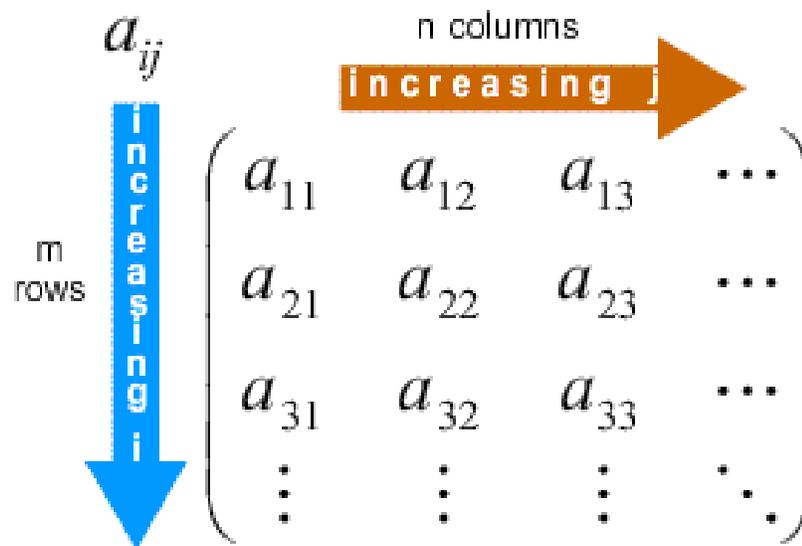# Grade 11

Worksheets

"Arrays – Worksheets No.1

One Dimensional Arrays"

2018-2019

Arrays

Traditionally, an array is a static data structure. This means the array is declared with a specified number of elements of one specified data type and this does not change after compilation. However, many programming languages now allow an array to be dynamic. This means the array can grow in size if required.

Pseudocode – Array declaration

Pseudocode declaration examples:

```
DECLARE List1 : ARRAY[1:3]    OF STRING  // 3 elements in this list
DECLARE List2 : ARRAY[0:5]    OF INTEGER // 6 elements in this list
DECLARE List3 : ARRAY[1:100]  OF INTEGER // 100 elements in this list
DECLARE List4 : ARRAY[0:25]   OF STRING  // 26 elements in this list
```

Pseudocode – Accessing 1D arrays

In A specific element in an array is accessed using an index value.

```
NList[25] = 0   // set 25th element to zero
AList[3] = "D"  // set 4th element to letter D
```

Python – Syntax definitions

In Python, there are no arrays. The equivalent data structure is called a list. A list is an ordered sequence of items that do not have to be of the same data type. Python's lists are dynamic.

As there are no declarations, the only way to generate a list is to initialize one.

Python	List1 = [] List1.append("Fred") List1.append("Jack") List1.append("Ali")	As there are no declarations, the only way to generate a list is to initialise one. You can append elements to an existing list.
	List2 = [0, 0, 0, 0, 0, 0]	You can enclose the elements in [].
	List3 = [0 for i in range(100)]	You can use a loop.
	AList = [""] * 26	You can provide an initial value, multiplied by number of elements required.

Python – Accessing 1D arrays

Python	NList[24] = 0 AList[3] = "D"	

1. Design an algorithm (Pseudocode or Python) that will take as input 10 Real numbers and store them in a 1D array. Your algorithm should calculate the count and percentage of positive numbers, negative numbers and zeros stored in your array.

2. Modify the algorithm you created above so that it calculates and displays the largest number along with the rows it was found in.

3. Declare and initialize an array of integers so that it contains ten elements that hold the first 5 perfect squares (starting at 1).

4. Create a program in Python that uses the randint() function to initialize a 5 row 1D array with random integer values between 1 and 6. You program should (after the array is initialized) also print the array elements.

5. Design an algorithm (Pseudocode or Python) that will take as input 10 integers values and store them in a 1D array. Your algorithm should calculate the number of odd and even values stored.

6. Design an algorithm (Pseudocode or Python) that will create a 10 row 1D array, where odd rows have a value of 1 and even rows have a value of 0

7. A 6 row 1D array Names[0:5] is used to hold the name of the students of a class. Another 6 row 1D array Grades[0:5] holds the corresponding grades of the students. Design an algorithm (Pseudocode or Python) that creates the arrays, calculates and displays the highest grade and the name(s) of the student(s) that achieved the highest grade.

8. What will the content of array A[1:5] will after the execution of the following program :

```
DECLARE i : INTEGER
DECLARE A : ARRAY[1:5] OF INTEGER

FOR i <-- 1 TO 5
    A[i] ← i
ENDFOR
FOR i <-- 2 TO 5
  IF (i mod 2 = 0)
     THEN
          A[i] ← 2 * A[i - 1] + 1
     ELSE
          A[i] ← A[i] + A[i - 1]
   ENDIF
 ENDFOR
```

9. Horses are entered for a horse race. A horse may have to carry a penalty weight in addition to the rider. This weight is added to the saddle. The penalty weight (if any) depends on the number of wins the horse has achieved in previous races. (According to the table below)

Number of previous wins	Penalty weight (kg)
0	0
1 or 2	4
Over 2	8

A program is to be written from the following structured English design.
- INPUT name of horse and store it in the 1D array Name[]
- INPUT number of previous wins. Validate data ensuring that only positive numbers are entered.
- CALCULATE penalty weight

3

- STORE penalty weight in a 1D array Penalty[]
- OUTPUT name of horse, penalty weight.
- Find and display the name of the horse(s) that have the maximum penalty weight.

10. Declare and initialize an array of integers so that it contains ten elements that hold the first ten perfect squares (starting with 1).

11. Modify the program above so that it will swap the 1st and last elements in the array you created above.

12. Create an algorithm (Python or Pseudocode) that declare and initialize 2 arrays Numb1, Numb2. Numb1 should contain the first 4 even numbers (starting at 2) and Numb2 should contain the 4 first odd two digit numbers.

13. Modify the algorithm you created above so that it merges the 2 arrays into a new 1D array Numb3.