



Cryptography in the classroom

Private Key Lesson Plan

Level:	Aimed at S1-S2 Level (Suitable for S1-S5)
Estimated time:	10min + 20min activity
Materials Needed:	Private Key Video, Private Key Activity Handouts for each student

Learning Outcomes: This lesson aims to:

- Inform the student on the difference between symmetric and asymmetric encryption.
- Instruct the student how a substitution cipher works.
- Inform the student on Caesar cipher.
- Provide a gentle introduction to frequency analysis.

Lesson outline:

1. Ask the students these questions prior to watching the video :

Play a game of hangman with the students using the word "cryptography"

- [Hangman Rules](#), The image used in playing hangman can be changed to a snowman if you are worried about exposing younger children to images of violence.

2. Show the Private Key Video to the class

3. Ask the students these questions after watching the video :

"How many Caesar Ciphers are there ?" - Tip : The number relates to the number of letters alphabet.

- The answer is 26 as you can shift each position once before you are back in the original alphabet.

4. Do activity 1

- Ciphertext : M PSZI GVCTXSKVETLC
- "This message is encoded with a Caesar cipher, can you decode the message?"
- Have a student write answer on the board.
- Tips (in order of least to most informative) :
 - (a) There is a single letter word in this example, there are only two letters it could be!
 - (b) The first letter in the plain text is "I"
 - (c) The shift applied to this string was +4
- Answer

Key : ABCDEFGHIJKLMNOPQRSTUVWXYZ >> 4 - Shifted right (>>) by 4.

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5. Do activity 2

- Ciphertext : ZNK WAKKT CKTZ CKYZ HKIGAYK YNK YSKRRKJ YCKKZY
- "Here's another Caesar cipher, do you notice something in common with each word, can you decrypt it? "
- Get a student to write answer on the board.
- Tips (in order of disclosure) :

- (a) Each word shares an encoded letter as 'k'
- (b) The most common letter in the english language is 'e'

- Answer

Key : ABCDEFGHIJKLMNOPQRSTUVWXYZ >> 6 - Shifted right (>>) by 6.

the queen went west because she smelled sweets

6. Do activity 3

- Alphabet: ABCDEFGHIJKLMNOPQRSTUVWXYZ
- Key: XCMTWVKFEUSRJLZDYBAQHIGNPO
- Ask the students to use this key to encrypt a message of their favourite movie, TV show or song and pass the cipher text to the person sitting to their right for decrypting.
 - This requires the students to be precise in how they encrypt and decrypt therefore they *must* ensure to write down their working similar to how is outlined in the video.