Python
Lesson Plan: Class 07 / PRG / 05 / 10

Overall goal of the lesson	**Children will learn about the Python programming language**
Prior knowledge required	Mathematical logic and Mathematical Formula.

MODULE 1:   **Module time:** 1 Week

Goal:	Children to learn about the basic level of Python programming language
Description:	Python is an interpreted high-level programming language for general-purpose programming created by Guido van Rossum. Python is a superb language for teaching programming at introductory level to children without talking about many of the nuances in real computer science implementations. This document lists the problems that the children would develop as part of the learning of Python language.
Material required:	**Physical: None.** **Electronic: Python installed on the machines** **Editor : Sublime text editor is preferred.**
Procedure Summary:	Request to follow the steps mentioned below for getting the students acquainted with Python. All steps to be performed by the teacher and students to follow the same. Students to perform later projects by themselves.

Procedure Details:-	A. **First explain that Python is a programming language using which you can create your own interactive software's, which can help them in solving daily life problems quickly and precisely like making a calculator of own.**
	B. **Motivate students to solve below questions to make them feel comfortable in Python. Questions have been divided into three sections, 1) Easy 2) Normal 3) Hard.**
	Each Section has been further divided into two subsections one is Normal questions and another Code Chef questions with link.
	C. **Students should firstly be able to solve 50 % of easy level questions before moving to Medium level. Hard level questions should only be approached after completely solving medium level questions.**
	
	Easy:
	  1. Write a program to accept two numbers (a and b) where a > b and print their sum, product, quotient, remainder, difference and a to the power b.
	  2. Write a program to accept speed in km/hr and convert it into meters/second and then print this value.
	  3. Write a program to accept the radius of a circle and print its area and perimeter.
	  4. Write a program to accept a number from the user and check if it is positive, negative or zero.
	  5. Write a program to accept a number from the user and check if it is an even number or not.
	  6. What is the difference between these two statements?

a. if a%2==0:

    print("EVEN")

b. if a%2==0:

      print("EVEN")

7. Fill in the blanks to take input into a suitable data type:

print("What is name of the boy?")

name = **input()**

print("How old is the boy?")

age = _____

print("The boy lived in England for two and a half years, what is that in decimal?")

years = _____

print("There once was a young boy called "+ name)

print("He told his friends that he had be living in England for two and a half years that is "+ years +" in decimal.")

print("He is "+ age +" years old")

8. Write a program to take input of 3 numbers and print their product.

9. Write a program to print "Hello World" 50 times as below:

    Hello World Hello World Hello World Hello World....

10. What will be the outcome of these Boolean statements? Answer in True or False.

STATEMENT	True or False
5 > 9	False
(3 * 4) == (1 * 12)	
(5 x 7) IS NOT > (6 x 4) + 11	
24 * 5 < 36 * 2	
(9 * 11) != (100 - 4)	
'1000' > '110'	

11. Write a code to print sum of first n numbers.

12. Write a code to multiply first n numbers.

13. Write a python program which will take all the three angles of a triangle as   input and will check whether the given triangle is valid or not using if else.

Input Format

The first line contains a float value, 1st angle of the triangle.

The Second line contains a float value, 2nd angle of triangle.
The Third line contains a float value, 3rd angle of triangle.
Output Format
 Print **Valid triangle** or **Invalid triangle**.

Sample Input
a) 97.60
   62.40
   20
b) 70
   50.50
   70.50
Sample Output
      a)   Valid triangle
      b)   Invalid triangle

   14. Make a program which takes three numbers A, B and C from the user and prints the minimum and maximum among them.

Input Format
The first line contains an Integer value, A.
The Second line contains a float value, B.
The Third line contains a float value, C.
Output Format
 Print minimum and maximum among them.
Sample Input
40
50
30
Sample Output
Minimum = 30
Maximum = 50
CodeChef Problems:

    1. **Number Mirror**

       Problem Statement

       Write a program that accepts a number, n, and outputs the same.

       Input

       The only line contains a single integer.

       Output

       Output the answer in a single line

       Sample Input

       123

       Sample Output

       123

    2. **Add Two Numbers**

       Problem Statement

Shivam is the youngest programmer in the world, he is just 12 years old. Shivam is learning programming and today he is writing his first program. Program is very simple, given two integers A and B, write a program to add these two numbers.

Input

The first line contains an integer T, total number of test cases. Then follow T lines, each line contains two Integers A and B.

Output

Add A and B and display it.

Sample Input

3

1 2

100 200

10 40

Sample Output

3

300

50

Source: https://www.codechef.com/problems/FLOW001

3. **Find Remainder**

Problem Statement

Write a program to find the remainder when two given numbers are divided.

Input

The first line contains an integer T, total number of test cases. Then follow T lines, each line contains two Integers A and B.

Output

Find remainder when A is divided by B.

Sample Input

3

1 2

100 200

10 40

Sample Output
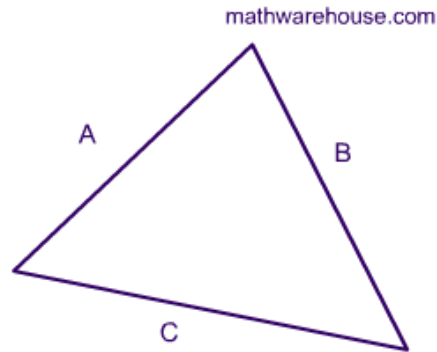
1

100

10

Source: https://www.codechef.com/problems/FLOW002

Medium:

1. Write a program to accept 3 sides of a triangle and use the Heron's Formula to calculate area of a triangle.

Heron's Formula

mathwarehouse.com

$$S = \frac{A + B + C}{2}$$

$$Area = \sqrt{S(S - A)(S - B)(S - C)}$$

2. Write a program to accept two numbers in two variables and print them by swapping their values without using a third variable.

3. **Challenge Problem:** Write a program to input a 2-digit number and print its reverse. Eg. Input: 59 Output: 95

4. Write a program that inputs 3 numbers from the user and prints the maximum of 3 numbers. Can we do it with just 2 conditions?

5. Write a program to input 3 sides of a triangle say a,b,c and check if the sides make a valid triangle or not.
   For the sides to form a valid triangle, it needs to satisfy the following 3 conditions:
   a+b>c, a+c>b and c+b>a.

6. Write a program to input 3 sides of triangle. Check if the triangle is equilateral, isosceles or scalene. Use logical operators as required.

7. Write a program to input 3 numbers from a user and find the second maximum of the three. Do it without using any logical operator.

8. Write a program to input a number from the user, print "Fizz" and "Buzz" when the input is divisible by 3 or 5 respectively. Print "Fizz-Buzz" in case the number is divisible by both and the number itself if the number is divisible by none. Use comments in the program to explain.

9. Write a program to take user's name as input and print the input along with the greeting 100 times. Ex. if the input is "Rahul", then
   Good Day Rahul Good Day Rahul Good Day Rahul...

10. Write a program to take input of 5 numbers and print its average.

11. Does your program in question 10, give correct output for the input: 3.2, 4, 1.2, 15, 8? If not, modify the program to handle this input.

12. Write a program to print numbers from 200-500 using while loop. Extend this code to print numbers from some N and till some M. Here M and N will be entered by user

13. Write a program to print the sum of first n even numbers.

14. Find max of N numbers.

15. Given 2 numbers - find the HCF

16. Check Reverse of a number.

17. Check for a Palindrome

18. Accept a number, print all of its factors.

19. Accept a number, check if it is a prime number.

20. Go through below two codes. There are four multiple choice questions given in the comment sections i.e. after '#'. You need to answer them.

   Note: -Assume below codes have been executed on python 3
   1)My_int = 10 + 5
      Print(My_int)   # What will be output? A)10+5 B)15 C)error
      My_int="Value changed to string"
      Print(My_int)   # What will be output? A)10+5 B) 15
                                                                       C) Value changed to string D) error

   2)My_int = Input(" Enter the number ") **# Assume user entered 10+5**
      Print(My_Int)   # What will be output? A)10+5 B)15 C) error
      My_int="Value changed to string"
      Print(My_int)   # What will be output? A)10+5 B)15
                                                                       C)Value changed to string D) error

21. Suppose Dominos manager asked you to develop an Interactive software for them which will do following tasks –
    It will ask for the three variable from the user one by one. Variables will be
    a) Rate of pizza
    b) Discount percentage
    c) GST percentage
    Your software should return net amount customer need to pay to Dominos.

Input Format
The first line contains a float value, Pizza rate.
The Second line contains a float value, Discount percentage.
The Third line contains a float value, GST percentage.
Output Format
 Print net amount customer need to pay to Dominos.
Sample Input
500.00
12.5
5
Sample Output
459.375
Explanation
Price after discount = 500 – (500 *12.5/100) = 437.50
Adding GST to above price =437.50+(437.50*5/100) = 459.375

22. Write a python program which take User_Name ,Python_Score and Math_Score as inputs and print the below statement.
    " Hi User_Name, your total score is (Python_Score+Math_Score) ".

Input Format

The first line contains a single string, User_Name.

The Second line contains an integer, Python_Score, where Python_Score <=100.

The Third line contains an integer, Math_Score, where Math_Score <=100.

Output Format

Print "Hi User_Name, your total score is (Python_Score+Math_Score) ".

Sample_Input

Ram

90

95

Sample_Output

Hi Ram, your total score is 185.

23. Write the outputs of following print functions. **In case of any error in print statement write "ERROR".**

     a. print(" Hello , \n I love Python \\n Maths)

     b. print(3>5)

     c. print('3>5 and 6>4')

     d. print(3>5 or 6>4)

     e. print("33"*4)

     f. print("42"+22)

CodeChef Problems

1. **ATM**

    Problem Statement

    Pooja would like to withdraw X $US from an ATM. The cash machine will only accept the transaction if X is a multiple of 5, and Pooja's account balance has enough cash to perform the withdrawal transaction (including bank charges). For each successful withdrawal the bank charges 0.50 $US. Calculate Pooja's account balance after an attempted transaction.

    Input

    Positive integer 0 < X <= 2000 - the amount of cash which Pooja wishes to withdraw.

    Nonnegative number 0<= Y <= 2000 with two digits of precision - Pooja's initial account balance.

    Output

    Output the account balance after the attempted transaction, given as a number with two digits of precision. If there is not enough money in the account to complete the transaction, output the current bank balance.

    Example 1 - Successful Transaction

    Sample Input

    30 120.00

    Sample Output

    89.50

    Example 2 - Incorrect Withdrawal Amount (not multiple of 5)

    Sample Input

    42 120.00

    Sample Output

120.00

Example 3 - Insufficient Funds

Sample Input

300 120.00

Sample Output

120.00

Source: https://www.codechef.com/problems/HS08TEST

2. **Sum of First and Last digit**

Problem Statement

If given an integer N . Write a program to obtain the sum of the first and last digit of this number.

Input

The first line contains an integer T, total number of test cases. Then follow T lines, each line contains an integer N.

Output

Display the sum of first and last digit of N.

Sample Input

3

1234

124894

242323

Sample Output

5

5

5

Source: https://www.codechef.com/problems/FLOW004

3. **Sum of digits**

Problem Statement

You're given an integer N. Write a program to calculate the sum of all the digits of N.

Input

The first line contains an integer T, total number of testcases. Then follow T lines, each line contains an integer N.

Output

Calculate the sum of digits of N.

Sample Input

3

12345

31203

2123

4. **Life, the Universe, and Everything**

   Problem Statement

   Your program is to use the brute-force approach in order to find the Answer to Life, the Universe, and Everything. More precisely... rewrite small numbers from input to output. Stop processing input after reading in the number 42. All numbers at input are integers of one or two digits.

Sample Input:

1

2

88

42

99

Sample Output:

1

2

88

Source: https://www.codechef.com/problems/TEST

Hard:

1. Find second max out of N numbers.

2. Write a code to print the following pattern. Take input from the user to print number of rows   he wants to print.

```
        *
       ***
      *****
     *******
    *********
   ***********
  *************
 ***************
*****************
```

3. Write a program to print the following pattern. Take input from the user to print number of rows he wants to print.

   1

   12

   123

   1234

12345

....

4. Suppose you visited a bank. When Branch Manager came to know about your coding profile, he asked you to develop an interactive software which will ask for the **amount** as the input and it will return minimum number of notes (of lower denomination) bank should give in exchange of the amount.

Note: - Allowed denominations are 1,2,5,10,20,50,100,500,2000.

Input Format

An Integer, amount, where amount >0.

Output Format

Print Minimum no of notes bank should give in exchange of amount.

Sample Input

3337

Sample Output

10

Explanation

Denomination	Notes
2000	1
500	2
100	3
50	0
20	1
10	1
5	1
2	1
1	0
Total	10

So in the above case your software should return total number of notes =10.

5. Predict the output of following python program.

```
i=1
while (i < 10) :
  print(i**i, end= ' ')
      if(i%4==0):
          break;
  i=i+1
print(i)
```

6. Given a natural number N, can you write a python program which will print the sum of squares of First N natural numbers.

Input Format

A natural number N, Where N<=1000.

Output Format

Print the sum of squares of first N natural numbers.

Sample Input

4

Sample Output

30

Explanation

We print the sum of square of first 4 natural numbers, which is 1^2 $+2^2 +3^2 +4^2 =30$.

7. Write a Python code which will print below pattern. Use while or for loop.

1
2 4 6
3 6 9 12 15
4 8 12 16 20 24 28
5 10 15 20 25 30 35 40 45

CodeChef Problems

1. **Reverse the number**

   Problem statement

   If an Integer N, write a program to reverse the given number.

   Input

   The first line contains an integer T, total number of testcases. Then follow T lines, each line contains an integer N.

Output

Display the reverse of the given number N.

Sample input

3

12345

31203

2123

Sample Output

54321

30213

3212

   Source: https://www.codechef.com/problems/FLOW007

2. **GCD and LCM**

   Problem Statement

   Two integers A and B are the inputs. Write a program to find GCD and LCM of and B.

   Input

   The first line contains an integer T, total number of testcases. Then follow T lines, each line contains an integer A and B.

   Output

   Display the GCD and LCM of A and B separated by space respectively.

   Sample Input

   3

   120 11

   10213 312

   10 3

   Sample Output

   1 1320

	1 3186456
	1 30
	Source: https://www.codechef.com/problems/FLOW016
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