PROGRAMMING FUNDAMENTALS – ULTIMATE PRACTICE SHEET

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For personal practice & helping batchmates

Whatsapp PF Group Link : https://chat.whatsapp.com/EprAZo9tXl2HWyHu9xZRKA

Topics: Conditions, Loops, Nested Loops, Logic Building – C++

LEVEL 0 – BASIC INPUT / OUTPUT

0.1 Input name & age → Print: "Hello [name], you are [age] years old."
0.2 Add 2 numbers
0.3 Swap 2 numbers using a third variable
0.4 Swap 2 numbers without using a third variable

LEVEL 1 – CONDITIONS PRACTICE

1.1 Check Even or Odd
1.2 Check Positive, Negative, or Zero
1.3 Find Largest of 2 and 3 Numbers
1.4 Simple Calculator (+ - * / %)
1.5 Check if character is vowel or consonant
1.6 Check Leap Year
1.7 Grade Calculator using percentage

LEVEL 2 – BASIC LOOPS (For, While, Do-While)

2.1 Print 1 to N (all 3 loops)
2.2 Print N to 1
2.3 Print even numbers from 1 to N
2.4 Print sum of N natural numbers
2.5 Print product of first N numbers (factorial-style)
2.6 Print digits of a number
2.7 Count digits of a number
2.8 Reverse a number
2.9 Sum of digits of a number
2.10 Multiplication table of a number
2.11 Power of a number (a^b)

LEVEL 3 – NESTED LOOPS + PATTERNS

3.1 SQUARE PATTERN (n = 4)

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

3.2 RIGHT TRIANGLE STAR PATTERN (n = 4)

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

3.3 NUMBER TRIANGLE (n = 4)

```
1
12
123
1234
```

3.4 FLOYD'S TRIANGLE (n = 4)

```
1
2 3
4 5 6
7 8 9 10
```

3.5 INVERTED TRIANGLE (n = 4)

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

*

3.6 PYRAMID PATTERN (n = 4)

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

3.7 PASCAL'S TRIANGLE (n = 5)

```
        1
      1   1
    1   2   1
  1   3   3   1
1   4   6   4   1
```

3.8 ALPHABET PATTERN (n = 4)

```
A
AB
ABC
ABCD
```

3.9 HOLLOW SQUARE (n = 4)

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

3.10 CHECKERBOARD PATTERN (n = 4)

```
# # #
 # #
# # #
 # #
```

LEVEL 4 – LOGIC BUILDING MINI CHALLENGES

4.1 Factorial of a number
4.2 Fibonacci series
4.3 Prime number checker
4.4 Print all primes from 1 to N
4.5 Armstrong number
4.6 Palindrome number

4.7 GCD (HCF) and LCM
4.8 Check if number is perfect (28 → 1+2+4+7+14 = 28)
4.9 Find power without using pow() function
4.10 Decimal to Binary conversion
4.11 Binary to Decimal conversion
4.12 Count frequency of digits in a number

LEVEL 5 – ADVANCED LOGIC BUILDING

5.1 Number guessing game
5.2 Menu driven calculator
5.3 Print first N prime numbers
5.4 Find nth term of a Fibonacci series
5.5 Print all Armstrong numbers in range
5.6 Reverse digits AND check palindrome
5.7 Strong number checker
5.8 Convert temperature (Celsius ↔ Fahrenheit)
5.9 Find smallest and largest digit in a number
5.10 Count number of 0s in a number

LEVEL 6 – DEBUGGING / DRY RUN PRACTICE

6.1
```
int a = 5;
if(a++ == 5) cout << "Hello";
else cout << "World";
```

6.2
```
int x = 10;
while(x-- > 7) {
    cout << x << " ";
}
```

6.3
```
for(int i = 1; i <= 5; i++) {
    for(int j = 1; j <= i; j++) {
        cout << i*j << " ";
    }
    cout << endl;
}
```

TIPS FOR QUIZ

- Dry run nested loops
- Use pen & paper to understand logic flow
- Focus on variable updates (++, conditions)
- Practice edge cases (0, negative, 1)
- If stuck, write steps in plain language

END OF SHEET – MASTER THIS = FULL MARKS
