## Variables, Data Types And Comments

**Key pointers:**

1. **Variables, Primitive Datatypes, Declaration and Initialisation, l and f for understanding long/float numbers**
2. **Comments and their need**
3. **Println vs print**
4. **String as a non primitive data type**
5. **Memory, Addresses**
6. **CPU**
7. **Algorithms And Flowcharts**
8. **Compilers , HLL, LLL**

| public class Main {  public static void main(String[] args) {  *// This is a comment.*  */\*System.out.print("Hello");  System.out.println("yo");\*/*  int a =5;  System.out.println(a);  long b = 13466788999l;  System.out.println(b);  float c = 1.0567F;  System.out.println(c);  char d = 'a';  System.out.println(d);  boolean e = true;  System.out.println(e);  String s = "Hello";  System.out.println(s);  } } |
| --- |

## Scanner & Taking Inputs

**Key Pointers:**

1. **Packages**
2. **Scanner object for taking input from user**
3. **Taking int, long,double, etc input from user**
4. **Taking string input -> next vs nextLine**
5. **Implicit TypeCasting**

| import java.util.\*; public class Main {  public static void main(String[] args) {  System.out.println("Hello World");  Scanner sc= new Scanner(System.in); *// Creating a scanner object named sc which will scan input from standard input(terminal)*  int a =sc.nextInt(); *// reads an integer space or \n is delimiter*  System.out.println(a);  int b = sc.nextInt();  System.out.println(b);  *// nextLong()*  *//nextFloat() nextDouble()*  *// next() // Read until it hits either a space or \n character*  *// nextLine() // Reads till it encounters \n (It is comfortable with spaces)*  String s = sc.next();  System.out.println(s);  String t = sc.nextLine();  System.out.println(t);  int a = 534;  int b= 900;  System.out.println("This is the sum " + (a + b));  System.out.println("This is the concatenation" + a + b);  char c = sc.next().charAt(0);  System.out.println(c);  char d = 65;  System.out.println(d);       } } |
| --- |

| import java.util.\*; public class Main {  public static void main(String[] args) {  int num1 = 50;  int num2 = 20;  int addition = num1+num2;  System.out.println(num1-num2);  *// Scanner*   Scanner sc = new Scanner(System.in);  *//int a = sc.nextInt();*  *//int b = sc.nextInt();*  *// nextInt() will take the input of an integer.It will read an integer till it encounters a space or \n*  *//System.out.println(a);*  *//System.out.println(b);*  *// nextLong()*  *//System.out.println("Number 1 is: " + a);*  *//long c = sc.nextLong();*  *// nextFloat()*  *// nextDouble()*  *// nextBoolean()*  *//boolean d = sc.nextBoolean();*  *//System.out.println(d);*    *// next() --> next takes the input of a word --> next will scan a string till it encounters a space or \n*  *// nextLine() --> Sentence --> Read a string till it encounters the \n*    *//String s = sc.next();*  *//String s = sc.nextLine();*  *//System.out.println(s);*    *//String s1 = sc.next();*  *//String s2 = sc.next();*  *//String s3 = sc.next();*  *//System.out.println(s1+s2+s3);*    *//String s = sc.next();*  *//String t = sc.nextLine();*  *//System.out.println(s);*  *//System.out.println(t);*  } } |
| --- |

**Basic reads:**

1. <https://www.w3schools.com/java/java_data_types.asp>
2. <https://www.javatpoint.com/java-data-types>

## Conditionals:

**Key Pointers:**

1. **Conditionals as control Flow**
2. **IF**
3. **IF-ELSE**
4. **IF-ELSE IF - ELSE IF - ELSE LADDER**

Basic if-else

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int age = sc.nextInt();  if(age>=18){  System.out.println("You can vote.");  }  else{  System.out.println("You are a kid.");  }  } } |
| --- |

Calculator(If-else if -else ladder) → Nesting also showed

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  System.out.println("Enter 1st number:");  int n = sc.nextInt();  System.out.println("Enter second number:");  int n2 = sc.nextInt();  System.out.println("Enter the operation you want");  char op = sc.next().charAt(0);  if(op == '+'){  System.out.println(n+n2);  }  else if(op=='\*'){  System.out.println(n\*n2);  }  else if(op=='-'){  System.out.println(n-n2);  }  else if(op=='/')  {  if(n2==0){  System.out.println("Can't divide by 0");  }  else{  System.out.println(n/n2);  }    }  else{  System.out.println("Hey man please read the manual.");  }  System.out.println("Job done");  } } |
| --- |

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  System.out.println("Enter age");  int age = sc.nextInt();  if(age>=18 && age<=54){  System.out.println("You are an adult");  System.out.println("You can vote");  }  else{  System.out.println("You are not an adult");  }  int a = sc.nextInt();  int b = sc.nextInt();  if(a==5){  System.out.println("Yo");  }  if(!(b==10)){  System.out.println("Hi");  }    if(b==5){  System.out.println("X");  }  else if(a==4){  System.out.println("Y");  }  else{  System.out.println("aa");  }  System.out.println("hello");  } } |
| --- |

Questions discussed: Big Light Assignment and basic calculator

## Loops

**Key pointers:**

1. **FOR**
2. **WHILE**
3. **DO-WHILE**
4. **FOR EACH**
5. **Basic differences, use cases , when to use which loop**
6. **Should be clear with the basic flow of loops**
7. **Break**
8. **Continue**

## Nested Loops

\*\*\*\*\*\*\*

\*\*\*\*\*\*\*

\*\*\*\*\*\*\*

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  System.out.println("Enter number of lines");  int m = sc.nextInt();  System.out.println("How many stars per line ?");  int n = sc.nextInt();  for(int i=1;i<=m;i++){  *// ith line*  for(int j=1;j<=n;j++){  System.out.print("\*");  }  System.out.println();  }  } } |
| --- |

\*

\* \*

\* \* \*

\* \* \* \*

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int n = sc.nextInt();  for(int i=1;i<=n;i++)  {  *// ith line*  for(int j=1;j<=i;j++)  {  System.out.print("\* ");  }  System.out.println();  }  } } |
| --- |

Pyramid pattern

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int n = sc.nextInt();  for(int i=1;i<=n;i++)  {  *// ith line*   *// (n-i) spaces*  for(int j=1;j<=n-i;j++)  {  System.out.print(" ");  }  *// i times \**   for(int j=1;j<=i;j++)  {  System.out.print("\* ");  }  System.out.println();  }  } } |
| --- |

## Arrays

**Key pointers:**

1. **Array allocation in memory (Contiguous)**
2. **Array indexing**
3. **Access and iteration over arrays**
4. **FIxed size (Cannot be changed dynamically)(Size needs to be specified)**
5. **Basic algorithms and questions on array like max, min, 2nd max ,etc … Will post basic question checklist**

**Basic playing with arrays**

| public class Main {  public static void main(String[] args) {  int []arr = new int[5];  for(int i=0;i<5;i++){  System.out.println(arr[i]);  }  arr[2]=10;  arr[4]=20;  for(int i=0;i<5;i++){  System.out.println(arr[i]);  }    int []brr = {1,6,7,8,34};  for(int i=0;i<5;i++){  System.out.println(brr[i]);  }  } } |
| --- |

**Taking contents of array as user input**

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int n=sc.nextInt();  int []arr = new int[n];  for(int i=0;i<n;i++){  arr[i]=sc.nextInt();  }  for(int i=0;i<n;i++){  System.out.println(arr[i]);  }  } } |
| --- |

**Basic Question CheckList**

**1.Find sum of all elements of array**

**2.Find max number in array**

**3. Search for a target in array. If target is present, print its index. If not print -1.**

**4. Check if a number is prime or not**

**5. Sum of digits of a number**

**6. Reverse a number**

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int n = sc.nextInt();  int []arr = new int[n];  *//int sum =0 ;*  for(int i=0;i<n;i++){  arr[i]=sc.nextInt();  *//sum+=arr[i];*  }  int sum=0;  for(int i=0;i<n;i++){  sum+=arr[i];  }  System.out.println(sum);  } } |
| --- |

Finding maximum element in array

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int n = sc.nextInt();  int []arr = new int[n];  for(int i=0;i<n;i++){  arr[i]=sc.nextInt();  }  int maxx = Integer.MIN\_VALUE;  int maxindex=0;  for(int i=0;i<n;i++){  if(arr[i]>maxx){  maxx = arr[i];  maxindex=i;  }  }  System.out.println(maxx);  } } |
| --- |

Search for a target element in array

| import java.util.\*; public class Main {  public static void main(String[] args) {  int []arr = {5,8,6,3,3,9};  int target = 6;  *//print the index of target element if present in the array, if not print -1*  int ans = -1;  for(int i=0;i<n;i++){  if(arr[i]==target){  ans=i;  *//break;*  }  }  System.out.println(ans);    } } |
| --- |

## 2-D Arrays(Matrix)

Important pointers

1. 2 ways of declaring 2d arrays
2. Understand that 2d array can be treated like an array of 1D arrays
3. Mat.length -> rows ,mat[i].length ->columns
4. Indexing of rows and columns
5. Taking input and iterating over 2D matrix using nested loops

| public class Main {  public static void main(String[] args) {  int [][]mat = {{1,2},{4,5,6}};  for(int i=0;i<mat.length;i++){  for(int j=0;j<mat[i].length;j++){  System.out.print(mat[i][j] + " ");  }  System.out.println();  }  } } |
| --- |

Taking Input all numbers of the matrix from user

| import java.util.\*; public class Main {  public static void main(String[] args) {  Scanner sc = new Scanner(System.in);  int m = sc.nextInt();  int n = sc.nextInt();  int [][]mat = new int[m][n];  for(int i=0;i<m;i++){  *// you are standing at row with index i*  for(int j=0;j<n;j++){  mat[i][j]=sc.nextInt();  }  }  for(int i=0;i<m;i++){  *//I am at row i*  for(int j=0;j<n;j++){  System.out.print(mat[i][j] + " ");  }  *// Done printing all elements of row i*  System.out.println();  }  } } |
| --- |

Sum of all white boxes in 2D matrix (White box is at 0,0 and it’s like chessboard)

| public class Main {  public static void main(String[] args) {  int m = 5;  int n= 4;  int [][]mat = new int[m][n];    int sum = 0;  for(int i=0;i<m;i++)  {  for(int j=0;j<n;j++){  if((i+j)%2==0){  sum+=mat[i][j];  }  }  }  System.out.println(sum);  } } |
| --- |

## Strings

Strings are immutable in java.

String is an object.

Playing with strings

| import java.util.\*; public class Main {  public static void main(String[] args) {  String s = "Hello my name";  System.out.println(s);  System.out.println(s.length()); *// gives the length of the string*  System.out.println(s.charAt(4)); *// charAt gives the character at the particular index*  System.out.println(s.indexOf('e')); *// gives the index of first occurence of the character*  System.out.println(s.indexOf('e', 5)); *// gives you the occurrence of the character starting from 5*  System.out.println(s.indexOf("my",7)); *// similar behaviour with strings*  System.out.println(s.toUpperCase()); *// self explainatory*  System.out.println(s.toLowerCase()); *// self explain*  System.out.println(Character.toUpperCase('a'));  System.out.println(s.substring(3)); *// gives substring from index 3 till end*   System.out.println(s.substring(1,3)); *// gives substring starting from index 1 going uptill index 2*  System.out.println(s.replace('e','f')); *// replaces all instances of the character*   System.out.println(s.replace("my","oop"));  String []srr = s.split(" ");*// returns an array of strings split at " "*  for(String x: srr){  System.out.println(x);  }  int []arr = {1,4,5,3,3,6,7,7};  System.out.println(Arrays.toString(arr)); *// convert array to string and print it*  } } |
| --- |

For each loop, printing all substrings of a particular string

| public class Main {  public static void main(String[] args) {    String s = "Hello my name is";  String []ret = s.split("y");  for(int i=0;i<ret.length;i++){  System.out.println(ret[i].length());  System.out.println(ret[i]);  }  *// s.trim() -> removes leading and trailing spaces*   *// s.contains -> Read this up*  *// for each loop*  for(String s1:ret){  System.out.println(s1);  }    int []arr = {1,8,7,8,6};  for(int x:arr){ *// for each loop*  System.out.println(x);  }    *// printing all non empty substrings of string*  String s2 = "abc";  System.out.println(s2.equals(s));  for(int i=0;i<s2.length();i++){  *// i is the starting index of the substring*  *// i.....n-1*  for(int j=i;j<s2.length();j++){  *// i is the start and j is the ending index*  System.out.println(s2.substring(i,j+1));  }  }  } } |
| --- |

More reads on strings:

1. <https://www.edureka.co/blog/java-string-pool/> (Get idea about string pool)
2. <https://www.javatpoint.com/java-string> (Has all details of strings)

Couple of basic questions to try:

1. Given a string s and a string t , check if s is a substring of t. If yes print true else print false
2. Take a string s , char c , int t input from the user. Find index of t th occurrence of character in the string. If character is present less than t times print -1.

## Functions

**Key pointers:**

1. **Context associated with function**
2. **When is context created/ paused/destroyed**
3. **LIFO ordering of context**
4. **Should be able to clearly trace the flow of function and context**
5. **Input parameters/arguments of functions - You can give the arguments whatever name you like**
6. **Return type of function**
7. **Return keyword**
8. **Why do we need functions**

**Playing with functions**

| public class Main {  public static void main(String[] args) {  System.out.println("Hello from main");  fun1();  System.out.println("Done executing fun1");  }    public static void fun1(){  System.out.println("Inside f1 before f2");  fun2();  System.out.println("Inside fun1 after fun2");  }  public static void fun2(){  System.out.println("Inside fun2");  } } |
| --- |

Writing basic functions and calling them

| public class Main {  public static void main(String[] args) {  System.out.println("Hello World");  System.out.println(sumOfNumbers(5,10));  return;  }    public static int sumOfNumbers(int a, int b){  int sum = a+b;  *//System.out.println(sum);*  differenceOftwo(a,b);  return sum;  }  public static void differenceOftwo(int a,int b){  System.out.println(a-b);  return;  } } |
| --- |

Read about scope of variables: <https://www.w3schools.com/java/java_scope.asp>

Read about functions: W3 schools/Java t point is a good resource

| public class Main {  public static void main(String[] args) {  System.out.println("Hello World");  sumofnumbers(5);  f1();  }  public static void sumofnumbers(int n){  int sum = 0;  for(int i=1;i<=n;i++){  sum+=i;  System.out.println(sum);  return;  }  System.out.println(sum);  return;  }    public static void f1(){  System.out.println("Inside f1 before f2 call");  int x = f2();  System.out.println(x);  System.out.println("Inside f1 after f2 call");    }    public static int f2(){  System.out.println("inside f2 before f3");  f3();  System.out.println("inside f2 after f3");  return 5;  }    public static void f3(){  System.out.println("Inside f3");  return;  } } |
| --- |

| import java.util.\*; public class Main {  public static void main(String[] args) {  f1();  int a = 5;  a = increment(a);  System.out.println(a);  int []arr = {1,2,3,4};  *//System.out.println(Arrays.toString(arr));*  for(int i=0;i<arr.length;i++){  System.out.println(arr[i]);  }  incrementArray(arr);  *//System.out.println(Arrays.toString(arr));*  for(int i=0;i<arr.length;i++){  System.out.println(arr[i]);  }  }  public static int increment(int x){  x++;  System.out.println(x);  return x;  }    public static void incrementArray(int []x){  for(int i=0;i<brr.length;i++){  brr[i]++;  }  } } |
| --- |