Objectives

- To introduce the string data type
- To demonstrate the use of string methods and operators
- To introduce simple cryptographic algorithms

String

- A sequence of characters
- Quote delimited
- ‘ single
- “ double

```
>>> "hello"
'hello'
>>> 'hello'
'hello'
>>> a = "hello"
>>> b = " world"
>>> a + b
'hello world'
>>> 'she said "how are you", then left'
'she said "how are you", then left'
```

Operators

- Concatenation +
- Repetition *

```
>>> "go "*3
'go go go '
>>> ("go go " + "power rangers! ")*3
'go go power rangers! go go power rangers! go go power rangers! '
```

Indexing [ ]
Slicing [:]

Starts at 0

Positive indexes	0	1	2	3	4	5	6	7	8	9	10	11
String	P	Y	T	H	O	N		R	O	C	K	S
Negative indexes	–12	–11	–10	–9	–8	–7	–6	–5	–4	–3	–2	–1

String Methods

- upper – return string in all uppercase
- lower – return string in all lower case
- center – center string (surrounded by space specified)
- count – return the number of occurrence of a substring in a string
- index – return the index of the first occurrence of substring (error if not found)
- find – return the index of first occurrence of substring (-1 if not found)
- replace – replace all occurrences of a substring with another substring.

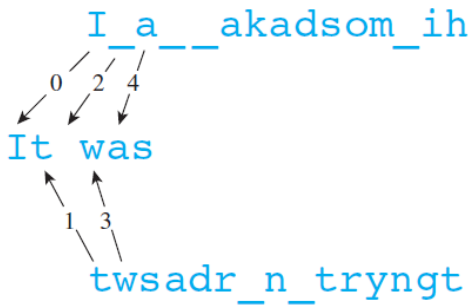
```
>>> "peter griffin".upper()
'PETER GRIFFIN'
>>> "PETER GRIFFIN".lower()
'peter griffin'
>>> "Peter Griffin".center(20)
'   Peter Griffin    '
>>> "Peter Griffin".rjust(20)
'       Peter Griffin'
>>> "Peter Griffin".ljust(20)
'Peter Griffin       '
>>> "Peter Griffin".count("f")
2
>>> "Peter Griffin".index("f")
9
>>> "Peter Griffin".replace("f","x")
'Peter Grixxin'
```

Cryptography

- Encoding and Decoding Messages
- Ciphertext
- Plaintext
- Encryption
- Decryption

Transposition Cipher

- Rail Fence
- Even Odd Shuffle
- Break up the plaintext into even and odd characters
- Combine the even and odd parts to make the cipher


I_a__akadsom_ih
0
2
4
It was
1
3
twsadr_n_tryngt

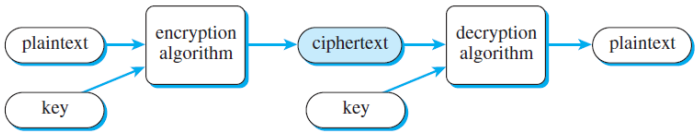
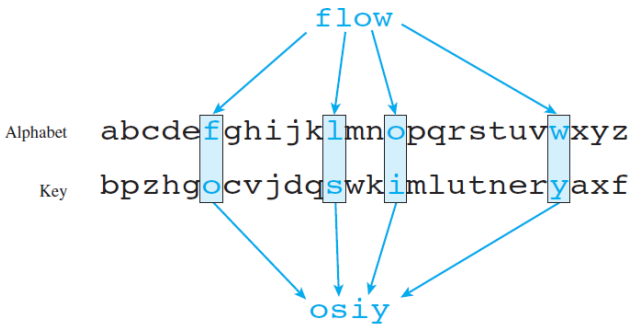

plaintext
encryption algorithm
ciphertext
decryption algorithm
plaintext
key
key

Figure 3.6


flow
Alphabet
abcdefghijklmnopqrstuvwxyz
Key
bpzhgocvjdqswkimlutneryaxf
osiy