1. Print Numbers from 1 to 10

Problem: Write a program that prints numbers from 1 to 10 using a `while` loop.

Solution:

```
java
Copy code
public class PrintNumbers {
    public static void main(String[] args) {
        int i = 1;
        while (i <= 10) {
            System.out.println(i);
            i++;
        }
    }
}
```

Explanation: The `while` loop runs until `i` reaches 11. On each iteration, `i` is printed and incremented by 1.

2. Sum of First N Natural Numbers

Problem: Write a program that calculates the sum of the first 10 natural numbers using a `while` loop.

Solution:

```
java
Copy code
public class SumNumbers {
    public static void main(String[] args) {
        int sum = 0;
        int i = 1;
        while (i <= 10) {
            sum += i;
            i++;
        }
        System.out.println("Sum: " + sum);
    }
}
```

Explanation: The loop runs from 1 to 10, adding each number to the `sum` variable, and the total sum is printed after the loop finishes.

3. Print Even Numbers from 2 to 20

Problem: Write a program that prints all even numbers between 2 and 20 using a `while` loop.

Solution:

```
java
Copy code
public class PrintEvenNumbers {
    public static void main(String[] args) {
        int i = 2;
        while (i <= 20) {
            System.out.println(i);
            i += 2;
        }
    }
}
```

Explanation: The `while` loop starts from 2 and increments by 2 on each iteration, printing all even numbers.

4. Factorial of a Number

Problem: Write a program to calculate the factorial of a number using a `while` loop.

Solution:

```
java
Copy code
public class Factorial {
    public static void main(String[] args) {
        int num = 5;  // You can change this value
        int factorial = 1;
        int i = 1;
        while (i <= num) {
            factorial *= i;
            i++;
        }
        System.out.println("Factorial of " + num + " is: " + factorial);
    }
}
```

Explanation: This program calculates the factorial of `num` by multiplying it by all numbers from 1 to `num` using the `while` loop.

5. Reverse a Given Number

Problem: Write a program to reverse a given number using a `while` loop.

Solution:

```
java
Copy code
public class ReverseNumber {
    public static void main(String[] args) {
        int num = 12345;
        int reverse = 0;
        while (num != 0) {
```

```
            int digit = num % 10;
            reverse = reverse * 10 + digit;
            num /= 10;
        }
        System.out.println("Reversed number: " + reverse);
    }
}
```

Explanation: The program extracts the last digit of `num` by using the modulo operator (`num % 10`) and builds the reversed number step by step.

6. Check if a Number is Palindrome

Problem: Write a program that checks whether a number is a palindrome using a `while` loop.

Solution:

```
java
Copy code
public class PalindromeCheck {
    public static void main(String[] args) {
        int num = 121;
        int originalNum = num;
        int reverse = 0;

        while (num != 0) {
            int digit = num % 10;
            reverse = reverse * 10 + digit;
            num /= 10;
        }

        if (originalNum == reverse) {
            System.out.println(originalNum + " is a palindrome.");
        } else {
            System.out.println(originalNum + " is not a palindrome.");
        }
    }
}
```

7. Find the Largest Digit in a Number

Problem: Write a program to find the largest digit in a given number using a `while` loop.

Solution:

```
java
Copy code
public class LargestDigit {
    public static void main(String[] args) {
        int num = 58392;
        int largest = 0;

        while (num != 0) {
            int digit = num % 10;
            if (digit > largest) {
                largest = digit;
            }
            num /= 10;
        }
        System.out.println("The largest digit is: " + largest);
    }
}
```

Explanation: This program extracts each digit of the number and compares it with the current largest digit. It keeps track of the largest one found.

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8. Count the Number of Digits in a Number

Problem: Write a program to count how many digits are in a number using a `while` loop.

Solution:

```
java
Copy code
public class CountDigits {
    public static void main(String[] args) {
        int num = 1234567;
        int count = 0;

        while (num != 0) {
            num /= 10;
            count++;
        }

        System.out.println("The number of digits: " + count);
    }
}
```

Explanation: The `while` loop runs until the number becomes zero, dividing the number by 10 in each iteration to remove the last digit and incrementing the `count` of digits.

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9. Find the Sum of Digits of a Number

Problem: Write a program to calculate the sum of the digits of a number using a `while` loop.

Solution:

```
java
Copy code
public class SumOfDigits {
    public static void main(String[] args) {
        int num = 1234;
        int sum = 0;

        while (num != 0) {
            sum += num % 10;
            num /= 10;
        }

        System.out.println("The sum of digits is: " + sum);
    }
}
```

Explanation: In each iteration, the last digit of the number is added to the `sum`, and the number is reduced by dividing it by 10.

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10. Reverse the Digits of a Number and Find the Difference

Problem: Write a program to reverse the digits of a number and then calculate the difference between the original number and the reversed number.

Solution:

```
java
Copy code
public class ReverseAndDifference {
    public static void main(String[] args) {
        int num = 12345;
        int originalNum = num;
        int reverse = 0;

        while (num != 0) {
```

```
            int digit = num % 10;
            reverse = reverse * 10 + digit;
            num /= 10;
        }

        int difference = originalNum - reverse;
        System.out.println("Difference between " + originalNum + " and " +
reverse + " is: " + difference);
    }
}
```

Explanation: This program first reverses the digits of a number and then calculates the difference between the original number and the reversed one.