2497, 2529, 2539, 2559, 2572, 2576, 2616, 2656, 2661, 2664, 2666, 2680, 2686, 2731, 2761, 2789, 2804, 2830, 2854, 2864, 2920, 2931, 2971, 2994, 3024, 3034, 3054, 3067, 3076, 3079, 3081, 3096, 3154, 3196, 3214, 3229, 3247, 3261, 3286, 3294, 3316, 3319, 3324, 3329, 3346, 3382, 3421, 3439, 3579, 3604, 3606, 3646, 3649, 3654, 3679, 3704, 3716, 3730, 3734, 3739, 3752, 3771, 3779, 3786, 3789, 3809, 3821, 3829, 3839, 3866, 3942, 3949, 3964, 3986, 4006, 4015, 4039, 4054, 4066, 4084, 4089, 4091, 4094, 4096,		

				4129, 4134, 4153, 4207, 4229, 4231, 4234, 4236, 4311, 4319, 4331, 4375, 4376, 4384, 4424, 4429, 4476, 4486, 4506, 4512, 4526, 4546, 4554, 4609, 4646, 4651, 4684, 4714, 4716, 4771, 4786, 4796, 4801, 4811, 4816, 4831, 4854, 4879, 4885, 4909, 4911, 4946, 4961, 4976, 4997, 5009, 5020, 5026, 5032, 5049, 5101, 5116, 5149, 5152, 5164, 5186, 5209, 5224, 5226, 5246, 5269, 5274, 5283, 5314, 5334, 5396, 5404, 5416, 5431, 5459, 5499, 5526, 5539, 5554, 5611, 5626, 5630, 5632, 5679, 5684, 5696, 5699, 5710, 5746, 5751, 5764, 5784, 5830, 5840, 5844, 5911, 5926, 5934, 5946, 5956, 5959, 5974, 5979,		

				5982, 6000, 6019, 6024, 6049, 6094, 6098, 6106, 6154, 6181, 6184, 6186, 6187, 6189, 6191, 6212, 6214, 6223, 6226, 6246, 6251, 6261, 6309, 6318, 6336, 6361, 6374, 6376, 6381, 6384, 6424, 6434, 6439, 6449, 6466, 6469, 6506, 6514, 6571, 6589, 6625, 6644, 6759, 6799, 6826, 6849, 6856, 6886, 6901, 6919, 6931, 6961, 6971, 6976, 6986, 7006, 7051, 7062, 7066, 7092, 7096, 7104, 7114, 7134, 7144, 7146, 7195, 7221, 7232, 7261, 7274, 7276, 7284, 7301, 7309, 7311, 7329, 7369, 7389, 7396, 7423, 7453, 7456, 7478, 7479, 7494, 7516, 7521, 7522, 7523, 7544, 7551, 7591, 7600, 7616, 7617, 7619, 7674,		

				7682, 7714, 7739, 7741, 7756, 7762, 7771, 7779, 7801, 7811, 7861, 7884, 7885, 7897, 7909, 7951, 8006, 8041, 8044, 8046, 8111, 8124, 8129, 8137, 8146, 8149, 8161, 8166, 8201, 8203, 8231, 8248, 8249, 8250, 8266, 8286, 8326, 8334, 8339, 8361, 8369, 8383, 8394, 8419, 8429, 8431, 8441, 8454, 8461, 8476, 8479, 8491, 8499, 8524, 8529, 8536, 8551, 8564, 8581, 8606, 8641, 8655, 8674, 8683, 8691, 8719, 8724, 8730, 8779, 8794, 8809, 8811, 8839, 8849, 8854, 8869, 8871, 8934, 8936, 8974, 8979, 8980, 8986, 9001, 9034, 9064, 9069, 9076, 9115, 9136, 9142, 9166, 9172, 9175, 9178, 9199, 9236, 9244,		

				9247, 9256, 9260, 9264, 9276, 9314, 9334, 9336, 9344, 9349, 9366, 9382, 9401, 9436, 9454, 9459, 9463, 9496, 9516, 9524, 9526, 9551, 9562, 9564, 9571, 9574, 9586, 9634, 9646, 9661, 9728, 9739, 9761, 9799, 9826, 9831, 9844, 9907, 9909, 9931, 9966, 9976 (for k <= 10K) (all at n=1K)		
125	8	3, 7	All k = m^3 for all n; factors to: (m*5^n - 1) * (m^2*25^n + m*5^n + 1)	none - proven	6 (24) 7 (5) 3 (3) 5 (2) 2 (2) 4 (1)	k = 1 proven composite by full algebraic factors.

126	480821	13, 19, 127, 829		380, 406, 438, 729, 893, 1132, 1523, 1654, 1810, 1855, 2707, 2744, 2804, 3285, 3566, 3573, 3631, 3721, 4335, 4416, 4436, 4596, 4772, 5081, 5164, 5285, 5784, 5820, 6026, 6041, 6204, 6605, 6990, 7075, 7107, 7183, 7479, 7580, 7673, 7876, 8061, 8099, 8238, 8256, 8323, 8336, 8485, 8527, 8836, 9025, 9127, 9166, 9220, 9524, 9606, 9651, 9936, 10195, 10728, 10818, 11012, 11287, 11366, 11475, 11493, 11683, 11696, 12013, 12416, 12424, 12433, 12594, 12794, 12820, 12868, 13006, 13016, 13023, 13027, 13134, 13302, 13389, 13824, 14225, 14270, 14509, 14790, 14831, 15167, 15348, 15366, 15577, 15596, 15620, 15752, 15898, 16130, 16367, 16636,	16604 (2475) 26728 (2429) 3428 (2428) 16844 (2365) 15239 (2348) 13759 (2324) 4698 (2302) 13672 (2239) 8177 (2224) 8682 (2162)	

				16723, 16974, 17351, 17436, 17826, 17920, 18001, 18058, 18067, 18162, 18430, 18437, 18543, 18571, 18617, 18638, 18849, 19314, 19686, 19759, 19847, 19940, 19996, 20192, 20216, 20439, 20497, 20520, 20573, 20575, 20608, 20635, 20744, 20907, 20983, 20993, 21060, 21209, 21306, 21316, 21342, 21583, 21849, 22031, 22224, 22389, 22478, 22790, 22837, 22938, 23180, 23264, 23390, 23466, 23533, 23692, 23748, 23830, 23903, 24001, 24060, 24176, 24319, 24390, 24579, 24706, 24748, 24779, 24832, 24963, 25012, 25106, 25130, 25886, 26159, 26279, 26326, 26490, 26822, 27182, 27296, 27730, 27842, 27920, 28447, 28453, 28659, 28791, 28928, 29001, 29012, 29228, 29329, 29477, 29551, 29617, 29719, 29844,		

				29942 (for k <= 30K) (k = 1 mod 5 at n=1K, other k at n=2.5K)		

127	2593	2, 5, 17, 137		13, 17, 25, 27, 33, 35, 79, 83, 91, 113, 121, 139, 159, 179, 191, 231, 233, 235, 236, 237, 239, 250, 251, 264, 279, 288, 293, 333, 353, 361, 367, 379, 443, 451, 459, 471, 473, 511, 513, 517, 523, 531, 537, 551, 553, 557, 561, 597, 599, 604, 617, 631, 639, 649, 659, 679, 699, 715, 725, 731, 733, 737, 739, 747, 751, 755, 763, 773, 778, 783, 797, 809, 838, 848, 863, 871, 895, 919, 937, 939, 950, 953, 964, 982, 997, 999, 1013, 1019, 1025, 1031, 1037, 1039, 1043, 1051, 1106, 1107, 1117, 1119, 1127, 1157, 1173, 1185, 1196, 1199, 1211, 1231, 1232, 1233, 1245, 1253, 1259, 1279, 1288, 1291, 1313, 1327, 1333, 1335, 1337, 1347, 1353, 1359, 1371, 1377, 1401, 1407, 1417, 1421,	667 (1000) 1775 (994) 2497 (989) 2199 (972) 1759 (936) 2015 (910) 343 (904) 1113 (899) 1962 (893) 1543 (872)	

				1429, 1432, 1439, 1473, 1481, 1491, 1513, 1525, 1539, 1549, 1551, 1573, 1577, 1579, 1589, 1593, 1595, 1597, 1599, 1611, 1612, 1618, 1631, 1639, 1641, 1661, 1677, 1693, 1699, 1709, 1711, 1731, 1732, 1737, 1751, 1771, 1792, 1793, 1803, 1837, 1839, 1903, 1911, 1921, 1928, 1933, 1936, 1939, 1943, 1951, 1957, 1959, 1999, 2013, 2017, 2032, 2039, 2045, 2072, 2073, 2079, 2092, 2097, 2099, 2129, 2155, 2168, 2179, 2191, 2197, 2215, 2231, 2247, 2253, 2273, 2279, 2303, 2313, 2339, 2367, 2377, 2389, 2411, 2427, 2431, 2433, 2479, 2501, 2543, 2548, 2559, 2565, 2573, 2583 (all at n=1K)		

128	44	3, 43	All k = m^7 for all n; factors to: (m*2^n - 1) * (m^6*64^n + m^5*32^n + m^4*16^n + m^3*8^n + m^2*4^n + m*2^n + 1)	none - proven	29 (211192) 23 (2118) 26 (1442) 37 (699) 16 (459) 42 (246) 35 (98) 30 (66) 36 (59) 12 (46)	k = 1 proven composite by full algebraic factors.
256	100	3, 7, 13	All k = m^2 for all n; factors to: (m*16^n - 1) * (m*16^n + 1)	none - proven	74 (319) 47 (228) 42 (224) 92 (143) 68 (87) 61 (54) 35 (28) 65 (24) 70 (18) 75 (17)	k = 1, 4, 9, 16, 25, 36, 49, 64, and 81 proven composite by full algebraic factors.
512	14	3, 5, 13	All k = m^3 for all n; factors to: (m*8^n - 1) * (m^2*64^n + m*8^n + 1)	none - proven	4 (2215) 13 (2119) 9 (7) 11 (6) 6 (6) 5 (2) 3 (2) 2 (2) 12 (1) 10 (1)	k = 1 and 8 proven composite by full algebraic factors.
1024	81	5, 41	All k = m^2 for all n; factors to: (m*32^n - 1) * (m*32^n + 1) -or- All k = m^5 for all n; factors to: (m*4^n - 1) * (m^4*256^n + m^3*64^n + m^2*16^n + m*4^n + 1)	29, 31, 56, 61 (k = 29 at n=1M, other k at n=3K)	74 (666084) 39 (4070) 43 (2290) 13 (1167) 78 (424) 65 (93) 69 (54) 3 (47) 71 (41) 44 (36)	k = 1, 4, 9, 16, 25, 32, 36, 49, and 64 proven composite by full algebraic factors.