

```

d=(a+b)2;
p=c/d;
System.out.println(c + " "+ " "+d+ " "+p);
}
}

4. class Sample
{
public static void main(String args[])
{
    int n,p;
    float k,r;
    n=25;p=12;
    if(n==25)
    {
        k=pow(p,2)
        System.out.println("The value of"+p+" = "+k);
    }
    else
    {
        r=Math.sqrt(n);
        System.out.println("The value of"+n+" = "+r);
    }
}
}

```

V. Unsolved Java Programs:

- 1.** Write a program to input three angles of a triangle and check whether its construction is possible or not. If possible then check and display whether it is an acute-angled triangle, right-angled or an obtuse-angled triangle. Otherwise, display 'A Triangle is not possible'.

Sample Input: Enter three angles: 40, 50, 90

Sample Output: Right-Angled Triangle

- 2.** Write a program to input the cost price and the selling price of an article. If the selling price is more than the cost price then calculate and display actual the profit and profit per cent otherwise, calculate and display the actual loss and loss per cent. If the cost price and the selling price are equal, the program displays the message 'Neither profit nor loss'.

- 3.** Write a program to input three numbers and check whether they are equal or not. If they are unequal numbers then display the greatest among them otherwise, display the message 'All the numbers are equal'.

Sample Input: 34, 87, 61

Sample Output: Greatest number: 87

Sample Input: 81, 81, 81

Sample Output: All the numbers are equal.

- 4.** Write a program to accept a number and check whether the number is divisible by 3 as well as 5. Otherwise, decide:

(a) Is the number divisible by 3 and not by 5?

(b) Is the number divisible by 5 and not by 3?

(c) Is the number neither divisible by 3 nor by 5?

The program displays the message accordingly.

5. Write a program to input the year. The program checks and displays whether it is:

- (a) a Leap year (b) a Century Leap year (c) a Century year but not a Leap year

Sample Input: 2000

Sample Output: It is a Century Leap Year.

6. Write a program to input two unequal positive numbers and check whether they are perfect square numbers or not. If the user enters any negative number then the program displays the message 'Square root of a negative number cannot be determined'.

Sample Input: 81, 100

Sample Output: They are perfect square numbers.

Sample Input: 225, 99

Sample Output: 225 is a perfect square number.

99 is not a perfect square number.

7. Without using if-else statement and ternary operators, accept three unequal numbers and display the second smallest number.

[Hint: Use Math.max() and Math.min() functions]

Sample Input: 34, 82, 61

Sample Output: 61

8. Write a program to input three unequal numbers. Display the greatest and the smallest number.

Sample Input: 28, 98, 56

Sample Output: Greatest Number: 98

Smallest Number: 28

9. A Pre-Paid taxi charges from the passenger as per the tariff given below:

Distance	Rate
Up to 5 km	₹ 100
For the next 10 km	₹ 10/km
For the next 10 km	₹ 8/km
More than 25 km	₹ 5/km

Write a program to input the distance covered and calculate the amount to be paid by the passenger. The program displays the printed bill with the details given below:

Taxi No. : _____

Distance covered : _____

Amount : _____

10. A cloth showroom has announced festival discounts and the gifts on the purchase of items, based on the total cost as given below:

Total Cost	Discount	Gift
Up to ₹ 2,000	5%	Calculator
₹ 2,001 to ₹ 5000	10%	School Bag
₹ 5,001 to ₹ 10,000	15%	Wall Clock
Above ₹ 10,000	20%	Wrist Watch

Write a program to input the total cost. Compute and display the amount to be paid by the customer along with the gift.

- 11.** Given below is a hypothetical table showing the rate of income tax for an Indian citizen, who is up to the age of 60 years.

Taxable income (TI) in ₹	Income Tax in ₹
Up to ₹ 2,50,000	Nil
More than ₹ 2,50,000 and less than or equal to ₹ 5,00,000	(TI - 1,60,000) * 10%
More than ₹ 5,00,000 and less than or equal to ₹ 10,00,000	(TI - 5,00,000) * 20% + 34,000
More than ₹ 10,00,000	(TI - 10,00,000) * 30% + 94,000

Write a program to input the name, age and taxable income of a person. If the age is more than 60 years then display the message "Wrong Category". If the age is less than or equal to 60 years then compute and display the income tax payable along with the name of the tax payer, as per the table given above.

[ICSE-2011]

- 12.** An employee wants to deposit a certain sum of money under 'Term Deposit' scheme in a Bank. The bank has provided the tariff of the scheme, which is given below:

No. of Days	Rate of Interest	No. of Days	Rate of Interest
Up to 180 days	5.5%	Exact 365 days	9.0%
181 to 364 days	7.5%	More than 365 days	8.5%

Write a program to calculate and display the maturity amount taking the sum and number of days as inputs.

- 13.** Mr. Kumar is an LIC agent. He offers discount to his policy holders on the annual premium. However, he also gets commission on the sum assured as per the given tariff.

Sum Assured	Discount	Commission
Up to ₹ 1,00,000	5%	2%
₹ 1,00,001 and up to ₹ 2,00,000	8%	3%
₹ 2,00,001 and up to ₹ 5,00,000	10%	5%
More than ₹ 5,00,000	15%	7.5%

Write a program to input the name of the policy holder, the sum assured and first annual premium. Calculate the discount of the policy holder and the commission of the agent. The program displays all the details as:

Name of the policy holder :

Sum assured :

Premium :

Discount on the first premium :

Commission of the agent :

14. A company announces revised Dearness Allowance (DA) and Special Allowances (SA) for their employees as per the tariff given below:

Basic	Dearness Allowance (DA)	Special Allowance (SA)
Up to ₹ 10,000	10%	5%
₹ 10,001 – ₹ 20,000	12%	8%
₹ 20,001 – ₹ 30,000	15%	10%
₹ 30,001 and above	20%	12%

Write a program to accept the name and Basic Salary (BS) of an employee. Calculate and display gross salary.

$$\text{Gross Salary} = \text{Basic} + \text{Dearness Allowance} + \text{Special Allowance}$$

Display the information in the given format:

Name	Basic	DA	Spl. Allowance	Gross Salary
xxx	xxx	xxx	xxx	xxx

15. Using a switch case statement, write a menu driven program to convert a given temperature from Fahrenheit to Celsius and vice-versa. For an incorrect choice, an appropriate message should be displayed.

Hint: $c = \frac{5}{9} * (f - 32)$ and $f = 1.8 * c + 32$ [ICSE-2007]

16. The volume of solids, viz. cuboid, cylinder and cone can be calculated by the formula:

- Volume of a cuboid ($v = l * b * h$)
- Volume of a cylinder ($v = \pi * r^2 * h$)

- Volume of a cone ($v = \frac{1}{3} * \pi * r^2 * h$) $[\pi = \frac{22}{7}]$

Using a switch case statement, write a program to find and display the volume of different solids by taking suitable variables and data types as input.

17. A Mega Shop has different floors which display varieties of dresses as mentioned below:

- Ground floor : Kids Wear
- First floor : Ladies Wear
- Second floor : Designer Sarees
- Third Floor : Men's Wear

The user should enter the floor number to get the information regarding different items of the Mega shop. After shopping, the shopkeeper inputs the item purchased and cost of the item and prints a bill to be paid by the customer in the given format:

Name of the Shop: City Mart

Total Amount : _____

Visit Again!!!

Write a program to perform the above task as per the user's choice.

18. The equivalent resistance of series and parallel connections of two resistances is given by the formula:

$$(a) R_1 = r_1 + r_2 \quad (\text{Series})$$

$$(b) R_2 = \frac{r_1 * r_2}{r_1 + r_2} \quad (\text{Parallel})$$

Using a switch case statement, write a program to enter the value of r_1 and r_2 . Calculate and display the equivalent resistance accordingly.

- 19.** The Simple Interest (SI) and Compound Interest (CI) of a sum (P) for a given time (T) and rate (R) can be calculated as:

$$(a) SI = \frac{P * R * T}{100}$$

$$(b) CI = P * \left(\left(1 + \frac{R}{100} \right)^T - 1 \right)$$

Write a program to input sum, rate, time and type of Interest ('S' for Simple Interest and 'C' for Compound Interest). Calculate and display the sum and the interest earned. Use switch case statement.

- 20.** 'Kumar Electronics' has announced the following seasonal discounts on purchase of certain items.

Purchase Amount	Discount on Laptop	Discount on Desktop PC
Up to ₹ 25000	0.0%	5.0%
₹ 25,001 to ₹ 50,000	5.0%	7.5%
₹ 50,001 to ₹ 1,00,000	7.5%	10.0%
More than ₹ 1,00,000	10.0%	15.0%

Write a program to input name, amount of purchase and the type of purchase ('L' for Laptop and 'D' for Desktop) by a customer. Compute and display the net amount to be paid by a customer along with his name.

(Net amount = Amount of purchase – discount)

[ICSE-2009]

Student's Notes

V. Unsolved Java Programs:

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1. Write the programs in Java to display the first ten terms of the following series:

- (a) 1, 4, 9, 16,
- (b) 1, 2, 4, 7, 11, *Doubt*
- (c) 3, 6, 9, 12,
- (d) 4, 8, 16, 32,
- (e) 1.5, 3.0, 4.5, 6.0,
- (f) 0, 7, 26,
- (g) 1, 9, 25, 49,
- (h) 4, 16, 36, 64,
- (i) 0, 3, 8, 15,
- (j) 24, 99, 224, 399,
- (k) 2, 5, 10, 17,

[ICSE-2003]

2. Write a program to input any 50 numbers (including positive and negative).
Perform the following tasks:

- (a) Count and display the positive numbers
- (b) Count and display the negative numbers
- (c) Display the sum of positive numbers
- (d) Display the sum of negative numbers

Ques 3 3. Write a program to calculate and display the sum of all odd numbers and even numbers between a range of numbers from m to n (both inclusive) where $m < n$. Input m and n (where $m < n$).

4. Write a program to enter any 50 numbers and check whether they are divisible by 5 or not. If divisible then perform the following tasks:

- Doubt* (a) Display all the numbers ending with the digit 5.
- Doubt* (b) Count and display the numbers ending with 0 (zero).

5. Write a program to display all the numbers between m and n input from the keyboard (where $m < n$, $m > 0$, $n > 0$), check and display the numbers that are perfect square. e.g. 25, 36, 49, are said to be perfect square numbers.
[A number is said to be a perfect square if its square root is an integer number.]

6. Write a program to display all the 'Buzz Numbers' between p and q (where $p < q$). A 'Buzz Number' is the number which ends with 7 or is divisible by 7.

7. Write a program to input marks in English, Maths and Science of 40 students who have passed ICSE Examination 2014. Now, perform the following tasks:

- (a) Find and display the number of students, who have secured 95% or more in aggregate.
- (b) Find and display the number of students, who have secured 90% or more in English, Maths and Science.

8. Write a program in Java to find and display the sum of the following series:

- (a) $1 + 4 + 9 + \dots + 400$
- (b) $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{20}$
- (c) $1 + \frac{1}{3} + \frac{1}{5} + \dots + \frac{1}{19}$
- (d) $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \dots + \frac{19}{20}$
- (e) $2 - 4 + 6 - 8 + \dots - 20$
- (f) $(1^2) + (2^2) + \dots + (19^2)$

[ICSE-2008]

Doubt

9. Write a program to input a number and count the number of digits. The program further checks whether the number contains odd number of digits or even number of digits and displays the output accordingly.

Sample Input: 749

Sample Output: Number of digits=3

The number contains odd number of digits.

10. Write a program to input a number and display the new number after reversing the digits of the original number. The program also displays the absolute difference between the original number and the reversed number.

Sample Input: 194

Sample Output: 491

Absolute Difference= 297

11. The Greatest Common Divisor (GCD) of two integers is calculated by the continued division method. Divide the larger number by the smaller, the remainder then divides the previous divisor. The process repeats unless the remainder reaches zero. The last divisor results in GCD. [ICSE-2009]

Write a program to accept two numbers. Find and display their GCD by using the technique discussed above.

Sample Input: 45, 20

Sample Output: GCD=5

12. Write a program in Java to find and display the sum of the following series:

$$(a) S = a^2 + \frac{a^2}{2} + \frac{a^2}{3} + \dots + \frac{a^2}{10}$$

$$(b) S = a + \frac{a^2}{2} + \frac{a^2}{3} + \dots + \frac{a^{10}}{10}$$

$$(c) S = (a^*2) + (a^*3) + \dots + (a^*20)$$

$$(d) S = a + a^2 + a^3 + \dots + a^n$$

$$(e) S = 1 + \frac{2^2}{a} + \frac{3^2}{a^2} + \dots \text{ to } n \text{ terms}$$

$$(f) S = \frac{1^2}{a} + \frac{3^2}{a^2} + \frac{5^2}{a^3} + \dots \text{ to } n \text{ terms}$$

$$(g) S = \frac{1}{a} + \frac{1}{a^2} + \frac{1}{a^3} + \dots + \frac{1}{a^n}$$

$$(h) S = \frac{x}{2} + \frac{x}{5} + \frac{x}{8} + \frac{x}{11} + \dots + \frac{x}{20} \quad [\text{ICSE-2008}]$$

13. In order to reach the top of a pole, a monkey in his first attempt reaches a height of 5 feet and in the subsequent jumps, he slips down by 2% of the height attained in the previous jump. The process repeats and finally the monkey reaches the top of the pole. Write a program to input height of the pole. Calculate and display the number of attempts the monkey makes to reach the top of the pole.

14. Write a program to input Principal (p), Rate (r) and Time (t). Calculate and display the amount, which is compounded annually for each year by using the formula:

$$\text{Simple Interest (si)} = \frac{prt}{100}$$

$$p = p + si$$

[Hint: The amount after each year will be the Principal for the next year]

3² 5⁵

- 15.** Write a menu driven program to input two positive numbers m and n (where $m > n$) and perform the following tasks:
- Find and display the sum of two numbers without using '+' operator.
 - Find and display the product of two numbers without using '*' operator.
 - Find and display the quotient and remainder of two numbers without using '/' or '%' operator.

[Hint: Successive subtraction is known as division, the last value obtained as a result of successive subtractions is the remainder and the number of subtractions will result in the quotient.]

Sample Input: $m=5, n=2$

$$5 - 2 = 3$$

$$3 - 2 = 1, \text{ thus Quotient} = 2 \text{ and Remainder} = 1]$$

- 16.** Write a menu driven program to accept a number from the user. Check and display whether it is a Palindrome or a Perfect number.

- (a) Palindrome number: (A number is a Palindrome which when read in the reverse order is the same as the original number)

Example: 11, 101, 151, etc.

- (b) Perfect number: (A number is called Perfect if it is equal to the sum of its factors other than the number itself.)

Example: $6 = 1 + 2 + 3$

[ICSE-2008]

- 17.** Write a menu driven program to accept a number from the user. Check and display whether it is a Prime number or an Automorphic number.

- (a) Prime number: (A number is said to be prime, if it is only divisible by 1 and itself)

Example: 3, 5, 7, 11-----.

- (b) Automorphic number: (An automorphic number is the number which is contained in the last digit(s) of its square.)

Example: 25 is an Automorphic number as its square is 625 and 25 is present as the last two digits.

[ICSE-2010]

- 18.** Write a menu driven program to perform the following tasks by using Switch case statement:

[ICSE-2011]

- (a) To display the series:

0, 3, 8, 15, 24, to n terms. (value of 'n' is to be input by the user)

- (b) To find and display the sum of the series:

$$S = \frac{1}{2} + \frac{3}{4} + \frac{5}{6} + \frac{7}{8} + \dots + \frac{19}{20}$$

- 19.** Using a switch statement, write a menu driven program to:

[ICSE-2012]

- (a) Generate and display the first 10 terms of the Fibonacci series

0, 1, 1, 2, 3, 5

The first two Fibonacci numbers are 0 and 1, and each subsequent number is the sum of the previous two numbers.

- (b) Find and display the sum of the digits of an integer that is input.

Sample Input: 15390

Sample Output: Sum of the digits = 18

For an incorrect choice, an appropriate error message should be displayed.

20. A special two-digit number is such when the sum of its digits is added to the product of its digits, the result is equal to the original two-digit number.

Example: Consider the number 59.

$$\text{Sum of digits} = 5 + 9 = 14$$

$$\text{Product of digits} = 5 \times 9 = 45$$

$$\text{Sum of the sum of digits and product of digits} = 14 + 45 = 59$$

Write a program to accept a two-digit number. Add the sum of its digits to the product of its digits. If the value is equal to the number input, then display the message "Special 2 - digit number" otherwise, display the message "Not a special two-digit number". [JCSE-2014]

21. Using switch statement, write a menu driven program to:

- (a) find and display all the factors of a number input by the user (including 1 and excluding the number itself).

Sample Input : n = 15

Sample Output : 1, 3, 5

- (b) find and display the factorial of a number input by the user (the factorial of a non-negative integer n , denoted by $n!$, is the product of all integers less than or equal to n).

Sample Input : n = 15

Sample Output : $5! = 1*2*3*4*5 = 120$

For an incorrect choice, an appropriate error message should be displayed.

[JCSE-2015]

22. Write a program to input a number. Check and display whether it is a Niven number or not. (A number is said to be Niven when it is divisible by the sum of its digits).

Sample Input : 126

Sum of its digits = $1 + 2 + 6 = 9$ and 126 is divisible by 9. [JCSE-2016]

23. Write a program to accept a number and check whether it is a 'Spy Number' or not. (A number is a spy if the sum of its digits equals the product of its digits.)

Sample Input: 1124

Sum of the digits = $1 + 1 + 2 + 4 = 8$

Product of the digits = $1*1*2*4 = 8$

24. Using a switch statement, write a menu driven program for the following:

- (a) To find and display the sum of the series given below:

$S = x^1 - x^2 + x^3 - x^4 + x^5 - \dots - x^{20}$; where $x = 2$

- (b) To display the series:

1, 11, 111, 1111, 11111

[JCSE-2017]

For an incorrect option, an appropriate error message should be displayed.