Cryptography

Course Name: social studies **Time Frame (in minutes): 40 min**
Unit/Theme: World War II **Grade Level: 8th**

CONTENT AND SKILLS
Learning Objectives: • Students will be able to identify the limitations of cryptography by examining how easy it would be to break a Caesar Cipher • Students will be able to better understand how cryptography is used in computer science by encoding and decoding messages using different Caesar Cipher keys.
Essential Questions (optional): What are the limitations of cryptography and what impact do those limitations have on society and individuals?
Students I can statements . . . • I can identify the limitations of cryptography by examining how easy it would be to break a Caesar Cipher • I can encode and decode messages using different Caesar Cipher keys to better understand how cryptography is used in computer science
How will you meet the needs of SWD and ENL students? • Pre-teaching vocabulary terms • Visual information paired with verbal • Tasks broken up into shorter steps • In my ICT section the ELL teacher will work with students in a small group • A model for students to reference
Content Standards List all standards and how learners will meet the standard
• 8.6b
NYS Computer Science and Digital Fluency Standards List all standards and how learners will meet the standard
Network Systems and Design • 7-8.NSD.4 Design a protocol for transmitting data through a multi-point network.

Cybersecurity
- 7-8.CY.4

Describe the limitations of cryptographic methods.

NYS SEL BENCHMARKS -
https://www.p12.nysed.gov/sss/documents/SELBenchmarks2022.pdf

- 1A.3a. Identify the connections between their thoughts, feelings, and behaviors.

INSTRUCTIONAL PLAN
List the steps of the lesson, including instructions for the students.

Warm up:

Students will do a gallery walk where they see different examples of "codes" or "ciphers" they have been used at various points in history. Students will be asked to use the Making Thinking Visible strategy of using post-it's to add to their notices and wonderings. At the end students will debrief as a whole class and talk about what the images had in common, and they are related to our current unit (WWII) and cybersecurity today.

Introduction to cryptography
Students will be shown a slide that reviews important lesson vocabulary terms: cryptography, encode, decode, and cipher

I will ask students to think about what kind of information we learned needed to be kept hidden during WWII and what kind of information might need to be kept hidden today

Students will examine the symmetric and asymmetric encryption algorithm from the Gallery Walk. I will ask students- how does encrypting a message, or modifying it to be unrecognizable before transmitting can keep our data safe? Responses may include "it would make it harder for someone to read the information or capture it unless they know how to decode it" I will ask them which method they think is more secure and why? Responses may include "asymmetric because even if one key is compromised the data remains safe."

Then students to discuss in their groups what would happen if our passwords or credit card information were transmitted over the internet without any sort of encryption
7-8.CY.4

Caesar Cipher
To help students better understand how cryptography works, and its limitations, they will use the Caesar cipher to encrypt a message used the cipher or "key" of shift 2.

I will explain to students the background of the cipher and how it works. Then they will be asked to decrypt the message "eqorwvgt" and shift of 2

Next, I will pass out the Caesar Cipher worksheet. For part 1 students will be asked to complete the Caesar Cipher table and then use it to encode the name of our school “TCMS.” I will ask students to compare with partners to see if they got the same answer. 7-8.NSD.4

Then students will be asked to determine how many different keys exist for the Caesar Cipher. I will ask them to discuss what limitations this shows regarding this cipher and other encryption methods. Student responses may include that since the Caesar Cipher only has 25 keys it’s easy to break and that symmetric encryption is less secure than asymmetric. 7-8.CY.4

Then they will practice decoding a full message on the worksheet.

Wrap up:

Students will engage in a one-word whip around SEL activity to describe how they felt during today’s lesson when creating and or breaking ciphers. If students do not wish to share they will have the opportunity to pass. Since this activity may be new so some learners it will be good to have them reflect on how it made them feel. I may ask some students to expand on their word- for example if they were frustrated, I may ask strategies they used to overcome that frustration.

BACKGROUND OR PRIOR KNOWLEDGE

- During our unit on WWI students learned about the role the Zimmerman Telegram played in America’s decision to join WWI. Students examined the primary encrypted and decrypted source.
- Students have learned how cryptographers during WWII played a major role in the outcome of WWII. The Allies gained a major advantage during the war when they were able to intercept and decrypt messages encrypted on cipher machines used by Germany and Japan
- They’ve also learned the importance of the Navajo Code Talkers who served in the US military.

MATERIALS / RESOURCES

Add additional resources needed for this lesson such as instructional technology templates, images, videos, etc.

L5 Gallery Walk Images.pptx
CryptographyWorksheets.pdf
Forken L5 Cryptography Presentation.pptx


monroe one
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