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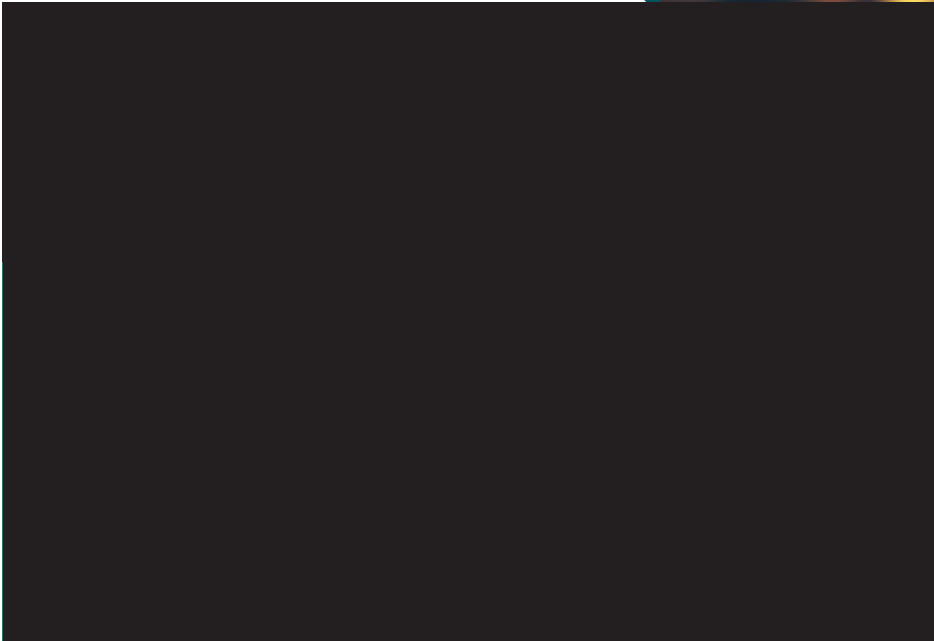
\* للحصول على جميع أوراق الصف العاشر في مادة تصميم ولجميع الفصول, اضغط هنا [10design/ae/com.almanahj//:https](https://almanahj.com/ae/10design)

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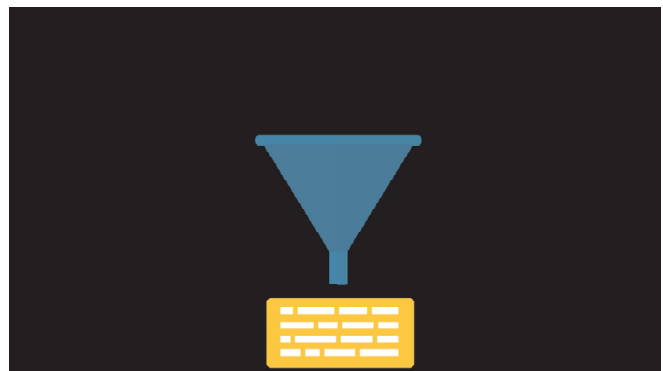
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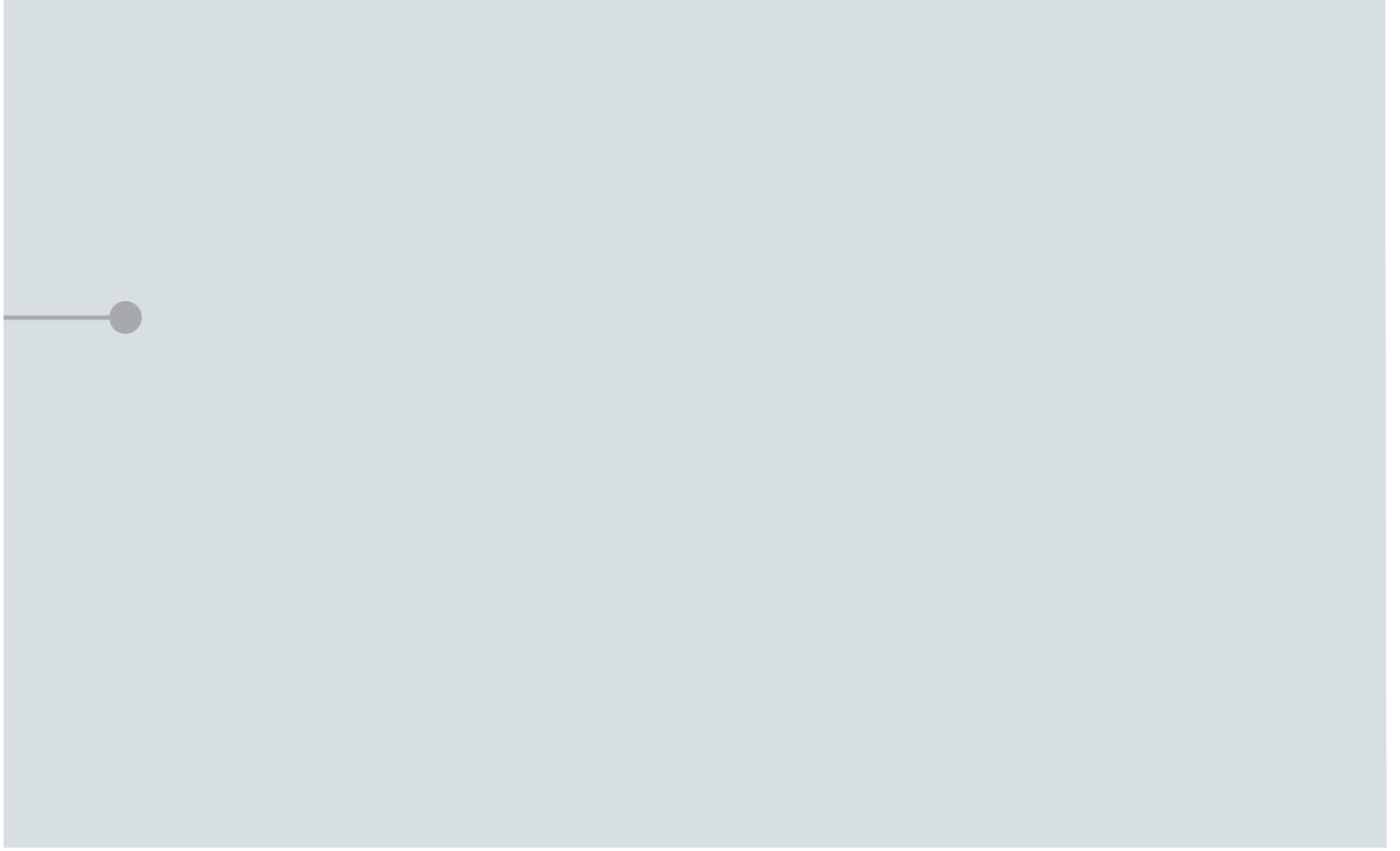
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# UNIT 5

Data Structures





## Data structures

### Python list



#### Creating lists

1. Create a list for each scenario described in the table below.

Table 37

Scenario	Description
a list containing the last six months of the year	<code>last6months = ["July", "August", "September", "October", "November", "December"]</code>
a list containing the first names of five students in your class	
a list of the ages of the five students in your class	
a list containing your first name, last name, age, school and grade in CS last term	
a list of 7 mountains	
all the operators used for math	
the heights in metres of seven members of your class	

2. Look at the list below and complete the tasks in Table 3.

```
cars=["Toyota","Fiat","BMW","Nissan","Volvo","Lexus"]
```

What values do the elements with the following index values contain?

Table 38

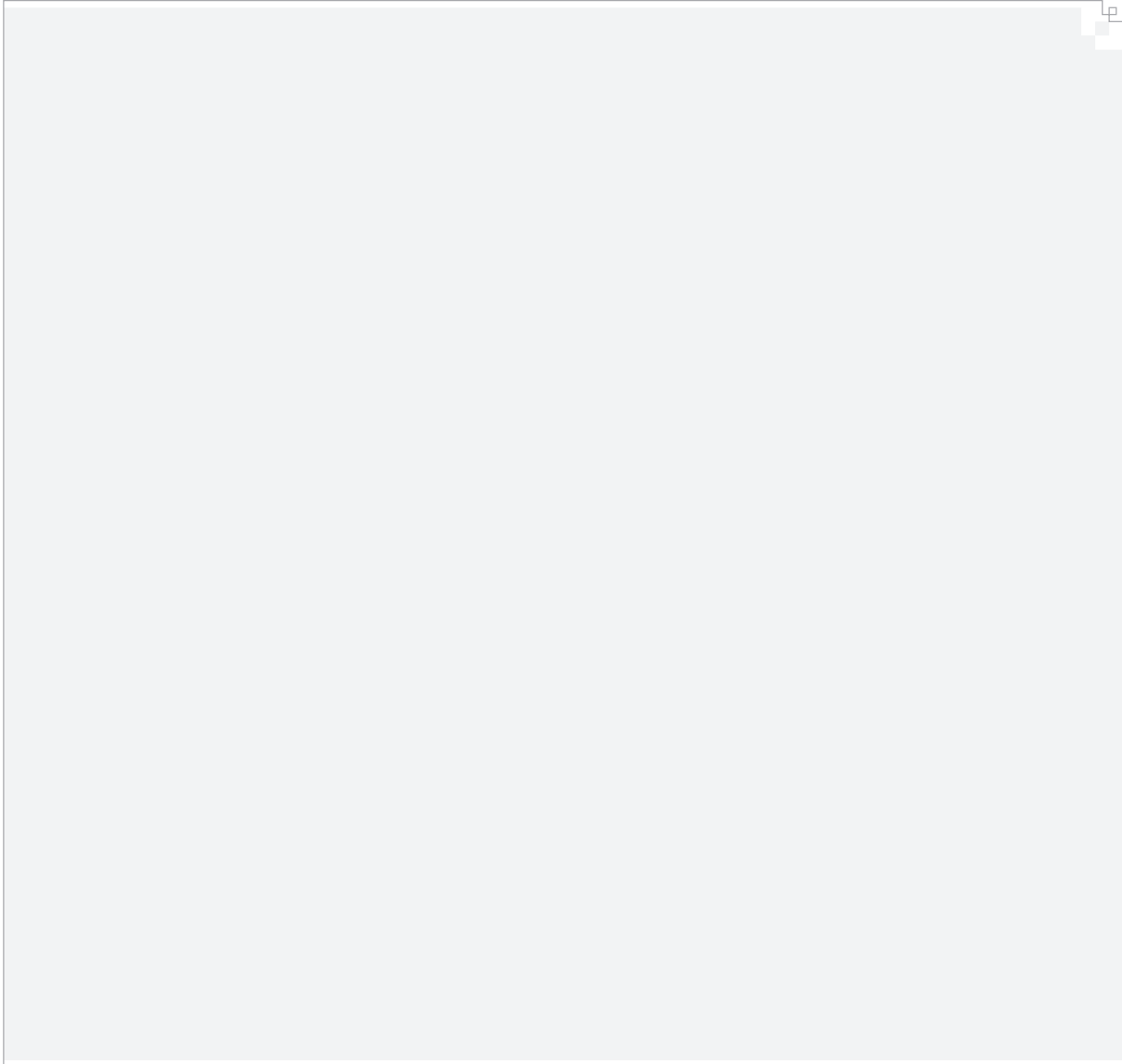
Element	Value
<b>cars[5]</b>	
<b>cars[1]</b>	
<b>cars</b>	
<b>cars[17]</b>	
<b>cars[3]</b>	
<b>Cars[2]</b>	

3. How would you assign values for the elements below?

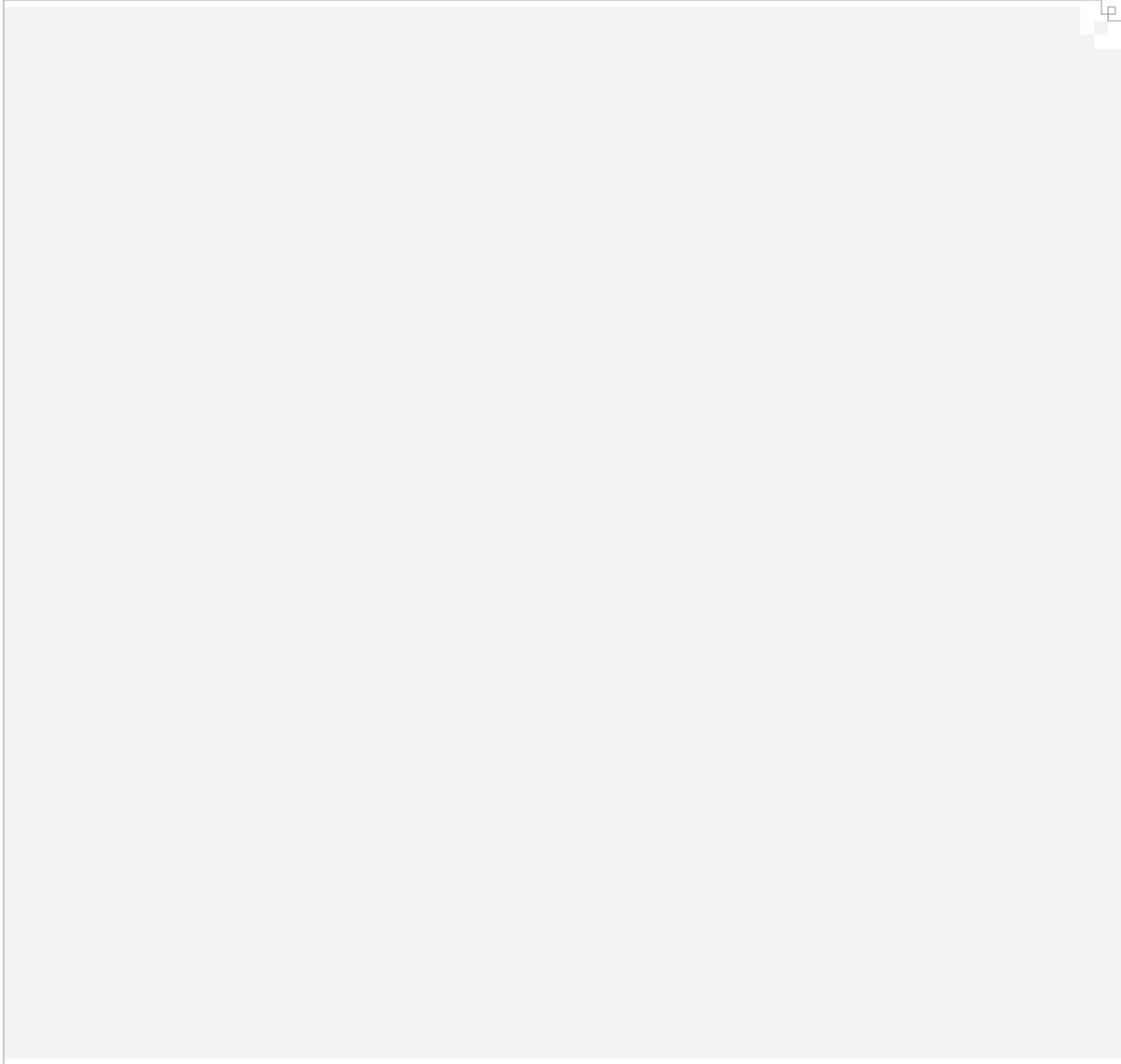
Table 39

Element	Value
change the Fiat to an Infiniti	
replace the BMW with a McLaren	
let the user enter a car name to change the value of Nissan	
change the value in cars[8] to Chevrolet	
replace the Volvo with Mercedes	

4. Design a program in Python to create a list to store the names of the first eight chemical elements in the periodic table. Your program should then print the values in the third and seventh elements in the list.



5. Design a program to store the following values in a list: SUV, Nissan, Patrol, 2018, R 2345, Dubai, 5.2 and blue. Print all the values in the list.



## Reading and writing data to lists



### Using loops to set and read values in lists

1. How would you set, read or print the values for the cases described in the table below?

Table 40

Case	What would you use?			
	for loop	while loop	append() function	create a full list at the start
Entering a list of grades achieved by grade 10 students on a computer science quiz		X	X	
Printing a list of all grade 10 students in a list				
Updating a list with the monthly high scores for a game				
Updating a list of travellers passing through Dubai International Airport				
Printing the results from a coding competition				

2. Design a Python program that will create a list containing odd numbers from 153 down to -77. The first value in your list should be 153. Your program should print the full list at once.



3. Design a Python program to store the names of all Computer Science students in grade 10. The teacher should enter the names. Your program should then print the full list of names one at a time.

4. Design a Python program to store ten random numbers in a list. Your program should find and print the index for the smallest and the largest numbers.

## Creating lists from other lists



### Creating lists from other lists

1. Using the lists below, write down the Python statements for the scenarios described in the table.

```
transport=["bus", "train", "plane", "car", "bike"]
```

```
clothes=["sweater","shirt","jumper","dress","jacket"] headCov=["hat","shayla","turban","crown","egal","cap"]
```

Table 41

Scenario	Statement
Create a list that will contain the last three elements from transport.	
Create a new list containing only the last element from clothes.	
Create a new list that will combine clothes and headCov.	
Create a new list that repeats the elements in the transport list twice.	
Create a copy of the headCov list.	
Create a new list that combines the first two elements from clothes and the last three elements from headCov.	

## Useful list operations

## Python dictionary



### Creating, reading, and writing data in dictionaries

(a) Using the dictionary below, answer all the questions in the table.

```
capitals={"Peru":"Lima","UAE":"Abu Dhabi","Zambia":"Lusaka","Germany":"Berlin", "Portugal":"Lisbon","China":"Beijing","Jordan":"Cairo"}
```

Table 9

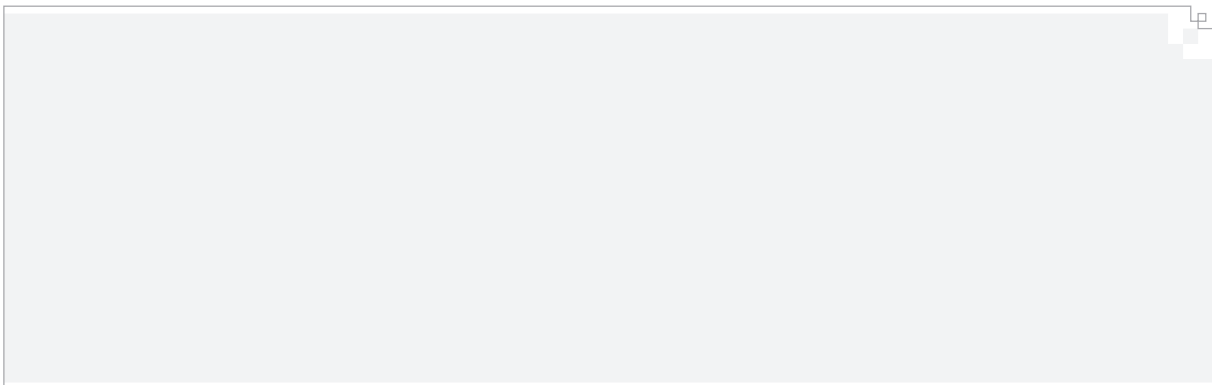
Question	Python statement
How can you print the <b>capitals</b> dictionary?	
Write down the statement to check the value of <b>Jordan</b> (the key).	
The entry for the capital of Jordan is wrong. Write the statement to change it.	
Write the statement to print the capitals for the <b>UAE</b> and <b>China</b> .	
Create a dictionary to store values for the following keys: name, age, gender, and class.	
Using your dictionary above, write down the code to change the age in your dictionary.	
What statement would you use to check and print the name in your dictionary?	

(b) Design a program to create a list of the keys for the dictionary in question (a). Print the values in the list one at a time.



(c) Design a program to store the high scores in a game for each month. See the example below. Your program should store the high scores for the whole year.

Key	Value
January	63
February	73
March	98
April	91
May	63





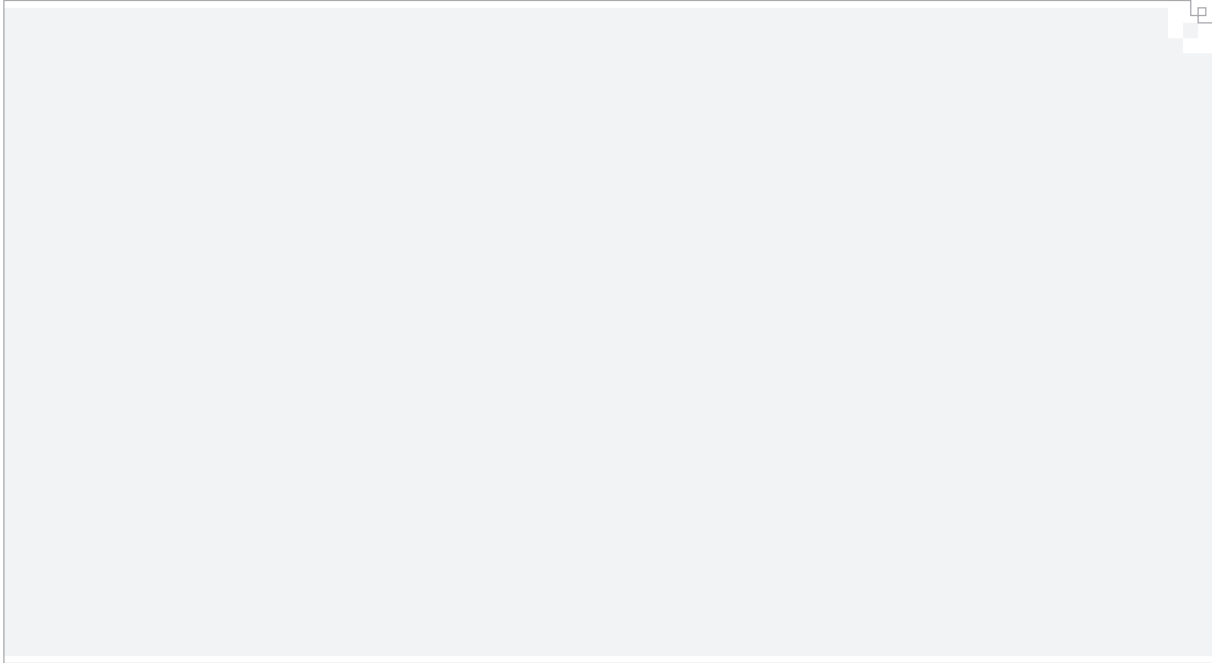
## Dictionary operations

(a) Create a dictionary containing the names of the Group I elements from the periodic table. The names of the chemical elements will be the keys. Their chemical symbols will be the dictionary values.

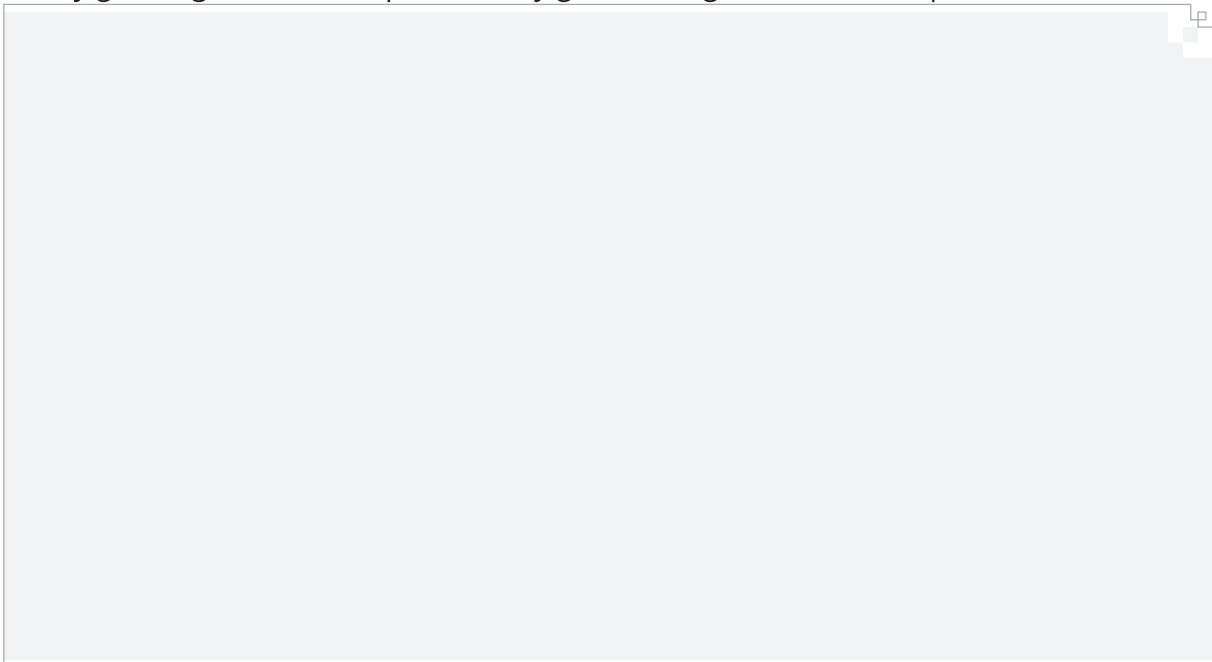
Table 10

Group I elements	
hydrogen	H
lithium	Li
sodium	Na
potassium	K
rubidium	Rb
caesium	Cs
francium	Fr

(b) Explain how a grade 11 student might use such a dictionary in real life.



(c) Using your dictionary from question (a), make a chemistry quiz in Python. Add code which asks users to guess the chemical symbol of each element. They should earn 2 points if they get it right but lose 1 point if they get it wrong. Print the total points at the end.



(d) Use an appropriate function to extend your dictionary. Add elements from the Group II elements of the periodic table.

Table 11

Group II elements	
beryllium	Be
magnesium	Mg
calcium	Ca
strontium	Sr
barium	Ba
radium	Ra

(e) Use the appropriate functions to delete all the elements that start with the letter 's'. Then print all the remaining keys in your dictionary.



## End-of-unit activities

1. Design a computer program to store a list of all your subjects and the grades you achieved last term. Print out your grade for Computer Science and the grades for any other subjects you also like.

A large, empty rectangular box with a light gray background and a thin black border. It is intended for the student to write their code for the first activity.

2. Design a computer program that allows a user to enter any popular designer brands. It should then print only the second element to the second-to-last element.

A large, empty rectangular box with a light gray background and a thin black border. It is intended for the student to write their code for the second activity.

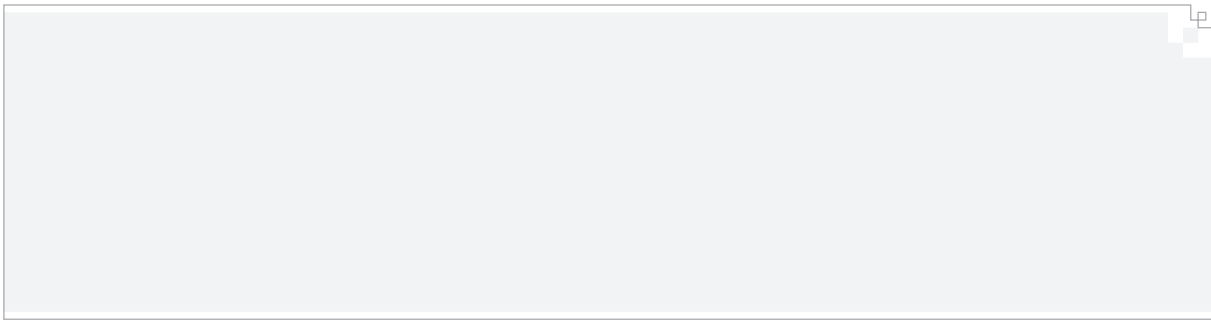


3. Design a program in Python that will store a reading list of 5 of your favourite books. It should store the author's names and the titles of the books. Your program should give the user two choices:

❖ Print the book title of only one author's book.

or

❖ Print all the book titles in random order.



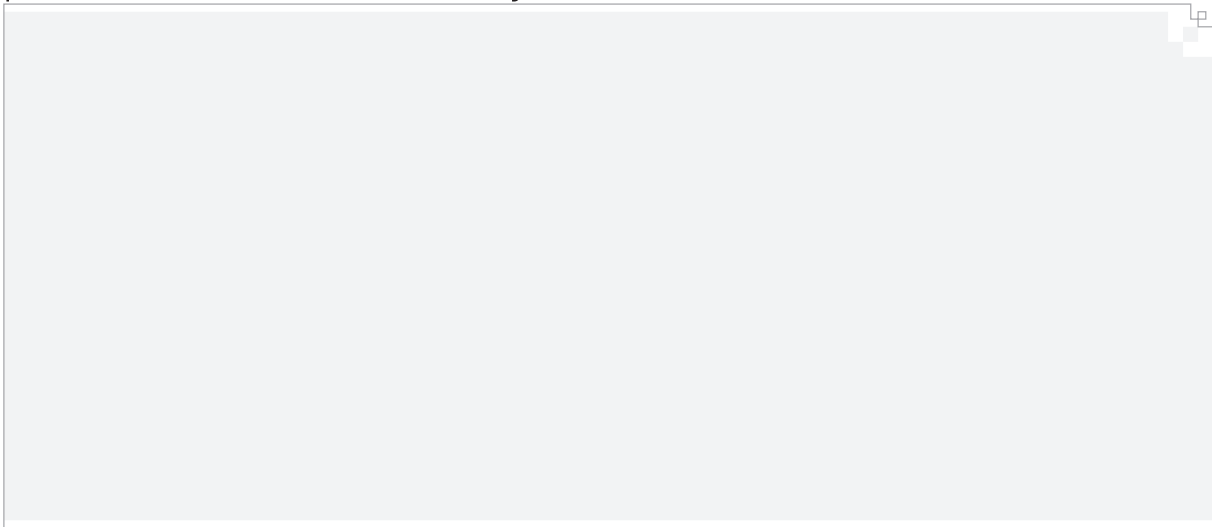
4. The following data shows the average value of the UAE dirham versus the US dollar in 2017:

Table 12

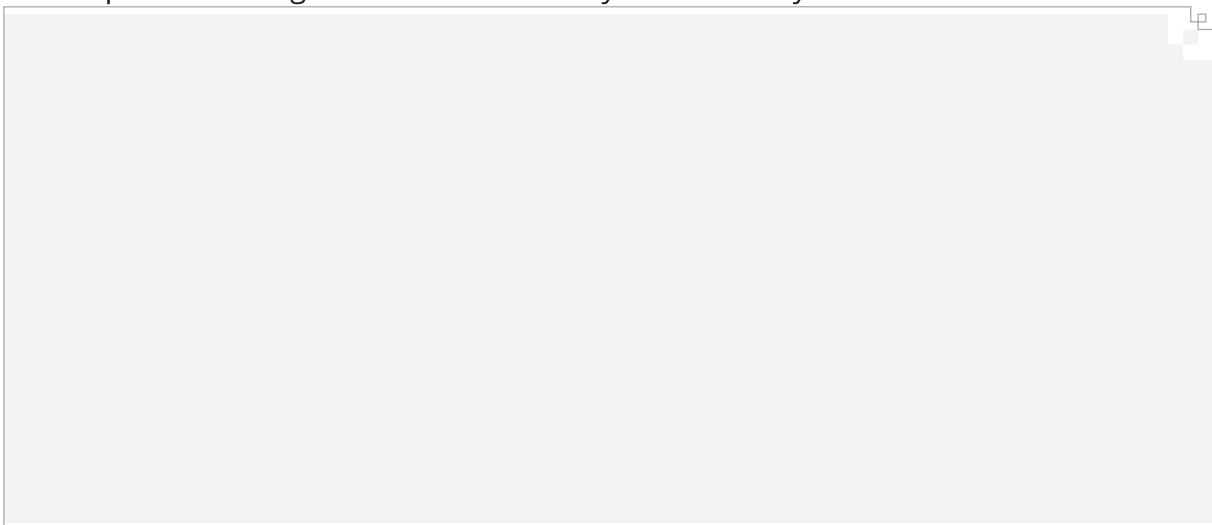
January	3.67292
February	3.67355
March	3.6733
April	3.673
May	3.67324
June	3.67374
July	3.673
August	3.67296
September	3.67248
October	3.67284
November	3.67253
December	3.67355

a) Design a Python program that will save data in a data structure. Then print only the data for the last six months.

b) Your program should ask the user for the months they want data for. It should then print the values for those months only.



5. Design a program to translate some simple words from English into Arabic. Your program should ask a user to enter a word in English and print the Arabic translation. It should print a message if the word is not in your dictionary.





## Khalifa Fund for Enterprise Development – Data structures I

Add a project team option for your program. Design the part of your program will let the user enter the team members for the project and display the names with the role. Your code should:

- ❖ Display a Project team option on the main menu.
- ❖ Give a submenu with 3 options:
  - ❖ Add team members
  - ❖ List team members and
  - ❖ Return to the main menu

THE KHALIFA FUND

1. Balance check

2. Expenses

3. Income

**4. Project team**

5. Exit

enter choice:

### Project team

Hessa – Project manager

Khalid – Chief architect

Maryam - CEO

Hadif – VP Quality

## Extension task

What would your program do if a team member was added by mistake?

*Can you add code to do it?*

1. Project description

2. Project design (sketch, flowcharts, description, Mind Map, pseudocode, etc.)

3. What went well?

4. How could you make your program better?

## *Project checklist*

Have you completed the following?

Task	Done?	Comment
Printed a submenu		
Users can choose an item from the submenu		
Users can return to the main menu		
Used a list to store the team members details		
Printed the team members details		
Attempted the extension task		

## *Project marks*

Task	Total Marks	Actual Marks	Comment
Project description			
Planning			
Project implementation			
Testing			
Evaluation			
<b>Total marks</b>			



## Khalifa Fund for Enterprise Development – Data structures II

You will now functionality to store the project monthly finances in data structures. Design the part of your program that will store the monthly expenses and income for the project.

The user should be able to:

- ❖ enter income and expense data for any month.
- ❖ display income and expense data for any month.
- ❖ display the net income for any month.
- ❖ display the total income and expenses for the year.

THE KHALIFA FUND

1. Balance check

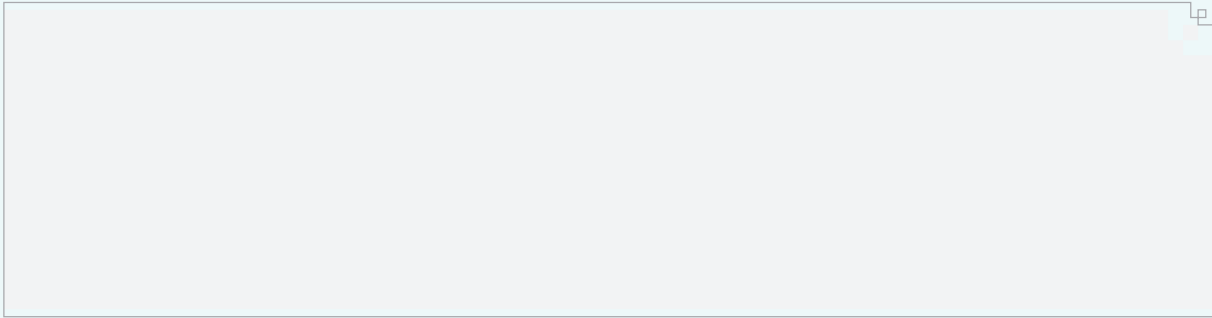
2. Expenses

3. Income

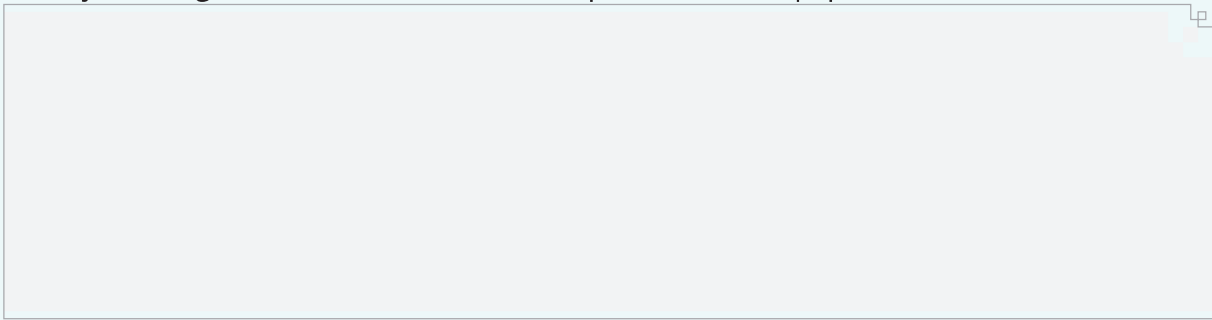
4. Exit

enter choice:

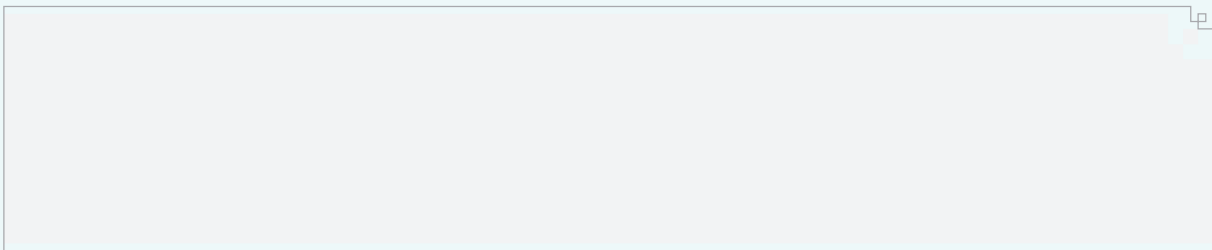
## 1. Project description



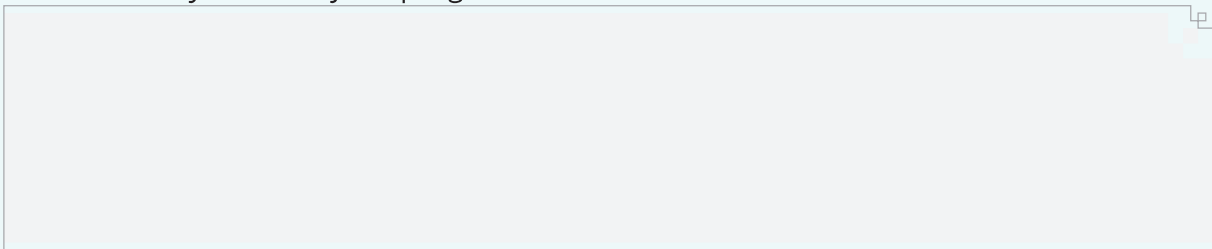
## 2. Project design (sketch, flowcharts, description, Mind Map, pseudocode, etc.)



## 3. What went well?



## 4. How could you make your program better?





## Project checklist

Have you completed the following?

Task	Done?	Comment
1. Used a dictionary to store income or expenses		
2. Users can enter income or expense data		
3. Users can display the income or expense data for any month		
4. Users can display the total income or expense data		

## Project marks

Task	Total Marks	Actual Marks	Comment
1. Project description			
2. Planning			
3. Project implementation			
4. Testing			
5. Evaluation			
<b>Total marks</b>			



## Student reflection

1. List three things you have learned.

2. Describe two skills that you can do on your own.

3. ✓ Tick it if you can do it.

- Describe a data structure using examples.
- Describe a list.
- Read or write data to a list.
- Describe a dictionary.
- Read or write data to a dictionary.