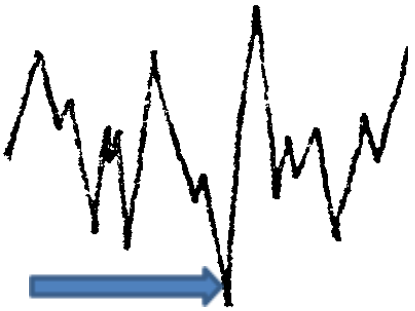
Find Minimum



A **Finding the Minimum** standard algorithm searches for through a list of numbers and returns the lowest number in the list.

Task 1

Study the pseudocode for a Finding the Minimum below very carefully. Explain each part and how it relates to the working of the standard algorithm.

```
SET search_list ARRAY [numbers…]
SET min TO search_list ARRAY[0 first index]
FOR x FROM 1 TO search_list ARRAY size DO
    IF search_list ARRAY[x] < min
        SET min TO search_list ARRAY[x]
    END IF
NEXT x
SEND min TO DISPLAY
```

Explain each line of code and need in Finding Minimum …

Create new array called search_list with some numbers inside

Create new variable called min and then get the first value from search_list array
Then iterate between search_list array based on its size
Then check if there is a smaller value than min value inside of search_list
IF so set min value to the new x value
Then output the min value

Why does the For loop counter start at 1? …

In order to check every value including first value you need to start from 1

Why is the if the most important part? …

You need 'if' part in order to check if there is some other value in an array that could be smaller

Why do you have to remember the final instruction?...

So you can output it or use it somewhere else

Task 2

Read the Python code below, you will get a hard copy of the code and the source code file supplied by your teacher to test run a few times. On the next page explain the program.

```
1  from random import *
2
3  numbers = []
4
5  def random20numbers ():
6      for x in range(20):
7          numbers.append(randrange(1,51))
8      return numbers
9
10 def displayNumbers (numbers):
11     for x in range(20):
12         print (numbers[x]," ",end="")
13     return
14
15 def findingMin (numbers):
16     min = numbers[0]
17     for x in range(1,20):
18         if numbers[x] < min:
19             min = numbers[x]
20     print ()
21     print ("The lowest number (minimum) in the list is",min,".")
22     return
23
24 numbers = random20numbers()
25 displayNumbers(numbers)
26 findingMin(numbers)
```

Explain the 3rd procedure parts and what they specifically do…

Task 3

Look at the screenshot of a test run below along with the structured listing of the source code. Trace through the Finding Minimum sub-program code with the number list example shown. Describe the actual flow through the standard algorithm line by line clearly stating all values and conditions throughout each iteration until completion.

```
3   40   36   43   26   8   12   31   29   1   27   29   42   23   28   47   27   20   32   39
The lowest number (minimum) in the list is 1 .
```

Explain execution of the finding minimum with the data above line by line, mentioning values and variables…

Task 4

"In the Charity Runners program it is required to find out what the fastest time was."

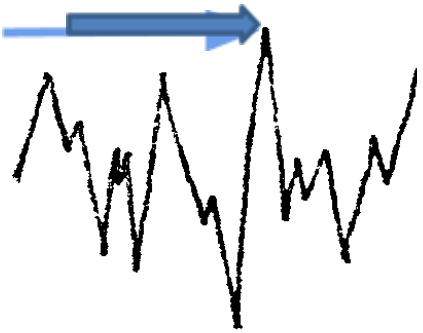
(a) Plan the algorithm to do this.

Main Step (parameters in/out)

Pseudocode refined steps

(b) Maintain the Charity Runners program to implement the new algorithm required, screenshot your block of code below and a screenshot of a successful test run finding the minimum - your teacher will remind you of the test data to use.

Find Maximum



A **Finding the Maximum** standard algorithm searches for through a list of numbers and returns the highest number in the list.

Task 5

Study the pseudocode for a Finding the Maximum below very carefully. Explain each part and how it relates to the working of the standard algorithm.

```
SET search_list ARRAY [numbers…]
SET max TO search_list ARRAY[0 first index]
FOR x FROM 1 TO search_list ARRAY size DO
    IF search_list ARRAY[x] > max
        SET max TO search_list ARRAY[x]
    END IF
NEXT x
SEND max TO DISPLAY
```

Explain each line of code and need in Finding Maximum …

How do you change a Finding Min into Finding Max?...

Task 6

Read the Python code below, you will get a hard copy of the code and the source code file supplied by your teacher to test run a few times. On the next page explain the program.

```
1  from random import*
2
3  numbers = []
4
5  def random20numbers ():
6      for x in range(20):
7          numbers.append(randrange(1,51))
8      return numbers
9
10 def displayNumbers (numbers):
11     for x in range(20):
12         print (numbers[x]," ",end="")
13     return
14
15 def findingMax (numbers):
16     max = numbers[0]
17     for x in range(1,20):
18         if numbers[x] > max:
19             max = numbers[x]
20     print ()
21     print ("The highest number (maximum) in the list is",max,".")
22     return
23
24 numbers = random20numbers()
25 displayNumbers(numbers)
26 findingMax(numbers)
```

Explain the third procedure Finding the Max algorithm parts and what they specifically do…

Task 7

Look at the screenshot of a test below along with the structured listing of the source code. Trace through the Finding Maximum sub-program code with the number list example shown. Describe the actual flow through the standard algorithm line by line clearly stating all values and conditions throughout each iteration until completion.

```
14   6   19   10   13   22   2   38   26   20   50   14   7   10   12   17   35   44   22   45
The highest number (maximum) in the list is 50 .
```

Explain execution of the finding maximum with the data above line by line, mentioning values and variables…