

Class 9(2026-27)
Computer Applications Notes & Solutions
Chapter 8
Conditional Constructs in Java

A. Tick (✓) the Correct Answer

Question 1

Choose the correct syntax of Java if statement below:

- a.

```
if(condition)
    //statement;
```
- b.

```
if(condition);
{
    //statement;
}
```
- c.

```
if(condition)
{
    //statement1;
    else
    //statement2;
}
```
- d. All

Answer:

✓ a.

```
if(condition)
    //statement;
```

Explanation:

- In Java, an `if` statement checks a condition.
 - If the condition is true, the statement executes.
 - Option **b** is wrong because of the semicolon (;) after `if(condition)`.
 - Option **c** is incorrect syntax for `if-else`.
-

Question 2

Is it necessary to enclose the code block of an if statement within braces { }?

- a. Yes, always
b. No, only if there is more than one line of code in the block
c. No, braces are never required
d. Yes, but only for if-else statements

Answer:

✓ b. No, only if there is more than one line of code in the block

Explanation:

- If there is only one statement, braces are optional.
- For multiple statements, braces are compulsory.

Example:

```
if(a>10)
    System.out.println("Hello");
Multiple statements:
if(a>10)
{
    System.out.println("Hello");
    System.out.println("Welcome");
}
```

Question 3

In Java, if statement is a _____ statement.

- a. Boolean
- b. Conditional
- c. Iterative
- d. Optional

Answer:

✓ **b. Conditional**

Explanation:

- The `if` statement is used to check conditions.
- Therefore, it is called a **conditional statement**.

Question 4

What is the output of Java program with if statement?

```
if(true)
    System.out.println("Yes");
else
    System.out.println("No");
```

- a. No
- b. Yes
- c. Both
- d. None of these

Answer:

✓ **b. Yes**

Explanation:

- The condition is `true`.
- So the `if` block executes.
- Output:

Yes

Question 5

What is the output of the Java program?

```
double a = 15.4;

if(a==15)
    System.out.println("India ");
    System.out.println("New Delhi");
else
    System.out.println("All");
```

- a. India New Delhi
- b. IndiaNew Delhi
- c. Error - else without if
- d. All of these

Answer:

✓ **c. Error - else without if**

Explanation:

- Only the first statement belongs to `if`.
 - The second `println` statement is outside the `if`.
 - Therefore `else` has no matching `if`.
 - This causes compilation error.
-

Question 6

Find the output of Java program:

```
float marks = 89.5f;
```

```
if(marks > 89.5)
    System.out.println("Grade A");
else
    System.out.println("Grade B");
```

- Grade A
- Grade B
- Error - else without if
- All of these

Answer:

✓ **b. Grade B**

Explanation:

- `marks = 89.5`
- Condition:

```
89.5 > 89.5
```

is false.

So `else` block executes.

Output:

```
Grade B
```

Question 7

In Java, what statement is alternative to Switch Case?

- break
- for
- if-else
- continue

Answer:

✓ **c. if-else**

Explanation:

- Both `if-else` and `switch` are decision-making statements.
-

Question 8

What is the output of the following Java program?

```
int a = 2;
```

```
switch(a)
{
    case 1: System.out.print("Tiger");
    case 2: System.out.print("Deer");
```

```
default: System.out.println("Lion");
}
```

a. Tiger
b. Lion
c. DeerLion
d. No output

Answer:

✓ **c. DeerLion**

Explanation:

- a = 2
- So execution starts from case 2.
- There is no break.
- Hence execution continues to default.

Output:

DeerLion

B. Fill in the Blanks

Question 1

Java Ternary Operators are also called _____.

Answer:

✓ **Conditional Operators**

Explanation:

- Ternary operator works on conditions.
- Syntax:

```
condition ? true_part : false_part;
```

Question 2

One example of _____ statement is switch case statement.

Answer:

✓ **Conditional**

Explanation:

- Switch case is used for decision making.

Question 3

In if else if, default statement of switch case will be written in the _____ else statement.

Answer:

✓ **last**

Explanation:

- The final else block acts like default.

Question 4

The output of if else is _____ datatype.

Answer:

✓ **Boolean**

Explanation:

- Conditions in if-else evaluate to true or false.

C. Assertion and Reasoning Based Question

Assertion (A):

Conditional flow of control is a programming concept where the flow of a program is altered based on a specified condition.

Reason (R):

The essence of conditional flow is that the program control follows different paths based on whether a given condition is true or false.

Answer:

✓ a. Both A and R are true, and R is the correct explanation of A.

Explanation:

- Both statements correctly explain conditional flow control.

D. More Unsolved Programs

1(a). Gift or Discount Program

Question

A pen manufacturing company declares:

- If price of pen is less than ₹500 → give a gift
- Otherwise → give 25% discount

Write a Java program.

Answer

```
import java.util.*;

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

        double price, discount;

        System.out.print("Enter pen price: ");
        price = sc.nextDouble();

        if(price < 500)
        {
            System.out.println("Gift will be provided.");
        }
        else
        {
            discount = price * 25 / 100;
            System.out.println("Discount = " + discount);
        }
    }
}
```

Explanation:

- if checks whether price is below 500.
- Otherwise discount is calculated.

1(b). Odd or Even Program

Answer

```
import java.util.*;

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

        int n;

        System.out.print("Enter a number: ");
        n = sc.nextInt();

        if(n % 2 == 0)
            System.out.println("Even Number");
        else
            System.out.println("Odd Number");
    }
}
```

Explanation:

- If remainder is 0 → even.
- Otherwise odd.

1(c). Triangle Program

Answer

```
import java.util.*;

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

        int a,b,c,sum;

        System.out.print("Enter three angles: ");
        a=sc.nextInt();
        b=sc.nextInt();
        c=sc.nextInt();

        sum = a+b+c;

        if(sum==180)
            System.out.println("Valid Triangle");
        else
            System.out.println("Not a Triangle");
    }
}
```

Explanation:

- Sum of angles of a triangle must be 180° .

1(d). Weekday Program

Answer

```

import java.util.*;

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

        int day;

        System.out.print("Enter number between 1-7: ");
        day = sc.nextInt();

        switch(day)
        {
            case 1: System.out.println("Sunday"); break;
            case 2: System.out.println("Monday"); break;
            case 3: System.out.println("Tuesday"); break;
            case 4: System.out.println("Wednesday"); break;
            case 5: System.out.println("Thursday"); break;
            case 6: System.out.println("Friday"); break;
            case 7: System.out.println("Saturday"); break;
            default: System.out.println("Invalid Input");
        }
    }
}

```

1(e). Greater and Smaller Number Program

Answer

```

import java.util.*;

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

        int a,b;

        System.out.print("Enter two numbers: ");
        a=sc.nextInt();
        b=sc.nextInt();

        if(a>b)
        {
            System.out.println("Square = " + (a*a));
            System.out.println("Cube = " + (b*b*b));
        }
        else if(b>a)
        {
            System.out.println("Square = " + (b*b));
            System.out.println("Cube = " + (a*a*a));
        }
        else
        {
            System.out.println("Twice of numbers = " + (2*a) + " " + (2*b));
        }
    }
}

```

1(f). Discount Program

Answer

```
import java.util.*;

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

        double amt, dis=0, finalamt;

        System.out.print("Enter purchase amount: ");
        amt = sc.nextDouble();

        if(amt<=3000)
            dis = amt*5/100;
        else if(amt<=5000)
            dis = amt*7/100;
        else
            dis = amt*10/100;

        finalamt = amt-dis;

        System.out.println("Discount = " + dis);
        System.out.println("Final Amount = " + finalamt);
    }
}
```

1(g). Mode of Payment Program

Answer

```
import java.util.*;

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

        double bill, amount;
        char ch;

        System.out.print("Enter bill amount: ");
        bill = sc.nextDouble();

        System.out.print("Enter mode (c/d/e): ");
        ch = sc.next().charAt(0);

        switch(ch)
        {
            case 'c':
                amount = bill - (bill*1.5/100);
                System.out.println("Credit Card Discount");
                System.out.println("Pay = " + amount);
                break;

            case 'd':
                amount = bill - 10;
                System.out.println("Debit Card Cashback");
                System.out.println("Pay = " + amount);
                break;

            case 'e':
                amount = bill - 20;
```

```

        System.out.println("E-wallet Cashback");
        System.out.println("Pay = " + amount);
        break;

    default:
        System.out.println("No Discount");
        System.out.println("Pay = " + bill);
    }
}

```

1(h). Telephone Bill Program

Answer

```

import java.util.*;

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

        int calls;
        double bill=100;

        System.out.print("Enter number of calls: ");
        calls = sc.nextInt();

        if(calls<=50)
            bill=100;

        else if(calls<=100)
            bill=100+(calls-50)*0.80;

        else if(calls<=200)
            bill=140+(calls-100)*0.60;

        else
            bill=200+(calls-200)*0.40;

        System.out.println("Bill Amount = " + bill);
    }
}

```

1(i). Sales Commission Program

Answer

```

import java.util.*;

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

        int sales;
        double amount, commission;

        System.out.print("Enter number of products sold: ");
        sales = sc.nextInt();

        System.out.print("Enter selling amount: ");
        amount = sc.nextDouble();
    }
}

```

```

        if(sales<=50)
        {
            commission = amount*5/100;
            System.out.println("Gift: Parker Pen");
        }
        else if(sales<=75)
        {
            commission = amount*7.5/100;
            System.out.println("Gift: Micro SD Card");
        }
        else if(sales<=100)
        {
            commission = amount*10/100;
            System.out.println("Gift: Mobile");
        }
        else
        {
            commission = amount*15/100;
            System.out.println("Gift: Laptop");
        }

        System.out.println("Commission = " + commission);
    }
}

```

1(j). Income Tax Program

Answer

```

import java.util.*;

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

        double income, tax=0;

        System.out.print("Enter annual income: ");
        income = sc.nextDouble();

        if(income<=100000)
            tax=0;

        else if(income<=150000)
            tax=(income-100000)*10/100;

        else if(income<=250000)
            tax=5000+(income-150000)*20/100;

        else
            tax=25000+(income-250000)*30/100;

        System.out.println("Tax = " + tax);
    }
}

```

1(k). Vowel or Consonant Program

Answer

```

import java.util.*;

```

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

        char ch;

        System.out.print("Enter a character: ");
        ch = sc.next().charAt(0);

        if(ch=='a' || ch=='e' || ch=='i' || ch=='o' || ch=='u' ||
            ch=='A' || ch=='E' || ch=='I' || ch=='O' || ch=='U')
        {
            System.out.println("Vowel");
        }
        else
        {
            System.out.println("Consonant");
        }
    }
}
```

Important Notes for Students

Conditional Statements in Java

1. if
2. if-else
3. if-else-if
4. switch

Relational Operators

- >
- <
- >=
- <=
- ==
- !=

Logical Operators

- && → AND
- || → OR
- ! → NOT

Switch Case Important Point

- break stops execution.
- Without break, control falls to next case.

2. Programs Using Multiple Branching Statement

2(a). Menu Driven Program for Volume Calculation

Question

Write a menu-driven program to input the radius (r) and height (h) and calculate:

1. Volume of Sphere
2. Volume of Cylinder
3. Volume of Cone

Answer

```
import java.util.*;

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

        int choice;
        double r,h,vs,vc,vco;

        System.out.print("Enter radius: ");
        r = sc.nextDouble();

        System.out.print("Enter height: ");
        h = sc.nextDouble();

        System.out.println("1. Volume of Sphere");
        System.out.println("2. Volume of Cylinder");
        System.out.println("3. Volume of Cone");

        System.out.print("Enter your choice: ");
        choice = sc.nextInt();

        switch(choice)
        {
            case 1:
                vs = (4.0/3.0) * 3.14 * r * r * r;
                System.out.println("Volume of Sphere = " + vs);
                break;

            case 2:
                vc = 3.14 * r * r * h;
                System.out.println("Volume of Cylinder = " + vc);
                break;

            case 3:
                vco = (3.14 * r * r * h)/3;
                System.out.println("Volume of Cone = " + vco);
                break;

            default:
                System.out.println("Invalid Choice");
        }
    }
}
```

Explanation

- switch statement is used for menu selection.
- Formula used:
 - Sphere = $\frac{4}{3} \times \pi \times r^3$
 - Cylinder = $\pi \times r^2 \times h$
 - Cone = $(\pi \times r^2 \times h)/3$

2(b). Temperature Conversion Program

Question

Using a switch statement, write a menu-driven program to convert temperature:

1. Fahrenheit to Celsius
2. Celsius to Fahrenheit

For incorrect choice, display an error message.

Answer

```
import java.util.*;

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

        int choice;
        double c, f;

        System.out.println("1. Fahrenheit to Celsius");
        System.out.println("2. Celsius to Fahrenheit");

        System.out.print("Enter your choice: ");
        choice = sc.nextInt();

        switch(choice)
        {
            case 1:
                System.out.print("Enter temperature in Fahrenheit: ");
                f = sc.nextDouble();

                c = (f - 32) * 5 / 9;

                System.out.println("Temperature in Celsius = " + c);
                break;

            case 2:
                System.out.print("Enter temperature in Celsius: ");
                c = sc.nextDouble();

                f = (c * 9 / 5) + 32;

                System.out.println("Temperature in Fahrenheit = " + f);
                break;

            default:
                System.out.println("Invalid Choice");
        }
    }
}
```

Explanation

Formula Used:

- Celsius:

$$C = (F - 32) \times 5/9$$

- Fahrenheit:

$$F = (C \times 9/5) + 32$$

- switch is used to select the conversion type.

2(c). Prime Number or Factorial Program

Question

Write a menu-driven class to:

1. Check whether a number is prime or not
2. Find factorial of a number

Answer

```
import java.util.*;

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

        int choice,n,i, fact=1, count=0;

        System.out.println("1. Prime Number");
        System.out.println("2. Factorial");

        System.out.print("Enter your choice: ");
        choice = sc.nextInt();

        System.out.print("Enter a number: ");
        n = sc.nextInt();

        switch(choice)
        {
            case 1:

                for(i=1;i<=n;i++)
                {
                    if(n%i==0)
                        count++;
                }

                if(count==2)
                    System.out.println("Prime Number");
                else
                    System.out.println("Not Prime");

                break;

            case 2:

                for(i=1;i<=n;i++)
                {
                    fact = fact*i;
                }

                System.out.println("Factorial = " + fact);
                break;

            default:
                System.out.println("Invalid Choice");
        }
    }
}
```

Explanation

Prime Number

- A prime number has exactly 2 factors:
 - 1 and itself

Factorial

Example:

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

2(d). Mathematical Evaluation Program

Question

Using switch case, display the results of the following:

1. Square root of 9
2. Absolute value of 126.4
3. Smallest integer greater than 56.7
4. Print any value between 0 and 1

Answer

```
import java.util.*;

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

        int choice;

        System.out.println("1. Square Root of 9");
        System.out.println("2. Absolute value of 126.4");
        System.out.println("3. Smallest integer greater than 56.7");
        System.out.println("4. Random value between 0 and 1");

        System.out.print("Enter your choice: ");
        choice = sc.nextInt();

        switch(choice)
        {
            case 1:
                System.out.println("Square Root = " + Math.sqrt(9));
                break;

            case 2:
                System.out.println("Absolute Value = " + Math.abs(-126.4));
                break;

            case 3:
                System.out.println("Value = " + Math.ceil(56.7));
                break;

            case 4:
                System.out.println("Random Number = " + Math.random());
                break;

            default:
                System.out.println("Invalid Choice");
        }
    }
}
```

Explanation

Math Functions Used

Function	Purpose
<code>Math.sqrt()</code>	Finds square root

Function	Purpose
Math.abs()	Finds absolute value
Math.ceil()	Finds next greater integer
Math.random()	Generates random number

2(e). Area Calculation Program

Question

Write a program to input a choice and print the following using if-else:

1. Area of Rectangle
 2. Area of Square
 3. Area of Circle
-

Answer

```
import java.util.*;

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

        int choice;
        double l,b,s,r,area;

        System.out.println("1. Area of Rectangle");
        System.out.println("2. Area of Square");
        System.out.println("3. Area of Circle");

        System.out.print("Enter your choice: ");
        choice = sc.nextInt();

        if(choice==1)
        {
            System.out.print("Enter length and breadth: ");
            l = sc.nextDouble();
            b = sc.nextDouble();

            area = l*b;

            System.out.println("Area of Rectangle = " + area);
        }

        else if(choice==2)
        {
            System.out.print("Enter side: ");
            s = sc.nextDouble();

            area = s*s;

            System.out.println("Area of Square = " + area);
        }

        else if(choice==3)
        {
            System.out.print("Enter radius: ");
            r = sc.nextDouble();

            area = 3.14*r*r;

            System.out.println("Area of Circle = " + area);
        }
    }
}
```

```
    }  
    else  
    {  
        System.out.println("Invalid Choice");  
    }  
}
```

Explanation

Rectangle Area

Area = length × breadth

Square Area

Area = side × side

Circle Area

Area = $\pi \times r^2$

- if-else-if is used for multiple conditions.

Chapter 8 – (2025-26) Conditional Constructs in Java

Practice Questions with Answers

A. Tick (✓) the Correct Answer

1. An if statement code must be defined in between two braces.

- a) true
- b) false
- c) may or may not ✓
- d) none of these

2. In Java, if statement is a-----Statement.

- a) Boolean
- b) Conditional ✓
- c) Iterative
- d) Optional

3. Choose the correct syntax of Java IF statement below.

- a) if(condition) //statement ✓
- b) if(condition): //statement
- c) if(condition) //statement1 else //statement2
- d) All

4. What is the output of the program?

```
if (true)  
    System.out.println("Yes");  
else  
    System.out.println("No");
```

- a) No
- b) Yes ✓

- c) Both
- d) None of these

5. What is the output of the Java program?

```
double a = 15.4;
if (a > 15)
    System.out.println("India");
    System.out.println("New Delhi");
else
    System.out.println("All");
```

- a) India New Delhi ✓
- b) IndiaNew Delhi
- c) Error: else without if
- d) All of these

6. Find the output of program:

```
float marks = 89.5f;
if (marks > 89.5)
    System.out.println("Grade A");
else
    System.out.println("Grade B");
```

- a) Grade A
- b) Grade B ✓
- c) Error – else without if
- d) All of these

7. In Java, what statement is alternative to Switch Case?

- a) break
- b) for
- c) if-else ✓
- d) continue

8. What is the output of the program below?

```
int a = 2;
switch(a) {
    case 1: System.out.print("Tiger");
    case 2: System.out.print("Deer");
    default: System.out.println("Lion");
}
```

- a) Tiger
- b) Lion
- c) DeerLion ✓
- d) No output

9. If ____ is not present in a switch case, then fall through occurs in Java.

- a) case
- b) default
- c) break ✓
- d) None of these

10. In Java, instead of if-else, the ____ operator may be used.

- a) if-else-if statement
 - b) if-else statement ✓
 - c) if statement
 - d) Both a and b
-

B. Fill in the Blanks

1. Java Ternary Operators are also called **conditional operators**.
2. Absence of **break** in switch statement is known as **Fall Through**.
3. One example of **multiple branching** statement is **switch-case**.
4. In if-else-if, default statement of switch case will be written in the **else statement**.
5. The output of if-else is always a **boolean datatype** (condition evaluates to true/false).

C. More Unsolved Programs (for Practice)

Programs Using Conditional Flow of Control

(a) Pen Price Discount or Gift

```
import java.util.Scanner;
class PenCompany {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter price of the pen: ");
        int price = sc.nextInt();

        if(price < 500)
            System.out.println("Gift will be given.");
        else
            System.out.println("Discounted Price = " + (price - (price * 25 /
100.0)));
    }
}
```

(b) Odd or Even

```
import java.util.Scanner;
class OddEven {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n = sc.nextInt();

        if(n % 2 == 0)
            System.out.println("Even Number");
        else
            System.out.println("Odd Number");
    }
}
```

(c) Valid Triangle Check

```
import java.util.Scanner;
class TriangleCheck {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter 3 angles: ");
        int a = sc.nextInt();
        int b = sc.nextInt();
        int c = sc.nextInt();

        if(a + b + c == 180)
            System.out.println("It is a Triangle");
        else
            System.out.println("Not a Triangle");
    }
}
```

(d) Weekday Name

```
import java.util.Scanner;
class Weekday {
```

```

public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter number (1-7): ");
    int day = sc.nextInt();

    if(day == 1) System.out.println("Sunday");
    else if(day == 2) System.out.println("Monday");
    else if(day == 3) System.out.println("Tuesday");
    else if(day == 4) System.out.println("Wednesday");
    else if(day == 5) System.out.println("Thursday");
    else if(day == 6) System.out.println("Friday");
    else if(day == 7) System.out.println("Saturday");
    else System.out.println("Invalid Input");
}
}

```

(e) Square/Cube of Numbers

```

import java.util.Scanner;
class SquareCube {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter two numbers: ");
        int a = sc.nextInt();
        int b = sc.nextInt();

        if(a > b)
            System.out.println("Square of greater: " + (a * a) + ", Cube of
smaller: " + (b * b * b));
        else if(b > a)
            System.out.println("Square of greater: " + (b * b) + ", Cube of
smaller: " + (a * a * a));
        else
            System.out.println("Both Equal. Twice = " + (2 * a));
    }
}

```

(f) Student Grade

```

import java.util.Scanner;
class StudentGrade {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter marks of 3 subjects: ");
        int m1 = sc.nextInt(), m2 = sc.nextInt(), m3 = sc.nextInt();

        int avg = (m1 + m2 + m3) / 3;
        System.out.println("Average = " + avg);

        if(avg >= 90) System.out.println("Grade A");
        else if(avg >= 80) System.out.println("Grade B");
        else if(avg >= 70) System.out.println("Grade C");
        else if(avg >= 60) System.out.println("Grade D");
        else System.out.println("Grade F");
    }
}

```

(g) Purchase Discount

```

import java.util.Scanner;
class Purchase {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter customer name: ");
        String name = sc.nextLine();
        System.out.print("Enter purchase amount: ");
        double amt = sc.nextDouble();
    }
}

```

```

double discount = 0;
if(amt < 3000) discount = 0.05 * amt;
else if(amt >= 5000) discount = 0.10 * amt;

double finalAmt = amt - discount;
System.out.println("Customer: " + name);
System.out.println("Discount = " + discount);
System.out.println("Final Amount = " + finalAmt);
}
}

```

(h) Mode of Payment

```

import java.util.Scanner;
class PaymentMode {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter bill amount: ");
        double amt = sc.nextDouble();
        System.out.print("Enter mode of payment (cc/dc/ew/c): ");
        String mode = sc.next();

        if(mode.equals("cc")) {
            amt -= amt * 0.015;
            System.out.println("Credit Card: 1.5% discount. Payable = " + amt);
        } else if(mode.equals("dc")) {
            amt -= 10;
            System.out.println("Debit Card: Rs.10 cashback. Payable = " + amt);
        } else if(mode.equals("ew")) {
            amt -= 20;
            System.out.println("E-Wallet: Rs.20 cashback. Payable = " + amt);
        } else if(mode.equals("c")) {
            System.out.println("Cash: No discount. Payable = " + amt);
        } else {
            System.out.println("Invalid Mode");
        }
    }
}

```

(i) Telephone Bill

```

import java.util.Scanner;
class TelephoneBill {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of calls: ");
        int calls = sc.nextInt();

        double bill = 100;
        if(calls > 50) {
            int rem = calls - 50;
            if(rem <= 50) bill += rem * 0.80;
            else if(rem <= 150) bill += (50 * 0.80) + (rem - 50) * 0.60;
            else bill += (50 * 0.80) + (100 * 0.60) + (rem - 150) * 0.40;
        }
        System.out.println("Telephone Bill = Rs." + bill);
    }
}

```

(j) Sales Commission

```

import java.util.Scanner;
class SalesCommission {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of products sold: ");
        int n = sc.nextInt();
        System.out.print("Enter selling amount: ");
    }
}

```

```

        double amt = sc.nextDouble();

        if(n <= 50)
            System.out.println("Commission = " + (0.05 * amt) + " on Parker Pen");
        else if(n <= 75)
            System.out.println("Commission = " + (0.075 * amt) + " on Micro SD
Card");
        else if(n <= 100)
            System.out.println("Commission = " + (0.10 * amt) + " on Mobile");
        else
            System.out.println("Commission = " + (0.15 * amt) + " on Laptop");
    }
}

```

(k) Income Tax

```

import java.util.Scanner;
class IncomeTax {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter annual taxable income: ");
        double income = sc.nextDouble();
        double tax = 0;

        if(income <= 100000) tax = 0;
        else if(income <= 150000) tax = (income - 100000) * 0.10;
        else if(income <= 250000) tax = 5000 + (income - 150000) * 0.20;
        else tax = 25000 + (income - 250000) * 0.30;

        System.out.println("Tax Payable = Rs." + tax);
    }
}

```

(l) Vowel or Consonant

```

import java.util.Scanner;
class VowelCheck {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a character: ");
        char ch = sc.next().charAt(0);

        if("aeiouAEIOU".indexOf(ch) != -1)
            System.out.println("Vowel");
        else
            System.out.println("Consonant");
    }
}

```

✓ 2. Programs Using Multiple Branching (Switch/If-Else)

(a) Volume Calculations

```

import java.util.Scanner;
class VolumeMenu {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("1. Sphere\n2. Cylinder\n3. Cone");
        System.out.print("Enter choice: ");
        int ch = sc.nextInt();

        switch(ch) {
            case 1:
                System.out.print("Enter radius: ");

```

```

        double r = sc.nextDouble();
        System.out.println("Volume of Sphere = " + (4.0/3 * Math.PI * r * r
* r));
        break;
    case 2:
        System.out.print("Enter radius & height: ");
        r = sc.nextDouble();
        double h = sc.nextDouble();
        System.out.println("Volume of Cylinder = " + (Math.PI * r * r *
h));
        break;
    case 3:
        System.out.print("Enter radius & height: ");
        r = sc.nextDouble();
        h = sc.nextDouble();
        System.out.println("Volume of Cone = " + (Math.PI * r * r * h /
3));
        break;
    default:
        System.out.println("Invalid Choice");
    }
}
}

```

(b) Temperature Conversion

```

import java.util.Scanner;
class TempConvert {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("1. F to C\n2. C to F");
        System.out.print("Enter choice: ");
        int ch = sc.nextInt();

        switch(ch) {
            case 1:
                System.out.print("Enter F: ");
                double f = sc.nextDouble();
                System.out.println("Celsius = " + ((f - 32) * 5/9));
                break;
            case 2:
                System.out.print("Enter C: ");
                double c = sc.nextDouble();
                System.out.println("Fahrenheit = " + ((c * 9/5) + 32));
                break;
            default:
                System.out.println("Invalid choice");
        }
    }
}

```

(c) Prime or Factorial

```

import java.util.Scanner;
class PrimeFactorial {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("1. Prime Check\n2. Factorial");
        System.out.print("Enter choice: ");
        int ch = sc.nextInt();
        System.out.print("Enter number: ");
        int n = sc.nextInt();

        switch(ch) {
            case 1:
                boolean prime = true;
                if(n < 2) prime = false;

```

```

        for(int i=2;i<=n/2;i++)
            if(n%i==0) {prime=false; break;}
        if(prime) System.out.println("Prime");
        else System.out.println("Not Prime");
        break;
    case 2:
        int fact = 1;
        for(int i=1;i<=n;i++) fact*=i;
        System.out.println("Factorial = " + fact);
        break;
    default:
        System.out.println("Invalid");
    }
}
}

```

(d) Math Operations Menu

```

import java.util.Scanner;
class MathMenu {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("1. Square root of 9\n2. Absolute value of 126.4\n3.
Smallest integer > 56.7\n4. Random number between 0-1");
        System.out.print("Enter choice: ");
        int ch = sc.nextInt();

        switch(ch) {
            case 1: System.out.println("sqrt(9) = " + Math.sqrt(9)); break;
            case 2: System.out.println("abs(126.4) = " + Math.abs(126.4)); break;
            case 3: System.out.println("ceil(56.7) = " + Math.ceil(56.7)); break;
            case 4: System.out.println("Random = " + Math.random()); break;
            default: System.out.println("Invalid");
        }
    }
}

```

(e) Area Calculations

```

import java.util.Scanner;
class AreaMenu {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("1. Rectangle\n2. Square\n3. Circle");
        System.out.print("Enter choice: ");
        int ch = sc.nextInt();

        switch(ch) {
            case 1:
                System.out.print("Enter length & breadth: ");
                int l = sc.nextInt(), b = sc.nextInt();
                System.out.println("Area of Rectangle = " + (l*b));
                break;
            case 2:
                System.out.print("Enter side: ");
                int s = sc.nextInt();
                System.out.println("Area of Square = " + (s*s));
                break;
            case 3:
                System.out.print("Enter radius: ");
                double r = sc.nextDouble();
                System.out.println("Area of Circle = " + (Math.PI*r*r));
                break;
            default:
                System.out.println("Invalid");
        }
    }
}

```



}