

Reference Material for Number Theory

Basics of Number Theory : <https://crypto.stanford.edu/pbc/notes/numbertheory/>

0. Binary Exponentiation

L1 : [Binary Exponentiation - Algorithms for Competitive Programming](#) ✓

P0 : <https://cses.fi/problemset/task/1095> ✓

P1 : <https://cses.fi/problemset/task/1712>

P2 (hard) : <https://www.codechef.com/COOK108A/problems/EXTPROD>

1. Modular Arithmetic, Euler Totient Function, Fermat's Little Theorem

L2 : <https://cp-algorithms.com/algebra/module-inverse.html>

L2 : https://en.wikipedia.org/wiki/Modular_arithmetic

L3 : https://en.wikipedia.org/wiki/Modular_exponentiation

L4 : https://en.wikipedia.org/wiki/Euler%27s_totient_function

L5 : https://en.wikipedia.org/wiki/Fermat%27s_little_theorem

L6 : <https://www.topcoder.com/community/data-science/data-science-tutorials/prime-numbers-factorization-and-euler-function/>

P1 : <http://www.spoj.com/problems/ADST01/>

P2 : <http://www.spoj.com/problems/ETF/>

P3 : <http://www.spoj.com/problems/NDIVPHI/>

P4 : <https://erdos.sdslabs.co/problems/8>

P5 : <https://erdos.sdslabs.co/problems/19>

P6 : <https://erdos.sdslabs.co/problems/124>

P7 : <https://projecteuler.net/problem=7>

2. Euclidean GCD Algorithm, Counting and Probability Basics

L1 : <https://cp-algorithms.com/algebra/euclid-algorithm.html>

L1 : https://en.wikipedia.org/wiki/Euclidean_algorithm

L2 : <https://www.topcoder.com/community/data-science/data-science-tutorials/mathematics-for-topcoders/>

L3 : <https://www.topcoder.com/community/data-science/data-science-tutorials/understanding-probabilities/>

L4 : <https://www.topcoder.com/community/data-science/data-science-tutorials/basics-of-combinatorics/>

P1 : http://www.spoj.com/problems/MAY99_3/

P2 : <http://www.spoj.com/problems/GCD2/>

P3 : <http://www.spoj.com/problems/RPSSL/>

P4 : <https://projecteuler.net/problem=15>

P5 : <https://codeforces.com/problemset/problem/1152/C>

3. Sieve

L1 : <https://cp-algorithms.com/algebra/sieve-of-eratosthenes.html>

P0: <https://codeforces.com/problemset/problem/948/B>

P1: <https://www.spoj.com/problems/PTRL/>

P2: <https://codeforces.com/problemset/problem/1176/D>

P3: <https://www.spoj.com/problems/NFACTOR/>

4. Fibonacci Numbers

L1 : https://en.wikipedia.org/wiki/Fibonacci_number

P1 : <https://projecteuler.net/problem=25>

P2 : <https://erdos.sdslabs.co/problems/14>

5. Extended Euclidean Algorithm

L1 : https://en.wikipedia.org/wiki/Extended_Euclidean_algorithm

P1 : <http://codeforces.com/problemset/problem/689/D>

P2 : <http://www.spoj.com/problems/MAIN74/>

6. Chinese Remainder Theorem

L1 : <http://www.cut-the-knot.org/blue/chinese.shtml>

L2 : <http://mathworld.wolfram.com/ChineseRemainderTheorem.html>

L3 : <https://www.codechef.com/wiki/very-brief-tutorial-chinese-remainder-theorem>
(Using CRT to find ans MOD M)

P1 : <https://www.codechef.com/problems/CHNBGMT>

P2 : <https://projecteuler.net/problem=271>

7. Euler Phi

L1 : <https://cp-algorithms.com/algebra/phi-function.html>

P1 : <https://codeforces.com/problemset/problem/776/E>

8. STL:

<https://en.cppreference.com/w/cpp/container>

<https://codeforces.com/blog/entry/11080>

<https://www.topcoder.com/community/competitive-programming/tutorials/power-up-c-with-the-standard-template-library-part-1/>

<https://www.topcoder.com/community/competitive-programming/tutorials/power-up-c-with-the-standard-template-library-part-2/>

<https://www.hackerearth.com/practice/notes/standard-template-library/>

Also these might help Java and Python users to get started with C++ :

<http://www.horstmann.com/ccj2/ccjapp3.html>

<http://users.aims.ac.za/~nneoma/cpp4py/cpptut.html>

Some practice problems :

<https://codeforces.com/problemset/problem/354/C>

<https://codeforces.com/problemset/problem/687/B>

<https://codeforces.com/problemset/problem/475/D>

<http://www.spoj.com/problems/APS/>

<http://www.spoj.com/problems/ENIGMATH/>

<http://www.spoj.com/problems/DIVFACT/>

<https://erdos.sdslabs.co/problems/118>

<https://erdos.sdslabs.co/problems/128>

<https://erdos.sdslabs.co/problems/147>

<https://www.codechef.com/problems/BIPIN3>

<https://codeforces.com/problemset/problem/798/C>

<https://www.codechef.com/OCT19A/problems/MSV>

Reference material for Dynamic Programming

Codechef :

codechef.com - ALTARAY
codechef.com - DELISH
codechef.com - DBOY
codechef.com - XORSUB
codechef.com - GRID
codechef.com - TADELIVE
codechef.com - FROGV
codechef.com - MATRIX2
codechef.com - AMSGAME2

SPOJ :

spoj.com - MDOLLS
spoj.com - MSTICK
spoj.com - MCARDS
spoj.com - MIXTURES
spoj.com - SAMER08D
spoj.com - AIBOHP

CF :

106C - Buns
2B - The least round way
4D - Mysterious Present
33C - Wonderful Randomized Sum
5C - Longest Regular Bracket Sequence
82D - Two out of Three
73C - LionAge II
38E - Let's Go Rolling!
30C - Shooting Gallery
119C - Education Reform
101B - Buses118D - Caesar's Legions
113B - Petr#
19B - Checkout Assistant
8C - Looking for Order
111C - Petya and Spiders
128C - Games with Rectangle
13C - Sequence
46E - Comb
77C - BeaverMuncher-0xFF
75D - Big Maximum Sum
54C - First Digit Law
41D - Pawn
69D - Dot
11D - A Simple Task

21C - Stripe 2
27E - Number With The Given Amount Of Divisors
95E - Lucky Country
123C - Brackets
126D - Fibonacci Sums
49E - Common ancestor

AtCoder Educational DP Contest is highly recommended.

Some Blogs :

<https://codeforces.com/blog/entry/67679>

<https://codeforces.com/blog/entry/43256>

DFS:

<https://cp-algorithms.com/graph/depth-first-search.html>

BFS:

<https://cp-algorithms.com/graph/breadth-first-search.html>

Dijkstra Shortest path: <https://cp-algorithms.com/graph/dijkstra.html>

<https://cses.fi/problemset/task/1197>

<https://cses.fi/problemset/task/1196>

<https://cses.fi/problemset/task/1680>

<https://codeforces.com/problemset/problem/545/E>

<https://codeforces.com/blog/entry/48169>

Bellman Ford Shortest Path: https://cp-algorithms.com/graph/bellman_ford.html

<https://codeforces.com/blog/entry/58769>

Cycles:

<https://cp-algorithms.com/graph/finding-cycle.html>

<https://codeforces.com/contest/711/problem/D> (directed graph)

<https://codeforces.com/contest/131/problem/D> (undirected graph)

<https://codeforces.com/contest/659/problem/E>

floyd warshal(apsp)

Tutorial

<https://youtu.be/4NQ3HnhyNfQ>

<https://cp-algorithms.com/graph/all-pair-shortest-path-floyd-warshall.html>

https://cp-algorithms.com/graph/fixed_length_paths.html

Basic question....

<https://codeforces.com/contest/25/problem/C>

<https://codeforces.com/problemset/problem/295/B>

<https://codeforces.com/problemset/problem/21/D>

Negative cycles:

<https://cp-algorithms.com/graph/finding-negative-cycle-in-graph.html>

DSU

https://cp-algorithms.com/data_structures/disjoint_set_union.html
<https://codeforces.com/problemset/problem/28/B>
<https://codeforces.com/contest/25/problem/D>

LCA:

https://cp-algorithms.com/graph/lca_binary_lifting.html
<https://cses.fi/problemset/task/1687>
<https://cses.fi/problemset/task/1688>
<https://cses.fi/problemset/task/1135> <https://codeforces.com/problemset/problem/192/E>
<https://www.spoj.com/problems/DISQUERY/>

Toposort:

<https://cp-algorithms.com/graph/topological-sort.html>
<https://cses.fi/problemset/task/1679>
<https://cses.fi/problemset/task/1680>
<https://cses.fi/problemset/task/1681>
<https://codeforces.com/problemset/problem/645/D>
https://atcoder.jp/contests/abc139/tasks/abc139_e

Min. Spanning Trees:

https://cp-algorithms.com/graph/mst_prim.html
https://cp-algorithms.com/graph/mst_kruskal_with_dsu.html
https://cp-algorithms.com/graph/mst_kruskal.html
https://www.geeksforgeeks.org/prims-algorithm-using-priority_queue-stl/amp/
<https://www.hackerearth.com/practice/algorithms/graphs/minimum-spanning-tree/practice-problems/>