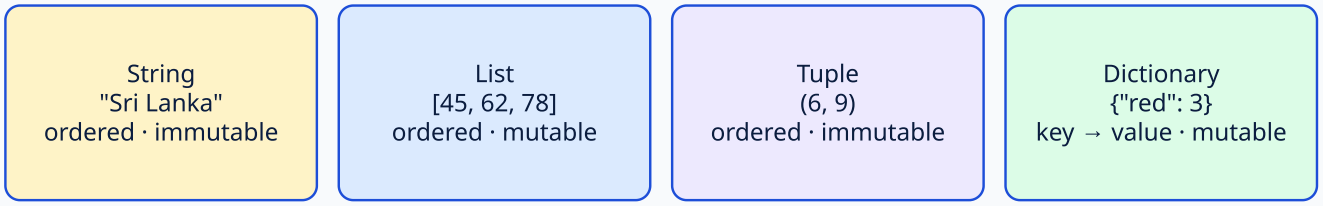
Grade 13 A/L ICT · Lesson 9

9.10 Data Structures: Strings, Lists, Tuples and Dictionaries

Syllabus 9.10. A **data structure** stores many values under one name. Python has **strings** (text), **lists** (changeable sequences), **tuples** (fixed sequences) and **dictionaries** (key → value pairs). You use **indexing**, **slicing** and **methods** to work with them.

1. Four structures

Python data structures



Index from 0: s[0] is the first item, s[-1] the last; s[4:9] slices items 4 to 8.

String, list, tuple and dictionary

Structure	Brackets	Ordered?	Changeable?
String	" "	Yes	No
List	[ ]	Yes	Yes
Tuple	( )	Yes	No
Dictionary	{key: value}	By insertion	Yes

🐍 Strings, lists, tuples and dictionaries

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```
s = "Sri Lanka"
print(s[0], s[-1], s[4:9], len(s), s.upper())

marks = [45, 78, 62]
marks.append(90)
marks.sort()
print(marks, marks[1:3], sum(marks))

point = (6, 9)                # tuple: cannot be changed
print(point[0] + point[1])

words = "red blue red green red".split()
freq = {}
for w in words:
    freq[w] = freq.get(w, 0) + 1
print(freq)
print(sorted(freq.items()))
```

▶ Output

```
S a Lanka 9 SRI LANKA
[45, 62, 78, 90] [62, 78] 275
15
{'red': 3, 'blue': 1, 'green': 1}
[('blue', 1), ('green', 1), ('red', 3)]
```

🧱 **Worked example: Explain s[4:9], the sorted list and the word counts.**
"Sri Lanka" has 9 characters (index 0–8); s[4:9] takes 4 to 8 = **Lanka**. After append(90) and sort() the list is **[45, 62, 78, 90]**, the slice [1:3] is [62, 78] and the sum is **275**. The dictionary counts red **3**, blue 1, green 1.

- List methods: append, insert, remove, pop, sort, len().
- String methods: upper, lower, split, strip, find, replace.
- Dictionary: d[key], d.get(key, default), d.keys(), d.values(), d.items().

💡 Negative indexes count from the end: s[-1] is the last item.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* JSON – the format most 2026 web APIs use – maps directly to Python dictionaries and lists.

Key Words

Data structure – Way of storing many values under one name.

String – Ordered immutable sequence of characters.

List – Ordered mutable sequence written in square brackets.

Tuple – Ordered immutable sequence written in round brackets.

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Dictionary – Collection of key and value pairs.	**Index** – Position number of an item starting from 0.
Slice – Part of a sequence taken with start:stop.	**Mutable** – Can be changed after it is created.
Immutable – Cannot be changed after it is created.	**Method** – Function that belongs to an object such as append.
Key – Unique label used to look up a value in a dictionary.	**Concatenation** – Joining strings or lists with +.

Sample Q&A

1. List vs tuple?

> **Answer:** Lists can change; tuples cannot.

2. s[0] and s[-1] for "Sri Lanka"?

> **Answer:** S and a.

3. List after append(90) and sort()?

> **Answer:** [45, 62, 78, 90].

4. How many times does red appear?

> **Answer:** 3.

5. What does freq.get(w, 0) do?

> **Answer:** Returns the count or 0 if w is not yet a key.

6. Why use a tuple for a point?

> **Answer:** The coordinates should not change.

MCQ

1. For s = "Sri Lanka", s[4:9] is

A. Sri
B. anka
C. Lank
D. Sri L
E. Lanka

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2. len("Sri Lanka") is

A. 8
B. 2
C. 9
D. 7
E. 10

3. After append(90) and sort(), marks[1:3] is

A. [45, 62, 78]
B. [62, 78]
C. [62, 78, 90]
D. [78, 90]
E. [45, 62]

4. sum of [45, 62, 78, 90] is

A. 230
B. 90
C. 275
D. 285
E. 265

5. Which structure cannot be changed after creation?

A. tuple
B. list
C. none
D. dictionary
E. set of lists

6. In the word count, freq["red"] is

A. 2
B. 5
C. 3
D. 0
E. 1

7. Key → value pairs are stored in a

A. file
B. dictionary
C. tuple
D. string
E. list only

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8. point[0] + point[1] for (6, 9) is

A. 3
B. 6
C. 54
D. 69
E. 15

9. Which term means: “Way of storing many values under one name”?

A. Data structure
B. Mutable
C. Index
D. List
E. Key

10. Which term means: “Ordered immutable sequence of characters”?

A. String
B. Slice
C. Tuple
D. Immutable
E. Concatenation

11. Which term means: “Ordered mutable sequence written in square brackets”?

A. Method
B. Mutable
C. Data structure
D. List
E. Dictionary

12. Which term means: “Ordered immutable sequence written in round brackets”?

A. Index
B. Key
C. Tuple
D. String
E. Immutable

13. Which term means: “Collection of key and value pairs”?

A. Method
B. Dictionary
C. Concatenation
D. Slice
E. List

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14. Which term means: “Position number of an item starting from 0”?

A. Mutable
B. Index
C. Key
D. Tuple
E. Data structure

15. Which term means: “Part of a sequence taken with start:stop”?

A. Dictionary
B. String
C. Concatenation
D. Slice
E. Immutable

16. Which term means: “Can be changed after it is created”?

A. Mutable
B. Data structure
C. List
D. Method
E. Index

17. Which term means: “Cannot be changed after it is created”?

A. Key
B. Tuple
C. String
D. Slice
E. Immutable

18. Which term means: “Function that belongs to an object such as append”?

A. List
B. Mutable
C. Concatenation
D. Method
E. Dictionary

19. Which term means: “Unique label used to look up a value in a dictionary”?

A. Tuple
B. Index
C. Data structure
D. Immutable
E. Key

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20. Which term means: “Joining strings or lists with +”?

A. Method
B. Slice
C. Dictionary
D. Concatenation
E. String

Structured Questions

1. Compare strings, lists, tuples and dictionaries. *(4 marks)*

> Brackets; ordered; mutable or not; key → value.

2. Give the output of s[0], s[-1], s[4:9] and s.upper() for "Sri Lanka". *(4 marks)*

> S; a; Lanka; SRI LANKA.

3. Write code to add a mark, sort the list and print the total. *(3 marks)*

> marks.append(90); marks.sort(); print(sum(marks)).

4. Write code that counts words using a dictionary. *(4 marks)*

> split(); for each word; freq[w] = freq.get(w, 0) + 1; print.

5. Explain mutable and immutable with examples. *(2 marks)*

> List mutable (append); string/tuple immutable.

Summary

- Strings hold text and cannot be changed.
- Lists are ordered and changeable.
- Tuples are ordered and fixed.
- Dictionaries map keys to values.
- Indexes start at 0; slices exclude the stop.

MCQ answer key – 9.10

1. **E** – Index 4 to 8.
2. **C** – Space counts.
3. **B** – Items 1 and 2.
4. **C** – Total.
5. **A** – Tuple.
6. **C** – Three times.
7. **B** – Dictionary.

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8. **E** – 6 + 9.
9. **A** – Data structure – Way of storing many values under one name.
10. **A** – String – Ordered immutable sequence of characters.
11. **D** – List – Ordered mutable sequence written in square brackets.
12. **C** – Tuple – Ordered immutable sequence written in round brackets.
13. **B** – Dictionary – Collection of key and value pairs.
14. **B** – Index – Position number of an item starting from 0.
15. **D** – Slice – Part of a sequence taken with start:stop.
16. **A** – Mutable – Can be changed after it is created.
17. **E** – Immutable – Cannot be changed after it is created.
18. **D** – Method – Function that belongs to an object such as append.
19. **E** – Key – Unique label used to look up a value in a dictionary.
20. **D** – Concatenation – Joining strings or lists with +.

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