



Girls' Programming Network

Cryptography-G

TUTORS ONLY

Create a Caesar Cipher encryptor and decryptor!



Part 1: Caesar Ciphers

Task 1.1: Encrypting and decrypting messages

Using the rotated wheel above can you encrypt and decrypt these messages

Encrypt
SECRET → V H F U H W
CIPHER → F L S K H U

Decrypt
FUDFN → C R A C K
FDHVDU → C A E S A R

Cipher Wheels

To encrypt a message, rotate the **inner** wheel anti-clockwise (to the left)

When encrypting read the wheel from outside in AKA the outer wheel contains our original letter, the inner wheel contains our encrypted letter

Task 1.2: Encrypt with a key of 10!

Let's try using a different key. **Let's try 10**. Rotate your inner cipher wheel 10 to the left so the **green A** lines up with the **purple K**. **Encrypt** this message:

MYSTERY → W I C D O B I

Hint : remember you are **encrypting** this message so start with the green letter on the outside wheel and replace it with the matching purple letter on the inside wheel.

Encrypt with a key of 24!

Let's try a **key of 24**. Rotate your inner cipher wheel 24 spots to the left. **Encrypt** this message (you can ignore spaces):

GPN IS GREAT → E N L G Q E P C Y R

Decrypt with a key of 7!

Try a **key of 7**. Rotate your inner cypher wheel 7 spots to the left. **Decrypt** this message:

JYFWAVNYHWOF → C R Y P T O G R A P H Y

Hint : remember you are **decrypting** this message so start with the purple letter on the inner wheel and replace it with the matching green letter on the outer wheel.

Decrypt with a key of 11!

Try a **key of 11**. Rotate your inner cipher wheel 11 spots to the left. **Decrypt** this message:

DATY ESP HSPPW → S P I N T H E W H E E L

Part 2: Tell me your message

Full code Lesson 2

The code should look like this (no bonuses):

```
# <the student's name>
print("Welcome, this is the Caesar cipher")
message = input("What is the message? ")
key = input("What is the key number? ")
key = int(key)
# remove print line below when they've verified message variable correct
print(message)
```

Bonuses: Full code Lesson 2

The code should look like this (with bonuses):

```
# <the student's name>
print("Welcome, this is the DAZZLING DONNA Caesar cipher")
name = input("What is your name? ")
print("Welcome to my amazing cipher, " + name)
message = input("What is the message? ")
key = input("What is the key number? ")
key = int(key)
```

Part 3: Getting a secret letter

Full Code Lesson 3

Make sure they have a go at 3.1 on paper if they are confused about the logic of encryption

The code should look like this (no bonuses):

```
# <the student's name>
alphabet = 'abcdefghijklmnopqrstuvwxyz'
```

```

print("Welcome, this is the Caesar cipher")
message = input("What is the message? ")
key = input("What is the key number? ")
key = int(key)

current_letter = message[0]
current_index = alphabet.index(current_letter)
new_index = current_index + key
new_index = new_index % 26
new_letter = alphabet[new_index]

# comment out following 3 lines when they have verified correct
# print(current_letter)
# print(current_index)
# print(new_index)

print(new_letter)

```

Bonuses: Full Code Lesson 3

End Part 3 - The code should look like this (with bonuses):

```

# <the student's name>
alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the DAZZLING DONNA Caesar cipher")
name = input("What is your name? ")
print("Welcome to my amazing cipher, " + name)
message = input("What is the message? ")
message = message.lower()
key = input("What is the key number? ")
key = int(key)

current_letter = message[0]
current_index = alphabet.index(current_letter)
new_index = current_index + key
new_index = new_index % 26
new_letter = alphabet[new_index]

# print(current_letter)
# print(current_index)
# print(new_index)

print(new_letter)

```

Part 4: What about words?

Full Code Lesson 4

The code should look like this (no bonuses):

```

# <the student's name>
alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")

```

```

message = input("What is the message? ")
key = input("What is the key number? ")
key = int(key)

# current_letter = message[0]
for current_letter in message:
    current_index = alphabet.index(current_letter)
    new_index = current_index + key
    new_index = new_index % 26
    new_letter = alphabet[new_index]
    # print(current_letter)
    # print(current_index)
    # print(new_index)
    print(new_letter, end='')

```

Bonuses: Full Code Lesson 4

End Part 4 - The code should look like this (with bonuses):

```

# <the student's name>
import time

alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the DAZZLING DONNA Caesar cipher")
name = input("What is your name? ")
print("Welcome to my amazing cipher, " + name)
message = input("What is the message? ")
message = message.lower()
key = input("What is the key number? ")
key = int(key)
# current_letter = message[0]
for current_letter in message:
    current_index = alphabet.index(current_letter)
    new_index = current_index + key
    new_index = new_index % 26
    new_letter = alphabet[new_index]
    # print(current_letter)
    # print(current_index)
    # print(new_index)
    print(new_letter, end='')
    time.sleep(0.2)

```

Part 5: Dealing With Spaces

Full Code Lesson 5

The code should look like this (no bonuses):

```
# <the student's name>
alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")
message = input("What is the message? ")
key = input("What is the key number? ")
key = int(key)

# current_letter = message[0]
for current_letter in message:
    if current_letter in alphabet:
        current_index = alphabet.index(current_letter)
        new_index = current_index + key
        new_index = new_index % 26
        new_letter = alphabet[new_index]
        # print(current_letter)
        # print(current_index)
        # print(new_index)
        print(new_letter, end='')
    else:
        print(current_letter, end='')
```

Part 6: Let's Get Cracking!

Full Code Lesson 6

The code should look like this (no bonuses):

```
# <the student's name>
alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")
message = input("What is the message? ")
key = input("What is the key number? ")
key = int(key)
mode = input("Do you want to encrypt or decrypt? (e or d) ")
if mode == 'd':
    key = key * -1

# current_letter = message[0]
for current_letter in message:
    if current_letter in alphabet:
        current_index = alphabet.index(current_letter)
        new_index = current_index + key
        new_index = new_index % 26
        new_letter = alphabet[new_index]
        # print(current_letter)
        # print(current_index)
        # print(new_index)
        print(new_letter, end='')
    else:
        print(current_letter, end='')

```

Extension 7 Full code

Random keys

```
# <the student's name>
import random

alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")
message = input("What is the message? ")
key = input("What is the key number? ")
if key == "random":
    key = random.randrange(1,26)
    print("The key is: " + str(key))
else:
    key = int(key)

mode = input("Do you want to encrypt or decrypt? (e or d) ")
if mode == 'd':
    key = key * -1

# current_letter = message[0]
for current_letter in message:

```

```

if current_letter in alphabet:
    current_index = alphabet.index(current_letter)
    new_index = current_index + key
    new_index = new_index % 26
    new_letter = alphabet[new_index]
    # print(current_letter)
    # print(current_index)
    # print(new_index)
    print(new_letter, end='')
else:
    print(current_letter, end='')

```

Extension 8 Full Code

While loop

```

# <the student's name>
import random

alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")

while True:

    message = input("What is the message? ")
    if message == "":
        break

    key = input("What is the key number? ")
    if key == "random":
        key = random.randrange(1,26)
        print("The key is: " + str(key))
    else:
        key = int(key)

    mode = input("Do you want to encrypt or decrypt? (e or d) ")
    if mode == 'd':
        key = key * -1

    # current_letter = message[0]
    for current_letter in message:
        if current_letter in alphabet:
            current_index = alphabet.index(current_letter)
            new_index = current_index + key
            new_index = new_index % 26
            new_letter = alphabet[new_index]
            # print(current_letter)
            # print(current_index)
            # print(new_index)
            print(new_letter, end='')
        else:
            print(current_letter, end='')
    print("")

```

Extension 9 Full Code

Writing files

```
# <the student's name>
import random

alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")
message = input("What is the message? ")
key = input("What is the key number? ")
if key == "random":
    key = random.randrange(1,26)
    print("The key is: " + str(key))
else:
    key = int(key)

mode = input("Do you want to encrypt or decrypt? (e or d) ")
if mode == 'd':
    key = key * -1

encrypted_message = ""
# current_letter = message[0]
for current_letter in message:
    if current_letter in alphabet:
        current_index = alphabet.index(current_letter)
        new_index = current_index + key
        new_index = new_index % 26
        new_letter = alphabet[new_index]
        # print(current_letter)
        # print(current_index)
        # print(new_index)
        # print(new_letter, end='')
        encrypted_message = encrypted_message + new_letter
    else:
        # print(current_letter, end='')
        encrypted_message = encrypted_message + current_letter

# print("")
print(encrypted_message)
with open('output.txt', 'w') as f:
    f.write(encrypted_message)
```

Extension 9 Full Code

Reading files

```
# <the student's name>
import random
with open('caesar1.txt') as f:
    message = f.read()
    message = message.strip()

alphabet = 'abcdefghijklmnopqrstuvwxyz'
print("Welcome, this is the Caesar cipher")
# message = input("What is the message? ")
key = input("What is the key number? ")
if key == "random":
    key = random.randrange(1,26)
```

```

    print("The key is: " + str(key))
else:
    key = int(key)

mode = input("Do you want to encrypt or decrypt? (e or d) ")
if mode == 'd':
    key = key * -1

# encrypted_message = ""
# current_letter = message[0]
for current_letter in message:
    if current_letter in alphabet:
        current_index = alphabet.index(current_letter)
        new_index = current_index + key
        new_index = new_index % 26
        new_letter = alphabet[new_index]
        # print(current_letter)
        # print(current_index)
        # print(new_index)
        print(new_letter, end='')
        # encrypted_message = encrypted_message + new_letter
    else:
        print(current_letter, end='')
        # encrypted_message = encrypted_message + current_letter

# print("")
# print(encrypted_message)
# with open('output.txt', 'w') as f:
#     f.write(encrypted_message)

```

Decrypted files solutions

File name	Key	Decrypted message
Caesar1.txt	's' or 18	one fish two fish red fish blue fish - Dr. Seuss
Caesar2.txt	'm' or 12	it is very important to know who you are. to make decisions. to show who you are - Malala Yousafzai
Caesar3.txt	'h' or 7	optimism is the faith that leads to achievement - Helen Keller
Caesar4.txt	'f' or 5	i attribute my success to this: i never gave or took any excuse - Florence Nightingale
Caesar5.txt	'g' or 6	i mean, it's sort of exciting isn't it? breaking the rules - Hermione Granger
Caesar6.txt	't' or 19	you will board my boat, sail across the sea, and restore the heart of te fiti - Moana

