

## Affine Cipher – Programming Directions

**Goal:** Write VBA code within Microsoft Excel, which will enable a user to encrypt and decrypt using an affine cipher.

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- Create a userform to hand input and possibly output.
- Encryption
  - Inputs
    - $a$  for the equation  $c = (a p + b) \bmod 26$
    - $b$  for the equation  $c = (a p + b) \bmod 26$
    - Plaintext
  - Output – ciphertext
  - Include code to check for the condition that the GCD of  $a$  and 26 is 1. The program should stop and display a message if this condition is not met.
  - Include code to remove any formatting from the plaintext.
- Decryption
  - Inputs
    - $a$  for the equation  $c = (a p + b) \bmod 26$
    - $b$  for the equation  $c = (a p + b) \bmod 26$
    - Ciphertext
  - Output – plaintext
  - Include code to calculate  $a^{-1}$  for use in the equation  $c = (a^{-1}(c - b)) \bmod 26$ .
- Other things to include
  - Appropriate use of tab in the code (organization).
  - Appropriate documentation (comments) in the code
  - You may not use anyone else’s code or logic in your program.
  - Instructions for using the program and a method of launching the VBA code
- Extra Credit
  - Removes spaces and punctuation for plaintext.
  - Changes plaintext to all lowercase.
- Email
  - Email to: [evans@scienceandmathacademy.com](mailto:evans@scienceandmathacademy.com)
  - Subject: *YourLastName* – Affine
  - Filename: *YourLastName\_Affine.xls*

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### Grading:

Correctly prompts and handles inputs	/4
Properly encrypts a passage using Affine cipher	/20
Properly decrypts a passage using Affine cipher	/10
Includes error checking for “ $a$ ”	/3
Routine calculates $a^{-1}$ correctly	/4
Appropriate use of tab (organization)	/2
Appropriate use of documentation	/2
Emails assignment correctly	/1
Instructions and method for launching program	/4
Total	/50