CRYPTOGRAPHY

Cryptography is the practice of using maths to keep information safe.

A **cipher** is a way of making a message secret by changing or rearranging the letters.

The Caesar Cipher

In the Caesar Cipher, we need to change letters into numbers ($A = 1$, $B = 2$, ...), and then the numbers back into letters. Can you work out the numbers for these letters?

$C = \boxed{}$ $G = \boxed{}$

$M = \boxed{}$ $S = \boxed{}$

$V = \boxed{}$ $Y = \boxed{}$

What about the other way around?

$\boxed{} = 4$ $\boxed{} = 18$

$\boxed{} = 6$ $\boxed{} = 11$

$\boxed{} = 9$ $\boxed{} = 23$

Can you change these messages into numbers?

Message	S	P	Y
Numbers			

Message	S	E	C	R	E	T
Numbers						

Message	M	I	S	S	I	O	N
Numbers							

The next step is to add on the shift to each letter.

Let's encrypt a message, **with a shift of 2**.

Message	T	A	R	G	E	T
Numbers	20				5	
+ Shift	2	2	2	2	2	2
Total	22					
Letters	V			I		

Encrypted Message: V

Now you try some!

Using a **shift of 1**, encrypt the message: CAESAR

Message	C	A	E	S	A	R
Numbers						
+ Shift						
Total						
Letters						

Encrypted Message: ______________________________

Using a **shift of 3**, encrypt the message: DOUBLE AGENT

Message	D	O	U								
Numbers											
+ Shift											
Total											
Letters											

Encrypted Message: ______________________________

Using a **shift of 5**, encrypt the message:

ENIGMA

Message	E					
Numbers						
+ Shift						
Total						
Letters						

Encrypted Message: ____________________

Using a **shift of 7**, encrypt the message:

AGENT

Message	A				
Numbers					
+ Shift					
Total					
Letters					

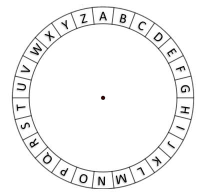
Encrypted Message: ____________________

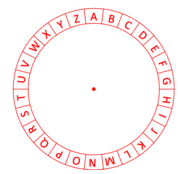
Something went wrong...

What happens when the numbers go over 26?

Using the Caesar Cipher Wheel

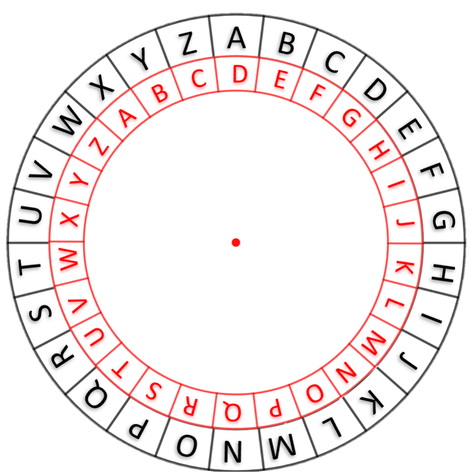
Two circles:

- **Black** is the **original message** 

- **Red** is the **encrypted message** 

- Always start with the black **A** and the red **A** together.

Using the Caesar wheels, let's encrypt the message ESCAPE with a shift of 3.



Message	E	S	C	A	P	E
Encryption	H					

Use your Caesar Cipher wheel to encrypt these messages:

Message: CHASE
Shift: 4

Message	C	H	A	S	E
Encryption					

Message: CLASSIFIED
Shift: 7

Message	C	L	A	S	S	I	F	I	E	D
Encryption										

Message: INVESTIGATE
Shift: 10

Message	I	N	V	E	S	T	I	G	A	T	E
Encryption											

Message: ABORT MISSION
Shift: 12

Message	A	B	O	R	T	M	I	S	S	I	O	N
Encryption												

Decoding the Caesar Cipher

To get back to the original message, we **subtract** the shift!

Let's decrypt the message EKRJGT, with a **shift of 2**:

Message	E	K	R	J	G	T
Numbers	5				7	
- Shift	2	2	2	2	2	2
Total	3					
Letters	C			H		

Original Message: C ____________

Now you try some!

Using a **shift of 1**, decrypt the message: EFDPZ

Message	E	F	D	P	Z
Numbers					
- Shift					
Total					
Letters					

Original Message: ____________________

Using a **shift of 4**, decrypt the message:

GSHI

Message	G	S	H	I
Numbers				
- Shift				
Total				
Letters				

Original Message: ______________________

Using a **shift of 3**, decrypt the message:

HYDFXDWH

Message	H	Y	D	F	X	D	W	H
Numbers								
- Shift								
Total								
Letters								

Original Message: ______________________

Using a **shift of 6**, decrypt the message:

KYVOUTGMK

Message	K	Y	V	O	U	T	G	M	K
Numbers									
- Shift									
Total									
Letters									

Original Message: ______________________

Using a **shift of 4**, decrypt the message:

YRHIVGSZIV

Message	Y	R	H	I	V	G	S	Z	I	V
Numbers										
- Shift										
Total										
Letters										

Original Message: ______________________

Now try decrypting these using your Caesar Cipher Wheel.

Remember: The **Black** wheel is the **original message** and the **Red** wheel is the **encrypted message**.

Encryption: JMPI
Shift: 4

Encryption	J	M	P	I
Message	F			

Encryption: UWURGEV
Shift: 2

Encryption	U	W	U	R	G	E	V
Message	S					C	

Encryption: CXY BNLANC
Shift: 9

Encryption	C	X	Y	B	N	L	A	N	C
Message	T								

Encryption: ODKBFASDMBTK
Shift: 12

Encryption	O	D	K	B	F	A	S	D	M	B	T	K
Message												

Encrypt a secret message to the person next to you using the Caesar Cipher.

Pass it to them and see if they can decrypt it.

My secret message:

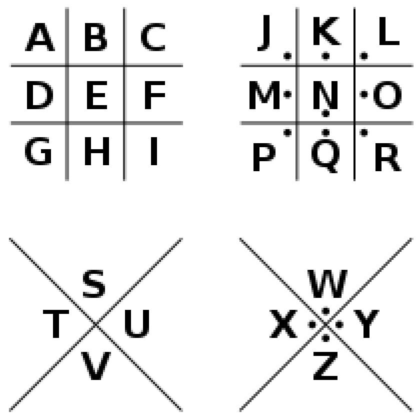
Now pass it over.

Can you decrypt the above message?

Decryption:

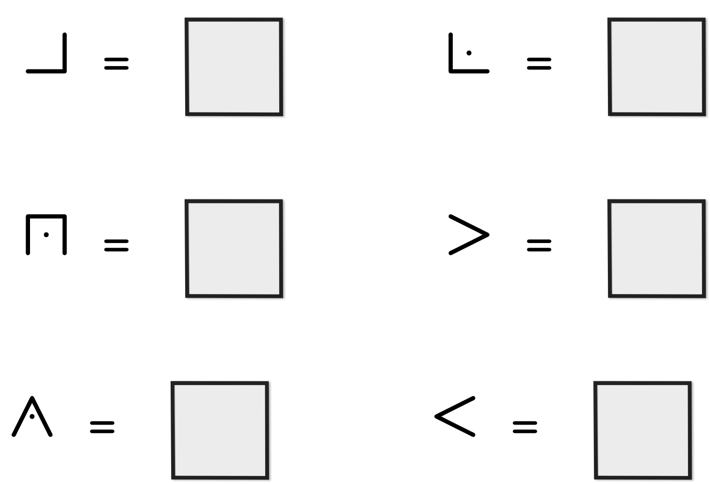
The Pigpen Cipher

In the Pigpen Cipher, we represent each letter with a different symbol.

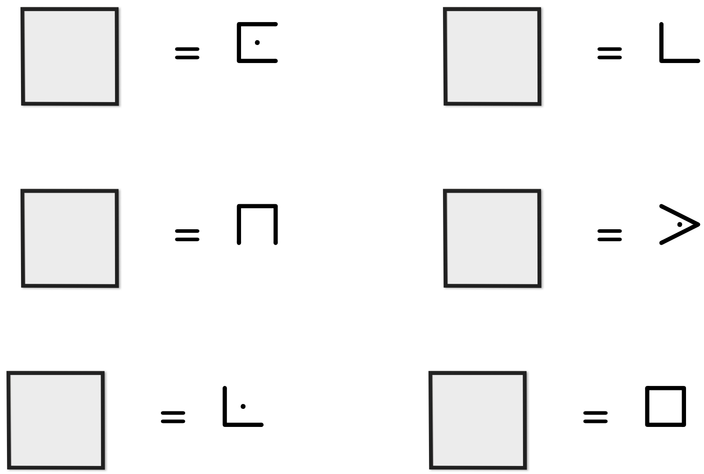


Each letters symbol is the shape of the lines and dots around it.
For example: The symbol for F is ⊏, and the symbol for Y is <.

Can you tell which symbol is which letter?



What about the other way around?



Can you encrypt these messages using the Pigpen Cipher?

Message: AGENCY

Letters	A	G	E	N	C	Y
Symbols	⌟	⌝				

Encrypted message: ______________________________

Message: REPORT

Letters	R	E	P	O	R	T
Symbols						

Encrypted message: ______________________________

Message: RECRUIT

Letters	R	E	C	R	U	I	T
Symbols							

Encrypted message: ______________________________

Message: SEND BACKUP

Letters	S	E	N	D	B	A	C	K	U	P
Symbols										

Encrypted message: ______________________________

Message: HEADQUARTERS

Letters	H	E	A	D	Q	U	A	R	T	E	R	S
Symbols												

Encrypted message: ______________________________

Decrypt the following messages.

Message: ┘└·└·<·

Symbols	┘	└·	└·	<·
Letters				

Original message: ____________________

Message: ⊔┌·┌□⊏

Symbols	⊔	┌·	┌	□	⊏
Letters					

Original message: ____________________

Message: ┌⊡>□└·└·┌┐□⊡└□

Symbols	┌	⊡	>	□	└·	└·	┌	┐	□	⊡	└	□
Letters												

Original message: ____________________

Message: ⊐·┌∨∨┌⊏·⊡ └⊏·⊐·┐·└·□>□⊐

Symbols	⊐·	┌	∨	∨	┌	⊏·	⊡	└	⊏·	⊐·	┐·	└·	□	>	□
Letters															

Original message: ____________________