

Scytale Cipher

Teacher Materials

Students will understand the basics of how transposition or Scytale ciphers work and are created, decode various messages using rods and paper strips, and encode messages using a rod and paper clip.

Acknowledgements and License

This activity was contributed by Crista Goehring, Westside Middle School for UNO's TED 8006 course. Activity introduction taken from Wikipedia, <https://en.wikipedia.org/wiki/Scytale>.

Lesson Details

Grade Level: 6th-10th graders

Activity Length: 25 minutes

Format: Students working in groups of 2-4 people, materials for 1 group

Connection to Standards

This activity contains content and practices addressing elements of the following CSTA K-12 Computer Science Standards (2017):

CSTA Std	Description
1A-AP-09	Model the way programs store and manipulate data by using numbers or other symbols to represent information.
2-NI-06	Apply multiple methods of encryption to model the secure transmission of information.
2-DA-07	Represent data using multiple encoding schemes.
2-IC-23	Describe tradeoffs between allowing information to be public and keeping information private and secure.

This activity contains content and practices addressing elements of the following Nebraska K-12 Technology Scope & Sequence Standards:

NE Tech Standard	Description
Computational Thinking 1	Create algorithms, or series of ordered steps, to solve problems.
Computational Thinking 3	Collect, analyze, and represent data effectively.
Computational Thinking 4	Demonstrate and understanding of how information is represented, stored, and processed.

Bin Materials Checklist

#	Description
4	12" rods of various diameters
1	Notepad
4	Strips of self adhesive tape with messages on them OR paper strips with messages on them
10	Pencils

Lesson Vocabulary Words

cryptography the practice and study of techniques used for securing communication and information from unintended readers, enemies, or adversaries.

cipher a secret or disguised way of writing a code

decoding/ decrypting returning the encoded/ encrypted message back to its plain text form

encoding/ encrypting converting information or data into another system

plain text text that is not written in code; messages before they have been encoded or encrypted are in plain text

Lesson Setup / Introduction

Students learn about the history and uses of cryptography as they decode and encode Scytale ciphers (transposition ciphers). The students will have hands-on practice decoding and encoding messages using the Scytale cipher.

Connection to Computing

Encryption is an important topic in computing because encryption is how data is secured, especially when sent over networks. Scytale ciphers are not feasible for computers because they are a physical form of encryption in which both ends - the encryption and decryption - require a physical device to determine the message. However, because they are a fairly simple transposition cipher, they can be straightforward to break, particularly using a brute force attack such as those that computers excel at.

Further Related Resources

- <https://en.wikipedia.org/wiki/Scytale>
- <http://www.dcode.fr/scytale-cipher>



Answer Key

send help

computer science is fun

this is a secret



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Student Instructions



Figure 1: photo from <https://commons.wikimedia.org/wiki/File:Skytale.png>

Background:

“In cryptography, a scytale (rhymes approximately with Italy; also transliterated skytale, Greek “baton”) is a tool used to perform a transposition cipher, consisting of a cylinder with a strip of parchment wound around it on which is written a message. The ancient Greeks, and the Spartans in particular, are said to have used this cipher to communicate during military campaigns.

The recipient uses a rod of the same diameter on which the parchment is wrapped to read the message. It has the advantage of being fast and not prone to mistakes—a necessary property when on the battlefield. It can, however, be easily broken. Since the strip of parchment hints strongly at the method, the ciphertext would have to be transferred to something less suggestive, somewhat reducing the advantage noted.” -Wikipedia
<https://en.wikipedia.org/wiki/Scytale>

Challenge:

Using the various dowels and paper strips see if you can decode the three messages.

Write the decoded messages on the paper slip and show the completed message to the teacher.

Create your own Scytale Cipher:

Using a blank paper strip choose a dowel and create your own message to share with a friend.



Resupply

- Make sure notepad has paper
- Sharpen pencils
- Add more blank paper strips