Note:

1. **The Ans section contains the program /coding part [which you have to write in your IDE to get the output.]**

2. **Only the questions which aren't written with the output contain the output after their Ans**

3. `Output which is written with the question is in this style text.`

Q1.

Write a java program that reads a Celsius degree in a **double** value from the console then converts it to Fahrenheit and displays the result. The formula for the conversion is as follows:
Fahrenheit = (9 / 5) * Celsius + 32

Hint: In Java, **9 / 5** is **1**, but **9.0 / 5** is **1.8**.

Here is a sample run:
```
Enter a degree in Celsius: 43
43 Celsius is 109.4 Fahrenheit
```

Ans.
```java
import java.util.Scanner;
public class A2Q1 {
        public static void main(String[] args) {
                Scanner input = new Scanner(System.in);
                System.out.print("Enter a degree in Celsius: ");
                double celsius = input.nextDouble();
                double fahrenheit = (9.0 / 5) * celsius + 32;
                System.out.println(celsius + " Celsius is " + fahrenheit + " Fahrenheit");
                input.close();
        }
}
```

Q2.

Write a java program that reads in the radius and length of a cylinder and computes the area and volume using the following formulas:
Area = radius * radius * π
Volume = area * length

Here is a sample run:
```
Enter the radius and length of a cylinder: 5.5 12
The area is 95.0331
The volume is 1140.4
```

Ans
```java
import java.util.Scanner;
public class A2Q2 {
        public static void main(String[] args) {
                Scanner input = new Scanner(System.in);
                final double PI = 3.14159265359;
```

```
                System.out.print("Enter the radius and length of a cylinder: ");
                double radius = input.nextDouble();
                double length = input.nextDouble();
                double area = radius * radius * PI; //you can also take math.PI
                double volume = area * length;
                System.out.println("The area is " + area);
                System.out.println("The volume is " + volume);
                input.close();
        }
}
```

Q3
Write a java program that reads a number in feet, converts it to meters, and displays the result. One foot is **0.305** meter.

Here is a sample run:
```
Enter a value for feet: 16.5
16.5 feet is 5.0325 meters
```

Ans
```
import java.util.Scanner;
public class A2Q3 {
        public static void main(String[] args) {
                Scanner input = new Scanner(System.in);
                System.out.print("Enter a value for feet: ");
                double feet = input.nextDouble();
                double meters = feet * 0.305;
                System.out.println(feet + " feet is " + meters + " meters");
                input.close();
        }
}
```

Q4
Write a java program that reads an integer between **0** and **1000** and adds all the digits in the integer. For example, if an integer is **932**, the sum of all its digits is **14**.

Hint: Use the **%** operator to extract digits, and use the **/** operator to remove the extracted digit.
For instance, **932 % 10 = 2** and **932 / 10 = 93**.

Here is a sample run:
```
Enter a number between 0 and 1000
999
The sum of the digits is 27
```

Ans
```java
import java.util.Scanner;
public class A2Q4 {
        public static void main(String[] args) {
                Scanner sc=new Scanner(System.in);
                int n, x, sum=0;
                System.out.println("Enter number between 0 and 1000");
                n=sc.nextInt();
                x=n % 10;
                sum=sum + x;
                n=n / 10;
                x=n % 10;
                sum=sum + x;
                n=n / 10;
                x=n % 10;
                sum=sum + x;
                n=n / 10;
                System.out.println("The sum of the digits is " + sum);
                sc.close();
        }
}
```
Q5
Average acceleration is defined as the change of velocity divided by the time taken to make the change, as shown in the following formula:

$$a= \frac{v_1 - v_0}{t}$$

Write a java program that prompts the user to enter the starting velocity $v0$ in meters/second, the ending velocity $v1$ in meters/second, and the time span t in seconds, and displays the average acceleration.

Here is a sample run:
```
Enter v0, v1, and t: 5.5 50.9 4.5
The average acceleration is 10.0889
```

Ans
```java
import java.util.Scanner;
public class A2Q5 {
        public static void main(String[] args) {
                Scanner sc = new Scanner(System.in);
                System.out.print("Enter v0, v1 and t: ");
                double v0 = sc.nextDouble();
                double v1 = sc.nextDouble();
                double t = sc.nextDouble();
                double a = (v1 - v0) / t;
                System.out.println("The average acceleration is " + a);
                sc.close();
        }
}
```

Q6
Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters. Write a java program that prompts the user to enter a weight in pounds and height in inches and displays the BMI.
Note that one pound is **0.45359237** kilograms and one inch is **0.0254** meters.

Here is a sample run:
```
Enter weight in pounds: 95.5
Enter height in inches: 50
BMI is 26.8573
```

Ans
```java
import java.util.Scanner;
public class A2Q6 {
        public static void main(String[] args) {
                Scanner sc = new Scanner(System.in);
                System.out.print("Enter weight in pounds: ");
                double weight = sc.nextDouble();
                System.out.print("Enter height in inches: ");
                double height = sc.nextDouble();
                weight = weight * 0.45359237;
                height = height * 0.0254;
                double bmi = weight / (height*height);
                System.out.println("BMI is " + bmi);
                sc.close();
        }
}
```

Q7
Write a java program that prompts the user to enter the side of a hexagon and displays its area. The formula for computing the area of a hexagon is
$$Area = \frac{3\sqrt{3}}{2}s^2$$
Where s is the length of a side.

Here is a sample run:
```
Enter the side: 5.5
The area of the hexagon is 78.5918
```

Ans
```java
import java.util.Scanner;
public class A2Q7 {
        public static void main(String[] args) {
                Scanner sc = new Scanner(System.in);
                System.out.print("Enter the side: ");
                double side = sc.nextDouble();
                double area = ((3 * Math.pow(3, 0.5)) / 2) * Math.pow(side, 2);
                System.out.println("The area of the hexagon is " + area);
```

```
                    sc.close();
        }
}
```

Write a java program that displays the following table. Cast floating-point numbers into integers.

a	b	Pow(a, b)
1	2	1
2	3	8
3	4	81
4	5	1024
5	6	15625

Ans

```
public class A2Q8 {
public static void main(String[] args) {
                float a, b;
                System.out.println("a    b    pow(a, b)");
                a = 1;
                b = 2;
                System.out.println((int)a + "   " + (int)b + "   " + (int)Math.pow(a, b));
                a++;
                b++;
                System.out.println((int)a + "   " + (int)b + "   " + (int)Math.pow(a, b));
                a++;
                b++;
                System.out.println((int)a + "   " + (int)b + "   " + (int)Math.pow(a, b));
                a++;
                b++;
                System.out.println((int)a + "   " + (int)b + "   " + (int)Math.pow(a, b));
                a++;
                b++;
                System.out.println((int)a + "   " + (int)b + "   " + (int)Math.pow(a, b));
        }
}
```

Output

a	b	Pow(a, b)
1	2	1
2	3	8
3	4	81
4	5	1024
5	6	15625

Q9
Write a java program that prompts the user to enter two points (**x1, y1**) and (**x2, y2**) and displays their distance between them. The formula for computing the distance is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
Note that you can use **Math.pow (a, 0.5)** to compute $\sqrt{a}$.

Ans
```java
import java.util.Scanner;
public class A2Q9 {
        public static void main(String[] args) {
                Scanner sc = new Scanner(System.in);
                System.out.print("Enter x1 and y1: ");
                double x1 = sc.nextDouble();
                double y1 = sc.nextDouble();
                System.out.print("Enter x2 and y2: ");
                double x2 = sc.nextDouble();
                double y2 = sc.nextDouble();
                double distance = Math.pow(Math.pow(x2 - x1, 2) +Math.pow(y2 - y1, 2), 0.5);
                System.out.println("The distance between the two points is " + distance);
        sc.close();
        }
}
```

Output
Enter x1 and y1: 1.5 -3.4
Enter x2 and y2: 4 5
The distance between the two points is 8.764131445842194

Q10
Write a java program that prompts the user to enter three points (**x1, y1**), (**x2, y2**), (**x3, y3**) of a triangle and displays its area. The formula for computing the area of a triangle is
$s = (side1 + side2 + side3)/2;$
$area=\sqrt{s*(s-a)*(s-b)*(s-c)}$

Here is a sample run:
```
Enter three points for a triangle: 1.5 -3.4 4.6 5 9.5 -3.4
The area of the triangle is 33.6
```

Ans
```java
import java.util.Scanner;
public class A2Q10 {
        public static void main(String[] args) {
                Scanner input = new Scanner(System.in);
                System.out.print("Enter three points for a triangle: ");
                double x1 = input.nextDouble();
                double y1 = input.nextDouble();
                double x2 = input.nextDouble();
```

```java
        double y2 = input.nextDouble();
        double x3 = input.nextDouble();
        double y3 = input.nextDouble();
        double side1 = Math.pow(Math.pow(x2 - x1, 2) + Math.pow(y2 - y1, 2), 0.5);
        double side2 = Math.pow(Math.pow(x3 - x2, 2) + Math.pow(y3 - y2, 2), 0.5);
        double side3 = Math.pow(Math.pow(x1 - x3, 2) + Math.pow(y1 - y3, 2), 0.5);
        double s = (side1 + side2 + side3) / 2;
        double area = Math.pow(s * (s - side1) * (s - side2) * (s - side3), 0.5);
        System.out.println("The area of the triangle is " + area);
    input.close();
    }
}
```

Q11

Write a java program that reads in investment amount, annual interest rate, and number of years, and displays the future investment value using the following formula:

Future Investment Value= Investment Amount x$(1 + montlyInterestRate)^{numberOfYears*12}$

For example, if you enter amount **1000**, annual interest rate **3.25%**, and number of years **1**, the future investment value is **1032.98**.

Here is a sample run:
```
Enter investment amount: 1000.56
Enter annual interest rate in percentage: 4.25
Enter number of years: 1
Accumulated value is $1043.92
```

Ans

```java
import java.util.Scanner;
public class A2Q11 {
    public static void main(String[] args) {
    Scanner input = new Scanner(System.in);
    System.out.print("Enter investment amount: ");
    double amount = input.nextDouble();
    System.out.print("Enter annual interest rate in percentage: ");
    double monthlyInterestRate = input.nextDouble();
    monthlyInterestRate /= 1200;
    System.out.print("Enter number of years: ");
    int years = input.nextInt();
    double futureInvestmentValue = amount * Math.pow(1 + monthlyInterestRate, years * 12);
    System.out.println("Accumulated value is $" + futureInvestmentValue);
input.close();
    }
}
```

Q12

If you have N eggs, then you have N/12 dozen eggs, with N%12 eggs left over. (This is essentially the definition of the / and % operators for integers.) Write a java program that asks the user how many eggs she has and then tells the user how many dozen eggs she has and how many extra eggs are left over. A gross of eggs is equal to 144 eggs. Extend your program so that it will tell the user how many gross, how many dozen, and how many left over eggs she has. For example, if the user says that she has 1342 eggs, and then your program would respond with

```
Your number of eggs is 9 gross, 3 dozen, and 10.
```

Ans
```java
import java.util.Scanner;
public class A2Q12 {
    public static void main(String[] args) {
        int num,dozen,gross;
        Scanner sc=new Scanner(System.in);
        System.out.println("How many eggs do you have?");
        num=sc.nextInt();
        gross=num/144;
        num=num%144;
        dozen=num/12;
        num=num%12;
System.out.println("Your number of eggs "+gross+" gross, "+dozen+" dozens,"+" and "+num+".");
        sc.close();
    }
}
```

Q13

Write a java program that prompts the user to enter the minutes (e.g., 1 billion), and displays the number of years and days for the minutes.
For simplicity, assume a year has **365** days.

Here is a sample run:
```
Enter the number of minutes: 1000000000
1000000000 minutes is approximately 1902 years and 214 days
```

Ans
```java
import java.util.Scanner;
public class A2Q13 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the number of minutes: ");
        int minutes = sc.nextInt();
        int years = minutes / 525600;
        int days = (minutes % 525600) / 1440;
        System.out.println(minutes + "minutes is approximately " + years + " years and " + days + " days");
    sc.close();
    }
}
```

Q14
Write a java program that takes two positive integers as command-line arguments and prints **true** if either evenly divides the other.

Ans
```java
public class A2Q14 {
    public static void main(String[] args) {
        int a,b;
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
        boolean res=((a%b==0)||(b%a==0));
        System.out.println("Result = "+res);
    }
}
```
Output
Result = true

Q15
Write a java program that takes two int values a and b from the command line and prints a random integer between a and b.

Ans
```java
public class A2Q15 {
    public static void main(String[] args) {
        int a;//a = 5
        int b;//b = 10
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
        int c=(int)(Math.random()*(b-a+1))+a;
        System.out.println("c = "+c);
    }
}
```
Output
c = 6

Q16
Write a java program that prints the sum of two random integers between 1 and 6 (such as you might get when rolling dice).

Ans
```java
public class A2Q16 {
    public static void main(String[] args) {
        int a,b,res1,res2;
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
        res1=a+(int)(Math.random()*(b-a+1));
```

```
                res2=a+(int)(Math.random()*(b-a+1));
                int sum=res1+res2;
                System.out.println(sum);
        }
}
```

Output

8

Q17

Write a java program that takes three positive integers as command-line arguments and prints true if any one of them is greater than or equal to the sum of the other two and false otherwise.

Ans

```
public class A2Q17 {
        public static void main(String[] args) {
                int a,b,c;
                a=Integer.parseInt(args[0]);
                b=Integer.parseInt(args[1]);
                c=Integer.parseInt(args[2]);
                boolean res=((a+b)>=c)||((b+c)>=a)||((a+c)>=b);
                System.out.println(res);
        }
}
```

Output

true

Q18

Write a java program that takes three double values x, y, and z as command-line arguments and prints true if the values are strictly ascending or descending (x < y < z or x > y > z), and false otherwise.

Ans

```
public class A2Q18 {
        public static void main(String[] args) {
                Double x,y,z;
                x=Double.parseDouble(args[0]);
                y=Double.parseDouble(args[1]);
                z=Double.parseDouble(args[2]);;
                boolean res=((x<y&&y<z)||(x>y&&y>z));
                System.out.println(res);
        }
}
```

Output

true

Q19

Enter the basic salary of an employee of an organization through the command prompt. His dearness allowance (DA) is 40% of basic salary, and house rent allowance (HRA) is 20% of basic salary. Write a java program to calculate his gross salary.

Ans
```
public class A2Q19 {
        public static void main(String[] args) {
                double basic,HRA,DA,gross;
                basic=Double.parseDouble(args[0]);
                DA=0.40*basic;
                HRA=0.20*basic;
                gross=basic+DA+HRA;
                System.out.println("The gross salary is: "+gross);
        }
}
```
Output
The gross salary is: 64000.0

Q20
Write a java program that takes two int values m and d from the command line and prints true if day d of month m is between 3/20 and 6/20, false otherwise.

Ans
```
public class A2Q20 {
        public static void main(String[] args) {
                int m,d;
                m=Integer.parseInt(args[0]);
                d=Integer.parseInt(args[1]);
                boolean res=(m==3&&d>=20)||(m==4&&d<=30)||(m==5&&d<=31)||(m==6&&d<=20);
                System.out.println(res);
        }
}
```
Output
true

Q21
Write a java program that takes a double value t from the command line and prints the value of sin (2t) + sin (3t).

Ans
```
public class A2Q21 {
        public static void main(String[] args) {
                double t,sum;
                t=Double.parseDouble(args[0]);
                t=Math.toRadians(t);
                sum=Math.sin(2*t)+Math.sin(3*t);
                System.out.println(sum);
        }
}
```

Output

0.21768193496770974

Q22

Write a java program that calculates the monthly payments you would have to make over a given number of years to pay off a loan at a given interest rate compounded continuously, taking the number of years t, the principal P, and the annual interest rate r as command-line arguments. The desired value is given by the formula Pe^{rt}. Use Math.exp ().

Ans

```java
public class A2Q22 {
    public static void main(String[] args) {
        double p,r,t;
        p=Double.parseDouble(args[0]);
        r=Double.parseDouble(args[1]);
        t=Double.parseDouble(args[2]);
        double monthly_payment=p*Math.exp(r*t);
        System.out.println(monthly_payment);
    }
}
```

Output

9.4154106734808E21

Q23

Write a java program that takes three int values from the command line and prints them in ascending order. Use Math.min() and Math.max().

Ans

```java
public class A2Q23 {
    public static void main(String[] args) {
        int a,b,c;
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
        c=Integer.parseInt(args[2]);
        int max=Math.max(a,Math.max(b,c));
        int min=Math.min(a,Math.min(b,c));
        int median=(a+b+c)-max-min;
        System.out.println(min+" "+median+" "+max);
    }
}
```

Output

2 5 8

Q24

Write a java program that prints five uniform random values between 0 and 1, their average value, and their minimum and maximum value. Use Math.random(), Math.min(), and Math.max().

Ans

```java
public class A2Q24 {
        public static void main(String[] args) {
                double r1,r2,r3,r4,r5;
                r1=Math.random();
                r2=Math.random();
                r3=Math.random();
                r4=Math.random();
                r5=Math.random();
                System.out.println(r1+" "+r2+" "+r3+" "+r4+" "+r5);
                double sum=r1+r2+r3+r4+r5;
                double avg=sum/5;
                System.out.println("Average ="+avg);
                double max=Math.max(r1,Math.max(r2,Math.max(r3,Math.max(r4, r5))));
                double min=Math.min(r1,Math.min(r2,Math.min(r3,Math.min(r4, r5))));
                System.out.println("Max="+max);
                System.out.println("Min="+min);
        }
}
```

Output

0.9196401923950633 0.11935657276752754 0.5701378598801541 0.6400494190187628
0.523544819073434
Average = 0.5545457726269885
Max = 0.9196401923950633
Min = 0.11935657276752754

_____ *The End*_____