Sample Problems

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1. Write a Java program to reverse a number using a *while* loop.

2. Write a Java program to find the frequency of the first character in a string.

3. Write a Java program to display fibonacci series using *for* loop.

4. Suppose, there are two companies each having n number of employees. **Write** a Java program to input the salaries of two companies in two different arrays and find out which company has higher average salary.

Sample Input	Sample Output
Enter number of employees: 5	Company 2 has higher average
Enter salaries of company 1: 100 550 200	salary
250 500	
Enter salaries of company 2: 450 500 750	
600 350	

5. Write a Java Program to calculate difference between two time periods. A time has hour, minute, and second parts. Use constructor to create an object.

6. Write a Java program to compute the sum of the following series, where n is an user input and is an odd integer. Use *for* statement for looping.

$$sum = 1^2 + 3^2 + 5^2 + \ldots + n^2$$

7. Write a Java program to compute the sum of the following series, where n is an user input and is an even integer. Use *for* statement for looping.

$$sum = 2^2 + 4^2 + 6^2 + \ldots + n^2$$

8. The distance travelled by an object is given by

$$s = ut + \frac{1}{2}at^2$$

where u is the initial velocity (m/s), a is the acceleration (m/s^2), and t is the time. u, a, and t are user inputs. **Write** a Java program to calculate the distance s travelled in time t.

9. The height travelled by a falling body is given by

$$h = ut - \frac{1}{2}gt^2$$

where u is the initial velocity (m/s), $g = 9.8m/s^2$ is the acceleration due to gravity, and t is the time. u and t are user inputs. **Write** a Java program to calculate the height h travelled in time t.

10. Write a Java program to determine whether an integer (user input) is divisible by 6 but not divisible by 4. Use *if* statement for decision making.

11. Write a Java program to determine whether an integer (user input) is divisible by 2 but not divisible by 3. Use *if* statement for decision making.

12. Electricity bill is calculated by using the following rule:

- 0 - 199 units: Tk. 5.00 per unit

- 200 - 299 units: Tk 5.00 per unit for the first 199 units + Tk. 10.00 per unit for the remaining units

- 300 - above units: Tk 5.00 per unit for the first 199 units + Tk. 10.00 per unit for the next 100 units + Tk. 15.00 per unit for the remaining units

Write a Java program for calculating the bill amount, where the total electricity unit is the user input. Use *switch* statement for decision making.

13. Factorial of an integer m is defined as

$$m! = 1 \times 2 \times 3 \times \ldots \times m$$

Write a Java program for calculating $m!$, where the m is an integer and is the user input. Use *for* statement for looping.

14. Write a Java program to take the length and width of a rectangle as inputs and find the area of the rectangle rounded up to two decimal places.

Sample Input:
Enter length: 10.0
Enter width: 5.0
Sample Output:
Area of the rectangle: 50.00 units

15. Write a Java program that prints only the even numbers between 1 and 50. Use *for* loop and also use *continue* statement to avoid printing odd numbers.

16. Write a Java program that prints the following English alphabet sequence. Use only one *for* statement for looping.

AABBCCDDEEFFGGHHIIJJKKLLMMNNOOPPQQRRSSTTUUVVWWXXYYZZ

17. Write a Java program that can take lowercase English alphabet as input and it then determine whether the entered alphabet is vowel or consonant. Use *switch* statement for decision making. The sample input and output for the program are as follows:

Sample Input	Sample Output
a	The entered alphabet is: a and it is a vowel
d	The entered alphabet is: d and it is a consonant

18. Write a Java program which can take a floating point number as input indicating length(in centimeter scale) of a cricket bat and display length of that cricket bat in inch scale. Recall that, 1.00 centimeter equals to 0.393 inch. The sample input and output for the program are as follows:

Sample Input:
Insert bat length in cm : 10.0
Sample Output:
Length in inch is : 3.90

19. Write a Java program that can take an integer number as input representing number of seconds. Convert this number to the corresponding hours, minutes and seconds. The sample input and output for the program are as follows:

Sample Input	Sample Output
106	0 Hours, 1 Minutes, 46 Seconds
43239	12 Hours, 0 Minutes, 39 Seconds

20. Write a Java program that can take integer inputs until a negative number is inserted. Then your program should display the largest number among all input numbers. The sample input and output for the program are as follows:

Sample Input	Sample Output
1 8 32 90 17 -1	90

21. Write a Java program that can take an integer number as input and display all factors of that number. For example: factors of 20 are: 1, 2, 4, 5, 10, 20

22. Write a Java program that can take radius r of a sphere(an integer number) as input and it then calculates and displays the volume $(\frac{3}{4}\pi r^3)$ of the sphere as output.

23. Write a Java program that can take radius r of a sphere(an integer number) as input and it then calculates and displays the surface area $(4\pi r^2)$ of the sphere as output.

24. We know, a character is an alphabet if it is between a-z or A-Z. A character is digit if it is between 0-9. A character is a special symbol if it is neither an alphabet nor a digit. **Write** a Java program to input a character and check whether it is alphabet, digit or special symbol. The sample input and output for the program are as follows:

Sample Input	Sample Output
3	3 is a digit

25. Solve the problem of calculating area (πr^2) and circumference $(2\pi r)$ of a circle by writing a Java program which can input an integer number indicating radius of that circle.

26. Write a Java program which can take a floating point number as input indicating length(in centimeter scale) of a book and display length of that book in inch scale. Recall that, 1.00 centimeter equals to 0.393 inch. The sample input and output for the program are as follows:

Sample Input:
Insert book length in cm : 10.0
Sample Output:
Length in inch is : 3.90

27. Write a Java program that takes a number as input and find summation of each digit of that number.

28. Write a Java program that takes an integer number as user input that indicates the annual salary of a person. The program should find and display the monthly salary of that person.

29. Write a Java program that takes three numbers from user as input indicating the three angles of a triangle. The program then should classify the triangle as either acute or obtuse or right triangle.

30. Write a Java program which takes two integers numbers from user as input indicating the three angles of a triangle. The program then should classify the triangle as either acute or obtuse or right triangle.

31. Determine the output of the following Java program. **Justify** your answer with step by step analysis.

```c
#include <stdio.h>
int main() {
    int i,j,k;
    for(j=0;j<5;j++) {
        for(k=0;k<2;k++) {
            printf("%c",'A'+j);
        }
    }
    printf("\n");
    return 0;
}
```

32. Write a Java program for reversing an array elements.

Sample Input	Sample Output
Enter no of elements: 5 Arrays: 2 4 5 6 7	After reversing array becomes: 7 6 5 4 2

33. Write a Java program which can input some integers into an array and find how many of those numbers are greater than the middle positioned number. [You may assume that user will input odd number of values]

34. Write a Java program which can input some students' marks into an array and find how many of them scored above average marks.

35. Write a Java program which can input a word and find how many times the first letter appears in the remaining part of the word.

Sample Input	Sample Output
Enter the word: property	1
Enter the word: tatter	2

36. Write a Java program which can input some numbers and display number of factor of each number.

37. Write a Java program which can input 50 students exam marks into a 2D array where each student appeared for three exams. Find which student got highest marks in each exam.

38. Write a Java program to find all perfect numbers between 1 to n. In number theory, a perfect number is a positive integer that is equal to the sum of its proper positive divisors, that is, the sum of its positive divisors excluding the number itself.

Sample Input	Sample Output
Input upper limit: 100	Perfect numbers between 1 to 100: 6, 28

39. Write a Java program that can input integer numbers into an 2D array and find the sum of elements of each row and column of the matrix.

Sample Input	Sample Output
Input elements in 2D Array	Sum of row 1 = 6
1 2 3	Sum of row 2 = 15
4 5 6	Sum of row 3 = 24
7 8 9	Sum of column 1 = 12
	Sum of column 2 = 15
	Sum of column 3 = 18

40. Write a Java program which can input some students' age of a particular class into an array and check whether there is any teenager in that class.

41. Write a Java program which can input a word and convert each letter to immediate next letter of the alphabet set, except the first letter. For example, if input word is "teeth" then the answer should be "tffui".

42. Write a Java program which can input a word and find how many vowels are there.

43. Write a Java program which can input some numbers and find how many of those numbers are prime.

44. Write a Java program to input a matrix and check whether a matrix is scalar matrix or not. A scalar matrix is a square matrix in which all elements except the main diagonal are 0 and all elements on main diagonal are the same.

Sample Input	Sample Output
5 0 0 0 5 0 0 0 5	The matrix is a scalar matrix.

45. Write a Java program to input a matrix and calculate the sum of the diagonal elements of the matrix.

Sample Input	Sample Output
5 1 4 0 1 0 4 6 3	The sum of the diagonal elements = 9

46. Write a Java program which can input an array of n integers and count number of unique elements in the array.

Sample Input	Sample Output
Enter size of the array: 10 Enter the elements: 1 2 4 2 5 1 6 3 2 4	No. of unique elements: 3

47. Write a Java program which can input monthly sales of a company for the last 3 years in a two-dimensional array and find the total sale of each individual year. Consider each row represents a year and each column represents a month.

48. Write a Java program which can input an array of n integers and count number of repeating elements in the array.

Sample Input	Sample Output
Enter size of the array: 10 Enter the elements: 4 2 3 2 1 6 4 3 6 2	No. of repeating elements: 4

49. Write a Java program which can input 10 students' marks of three exams in a two-dimensional array and find the highest marks of each individual student. Consider each row represents a student and each column represents an exam.

50. Write a Java program which can input a string and then prints this string in reverse order. You can't use any built-in string function in your program. The sample input output for the program is as follows:

Sample Input	Sample Output
I am fine	enif ma I
Today is Sunday	yadnuS si yadoT