

Computer Science Lesson Plan

Codes, Ciphers, and Computer Science

Focus Activity – Video clip or something historically cool about ciphers and codes
Suggestions – National Treasure 2 Disk Collector’s Edition
Additional Bonus Material – Ciphers, Codes, and Codebreakers - 11:41

Explanation – Slides and examples that are language independent
Discuss why ciphers are important and how they have affected history.
Use Wikipedia or something like that to allow students to research ciphers and codes.
Research the types of ciphers listed below.

CS topic possibilities – Strings, arrays, ArrayList, matrices, and maps are the obvious types to use, but interfaces are also very possible.

Lab Options – all use codes

Project possibilities – listed from simple to difficult

Substitution – Intro class or AP A

- 1 Simple Substitution
Strings or Maps
abcdefghijklmnopqrstuvwxyz
zyxwvutsrqponmlkjihgfedcba
- 2 Ceaser – shifting letters and then substitution
Strings or Maps
abcdefghijklmnopqrstuvwxyz
abczyxwvutsrqponmlkjihgfed

Breaking these is easy using letter frequency statistics.
Maps work well for frequency problems.

- 3 Morse code – binary to ASCII
Use ArrayList in AP A and use Sets and Maps for AP AB

Transposition Ciphers – AP A

- 1 Columns and Rows - matrices
- 2 Waves - matrices
- 3 Spiral - matrices

Random – More difficult Ciphers – AP A or AP AB

- 1 Playfair Cipher - matrices
- 2 Pigpen Cipher – matrix concepts – scratch – graphics are tricky
- 3 Enigma machine – very cool, but a bit tricky to code