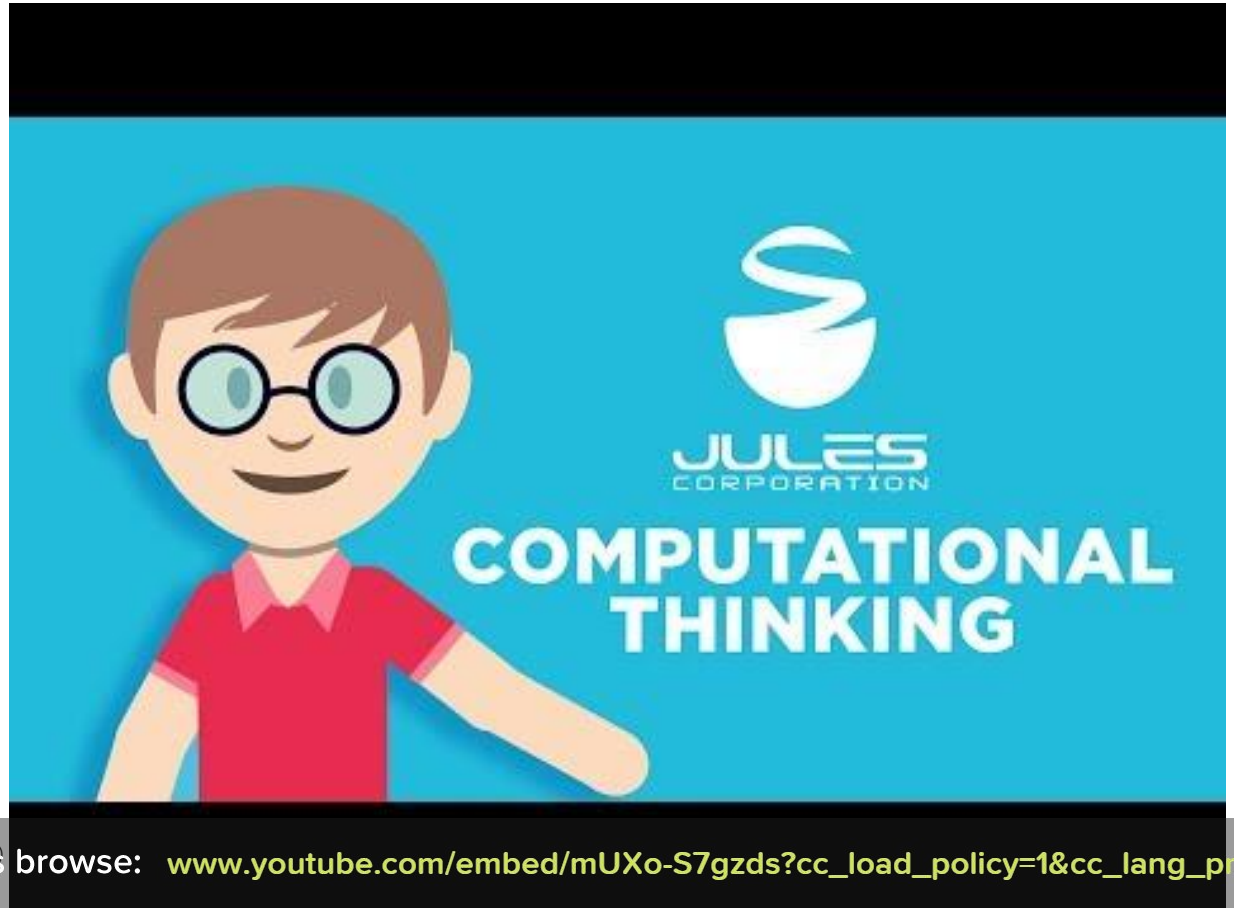
Computational Thinking?

Session-2

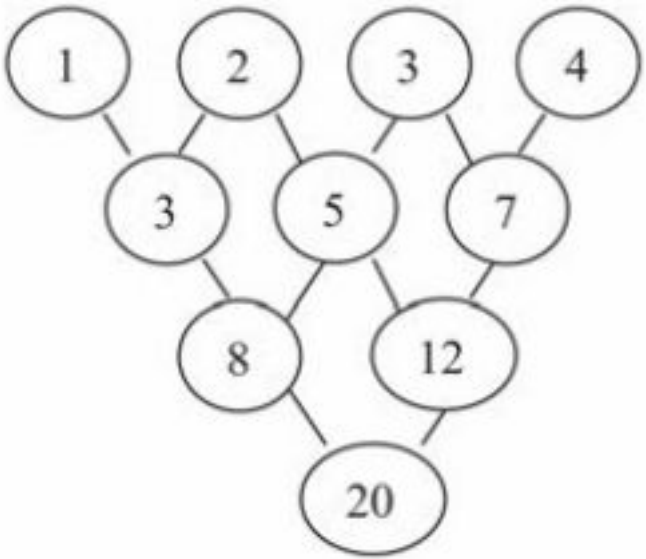
Were you able to finish pre-class work for Computational Thinking?

Recap Time



Students browse: www.youtube.com/embed/mUXo-S7gzds?cc_load_policy=1&cc_lang_pref=tr...

Find the “?”



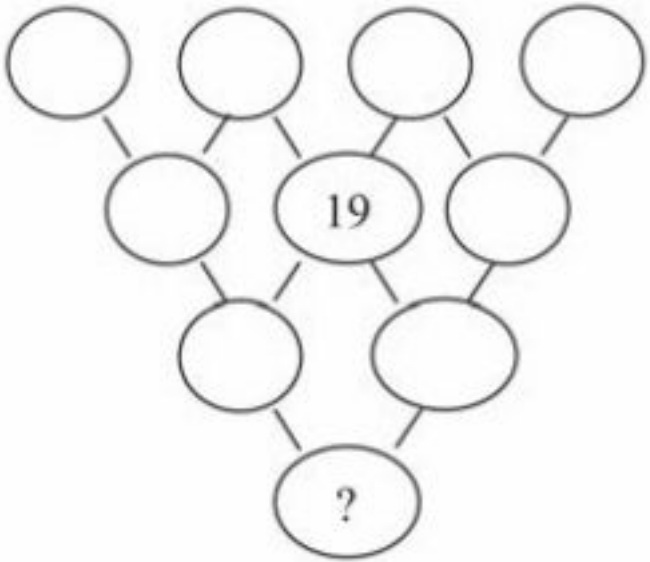


Table of Contents

4 Algorithm

Review

Algorithm

- Step by step
- Clearly defined
- One simple job at a time
- Instruct computer what to do

Example: Let's brew a tea

- START
- Fetch a tea cup
- Add 300 ml of water to the kettle
- Boil the water until the kettle switches itself off
- Place a new tea bag into the bottom of the cup
- Pour 200 ml of boiling water from the kettle, into the cup
- Leave the tea bag to stew for 10 seconds
- Use a metal spoon to stir the tea bag for 3 seconds
- Using the spoon, remove the tea bag from the cup
- Dispose of the tea bag
- END

Example

- This example describes the route

  a person will take to leave the house

  and

  go to work

  and

  what they will do first when entering the workplace.

Example

- Get out of home
- Walk to the bus stop
- Wait for the bus at the stop in the direction you are going
- Get on the bus when your bus arrives
- Put your ticket in the ticket box
- Walk back when you're close to where you're landing
- Press the warning light indicating that you will descend
- Get off when the bus stops
- Walk to your workplace
- Enter through the entrance door of the workplace
- Say hello to your coworkers
- Wear work clothes
- Start your job

1 Pseudocode

Pseudocode

Let's discuss and try to predict what does pseudocode mean!

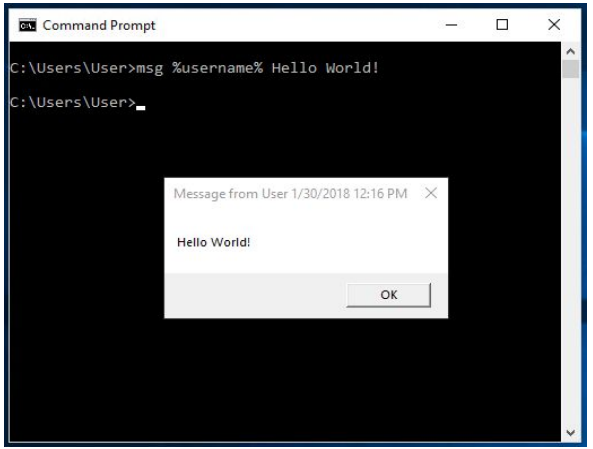
Students, write your response!

Pseudocode

- Pseudocodes are one of two popular ways to represent an algorithm.
- Pseudocode is an informal way of representing a computer program or an algorithm.
- It looks like a programming language though, it should be written in a programming language for it to be executed. It's language-agnostic.
- Writing pseudocode is basically writing what you want your programm to do in English.
- Aims to mimic the general style of a programming language

Pseudocode

```
OUTPUT 'What is your name?'
INPUT user inputs their name
STORE the user's input in the name variable
OUTPUT 'Hello' + name
OUTPUT 'How old are you?'
INPUT user inputs their age
STORE the user's input in the age variable
IF age >= 70 THEN
    OUTPUT 'You are aged to perfection!'
ELSE
    OUTPUT 'You are a spring chicken!'
```



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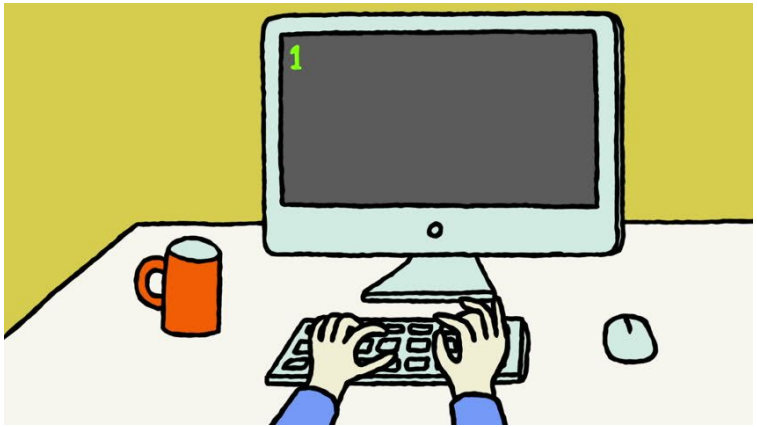

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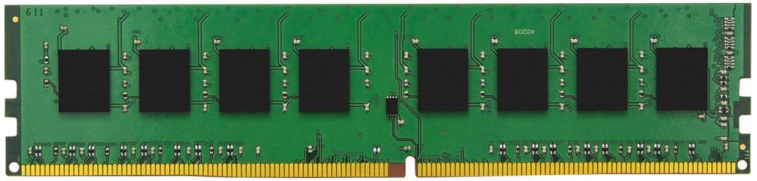


Keyword

There are these keywords that are widely used, you can use your own keywords, but these are the most frequently used amongst other computer programmers and should not be used as variable names.

```
START, BEGIN: This is the start of your pseudocode.
INPUT: This is data retrieved from the user through the input device.
READ, GET: This is used when reading data from a data file.
PRINT, DISPLAY, SHOW, OUTPUT: This will show your output to a screen.
COMPUTE, CALCULATE: To calculate the result of the expression.
SET, INIT: To initialize values
INCREMENT, BUMP: To increase the value of a variable
DECREMENT: To reduce the value of a variable
END: This is the end of your pseudocode
```

Variable

Variable is a symbolic name associated with a value and whose associated value may be changed.

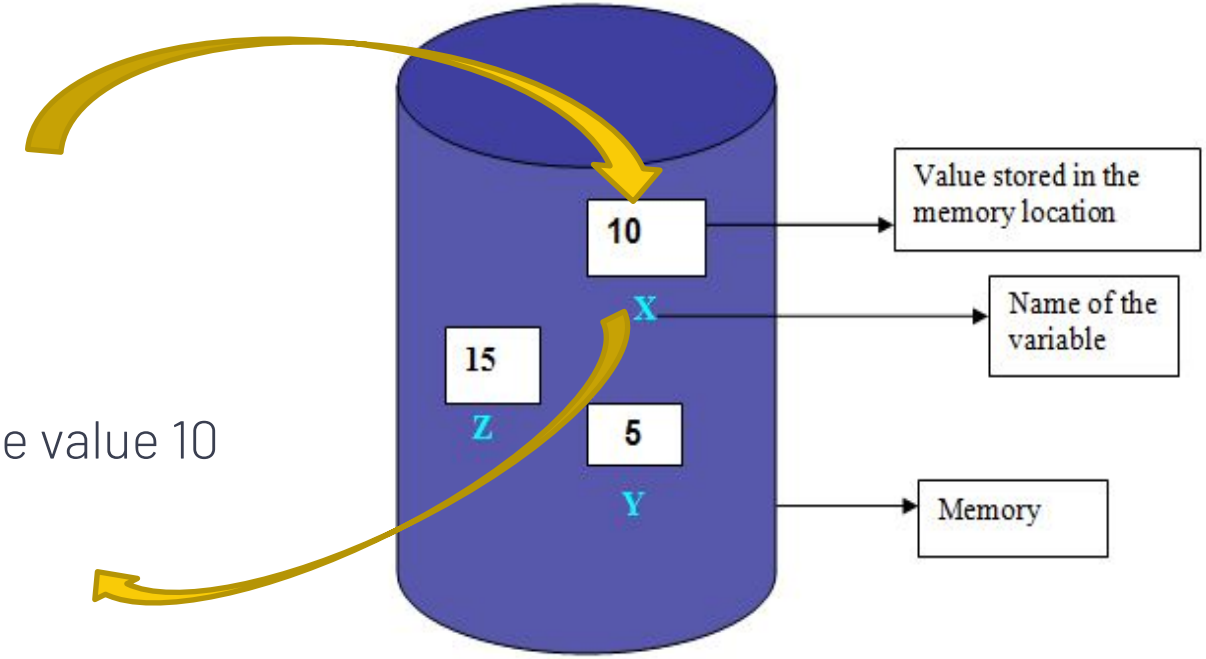
X = 10

"X" is variable name

10 is variable value

X=10 meaning is X's variable value 10

print x



Arithmetic Operators

OPERATOR	MEANING
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulo Division

!

In addition to these, there may be other arithmetic operators specific to the programming language you are using.

Example

A pseudocode that outputs the sum of two numbers.

```
START

PRINT "enter first number"

INPUT  number1

PRINT "enter second number"

INPUT  number2

sum=number1+number2

PRINT sum

END
```

Example

```
START

PRINT "enter first number"

INPUT  number1

PRINT "enter second number"

INPUT  number2

sum=number1+number2

PRINT sum

END
```

Short form

```
START

INPUT "enter first number",number1
INPUT "enter second number",number2
sum=number1+number2

PRINT sum

END
```

Shorter form

```
START

INPUT number1 ,number2
sum=number1+number2

PRINT sum

END
```

Question

Let's write a pseudocode for calculating Mary's wage.

Inputs : hours and rate

Output: pay

Students, write your response!

Question

Let's write a pseudocode for calculating Mary's wage.

Inputs : hours and rate

Output: pay

```
START

INPUT hours, rate

pay=hours * rate

OUTPUT pay

END
```

Decision / Condition

A decision structure is a construct in a computer program that allows the program to make a decision and change its behavior based on that decision.

- IF
- IF... ELSE...
- IF...ELSE IF...ELSE

IF...

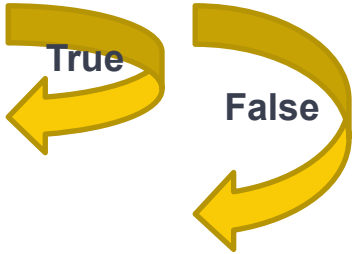
This keyword is used if a certain condition has to be met for the upcoming block to be executed.

each condition has two possibility

If condition

[Then] [statements]

End If



True / False

As you can see we also use indentation in order to declare that “smile” is being executed inside the if statement above it.

IF...

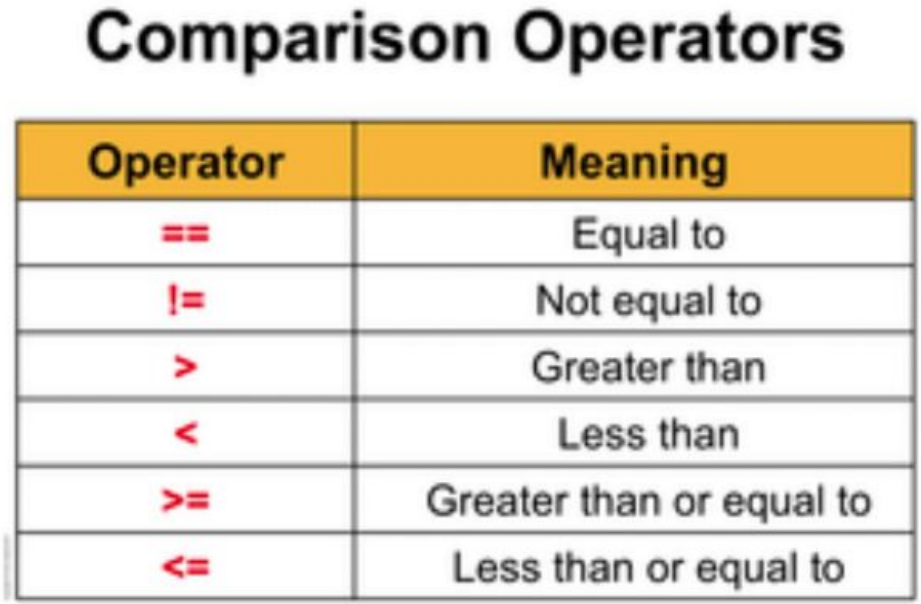
For example:

IF you are happy

    Then smile

ENDIF

Comparison Operators



Comparison Operators

Operator	Meaning
==	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

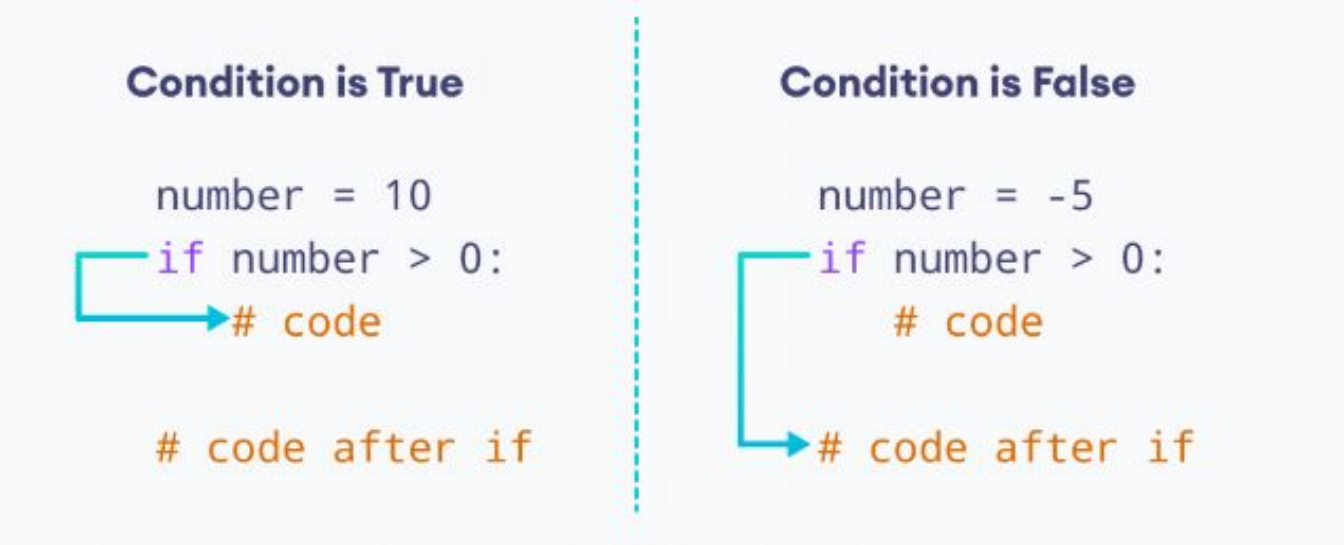
!

In addition to these, there may be other arithmetic operators specific to the programming language you are using.

Comparison Operators

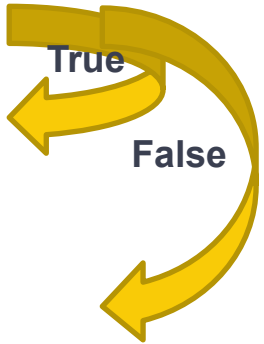
Operators	Meaning	Example	Result
<	Less than	5<2	False
>	Greater than	5>2	True
<=	Less than or equal to	5<=2	False
>=	Greater than or equal to	5>=2	True
==	Equal to	5==2	False
!=	Not equal to	5!=2	True

Comparison Operators



IF...ELSE...

```
If condition  Then
 [ statements ]
Else
[ else statements ]
End If
```



IF...ELSE...

IF you are tired
    Then rest
ELSE
    Keep working
END IF

IF… ELSE IF……. ELSE

```
If condition
[ Then ] [ statements ]
ElseIf elseifcondition
[ Then ] [ elseifstatements ] ]
ElseIf elseifcondition
.
.
.
Else
[ elsestatements ] ]
End If
```

IF... ELSE IF... ELSE

IF you are tired
    Then rest
ELSE IF you are stressed
    Then relax
ELSE
    Keep working
END IF

IF... ELSE IF... ELSE

IF you are tired
    Then rest
ELSE IF you are stressed
    Then relax
ELSE
    Keep working
END IF

IF... ELSE IF... ELSE

IF you are happy

    smile

ELSE IF you are angry

    Calm down

ELSE

    try to be happy

ENDIF

Exercise

Write a pseudocode that takes a number as an input and prints true if it is greater than 10 and false otherwise.

Students, write your response!

Exercise

```
START
INPUT num
IF num > 10
        print "true"
ELSE
        print "false"
END
```

Exercise

Let's write a pseudocode for calculating Mary's wage.

Inputs : hours and rate

Output: pay

Students, write your response!

Exercise

```
START
INPUT hours,rate
IF hours < 40
        pay = rate * 40
ELSE
        pay = 40 * rate + (hours - 40) * rate * 1.5

PRINT pay
END
```

Exercise

Takes a number and show is the number positive, negative or neutral?

Students, write your response!

Exercise

START

Input number

IF number>0

    print ‘positive’

ELSE IF number<0

    print ‘negative’

ELSE

    print ‘neutral’

END

Exercise

Find the largest of the 3 entered numbers.

Students, write your response!

Exercise

```
START
INPUT a,b,c
big=a
IF b>big
    big=b
IF c>big
    big=c
print big
END
```

Logical Operators

Operator	Meaning	Example	Result
&&	Logical and	(5<2)&&(5>3)	False
||	Logical or	(5<2)||(5>3)	True
!	Logical not	!(5<2)	True

Exercise

Find out whether the student is successful or unsuccessful according to the grade entered.

Students, write your response!

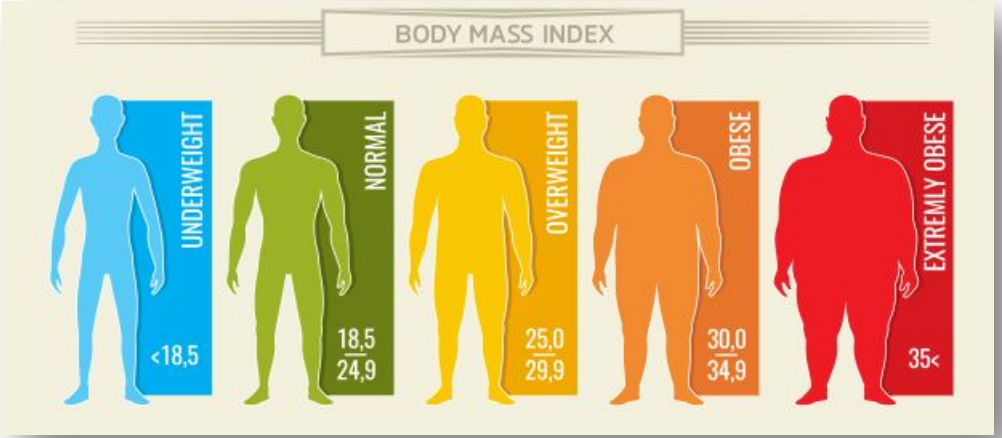
Exercise

```
START
INPUT “enter student grade”, grade
IF grade >=0 and grade<50
    PRINT “unsuccessful”
ELSE IF grade >=50 and grade <=100
    PRINT“successful”
ELSE
    PRINT “incorrect entry”
END
```

Assignment

Write a pseudocode that finds the classification of body mass index by taking the person's height and weight values.

$$\text{Body Mass Index} = \frac{\text{Weight (in kg)}}{\text{Height}^2 \text{ (in m)}}$$



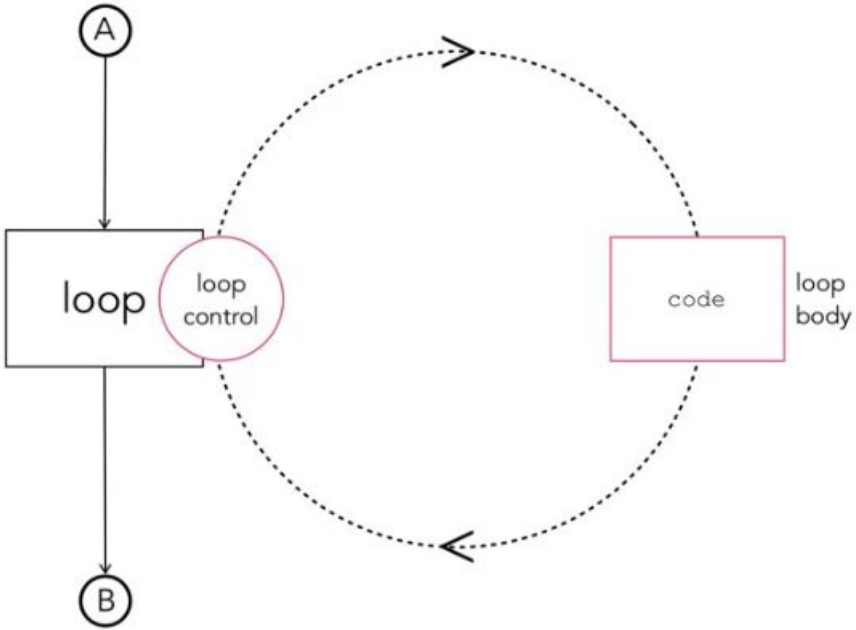
Assignment

Calculate the shipping fee according to the information given in the table

distance	price multiplier by distance
0-500	50
500-1000	100
1000+	500

LOOPS

A loop is a sequence of instruction s that is continually repeated until a certain condition is reached.



FOR structure

For loop runs for each element inside a group.

For example:

```
FOR every day of the week
    Count;
ENDFOR
```

FOR structure

For loop runs for each element inside a group.
For example:

For every 25 minutes of study

    Earn one Pomodoro;

endfor

WHILE Structure

While is similar to the for loop, differently it runs the loop until the condition provided is unsatisfied.

Example:

```
Apples = 5
Oranges = 10
While apples < oranges
        increase apples;
endwhile
```

Let's wash the dishes

Let's wash the dishes. Think that we have all the tools etc.

Let's wash the dishes

gather the dirty dishes
IF you have a dishwasher around you
    put the dirty dishes inside the dishwasher
    set the settings of the dishwasher
    WHILE the time set is not over
        wait
ELSE
    WHILE dishes are not clean
        take one of the dishes
        wash it with your hand
        dry it and put it aside

THANKS!

Any questions?