Mathematics:

Probabilities and Expected values: Basic Probability, Random Variable and Expectation, Coupon Collector Problem, Birthday Paradox

Birthday Paradox:
https://betterexplained.com/articles/understanding-the-birthday-paradox/
Code: http://pastebin.com/KDYMm1MQ

https://www.codechef.com/wiki/tutorial-expectation

(30-40 minute)
1. http://www.spoj.com/problems/CHICAGO/ probability graph easy floyd-warshall solution http://pastebin.com/YpGHENDG
2c. http://www.spoj.com/problems/FAVDICE/ maths coupon_collector prob random variable solution http://pastebin.com/Sa6kbp0M
3. https://www.codechef.com/problems/RRPLAYER maths medium coupon_collector

Linear Recurrence for Programming Contest:

http://fusharblog.com/solving-linear-recurrence-for-programming-contest/

http://fusharblog.com/solving-linear-recurrence-for-programming-contest-part-2/

http://zobayer.blogspot.in/2010/11/matrix-exponentiation.html
(40-50 mins)

1c. http://www.spoj.com/problems/SEQ/ maths linear recurrence medium solution http://pastebin.com/MtUnt4nh

2c. http://www.spoj.com/problems/SPP/ maths linear recurrence medium solution http://pastebin.com/BzdBWpHR

3. http://www.spoj.com/problems/FIBOSUM/ maths linear recurrence fibonacci easy solution http://pastebin.com/A1xS9NMf

4. http://www.spoj.com/problems/SUMSUMS/ maths liner recurrence HARD no-solution

Pigeonhole Principle
(30-40 min)

1. http://codeforces.com/contest/577/problem/B pigeonhole dp medium http://codeforces.com/blog/entry/20226 solution

2c. https://www.codechef.com/problems/DIVSUBS pigeonhole medium https://discuss.codechef.com/questions/43404/divsubs-editorial http://pastebin.com/9aHSVyXc solution

3c*. http://www.spoj.com/problems/TUG/ pigeonhole dp medium solution

4c*. http://www.spoj.com/problems/HOLI/ pigeonhole dfs graph hard http://zobayer.blogspot.in/2014/01/spoj-holi.html http://pastebin.com/cSZgYESm solution

5c. https://www.codechef.com/problems/GRAYSC pigeonhole bits xor gray-code imp https://discuss.codechef.com/questions/1582/graysc-editorial solution

Inclusion Exclusion Principle

(20 min)

http://www.cut-the-knot.org/arithmetic/combinatorics/InclusionExclusion.shtml

1c. https://www.codechef.com/problems/SEALCM inclusion-exclusion hard

https://discuss.codechef.com/questions/62442/explaination-of-sealcm

http://pastebin.com/cA5bbHLk solution

Combinatorics

http://math.stackexchange.com/questions/910809/how-to-use-stars-and-bars-combinatorics

http://math.stackexchange.com/questions/1129790/stars-and-bars-combinatorics-problem

1. http://www.spoj.com/problems/MARBLES/ stars and Bars problem medium solution

Bits(tentative)
https://www.topcoder.com/community/data-science/data-science-tutorials/a-bit-of-fun-fun-with-bits/

Calculation of nCrmodM
(20 min) code to be added

If small n and r then make the combination table else make array of mod of factorials and take inverse mod of (n-r)! and r!

http://www.geeksforgeeks.org/basic-and-extended-euclidean-algorithms/

http://www.geeksforgeeks.org/multiplicative-inverse-under-modulo-m/

https://comeoncodeon.wordpress.com/2011/07/31/combination/

https://www.hackerearth.com/practice/notes/number-theory-1/

http://pastebin.com/E8EWGGB1

Problem to try

:https://www.codechef.com/SEPT14/problems/RAINBOWB/