

How to determine whether a number is prime or composite

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A prime number is an integer greater than 1 which has no factors besides 1 and itself. (For example 7 is divisible evenly by only 1 and 7, therefore it is prime).

- The number 1 is NOT a prime because the definition states that the integer has to be greater than 1

- Two is the only even prime number, since every even number thereafter is divisible by 2

A composite number is a nonprime integer. (For example, 9 is a composite number because it is divisible evenly by 1, 3, and 9)

Rules of testing whether a number is prime or composite:

- If a number is even, unless it is 2 it is always composite

-If a number's digits add up to a number which is divisible by 3, it is divisible by 3 and therefore composite. For example, consider number 246
(246- $2+4+6=12$ $12/3=4$ therefore it is composite)

Now let us take rather large numbers, e.g. 2,321

1) Find the square root of the number (The Square root of 144 is 12 because $12*12=144$)

- The Square root of 2,321 is 48.176...

2) remember that if the square root results in an integer it is automatically composite

3) if your number ends in a 0,2,4,5,6,8 it is NOT PRIME

- 2,321 ends in a 1, so we keep going

4) add up the digits of your number, if the sum is divisible by 3, your number is composite. In this example, $2+3+2+1=8$ - 8 is not divisible by 3, hence we go to next step.

5) Divide the number by all the prime numbers less than the square root.

(You can skip 2, 3, and 5, since steps 3 and 4 above ensured that the number is not divisible by 2,3 or 5)

-since the square root of 2,321 is 48.176..., we need to try dividing 2,321 by primes less than 48 (7,11,13,17,19,23,29,31,37,41,43,47)

- since 2,321 is divisible by 11, it is NOT prime and therefore composite.

6) If a number is not divisible by any of the prime numbers less than the square root, it is PRIME, if it is, it's COMPOSITE

***** The End *****

It is a good idea to remember the 4 primes that are between 1 and 10 (2,3,5, 7) and four primes between 10 and 20 (11.13.17.19)

To determine on Internet if a number is prime visit

<http://mste.illinois.edu/html.f/resource/prime.html>

Below is the list of first 1,000 primes. (Last prime is 7919; so between 1 and 7919 there are 1,000 primes.)

The First 1,000 Primes

| | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|
| 2 | 3 | 5 | 7 | 11 | 13 | 17 | 19 | 23 | 29 |
| 31 | 37 | 41 | 43 | 47 | 53 | 59 | 61 | 67 | 71 |
| 73 | 79 | 83 | 89 | 97 | 101 | 103 | 107 | 109 | 113 |
| 127 | 131 | 137 | 139 | 149 | 151 | 157 | 163 | 167 | 173 |
| 179 | 181 | 191 | 193 | 197 | 199 | 211 | 223 | 227 | 229 |
| 233 | 239 | 241 | 251 | 257 | 263 | 269 | 271 | 277 | 281 |
| 283 | 293 | 307 | 311 | 313 | 317 | 331 | 337 | 347 | 349 |
| 353 | 359 | 367 | 373 | 379 | 383 | 389 | 397 | 401 | 409 |
| 419 | 421 | 431 | 433 | 439 | 443 | 449 | 457 | 461 | 463 |
| 467 | 479 | 487 | 491 | 499 | 503 | 509 | 521 | 523 | 541 |
| 547 | 557 | 563 | 569 | 571 | 577 | 587 | 593 | 599 | 601 |
| 607 | 613 | 617 | 619 | 631 | 641 | 643 | 647 | 653 | 659 |
| 661 | 673 | 677 | 683 | 691 | 701 | 709 | 719 | 727 | 733 |
| 739 | 743 | 751 | 757 | 761 | 769 | 773 | 787 | 797 | 809 |
| 811 | 821 | 823 | 827 | 829 | 839 | 853 | 857 | 859 | 863 |
| 877 | 881 | 883 | 887 | 907 | 911 | 919 | 929 | 937 | 941 |
| 947 | 953 | 967 | 971 | 977 | 983 | 991 | 997 | 1009 | 1013 |
| 1019 | 1021 | 1031 | 1033 | 1039 | 1049 | 1051 | 1061 | 1063 | 1069 |
| 1087 | 1091 | 1093 | 1097 | 1103 | 1109 | 1117 | 1123 | 1129 | 1151 |
| 1153 | 1163 | 1171 | 1181 | 1187 | 1193 | 1201 | 1213 | 1217 | 1223 |
| 1229 | 1231 | 1237 | 1249 | 1259 | 1277 | 1279 | 1283 | 1289 | 1291 |
| 1297 | 1301 | 1303 | 1307 | 1319 | 1321 | 1327 | 1361 | 1367 | 1373 |
| 1381 | 1399 | 1409 | 1423 | 1427 | 1429 | 1433 | 1439 | 1447 | 1451 |
| 1453 | 1459 | 1471 | 1481 | 1483 | 1487 | 1489 | 1493 | 1499 | 1511 |
| 1523 | 1531 | 1543 | 1549 | 1553 | 1559 | 1567 | 1571 | 1579 | 1583 |
| 1597 | 1601 | 1607 | 1609 | 1613 | 1619 | 1621 | 1627 | 1637 | 1657 |
| 1663 | 1667 | 1669 | 1693 | 1697 | 1699 | 1709 | 1721 | 1723 | 1733 |
| 1741 | 1747 | 1753 | 1759 | 1777 | 1783 | 1787 | 1789 | 1801 | 1811 |
| 1823 | 1831 | 1847 | 1861 | 1867 | 1871 | 1873 | 1877 | 1879 | 1889 |
| 1901 | 1907 | 1913 | 1931 | 1933 | 1949 | 1951 | 1973 | 1979 | 1987 |
| 1993 | 1997 | 1999 | 2003 | 2011 | 2017 | 2027 | 2029 | 2039 | 2053 |
| 2063 | 2069 | 2081 | 2083 | 2087 | 2089 | 2099 | 2111 | 2113 | 2129 |
| 2131 | 2137 | 2141 | 2143 | 2153 | 2161 | 2179 | 2203 | 2207 | 2213 |
| 2221 | 2237 | 2239 | 2243 | 2251 | 2267 | 2269 | 2273 | 2281 | 2287 |
| 2293 | 2297 | 2309 | 2311 | 2333 | 2339 | 2341 | 2347 | 2351 | 2357 |
| 2371 | 2377 | 2381 | 2383 | 2389 | 2393 | 2399 | 2411 | 2417 | 2423 |

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|------|------|------|------|------|------|------|------|------|------|
| 2437 | 2441 | 2447 | 2459 | 2467 | 2473 | 2477 | 2503 | 2521 | 2531 |
| 2539 | 2543 | 2549 | 2551 | 2557 | 2579 | 2591 | 2593 | 2609 | 2617 |
| 2621 | 2633 | 2647 | 2657 | 2659 | 2663 | 2671 | 2677 | 2683 | 2687 |
| 2689 | 2693 | 2699 | 2707 | 2711 | 2713 | 2719 | 2729 | 2731 | 2741 |
| 2749 | 2753 | 2767 | 2777 | 2789 | 2791 | 2797 | 2801 | 2803 | 2819 |
| 2833 | 2837 | 2843 | 2851 | 2857 | 2861 | 2879 | 2887 | 2897 | 2903 |
| 2909 | 2917 | 2927 | 2939 | 2953 | 2957 | 2963 | 2969 | 2971 | 2999 |
| 3001 | 3011 | 3019 | 3023 | 3037 | 3041 | 3049 | 3061 | 3067 | 3079 |
| 3083 | 3089 | 3109 | 3119 | 3121 | 3137 | 3163 | 3167 | 3169 | 3181 |
| 3187 | 3191 | 3203 | 3209 | 3217 | 3221 | 3229 | 3251 | 3253 | 3257 |
| 3259 | 3271 | 3299 | 3301 | 3307 | 3313 | 3319 | 3323 | 3329 | 3331 |
| 3343 | 3347 | 3359 | 3361 | 3371 | 3373 | 3389 | 3391 | 3407 | 3413 |
| 3433 | 3449 | 3457 | 3461 | 3463 | 3467 | 3469 | 3491 | 3499 | 3511 |
| 3517 | 3527 | 3529 | 3533 | 3539 | 3541 | 3547 | 3557 | 3559 | 3571 |
| 3581 | 3583 | 3593 | 3607 | 3613 | 3617 | 3623 | 3631 | 3637 | 3643 |
| 3659 | 3671 | 3673 | 3677 | 3691 | 3697 | 3701 | 3709 | 3719 | 3727 |
| 3733 | 3739 | 3761 | 3767 | 3769 | 3779 | 3793 | 3797 | 3803 | 3821 |
| 3823 | 3833 | 3847 | 3851 | 3853 | 3863 | 3877 | 3881 | 3889 | 3907 |
| 3911 | 3917 | 3919 | 3923 | 3929 | 3931 | 3943 | 3947 | 3967 | 3989 |
| 4001 | 4003 | 4007 | 4013 | 4019 | 4021 | 4027 | 4049 | 4051 | 4057 |
| 4073 | 4079 | 4091 | 4093 | 4099 | 4111 | 4127 | 4129 | 4133 | 4139 |
| 4153 | 4157 | 4159 | 4177 | 4201 | 4211 | 4217 | 4219 | 4229 | 4231 |
| 4241 | 4243 | 4253 | 4259 | 4261 | 4271 | 4273 | 4283 | 4289 | 4297 |
| 4327 | 4337 | 4339 | 4349 | 4357 | 4363 | 4373 | 4391 | 4397 | 4409 |
| 4421 | 4423 | 4441 | 4447 | 4451 | 4457 | 4463 | 4481 | 4483 | 4493 |
| 4507 | 4513 | 4517 | 4519 | 4523 | 4547 | 4549 | 4561 | 4567 | 4583 |
| 4591 | 4597 | 4603 | 4621 | 4637 | 4639 | 4643 | 4649 | 4651 | 4657 |
| 4663 | 4673 | 4679 | 4691 | 4703 | 4721 | 4723 | 4729 | 4733 | 4751 |
| 4759 | 4783 | 4787 | 4789 | 4793 | 4799 | 4801 | 4813 | 4817 | 4831 |
| 4861 | 4871 | 4877 | 4889 | 4903 | 4909 | 4919 | 4931 | 4933 | 4937 |
| 4943 | 4951 | 4957 | 4967 | 4969 | 4973 | 4987 | 4993 | 4999 | 5003 |
| 5009 | 5011 | 5021 | 5023 | 5039 | 5051 | 5059 | 5077 | 5081 | 5087 |
| 5099 | 5101 | 5107 | 5113 | 5119 | 5147 | 5153 | 5167 | 5171 | 5179 |
| 5189 | 5197 | 5209 | 5227 | 5231 | 5233 | 5237 | 5261 | 5273 | 5279 |
| 5281 | 5297 | 5303 | 5309 | 5323 | 5333 | 5347 | 5351 | 5381 | 5387 |
| 5393 | 5399 | 5407 | 5413 | 5417 | 5419 | 5431 | 5437 | 5441 | 5443 |
| 5449 | 5471 | 5477 | 5479 | 5483 | 5501 | 5503 | 5507 | 5519 | 5521 |
| 5527 | 5531 | 5557 | 5563 | 5569 | 5573 | 5581 | 5591 | 5623 | 5639 |
| 5641 | 5647 | 5651 | 5653 | 5657 | 5659 | 5669 | 5683 | 5689 | 5693 |
| 5701 | 5711 | 5717 | 5737 | 5741 | 5743 | 5749 | 5779 | 5783 | 5791 |
| 5801 | 5807 | 5813 | 5821 | 5827 | 5839 | 5843 | 5849 | 5851 | 5857 |
| 5861 | 5867 | 5869 | 5879 | 5881 | 5897 | 5903 | 5923 | 5927 | 5939 |
| 5953 | 5981 | 5987 | 6007 | 6011 | 6029 | 6037 | 6043 | 6047 | 6053 |
| 6067 | 6073 | 6079 | 6089 | 6091 | 6101 | 6113 | 6121 | 6131 | 6133 |
| 6143 | 6151 | 6163 | 6173 | 6197 | 6199 | 6203 | 6211 | 6217 | 6221 |
| 6229 | 6247 | 6257 | 6263 | 6269 | 6271 | 6277 | 6287 | 6299 | 6301 |
| 6311 | 6317 | 6323 | 6329 | 6337 | 6343 | 6353 | 6359 | 6361 | 6367 |
| 6373 | 6379 | 6389 | 6397 | 6421 | 6427 | 6449 | 6451 | 6469 | 6473 |
| 6481 | 6491 | 6521 | 6529 | 6547 | 6551 | 6553 | 6563 | 6569 | 6571 |
| 6577 | 6581 | 6599 | 6607 | 6619 | 6637 | 6653 | 6659 | 6661 | 6673 |
| 6679 | 6689 | 6691 | 6701 | 6703 | 6709 | 6719 | 6733 | 6737 | 6761 |
| 6763 | 6779 | 6781 | 6791 | 6793 | 6803 | 6823 | 6827 | 6829 | 6833 |
| 6841 | 6857 | 6863 | 6869 | 6871 | 6883 | 6899 | 6907 | 6911 | 6917 |
| 6947 | 6949 | 6959 | 6961 | 6967 | 6971 | 6977 | 6983 | 6991 | 6997 |
| 7001 | 7013 | 7019 | 7027 | 7039 | 7043 | 7057 | 7069 | 7079 | 7103 |
| 7109 | 7121 | 7127 | 7129 | 7151 | 7159 | 7177 | 7187 | 7193 | 7207 |
| 7211 | 7213 | 7219 | 7229 | 7237 | 7243 | 7247 | 7253 | 7283 | 7297 |

| | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|
| 7307 | 7309 | 7321 | 7331 | 7333 | 7349 | 7351 | 7369 | 7393 | 7411 |
| 7417 | 7433 | 7451 | 7457 | 7459 | 7477 | 7481 | 7487 | 7489 | 7499 |
| 7507 | 7517 | 7523 | 7529 | 7537 | 7541 | 7547 | 7549 | 7559 | 7561 |
| 7573 | 7577 | 7583 | 7589 | 7591 | 7603 | 7607 | 7621 | 7639 | 7643 |
| 7649 | 7669 | 7673 | 7681 | 7687 | 7691 | 7699 | 7703 | 7717 | 7723 |
| 7727 | 7741 | 7753 | 7757 | 7759 | 7789 | 7793 | 7817 | 7823 | 7829 |
| 7841 | 7853 | 7867 | 7873 | 7877 | 7879 | 7883 | 7901 | 7907 | 7919 |

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