Algorithms

Algorithms: steps to solve a given problem (In our case programming problem).

Sequence: Solution is a group of sequential steps.

Selection (conditional): Solution may include conditions (use if/else statements).

Repetition (loops): Solution may include loops (use while loop).

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* Algorithms usually have input / processing / output.

Examples (sequence):

1- write an algorithm (pseudo code) to find the sum of any two given numbers.

```
Asks user to enter first number
Read number and save as num1
Ask user to enter second number
Read number and save as num2
Set sum equal to num1 plus num2 [or Add num1 to num2 and save result as sum]
Print sum to screen
```

2- Write an algorithm to Reverse any three digit number

567 → 5 (hunds), 6 (tens), 7 (ones) → 7 6 5 → 765

567 (in) → 76 5 (out)

```
Ask user to enter any three digit number        } -> input
Read number and save as num
Divide num by a hundred and save result as hunds
Divide num by ten and save remainder as ones
Divide num by ten and save result as temp
Divid temp by ten and save remainder as tens
Multiply ones by hundred and save result as rev
Multiply tens by ten and add result to rev      } -> process
```

Add hunds to rev]→ process
Print rev to screen]– output

Selection (if/else):

Example:

1→ Ask user to enter two different numbers
Read numbers and save as num1 and num2 respectively (ترتيب تدخيلهم)
If num1 is greater than num2
لازم تترك فراغ —— print num1 is the larger number.
Else
لازم تترك فراغ —— print num2 is the larger number
End If

2- Write an algorithm (pseudo-code) that takes a mark (0-100) and print a letter grade (A=90-100, B=80-89, C=70-79, F=0-69):

Ask user to enter mark (0-100)
Read mark and save as mk
If mk is greater than eighty nine
print "grade is A" to screen
Print "good job" to screen
Else if mk is greater or equal eighty
Print "grade is B" to screen
Else if mk is greater or equal seventy
Print "grade is C" to screen
Else
print "grade is F" to screen
Print "good luck next time" to screen
End If
Print "good bye" to screen.

Q write an algorithm (psudo code) that takes any four digit number an input and prints the number after moving outside numbers in and visa versa (e.g num = 5467 result = 4576)

54 67

5 4 6 7

4 5 7 6

Ask user to enter four digit number
Read number and save as num
Divide num by ten and save remainder as ones
Divide num by a thousand and save result as thous
Divide num by a hundred and save result as temp
Divide temp by ten and save remainder as hands
Divide num by a hundred and save remainder as new temp
Divide new temp by ten and save result as tens
Multiply ones by ten and save result as rev
Add tens to rev
Multiply hunds by a thousand and Add result to rev
Multiply thous by a hundred and Add result to rev
Print rev to screen

Q: 5

Ask user to enter two numbers
Read numbers and save as num1 and num2 respectively
Ask user to enter operation (+ , - , * , /)
Read operation and save as op
If op equal '+'
    set res as num1 plus num2
Else if op equal '-'
    set res as num1 minus num2
Else if op equal '*'
    set res as num1 Multiply by num2
Else
    set res as num1 Divided by num2
End if
Print res to screen

لو بدنا برمجة يشوف حرف ماله !
I letter equal 'a'
لو حطينا a بدون single quate
ممكن تكونه متغير زي :
a = 'E'

Q: 6

Ask user to add four different numbers
Read numbers and save first number as num1
Save second number as num2
Save third number as num3
Save fourth number as num4
Set max equal num1
If num2 is greater than max
    Set max equal num2
End if
If num3 is greater than max
    Set max equal num3
End if
If num4 is greater than max
    Set max equal num4
Endif
Print max to screen

تعرّض أول رقم هو أكبر رقم وقارنه مع الأرقام الباقي

Q: n1 = 10 n2 = 30 n3 = 3 → بدنا نطلع الرقم الوسطاني

Ask user to enter three different numbers
Read numbers and save first number as n1
Save second number as n2
Save third number as n3
Set res as n1 plus n2 plus n3
set max equal n1
If n2 is greater than max
    Set max equal n2
End If
If n3 is greater than max
    set max equal n3
End If
set min equal n1
If n2 is less than min
    set min equal n2
End If
If n3 is less than min
    set min equal n3
End If
set mid equal res minus max minus min
Print mid to screen

Loops:

Write an algorithm to find and print the average grade for a class of Ten students

initial value
count = 0

final value
count = 9 (لأنه يبدأ من 0)

change
count + 1

Set count equal to zero
Set sum equal to zero
While count is less than or equal to nine
    Ask user to enter first mark (0-100)
    Read mark an save as mk
    Add mk to sum
    Increment count by one
End while
Set average equal to sum divided by ten (count)
Print average to screen

Write an algorithm to find and print the average grade for a class of an unspecified number of students.

Sentinel

Set count equal to zero
Set sum equal to zero
Ask user to enter mark or -1 to stop (علامة توقف)
Read mark and save as mk
While mk is not equal to -1
    Add mk to sum
    Ask user to enter mark or -1 to stop
    Read mark and save as mk
    Increment count by one
End while
If count equal zero
    Print "no mark were enter" to screen
Else
    set avg equal to sum divided by count
    Print avg to screen
End if

Write an algorithm to find the factorial to any given value (n):

Set result equal to one
Ask user to enter number
Read number and save as n
Set value equal to n
While value is great than zero
    set result equal to result multiply by value
    decrement value by one
End While
Print result to screen

Q2:

Set count equal to zero
Set sum equal to zero
Ask user to enter mark or -1 to stop
Read mark and save as mk
While mk is not equal to -1
    Add mk to sum
    Increment count b

    Ask user to enter mark or -1 to stop
    Read mark and save as mk
    Increment count by one
End while
If count equal zero
    Print "no mark were enter" to screen
Else
    set avg equal to sum divided by count
    print avg to screen
End If

```
set count_pass equal to zero
set count_fail equal to zero
Ask user to enter mark or -1 to stop
Read mark and save as mk
While mk is not equal to -1
    If mk is less than sixty
        Increment count_fail by one
    Else
        Increment count_pass by one
    End If
    Ask to enter mark or -1 to stop
    Read mark and save as mk
End While
Print count_pass to screen
Print count_fail to screen
Set total as count_pass plus count_fail
Divid count fail by total and save result as temp
Multiply temp by a hundred and save result as fail percentage
Print fail perc to screen


set sum equal to coun_pass plus count_fail
If sum is equal to zero
    Print (" No mark were entered
Else
    set fail_perc equal to count_fail divided by sum
    Print fail_perc to screen
End If
```

write an algorithm to find the sum of divisions for a given number

20 : 1 + 2 + 4 + 5 + 10 + 20 = 42

Set sum equal zero
set try_num equal to one
Ask user to enter a number
Read number and save as num
While try_num is less or equal than num
    divid num by try_num and save remainder as rem
    If rem equal to zero
        Add try_num to sum
    End If
    Increment try_num by one
End while
Print sum to screen

try_num = val

set value equal to one

Ask user to enter number or -1 to stop
Read number and save as num → set max equal to zero
While num is not equal to -1
    If num is greater than max
        set max equal to num
    End If
    Ask user to enter number or -1 to stop
    Read number and save as num
End while
Print max to screen.