

## Junior Knights 11/17 – Cryptography Activities

1) Download the Caesar cipher program and encrypt the following text “UCF KNIGHTS” with the key 17. What is the result?

2) Decrypt the following message, which was produced with the shift cipher:

BWLG I QA I TWDMTG LIG WCBAQLM

3) Decrypt the following message, which was produced with the shift cipher:

E ykjopnqyp pdeo pdkqcdp sepdkqp wj eilknwjp ouixkh. Sdwp eo ep?

Once you decrypt this message, can you figure out the answer to the question?

4) The affine cipher uses two keys, a and b, both of which are in between 0 and 25, inclusive. The value of a has further restrictions. Once you convert the input character to a number, x, in between 0 and 25 as described in class, the affine cipher encrypts using the following function:

$$f(x) = (ax + b) \% 26$$

Edit the shift cipher program to create a program that encrypts using the affine cipher.

Once you've finished your program, encrypt the following plaintext with the keys a = 9 and b = 16:

Turkey lurkey doo and Turkey lurkey dap I eat that turkey Then I take a nap

5) Decry

pt the following ciphertext produced by the affine cipher:

Oh icq acgw qn fc Ejqn erl uei fdw gesoa mcjl epjeaelepje icq movv swf e njotw!

6) The Vigenere Cipher works as follows:

Your key is a keyword, which you then translate into corresponding letter values 0 – 25. Then, to encrypt, write your message on one row (letters 0 – 25), and repeatedly write the keyword below it, adding each column, taking the result mod 26. These resultant numbers are the ciphertext. Here is a small example:

Message: LETSGOTOTHESHOW	11	4	19	18	6	14	19	14	19	7	4	18	7	14	22
Key: TICKET	19	8	2	10	4	19	19	8	2	10	4	19	19	8	2
Add:	30	12	21	28	10	33	38	22	21	17	8	37	26	22	24
Mod:	4	12	21	2	10	7	12	22	21	17	8	11	0	22	24
Ciphertext:	E	M	V	C	K	H	M	W	V	R	I	L	A	W	Y

Write a program that asks the user for the plaintext (all uppercase letters, no spaces) and the keyword (all uppercase letters), and produces the ciphertext using the Vigenere cipher. Give the output of your program for the following message and key:

Message: THISISTHELASTTASKHOORDAY  
Key: KNIGHTS