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01.

In Java, loops are used to repeat a specific block of code multiple times, which helps in automating repetitive tasks and simplifying the execution of tasks that require the same set of operations to be performed repeatedly.

for loop
while loop
do-while loop

02.

the `break` statement is used to exit a loop prematurely, while the `continue` statement is used to skip the current iteration and move to the next iteration within a loop

continue;

```
        for (int i = 1; i <= 5; i++) {
    if (i == 3) {
       continue;                                output=   i:1
    }                                                     i:2
    System.out.println("i: " + i);                       i:4
}                                                         I:5
```

break;

```
        for (int i = 1; i <= 5; i++) {
    if (i == 3) {
       break;                                   output=i: 1
                                                          i: 2
    }
    System.out.println("i: " + i);
}
```

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03.

An "infinite loop" in programming is a loop that continues to execute indefinitely, never reaching a natural or intended termination point.

```
while (true) {
  // Code
}
```

04.

1..Use a Break Statement

```
while (true) {
   // Some code
   if (condition) {
      break; // Exit the loop
   }
}
```

2..Use a Conditional Statement:

```
while (condition) {
   // Some code
   if (stopCondition) {
      break; // Exit the loop
   }
}
```

3..Increment/Decrement Control Variables

05.

```
public class Main{
public static void main(String args[]){
        for (int i = 20; i >= 1; i--)
        {
                if(i%2==0){
                System.out.println(i);
        }}}}
```

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06.

Nested loops in Java refer to the situation where one loop is placed inside another loop. This creates a loop within a loop, allowing you to perform more complex and fine-grained iterations in your code. Each inner loop executes its entire cycle for each iteration of the outer loop. This concept is commonly used in programming to work with multi-dimensional data structures, generate patterns, or solve problems that involve multiple levels of repetition.

```
        for (int i = 1; i <= 3; i++) {
    for (int j = 1; j <= 3; j++) {
       System.out.println("i: " + i + ", j: " + j);
    }
}
```

07.

"For-Each" (Enhanced for) Loop:

Simplified Syntax
Read Only
No Explicit Index
Type Safety

Traditional "For" Loop:

Control Over Index
Mutable Elements
General Purpose

08.

```
public class Main{
public static void main(String args[]){
        for (int i = 0; i < 10; i++)
        {
                System.out.println("Hello World");
        }

        }}
```

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```
 public class Main {
  public static void main(String args[]) {
    int count = 0;
    while (count < 10) {
      System.out.println("Hello World");
      count++;
    }
  }
}
```

09.

```
 public class Main {
  public static void main(String args[]) {
    for (int i = 1; i <= 100; i++)
        {
            System.out.println(i);
        }

  }
}
```

```
public class Main {
  public static void main(String args[]) {
    int i = 1;
    while (i <= 100) {
      System.out.println(i);
     i++;
    }
  }
}
```

10.

```
 public class Main {
  public static void main(String args[]) {
    for (int i = 100; i >= 1; i--)
        {
            System.out.println(i);
        }}}
```

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```
        public class Main {
   public static void main(String args[]) {
     int i=100;
     while(i>=1){
                  System.out.println(i);
                 i--;

                  }

   }
}
```

11.

```
        public classMain {
   public static void main(String[] args) {
      for (int i = 2; i <= 100; i += 2) {
         System.out.println(i);
      }
   }
}
```

```
        public class Main {
   public static void main(String[] args) {
      int i = 2;
      while (i <= 100) {
         System.out.println(i);
         i += 2;
      }
   }
}
```

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12.

```
import java.util.Random;

public class Main{
   public static void main(String[] args) {

      Random rand = new Random();


      for (int i = 0; i < 10; i++) {
         int randomNumber = rand.nextInt(101);
         System.out.println(randomNumber);
      }
   }
}
```

13.

```
import java.util.Random;

public class Main {
   public static void main(String[] args) {

      Random rand = new Random();


      for (int i = 0; i < 10; i++) {
         int randomNumber = rand.nextInt(101);
         if (randomNumber % 2 != 0) {
            System.out.println(randomNumber);
         }
      }
   }
}
```

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14.

```
        public class Main{
    public static void main(String[] args) {
        for (char c = 'A'; c <= 'Z'; c++) {
            System.out.println(c);
        }
    }
}
```

15.

```
        public class Main {
public static void main(String[] args) {
        for (int number = 2; number <= 100; number++) {
        boolean isPrime = true;
                for (int i = 2; i < number; i++) {
                if (number % i == 0) {
                isPrime = false;
        break;
        }
        if (isPrime) {
        System.out.println(number);
                        }
                }
        }
}
```

16.

```
        import java.util.Scanner;

public class Main{
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        int count = 0;

        System.out.println("Enter integer numbers:");
        for (int i = 1; i <= 50; i++) {
            System.out.print("Enter number " + i + ": ");
```

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```
            int number = input.nextInt();

            if (number > 100) {
                count++;
            }
        }



        System.out.println("The numbers: " + count);
    }
}
```

17.

```
        import java.util.Scanner;

        class Main {
        public static void printFactorial() {
                Scanner input = new Scanner(System.in);
                System.out.print("Input a number: ");
        int num = input.nextInt(); //5
        int fac = 1;
        if(num >= 0 && num <= 15) {
        for (int i = 1; i <= num; i++) {
fac = fac * i;
        }
        System.out.println(("!" + num + " = ") + fac );

        } else {
        System.out.println("Wrong input!!!");
}
        }
        public static void main(String args[]) {
        printFactorial();
        }
}
```

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18.

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        int total = 0;
        int max = Integer.MIN_VALUE;
        int min = Integer.MAX_VALUE;

        System.out.println("Enter 10 marks, one at a time:");
        for (int i = 1; i <= 10; i++) {
            System.out.print("Enter mark " + i + ": ");
            int mark = input.nextInt();



            total += mark;



            if (mark > max) {
                max = mark;
            }
            if (mark < min) {
```

```
            min = mark;
        }
    }



    double average = (double) total / 10;

    System.out.println("Total: " + total);
    System.out.println("Max: " + max);
    System.out.println("Min: " + min);
    System.out.println("Average: " + average);



  }
}
```

19.

```
 import java.util.Scanner;

public class StudentData {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);

    int numStudents = 100;
    double totalHeight = 0;
```

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```
        double totalWeight = 0;
        int validHeightEntries = 0;
        int validWeightEntries = 0;


        System.out.println("Enter the height and weight of " + numStudents + " students:");


        for (int i = 1; i <= numStudents; i++) {
            System.out.println("Student " + i + ":");


            double height = getInput("Enter height (in meters): ", scanner);
            if (height >= 0) {
                totalHeight += height;
                validHeightEntries++;
            } else {
                System.out.println("Invalid height. Please enter a non-negative value.");
                i--;
                continue;
            }


            double weight = getInput("Enter weight (in kilograms): ", scanner);
            if (weight >= 0) {
                totalWeight += weight;
                validWeightEntries++;
            } else {
```

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```
                System.out.println("Invalid weight. Please enter a non-negative value.");
                i--;
            }
        }

        scanner.close();

        if (validHeightEntries > 0 && validWeightEntries > 0) {
            double averageHeight = totalHeight / validHeightEntries;
            double averageWeight = totalWeight / validWeightEntries;
            System.out.println("Average height: " + averageHeight + " meters");
            System.out.println("Average weight: " + averageWeight + " kilograms");
        } else {
            System.out.println("No valid data entered.");
        }
    }

    public static double getInput(String prompt, Scanner scanner) {
        double input = -1;
        boolean validInput = false;
        while (!validInput) {
            System.out.print(prompt);
            if (scanner.hasNextDouble()) {
                input = scanner.nextDouble();
```

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```
            validInput = true;
        } else {
            System.out.println("Invalid input. Please enter a valid number.");
            scanner.next();
        }
    }
    return input;
  }
}
```

20.

```
 import java.util.Scanner;

public class Main {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);

    System.out.print("Enter a number: ");
    long number = input.nextLong();

    int numberOfDigits = countDigits(number);

    System.out.println("Number of digits in " + number + " is: " +
numberOfDigits);
```

```
    }

    public static int countDigits(long number) {
        String numberStr = Long.toString(Math.abs(number));
        return numberStr.length();
    }
}
```

21.

```
     public class Main {
    public static void main(String[] args) {
        int limit = 1000;
        int sum = 0;

        for (int i = 1; i < limit; i++) {
            if (i % 3 == 0 || i % 5 == 0) {
                sum += i;
            }
        }

        System.out.println("The sum of all multiples of 3 or 5 below 1000 is: " +
sum);
    }
}
```

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22.

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = input.nextInt();

        int sum = calculateSumOfDigits(number);

        System.out.println("Sum of the digits of " + number + " is: " + sum);



    }

    public static int calculateSumOfDigits(int number) {
        int sum = 0;

        number = Math.abs(number);

        while (number > 0) {
            int digit = number % 10;
            sum += digit;
```

```
            number /= 10;
        }

        return sum;
    }
}
```

23.

```
 import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter an integer: ");
        int number = input.nextInt();

        int reversedNumber = reverseDigits(number);

        System.out.println("Number with reversed digits: " + reversedNumber);



    }

    public static int reverseDigits(int number) {
```

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```
        int reversedNumber = 0;

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

        return reversedNumber;
    }
}
```

24.

```
        import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = input.nextInt();

        if (isArmstrongNumber(number)) {
            System.out.println(number + " is an Armstrong number.");
        } else {
```

```
            System.out.println(number + " is not an Armstrong number.");
        }

    }

    public static boolean isArmstrongNumber(int number) {
        int originalNumber = number;
        int sum = 0;

        while (number > 0) {
            int digit = number % 10;
            sum += Math.pow(digit, 3);
            number /= 10;
        }

        return sum == originalNumber;
    }
}
```

25.

```
         import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
```

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```
    Scanner input = new Scanner(System.in);

    System.out.print("Enter a number: ");
    int number = input.nextInt();

    if (isPalindrome(number)) {
        System.out.println(number + " is a palindrome number.");
    } else {
        System.out.println(number + " is not a palindrome number.");
    }

}

public static boolean isPalindrome(int number) {
    int originalNumber = number;
    int reversedNumber = 0;

    while (number > 0) {
        int digit = number % 10;
        reversedNumber = reversedNumber * 10 + digit;
        number /= 10;
    }

    return originalNumber == reversedNumber;
}}
```

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26.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Input number of Employees: ");
        int numEmployees = input.nextInt();

        int[] denominations = { 5000, 1000, 500, 100, 50, 20, 10, 5, 2, 1 };

        for (int employee = 1; employee <= numEmployees; employee++) {
            System.out.print("Input salary " + employee + " : ");
            int salary = input.nextInt();

            System.out.println("Salary payment for Employee " + employee + ":");

            for (int i = 0; i < denominations.length; i++) {
                int count = salary / denominations[i];
                if (count > 0) {
                    System.out.println("R" + denominations[i] + " notes/coins : " +
count);
                    salary %= denominations[i];
```

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```
            }
        }
    }


}
}
```

27.

```
     public class Main {
    public static void main(String[] args) {
        long result = findSmallestMultiple(20);
        System.out.println("The smallest positive number evenly divisible by all numbers from 1 to 20 is: " + result);
    }

    public static long findSmallestMultiple(int n) {
        long result = 1;
        for (int i = 2; i <= n; i++) {
            result = leastCommonMultiple(result, i);
        }
        return result;
    }

    public static long greatestCommonDivisor(long a, long b) {
        if (b == 0) {
```

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```
            return a;
        } else {
            return greatestCommonDivisor(b, a % b);
        }
    }

    public static long leastCommonMultiple(long a, long b) {
        return (a * b) / greatestCommonDivisor(a, b);
    }
}
```

28.

```
     public class Main {
    public static void main(String[] args) {
        int x = 1;
        while (true) {
            if (haveSameDigits(x, 2 * x, 3 * x, 4 * x, 5 * x, 6 * x)) {
                System.out.println("The smallest positive integer x is: " + x);
                break;
            }
            x++;
        }
    }

    public static boolean haveSameDigits(int... numbers) {
```

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```
        String[] numberStrings = new String[numbers.length];
        for (int i = 0; i < numbers.length; i++) {
            numberStrings[i] = sortDigits(Integer.toString(numbers[i]));
        }

        String first = numberStrings[0];
        for (String numStr : numberStrings) {
            if (!first.equals(numStr)) {
                return false;
            }
        }
        return true;
    }

    public static String sortDigits(String number) {
        char[] chars = number.toCharArray();
        java.util.Arrays.sort(chars);
        return new String(chars);
    }
}
```

29.

```
     public class Main {
    public static void main(String[] args) {
        int limit = 1000;
```

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```
int[] primes = generatePrimes(limit);
int longestSum = 0;
int longestLength = 0;

for (int start = 0; start < primes.length; start++) {
    int sum = 0;
    int length = 0;

    for (int i = start; i < primes.length; i++) {
        sum += primes[i];
        length++;

        if (sum > limit) {
            break;
        }

        if (isPrime(sum) && length > longestLength) {
            longestSum = sum;
            longestLength = length;
        }
    }
}
```

System.out.println("The prime below 1000 that can be written as the sum of the most consecutive primes is: " + longestSum);

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```
    }

    public static int[] generatePrimes(int limit) {
        boolean[] isPrime = new boolean[limit + 1];
        for (int i = 2; i <= limit; i++) {
            isPrime[i] = true;
        }

        for (int p = 2; p * p <= limit; p++) {
            if (isPrime[p]) {
                for (int i = p * p; i <= limit; i += p) {
                    isPrime[i] = false;
                }
            }
        }

        int count = 0;
        for (int i = 2; i <= limit; i++) {
            if (isPrime[i]) {
                count++;
            }
        }

        int[] primes = new int[count];
        int index = 0;
```

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```
    for (int i = 2; i <= limit; i++) {
        if (isPrime[i]) {
            primes[index++] = i;
        }
    }

    return primes;
}

public static boolean isPrime(int num) {
    if (num <= 1) {
        return false;
    }
    if (num == 2) {
        return true;
    }
    if (num % 2 == 0) {
        return false;
    }
    for (int i = 3; i * i <= num; i += 2) {
        if (num % i == 0) {
            return false;
        }
    }
    return true;
```

```
    }
}
```

30.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        int totalInquiries = 0;
        int inquiriesUnder50k = 0;
        int inquiriesAbove5M = 0;

        for (int day = 1; day <= 7; day++) {
            System.out.print("Day " + day + ": Enter the number of customer inquiries: ");
            int inquiries = input.nextInt();
            totalInquiries += inquiries;

            for (int i = 1; i <= inquiries; i++) {
                System.out.print("Enter the house price for inquiry " + i + (i == 1 ? " (in rupees): " : ": "));
                long price = input.nextLong();

                if (price < 50000) {
                    inquiriesUnder50k++;
```

```
            }


            if (price > 5000000) {
                inquiriesAbove5M++;
            }
        }
    }
```

```
    double percentageAbove5M = (double) inquiriesAbove5M / totalInquiries
* 100;


    System.out.println("Customer inquiries about houses costing less than
50,000 rupees each day: " + inquiriesUnder50k);
    System.out.println("Percentage of all inquiries made during the week
about houses costing more than 5 million rupees: " + percentageAbove5M +
"%");


  }
}
```

31.

```
 import java.util.Scanner;


public class Main {
  public static void main(String[] args) {
    Scanner input = new Scanner(System.in);
```

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```
int countLessThan1000 = 0;
int countGreaterThan1000 = 0;

System.out.println("Enter a series of positive integer numbers. Enter -1 to terminate the input.");

while (true) {
    System.out.print("Enter a number: ");
    int number = input.nextInt();

    if (number == -1) {
        break;
    }

    if (number < 1000) {
        countLessThan1000++;
    } else {
        countGreaterThan1000++;
    }
}

System.out.println("Numbers less than 1000: " + countLessThan1000);
System.out.println("Numbers greater than or equal to 1000: " + countGreaterThan1000);
```

```
    }
}
```

32.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        int totalStudents = 0;
        int totalMarks = 0;
        int maxMark = Integer.MIN_VALUE;
        int minMark = Integer.MAX_VALUE;

        while (true) {
            System.out.print("Enter the number of students in the class (or -1 to terminate): ");
            int numStudents = input.nextInt();

            if (numStudents == -1) {
                break;
            }

            totalStudents += numStudents;
```

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```
            System.out.print("Enter the total marks of the students in the class: ");
            int classTotalMarks = input.nextInt();

            totalMarks += classTotalMarks;

            maxMark = Math.max(maxMark, classTotalMarks);
            minMark = Math.min(minMark, classTotalMarks);
        }

        if (totalStudents > 0) {
            double average = (double) totalMarks / totalStudents;

            System.out.println("Results:");
            System.out.println("No of Students: " + totalStudents);
            System.out.println("Total marks: " + totalMarks);
            System.out.println("Maximum: " + maxMark);
            System.out.println("Minimum: " + minMark);
            System.out.printf("Average: %.3f%n", average);
        } else {
            System.out.println("No data entered.");
        }

    }
}
```

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33.

a.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a decimal number: ");
        int decimal = input.nextInt();

        String binary = Integer.toBinaryString(decimal);

        System.out.println("Binary representation: " + binary);

    }
}
```

b.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
```

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```
        System.out.print("Enter a decimal number: ");
        int decimal = input.nextInt();

        String octal = Integer.toOctalString(decimal);

        System.out.println("Octal representation: " + octal);

    }
}
```

c.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a decimal number: ");
        int decimal = input.nextInt();

        String hexadecimal = Integer.toHexString(decimal);

        System.out.println("Hexadecimal representation: " + hexadecimal);
```

```
    }
}
```

d.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a binary number: ");
        String binary = input.next();

        int decimal = 0;

        try {
            decimal = Integer.parseInt(binary, 2);
            System.out.println("Decimal representation: " + decimal);
        } catch (NumberFormatException e) {
            System.out.println("Invalid binary input.");
        }

    }
}
```

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e.

```
import java.util.Scanner;


public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter an octal number: ");
        String octal = input.next();

        int decimal = 0;

        try {
            decimal = Integer.parseInt(octal, 8);
            System.out.println("Decimal representation: " + decimal);
        } catch (NumberFormatException e) {
            System.out.println("Invalid octal input.");
        }

    }
}
```

f.

```
import java.util.Scanner;

public class Main {
```

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```
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);


        System.out.print("Enter a hexadecimal number: ");
        String hexadecimal = input.next();

        int decimal = 0;

        try {
            decimal = Integer.parseInt(hexadecimal, 16);
            System.out.println("Decimal representation: " + decimal);
        } catch (NumberFormatException e) {
            System.out.println("Invalid hexadecimal input.");
        }

    }
}
```

34.

```
         import java.util.Scanner;
import java.util.Random;

public class Main {
    public static void main(String[] args) {
```

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```
Scanner input = new Scanner(System.in);
Random random = new Random();

System.out.print("Enter the number of coin flips (N): ");
int N = input.nextInt();

if (N <= 0) {
    System.out.println("Please enter a positive integer for N.");
    return;
}

int heads = 0;
int tails = 0;

for (int i = 0; i < N; i++) {
    int coinResult = random.nextInt(2); // 0 for heads, 1 for tails
    if (coinResult == 0) {
        heads++;
    } else {
        tails++;
    }
}

double headsPercentage = (double) heads / N * 100;
double tailsPercentage = (double) tails / N * 100;
```

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```
        System.out.println("Results after " + N + " coin flips:");
        System.out.println("Heads: " + heads + " (" + headsPercentage + "%)");
        System.out.println("Tails: " + tails + " (" + tailsPercentage + "%)");

    }
}
```

35.

```
        import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter the base: ");
        double base = input.nextDouble();

        System.out.print("Enter the exponent: ");
        int exponent = input.nextInt();

        double result = calculatePower(base, exponent);

        System.out.println(base + " raised to the power of " + exponent + " is: " +
result);
```

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```
    }

    public static double calculatePower(double base, int exponent) {
        if (exponent == 0) {
            return 1;
        }

        double result = 1.0;

        for (int i = 1; i <= Math.abs(exponent); i++) {
            result *= base;
        }

        if (exponent < 0) {
            result = 1.0 / result;
        }

        return result;
    }
}
```

36.

```
        char letter = 'A';
while (letter <= 'Z') {
```

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```
    System.out.println(letter + " " + (int)letter);
    letter++;
}
```

outout

```
A 65
B 66
C 67
D 68
E 69
F 70
G 71
H 72
I 73
J 74
K 75
L 76
M 77
N 78
O 79
P 80
Q 81
R 82
S 83
T 84
U 85
```

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V 86

W 87

X 88

Y 89

Z 90

37.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        int n;

        do {
            System.out.println("Enter a non-negative integer: ");
            n = input.nextInt();

            if (n < 0) {
                System.out.println("The integer you entered is negative.");
            }
        } while (n < 0);
    }
}
```

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38.

d. int y = 12;

39.

9

10

11

0

0

40.

c. 1 2

41.

d. 01234

42.

b. Prints 6 5 5 6

43.

e. The code will compile without error and will print 3 when run.

44.

b. Prints: 8 3

45.

including incorrect variable names and some missing semicolons. I'll assume you intended to use lowercase "j" and that "J" was a typographical error.

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46.

b c d

47.

a.Infinite loop, printing "i : " followed by an increasing value of i.

b.

0

1

2

3

4

5

6

7

8

9

C.

0

1

2

3

4

5

6

7

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8

9

d.

print A to Z

e.

Prints pairs of values, starting from "0 10" and decreasing.

f.

Prints all characters with their ASCII values from 0 to 127.

g.

Prints "101" ten times.

h.

Prints "100" ten times, then prints the final value of x,

which is 110.

48.

d. Error at line 8

49.

a. for(int i=100;i<110;i++){

System.out.println(i);

}

50.

a, c, d, e, f, g, and j

51.

b. The code will fail to compile, owing to an illegal

conditional expression in the if Statement.

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52.

b. The program will print 3, 3 when run

53.

d. A B 2 A B 2 A B 2 A

54.

a. i=1, j=0

b. i=0, j=1

55.

c. 1 1 2 2 3 3 4 4 5 5

56.

c. block: { break block; } is a valid statement block.

e. The break statement can only be used in a loop (while, do-while or for) or a switch statement.

57.

c. Only 5 is printed

58.

e. Prints A

59.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
```

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```
    System.out.print("Enter the number of terms in the Fibonacci series: ");
    int n = input.nextInt();

    if (n <= 0) {
        System.out.println("Please enter a positive integer.");
    } else {
        System.out.println("Fibonacci series of " + n + " terms:");

        int first = 0, second = 1;

        for (int i = 0; i < n; i++) {
            if (i < n - 1) {
                System.out.print(first + ", ");
            } else {
                System.out.println(first);
            }

            int next = first + second;
            first = second;
            second = next;
        }
    }

}}
```

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60.

```
import java.util.Random;
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        Random random = new Random();

        char targetAlphabet = (char) ('A' + random.nextInt(26));
        int trials = 0;

        System.out.println("Welcome to the Alphabet Guessing Game!");
        System.out.println("Try to guess the randomly chosen alphabet (A-Z).");

        while (true) {
            System.out.print("Guess the alphabet: ");
            char userGuess = input.next().toUpperCase().charAt(0);

            trials++;

            if (userGuess == targetAlphabet) {
                System.out.println("Congratulations! You've guessed it right: " +
targetAlphabet);
```

```
            System.out.println("Number of trials: " + trials);
            break;
        } else {
            System.out.println("Try again!");
        }
    }

  }
}
```

61.

9

4

1

0

-1

0

2

4

62.

```
import java.util.Scanner;

public class Main {
  public static void main(String[] args) {
```

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```
        Scanner input = new Scanner(System.in);


        System.out.print("Enter the starting range: ");
        int start = input.nextInt();


        System.out.print("Enter the ending range: ");
        int end = input.nextInt();


        if (start < 1 || end <= start) {
            System.out.println("Invalid input. Please enter valid range values.");
        } else {
            System.out.println("Perfect numbers in the range " + start + " to " + end
+ ":");
            findAndPrintPerfectNumbers(start, end);
        }


    }


    public static void findAndPrintPerfectNumbers(int start, int end) {
        for (int num = start; num <= end; num++) {
            if (isPerfectNumber(num)) {
                System.out.println(num);
            }
        }
    }
```

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```
    public static boolean isPerfectNumber(int num) {
        int sum = 1;

        for (int i = 2; i * i <= num; i++) {
            if (num % i == 0) {
                sum += i;
                if (i != num / i) {
                    sum += num / i;
                }
            }
        }

        return sum == num && num != 1;
    }
}
```

64.

```
         public class Main {
    public static void main(String[] args) {
        int targetSum = 30;
        int count = 0;

        for (int x = 0; x <= targetSum; x++) {
            for (int y = 0; y <= targetSum - x; y++) {
                int z = targetSum - x - y;
```

```
                System.out.println("x: " + x + ", y: " + y + ", z: " + z);
                count++;
            }
        }

        System.out.println("Total number of solutions: " + count);
    }
}
```

66.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.println("Enter three distinct digits (0-9):");

        int[] digits = new int[3];

        for (int i = 0; i < 3; i++) {
            System.out.print("Enter digit " + (i + 1) + ": ");
            digits[i] = input.nextInt();

            if (digits[i] < 0 || digits[i] > 9) {
```

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```
            System.out.println("Invalid input. Please enter a digit between 0 and
9.");
            return;
        }
    }

    System.out.println("All possible three-digit numbers without repeating
digits:");
    generateThreeDigitNumbers(digits);

}

public static void generateThreeDigitNumbers(int[] digits) {
    for (int i = 0; i < digits.length; i++) {
        for (int j = 0; j < digits.length; j++) {
            if (i != j) {
                for (int k = 0; k < digits.length; k++) {
                    if (i != k && j != k) {
                        int number = digits[i] * 100 + digits[j] * 10 + digits[k];
                        System.out.println(number);
                    }
                }
            }
        }
    }
}}
```

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67.

```
 import java.util.Scanner;
import java.util.Random;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        Random random = new Random();

        System.out.print("Enter the target value: ");
        int targetValue = input.nextInt();

        if (targetValue < 2 || targetValue > 12) {
            System.out.println("Invalid target value. Please enter a value between 2 and 12.");
        } else {
            int rolls = 0;
            int currentSum = 0;

            while (currentSum != targetValue) {
                int die1 = random.nextInt(6) + 1; // Roll the first die (1-6)
                int die2 = random.nextInt(6) + 1; // Roll the second die (1-6)
                currentSum = die1 + die2;

                rolls++;
```

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```
            System.out.println("Roll " + rolls + ": Die 1: " + die1 + ", Die 2: " +
die2 + ", Sum: " + currentSum);
        }

        System.out.println("Target value " + targetValue + " reached in " + rolls
+ " rolls.");
    }

}
}
```

68.

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter a positive integer N: ");
        int n = input.nextInt();

        if (n <= 0) {
            System.out.println("Please enter a positive integer.");
        } else {
            System.out.println("Collatz sequence for " + n + ":");
            printCollatzSequence(n);
```

```
        }


    }

    public static void printCollatzSequence(int n) {
        while (n != 1) {
            System.out.print(n + " -> ");

            if (n % 2 == 0) {
                n = n / 2; // If N is even, divide it by 2.
            } else {
                n = 3 * n + 1; // If N is odd, multiply it by 3 and add 1.
            }
        }

        System.out.println(1);
    }
}
```

69.

```
         public class Main {
    public static void main(String[] args) {
        printPatternA();
        printPatternB();
        printPatternC();
        printPatternD();
```

```
        printPatternE();
        printPatternF();
    }

    public static void printPatternA() {
        System.out.println("Pattern A:");
        for (int i = 1; i <= 6; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print("* ");
            }
            System.out.println();
        }
    }

    public static void printPatternB() {
        System.out.println("\nPattern B:");
        for (int i = 6; i >= 1; i--) {
            for (int j = 1; j <= i; j++) {
                System.out.print((char) ('A' + j - 1) + " ");
            }
            System.out.println();
        }
    }

    public static void printPatternC() {
```

```
        System.out.println("\nPattern C:");
        for (int i = 1; i <= 5; i++) {
            for (int j = i; j >= 1; j--) {
                System.out.print(j + " ");
            }
            System.out.println();
        }
        for (int i = 4; i >= 1; i--) {
            for (int j = i; j >= 1; j--) {
                System.out.print(j + " ");
            }
            System.out.println();
        }
    }

    public static void printPatternD() {
        System.out.println("\nPattern D:");
        for (int i = 1; i <= 5; i++) {
            for (int j = 1; j <= 2 * i - 1; j++) {
                System.out.print("* ");
            }
            System.out.println();
        }
        for (int i = 4; i >= 1; i--) {
            for (int j = 1; j <= 2 * i - 1; j++) {
```

```
            System.out.print("* ");
        }
        System.out.println();
    }
}

public static void printPatternE() {
    System.out.println("\nPattern E:");
    for (int i = 1; i <= 9; i++) {
        for (int j = 1; j <= 9; j++) {
            if (i == 1 || i == 9 || j == 1 || j == 9) {
                System.out.print("+");
            } else {
                System.out.print(" ");
            }
        }
        System.out.println();
    }
}

public static void printPatternF() {
    System.out.println("\nPattern F:");
    for (int i = 1; i <= 6; i++) {
        for (int j = 1; j <= 6 - i + 1; j++) {
            System.out.print("* ");
```

```
            }
            System.out.println();
        }
    }
}
```