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Contents

Tasks

Algorithms

In chess how many possible moves are there when each player has made three moves?

9 Million

And when each player has made four moves?

288 Billion

State another scenario where very complex algorithms are used.

In an Aeroplane

Describe an algorithm.

A simple set of instructions on how to complete any task

Below explain the steps of riding a bike. You might prefer to show this on hand drawn paper, take a photo and insert below.

Put leg over bike
Sit on saddle
Hold the handlebars
Put one foot on pedal
Move foot on pedal downwards
Move other foot onto pedal
Push down
Iterate previous 4 steps
Stop at destination

Sequence, Iteration and Selection

Explain which parts of the algorithm above are SEQUENCE, ITERATION and SELECTION.

Put leg over bike SEQUENCE
Sit on saddle SEQUENCE
Hold the handlebars SEQUENCE
Put one foot on pedal SEQUENCE
Move foot on pedal downwards SEQUENCE
Move other foot onto pedal SEQUENCE

Push down SEQUENCE
Iterate previous 4 steps ITERATION
Stop at destination SELECTION

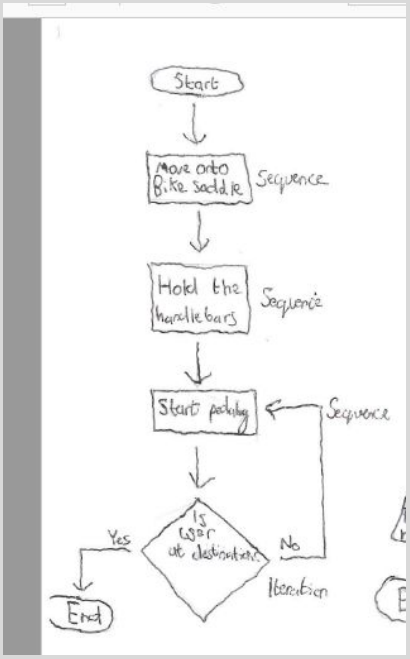
What are the two most important factors that make algorithms successful?

1) Correctness
2) Efficiency

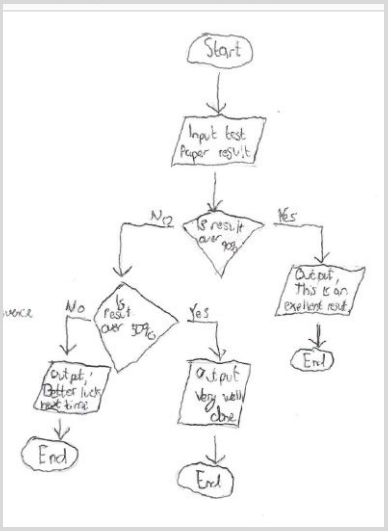
Flowcharts

Instead of just writing a bullet pointed list we can use a diagram to explain an algorithm. These diagrams are called FLOWCHARTS.

Using a FLOWCHART to show the algorithm above redo the process of riding a bike. Annotate where you are using SEQUENCE, ITERATION and SELECTION. This may be quicker and easier done on paper, take a photo and insert below.



Use a flowchart create an algorithm to solve this problem. A teacher is marking his students test papers. If they achieve over 50% he would like the message 'Very well done' displayed. If they achieve over 90%, they should also receive a second message stating 'This is an excellent result'. If they score 50% or lower, the message will be 'You will get there next time'. It might be quicker and easier to do this on paper, take a photo and insert below.



Code the above in Python. Screen shot your code and insert it below. Annotate using comments where there is SEQUENCE, SELECTION and ITERATION.

grader.py - U:/Computing/Python/grader.py (3.5.2)

File Edit Format Run Options Window Help

```
#Jac Fearnley
#15/09/2017
#TeacherGrader

def grader(): #SEQUENCE

    score = int(input("Please enter the score of the student:")) #SEQUENCE

    if score >=90: #SELECTION
        print("Exellent!") #SEQUENCE
    else: #SELECTION
        if score >=50: #SELECTION
            print("Well Done!") #SEQUENCE
        else: #SELECTION
            print("Better luck next time.") #SEQUENCE
```

Use a flowchart create an algorithm to solve this problem. Asking a user for a password. Allowing the user to have three attempts at the password before “Too many failed login attempts, account LOCKED!” is displayed. It might be quicker and easier to do this on paper, take a photo and insert below.

https://repl.it/L2x2/2

Code the above in Python. Screen shot your code and insert it below. Comment where there is SEQUENCE, SELECTION and ITERATION.

In code

Variables and Constants

Define the term VARIABLE and CONSTANT and explain how they are different.

A CONSTANT is a part of the code that always has one value and can be added anywhere in the code
A VARIABLE is a part of the code that has an assigned value which can be changed.

Describe what naming conventions you should use when creating variables.

No spaces or words associated with the language, camelCase or underscores

Pseudocode

Describe pseudocode stating its purpose and advantages.

Pseudocode is a structured English for describing algorithms. It is advantageous to use since it lets you concentrate on the logic and efficiency of the algorithm.

Operators

Describe the terms OPERATOR and OPERANDS. If it helps draw a diagram. This can be done on paper, take a photo and insert below.

OPERATOR is signs that tell the program to perform an operation, OPERANDS are the data an action is performed on.

Complete the table below

Operator	Purpose	Example
+	Adding numbers	5+5=10
-	Subtracting numbers	10-5=5
*	Multiplies numbers	5*5=25
/	Divides Numbers	25/5=5
DIV	Quotient, gives integer answer in division	13 DIV 3 = 4
MOD	Modulus function, gives remainder in division	44 MOD 8= 4
^	Indices	5^5=25
==	Checks if 2 things are equal	5==7 = FALSE

=	Assigns things	name = int(input("Hi"))
!=	Checks if 2 things are not equal	5!=7 = TRUE
<	Is less than	5<7=TRUE
>	Is greater than	5>7=FALSE
<=	Is less than or equal to	3<=3=TRUE
>=	Is greater than or equal to	3>=2=TRUE

Describe the difference between using = and ==?

= is the assign operator, it assigns values. == is the is equal to operator, is checks if two things are equal.

Provide examples from the list above of mathematical / **arithmetic** operators.

+, -, *, /, DIV, MOD and ^

Provide examples from the list above of comparison / **relational** operators.

==, =, !=, <, >, <= and >=

IF, ELSE ELSE IF

A teacher would like a program that allows her to enter three test results and calculate the average. Then if the average is 50 or above it should output the message 'PASS' and if it is below 50 the message should be 'FAIL'. Design using pseudocode the algorithm for this problem.

```
test1 = input("Enter test 1 percentage")
test2 = input("Enter test 2 percentage")
test3 = input("Enter test 3 percentage")

average = test1 + test2 + test3 / 3

if average >= 50 then print "PASS"
else print "FAIL"
endif
```

Code the above. Screenshot your code and insert the image below.

https://repl.it/L5e8/0

Describe the difference between ELSE and ELSEIF.

Else is used at the end of an if chain, elseif is used in the middle.

Describe the purpose of indentation

To indicate which part of the code are defining functions or in if statements etc.

Boolean Operators

Complete the table below (Example Code)

Operator	Purpose	Example
AND	Both parameters must be true for the if to run.	If 5 == 5 and 2 == 2: RUNS
OR	Runs if just one of the conditions is met.	If 5 == 5 or 3 == 2: RUNS
NOT	Parameters must be false for the code to run.	If not 5 == 3: RUNS

A student would like to select a suitable T-shirt from local shops. The colour could be red, blue or white, the size should be medium and the shop must be no more than 10 miles away. Design using pseudocode the answer to this problem.

```
Tcolour = input("Input the colour of the T-Shirt")
Tsize = input("Input the size of the T-Shirt")
shopDistance = input("Input the distance the shop is.")

If Tcolour == red or blue or white
   Then if size == medium
            Then if shopDistance < 10
                     Then print("RIght T-Shirt")
```

Code your design. Screenshot and inset the image below.

https://repl.it/L5fr/0

Nested IF Statements

What does the term 'Nested If Statements' mean?

Using if statements inside other if statements

Switch / CASE

Show using pseudo code how a solution using multiple IF Statements can also be completed using Switch/CASE. Use the same context for both the IF Statement and Switch/CASE.

```
answer = input("Input your answer")

if answer == "A":
    print("Correct")
elseif answer == "B"
    print("Incorrect")
elseif answer == "C"
    print("Incorrect")
else answer == "D"
    print("Incorrect")
endif
```

```
answer = input("Input your answer")

switch answer:
    case "A":
        print("Correct")
    case "B":
        print("Incorrect")
    case "c":
        print("Incorrect")
    case "d":
        print("Incorrect")
    default:
    print("You have not made a valid choice.")
```

Key Terms

Key Term	Description
Sequence	An action which leads to the next action
Sub Tasks	A task done in the code to perform the main task.
Decision	If the code has to miss out some code for example an if statement.
Process	A series of operations

Variable	A value that can change and be used throughout the code
Pseudocode	Code the is simple and can't actually be used but can be understood by different programmers.
Identifier	Function names or variable/constant names etc.
Constant	A value that cannot change and be used throughout the code
Comment	A way to leave messages in the code for other to read
Operator	A character that tells the program to do something mathematical
Operand	Any item that an operator operates on.
Parentheses	Brackets
Relational Operator	An operator that tell you if somethings are related
Logical Operator	Operators that are based off logic such as AND or NOT
Mathematical Operator	Operators used to do maths such as + or DIV or MOD

Questions

1. Using pseudocode show how a value of Brian would be assigned to a variable named firstName.

```
firstName = "Brian"
```

2. Using pseudocode show how a value of 15 and be compared to see if it is equal to 14.

```
15 == 14
```

3. Using pseudocode show how a boolean operators can be used to select all the people in a class that are male with blue eyes but do not have brown hair.

```
if person == male and person == blueEye and person != brownHair
```