



Classroom Teacher Preparation

Technology 4: Cryptography

Please use the following to prepare for the next SfS lesson.

Description:

Students get a crash course in cryptography, the science of encoding and decoding secret messages. Students are introduced to different types of ciphers, including transposition and substitution ciphers. Students, individually or with a partner, work through a variety of code breaking activities that make use of tools, keys, or just their own brains!

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd-8th

- Encode and decode messages using a variety of ciphers
- List pros and cons of using each cipher

Disciplinary Core Idea (DCI)

- No specific concepts apply

Science & Engineering Practice (SEP)

Using Mathematics and Computational Thinking

- (3rd-5th) Organize simple data sets to reveal patterns that suggest relationships
- (6th-8th) No specific concept applies

Crosscutting Concept (CCC)

Patterns

- (3rd-5th) Patterns can be used as evidence to support an explanation
- (6th-8th) Patterns can be used to identify cause and effect relationships

Preparation:

No preparation is necessary for this lesson.

Room Set Up for Activities:

Students will be working at their desks, individually or with a partner.

Safety:

There are no safety concerns for this lesson.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Codes**.



Technology 1: Binary Code, or How to Speak Computer – Students get their first taste of binary through a series of activities focusing on encoding and decoding.

Technology 3: Conditionals in Code – This lesson introduces conditional statements, an important element of coding by having students act as both computers (executing written code) and coders (creating their own written code to accomplish a specific goal) in a grid-based coding game.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by making a DIY Caesar Cipher like the kind we used in class and continuing to encode and decode at home!

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

Videos:

- Cryptography: The Science of Making and Breaking Codes - SciShow (8:20): <https://www.youtube.com/watch?v=-yFZGF8FHSg>
- Intro to Cryptography - Khan Academy (1:31): <https://www.youtube.com/watch?v=Kf9KjCKmDcU>
- Caesar Cipher - Khan Academy (2:35): <https://www.youtube.com/watch?v=sMOZf4GN3oc>
- Polyalphabetic Cipher - Khan Academy (2:26): <https://www.youtube.com/watch?v=BgFJD7oCmDE>

Websites:

- Count On Codebreaking: <http://www.counton.org/explorer/codebreaking/index.php>
- Secret Code Breaker – An Online Cryptanalyst’s Handbook: <http://www.secretcodebreaker.com/>
- Frequency analysis tools for different types of writing and different languages: <http://letterfrequency.org/>

Book Suggestion: For students interested in learning more about codes and ciphers

- *Top Secret – A Handbook of Codes, Ciphers, and Secret Writing* by Paul Jaceczko (2004)
- *Code Talker - A Novel about the Navajo Marines of World War Two* by Joseph Bruchac (2006)