Logic Building Hour (LBH) Plan

Background: Improving logic building skill is an important aspect in a programmer's journey. This training program is designed to nurture this skill in beginners. Logic building skill can be improved only by regular and focused practice.

What is Logic Building Hour (LBH)?
Logic Building Hour (LBH) is a dedicated 1 to 1.5 hours per day, when the students are expected to work on logic building exercises. The students are advised to choose any 1.5 hours' slot per day as per their convenience.

Should the students start Logic Building Hour (LBH) from day-1 of the learning?
No. For the initial 2 to 3 days, the students should focus on understanding the fundamentals of the programming language. It is expected that logic building practice must start from day-3 or day-4.

Below is a suggested day-wise plan to be followed for the Logic Building Hour (LBH)

<table>
<tr><td>Day-1</td><td rowspan="2"><u>Objective of Day1 and Day2 :</u> Learn the basics of the programming language

During the first two days of PBL, the students should have learnt the fundamentals of programming language and should be comfortable with the basic programming constructs.
- conditional statements
- looping constructs
- data types</td></tr>
<tr><td>Day-2</td></tr>
<tr><td></td><td><u>By the end of Day2 :</u>Students should be able to demonstrate their understanding of 'conditions' and 'loops' by being able to write the below programs

<u>Programs to demonstrate learner's understanding of "Conditional statements"</u>
• Write a program to accept a number N and print whether it is positive, negative or zero
• Write a program to accept two numbers and print the greater value of the two
• Write a program to accept a number N and print whether the number is EVEN or ODD
• Write a program to accept two numbers and print whether their sum is EVEN or ODD

<u>Programs to demonstrate learner's understanding of "Looping constructs"</u>
• Write a program to print all numbers from 1 to 100 i.e. 1 2 3 4 5 6 7 . . . 98 99 100
• Write a program to print alternate numbers starting from 1 to 99 i.e. 1 3 5 7 9 11 13 . . . 95 97 99
• Write a program to print alternate numbers starting from 0 to 100 i.e. 0 2 4 6 8 10 12 . . . 96 98 100
• Write a program to print all numbers backwards from 100 to 0 i.e. 100 99 98 97 96 . . . 4 3 2 1 0
• Write a program to print numbers backwards from 100 to 1 by skipping 2 numbers i.e. 100 97 94 91 88 85 82 79. . . 22 19 16 13 10 7 4 1</td></tr>
<tr><td>Day-3</td><td>Students who have NOT been able to complete the above mentioned programs on day-2, <u>MUST</u> complete them on day-3.</td></tr>
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Objective of Day3: Learn the use of division / and mod % operations to solve problems

Solve the below questions using the respective IDE (Eclipse for Java, Visual studio for C#, vi for C/C++)

- **Is Even?**
  Write a function to find whether the given input number is Even.
  If the given number is even, the function should return 2 else it should return 1.
  Note: The number passed to the function can be negative, positive or zero. Zero should be treated as Even.

- **Is Odd?**
  Write a function to find whether the given input number is Odd.
  If the given number is odd, the function should return 2 else it should return 1.
  Note: The number passed to the function can be negative, positive or zero. Zero should NOT be treated as odd.

- **Return last digit of the given number**
  Write a function that returns the last digit of the given number.
  Last digit is being referred to the least significant digit i.e. the digit in the ones (units) place in the given number.
  The last digit should be returned as a positive number.
  for example,
  if the given number is 197, the last digit is 7
  if the given number is -197, the last digit is 7

- **Return second last digit of the given number**
  Write a function that returns the second last digit of the given number.
  Second last digit is being referred to the digit in the tens place in the given number.
  for example,
  if the given number is 197, the second last digit is 9

  Note1 - The second last digit should be returned as a positive number.
  i.e. if the given number is -197, the second last digit is 9

  Note2 - If the given number is a single digit number, then the second last digit does not exist. In such cases, the function should return -1.
  i.e. if the given number is 5, the second last digit should be returned as -1

- **Sum of last digits of two given numbers**
  Rohit wants to add the last digits of two given numbers.
  For example,
  If the given numbers are 267 and 154, the output should be 11.
  Below is the explanation -
  Last digit of the 267 is 7
  Last digit of the 154 is 4
  Sum of 7 and 4 = 11

  Write a program to help Rohit achieve this for any given two numbers.
  The prototype of the method should be -
  int addLastDigits(int input1, int input2);

where input1 and input2 denote the two numbers whose last digits are to be added.

Note: The sign of the input numbers should be ignored.
i.e.
if the input numbers are 267 and 154, the sum of last two digits should be 11
if the input numbers are 267 and -154, the sum of last two digits should be 11
if the input numbers are -267 and 154, the sum of last two digits should be 11
if the input numbers are -267 and -154, the sum of last two digits should be 11

Day-4

Objective of Day4: Learn the usage of the mettl tool

Mettl is an automated evaluation tool for coding tests.
Students are advised to read the "Mettl User Guide" to learn the usage of the tool..

Solve the below questions on mettl

Note – These are same questions as day-3 questions. The focus on day-4 is to learn the usage of mettl.

Question Title	Mettl Practice Test Link
Is Even?	https://tests.mettl.com/authenticateKey/2bd025dc
Is Odd?	https://tests.mettl.com/authenticateKey/dbdac2a9
Return last digit of the given number	https://tests.mettl.com/authenticateKey/454f012b
Return second last digit of given number	https://tests.mettl.com/authenticateKey/9f87004e
Sum of last digits of two given numbers	https://tests.mettl.com/authenticateKey/783a1fcf

Day-5

Objective of Day5: Learn the use of division / and mod % operations to solve problems

Question Title	Mettl Practice Test Link
Is N an exact multiple of M?	https://tests.mettl.com/authenticateKey/36c4ef58
Of given 5 numbers, how many are even?	https://tests.mettl.com/authenticateKey/8edbe922
Of given 5 numbers, how many are odd?	https://tests.mettl.com/authenticateKey/67147bd5
Of 5 numbers, how many are even or odd?	https://tests.mettl.com/authenticateKey/607636d7

Logic building approach: Read the document "**An Approach to Logic Building**" (mainly section-B) available in the "Logic Building" link in PBLApp. It suggests a "Divide-and-Conquer" approach to be followed by beginners while developing logic. Students are expected to read the document carefully and follow the approach while solving all subsequent logic building problems.

Day-6

Objective of Day6: Learn to solve math based number problems (will require loops and maths)

Question Title	Mettl Practice Test Link
Is Prime?	https://tests.mettl.com/authenticateKey/b1efaa3d
Factorial of a number	https://tests.mettl.com/authenticateKey/8c1f2ae
Nth Fibonacci	https://tests.mettl.com/authenticateKey/f390cadf
Nth Prime	https://tests.mettl.com/authenticateKey/34fdaa41

Day-7

Objective of Day7: Learn to solve math based number problems (will require loops and maths)

Question Title	Mettl Practice Test Link
Number of Primes in a specified range	https://tests.mettl.com/authenticateKey/87c41143
All Digits Count	https://tests.mettl.com/authenticateKey/ed6b4da
Unique Digits Count	https://tests.mettl.com/authenticateKey/b7aac4a5
Non-Repeated Digits' Count	https://tests.mettl.com/authenticateKey/e46500f5

Day-8

Objective of Day8: Learn to solve number based problems (will require loops)

Question Title	Mettl Practice Test Link
digitSum : sum of all digits in N	https://tests.mettl.com/authenticateKey/ab1d60cc
digitSum even: sum of even digits in N	https://tests.mettl.com/authenticateKey/b55d1714
digitSum odd: sum of odd digits in N	https://tests.mettl.com/authenticateKey/738fdee0
digitSum opt: sum of even or odd digits	https://tests.mettl.com/authenticateKey/a05abbcf

Day-9

Objective of Day9: Learn to solve number based problems

Question Title	Mettl Practice Test Link
Is Palindrome Number?	https://tests.mettl.com/authenticateKey/28c41d9d
Is Palindrome Possible?	https://tests.mettl.com/authenticateKey/f4fdb02
Create PIN using alpha, beta, gamma	https://tests.mettl.com/authenticateKey/be582d9f
Weight of a hill pattern	https://tests.mettl.com/authenticateKey/d612c0e6

Day-10

Objective of Day10: Learn to solve number & string based problems

Question Title	Mettl Practice Test Link

Return second word in Uppercase	https://tests.mettl.com/authenticateKey/4a72723f
is Palindrome (string)	https://tests.mettl.com/authenticateKey/ffe8042
weight of string	https://tests.mettl.com/authenticateKey/387952fc
Most Frequent Digit	https://tests.mettl.com/authenticateKey/916310b8