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### Activity - Encryption with the Caesar Cipher

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## Activity: Encryption “The Caesar Cipher”

### Learning Objectives

Students will be able to:

- Conceptualize the processes of encryption and decryption
- Communicate how the Caesar Cipher works
- Make use of ASCII Tables
- Contextualize when and why encryption is used in a modern, applied sense

Encryption is a way to ensure that, when you send a message, only the person or entity that you intended to send it to can understand the message.

At its most basic level, encryption is intended to be a way of sending “secret” messages.

Imagine two students in a junior high school class. They want to send notes to each other and have a conversation about topics that are not exactly academic in nature – like whether one has a crush on the other. One writes a note saying, “Do you like me like me?”, and wants to pass it to the other. Of course, their great fear is that, if the teacher intercepts the note (and cruelly reads it out loud to the entire class), then they will be horribly embarrassed.

To prevent this nightmare scenario, the first student encrypts their message - “Do you like me like me?” - by **shifting each letter forward three letters in the alphabet**. So “D” becomes “G”, “o” becomes “r”, and so on.

When finished, what the student actually writes down on the note is:

Gr#|rx#olnh#ph#olnh#phB

Even if the teacher intercepts the note, dignity remains.

Of course, encrypting the note is pretty meaningless if the person you are trying to send it to can’t understand the intended message either. In order for them to decrypt the message, they need to know the “**key**” – which, in this case, is +3, since we shifted each letter 3 places forward in the alphabet.

You may have noticed that special characters in the original message – such as the spaces in between words and the question mark at the end – are also represented by new characters. How were these determined? The answer is with what’s called an “ASCII Table”. Since computers can only understand numbers, ASCII tables let us see the numerical representation of each possible character.



Here is the official standard ASCII table that nearly all computers use (you can ignore the middle column labeled “HEX” for now):

ASCII printable characters								
DEC	HEX	Simbolo	DEC	HEX	Simbolo	DEC	HEX	Simbolo
32	20h	espacio	64	40h	@	96	60h	`
33	21h	!	65	41h	A	97	61h	a
34	22h	"	66	42h	B	98	62h	b
35	23h	#	67	43h	C	99	63h	c
36	24h	\$	68	44h	D	100	64h	d
37	25h	%	69	45h	E	101	65h	e
38	26h	&	70	46h	F	102	66h	f
39	27h	'	71	47h	G	103	67h	g
40	28h	(	72	48h	H	104	68h	h
41	29h	)	73	49h	I	105	69h	i
42	2Ah	*	74	4Ah	J	106	6Ah	j
43	2Bh	+	75	4Bh	K	107	6Bh	k
44	2Ch	,	76	4Ch	L	108	6Ch	l
45	2Dh	-	77	4Dh	M	109	6Dh	m
46	2Eh	.	78	4Eh	N	110	6Eh	n
47	2Fh	/	79	4Fh	O	111	6Fh	o
48	30h	0	80	50h	P	112	70h	p
49	31h	1	81	51h	Q	113	71h	q
50	32h	2	82	52h	R	114	72h	r
51	33h	3	83	53h	S	115	73h	s
52	34h	4	84	54h	T	116	74h	t
53	35h	5	85	55h	U	117	75h	u
54	36h	6	86	56h	V	118	76h	v
55	37h	7	87	57h	W	119	77h	w
56	38h	8	88	58h	X	120	78h	x
57	39h	9	89	59h	Y	121	79h	y
58	3Ah	:	90	5Ah	Z	122	7Ah	z
59	3Bh	;	91	5Bh	[	123	7Bh	{
60	3Ch	<	92	5Ch	\	124	7Ch	
61	3Dh	=	93	5Dh	]	125	7Dh	}
62	3Eh	>	94	5Eh	^	126	7Eh	~
63	3Fh	?	95	5Fh	-			

This idea of alphabet-shifting known as the **Caesar Cipher** is a very basic form of encryption. However, the underlying idea of hiding the content of message from everyone except its intended recipient is a practice that is used today in everything from military communications to e-commerce financial transactions to virtually all internet activity where security is valued, and more.

1. ASSIGNMENT: Using the attached Worksheet, write your first and last name in the section labeled, “Decrypted Message”. Then, using a key of +7 and the ASCII Table, write the encrypted version of your first and last name in the section labeled, “Encrypted Message”.



2. ASSIGNMENT: Working with a partner, discover something that you both might have in common. Then come up with a team name for yourselves. Then write down your team name in its encrypted form on the second Worksheet *using any key of your own choosing*. When finished, trade your worksheet with that of another team's, and figure out each other's team names.
3. What are some vulnerabilities that you can foresee in using the Caesar Cipher? Can it be "hacked"? In what ways can the key be compromised? If you were given another team's encrypted name and were not told the key, what approach might you take to figuring out the key?
4. Be creative and think of possible ways to make the key more difficult to determine. Can you devise a more complex system for determining the key besides randomly selecting a simple number?
5. In our modern world, encryption is used to keep data safe from prying eyes in a multitude of contexts. Perform some online research and list 5 real-world examples of encryption being applied today that were not already mentioned.
6. If you came across an encrypted document, just by the very fact that it was encrypted, do you think it would be unethical to even attempt to figure out the key and decrypt it? Explain your reasoning.



# Cryptography Worksheet

(Caesar Cipher)

KEY: \_\_\_\_\_

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Encrypted Message:

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Decrypted Message:

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# Cryptography Worksheet

(Caesar Cipher)

KEY: \_\_\_\_\_

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Encrypted Message:

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Decrypted Message:

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