



NATIONAL UNIVERSITY OF SCIENCE & TECNOLOGY

SCHOOL OF MECHANICAL AND MANUFACTURING ENGINEERING

[FUNDAMENTALS OF PROGRAMMING –(LAB)]

MANUAL # 10

SEMESTER # 01

CLASS: - ME-15 [SEC A]

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TASK NO.1

```
#include<bits/stdc++.h>
using namespace std;
int main(){

    cout<<" The original vector is : "<<endl;
    vector<int> v;

    v.push_back(7);
    v.push_back(4);
    v.push_back(8);
    v.push_back(3);
    v.push_back(9);
    v.push_back(11);
    v.push_back(1);
    v.push_back(12);
    v.push_back(13);
    v.push_back(25);

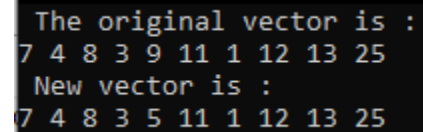
    vector<int>::iterator it;
    for (it=v.begin(); it!=v.end();it++ ){
        cout<<*it<<" ";
    }
    cout<<endl;

    v.erase(v.begin() + 4, v.begin()+5);
    v.insert( v.begin()+4, 5);

    cout<<" New vector is : "<<endl;

    for (it=v.begin(); it!=v.end();it++ ){
        cout<<*it<<" ";
    }

    return 0;
}
```



```
The original vector is :
7 4 8 3 9 11 1 12 13 25
New vector is :
7 4 8 3 5 11 1 12 13 25
-----
```

TASK NO.2

```
#include <bits/stdc++.h>
```

```
using namespace std;
```

```
int main() {
    int num_pairs;
    cout << "Enter the number of name/grade pairs: ";
    cin >> num_pairs;

    vector<string> names(num_pairs);
    vector<int> grades(num_pairs);

    for (int i = 0; i < num_pairs; i++) {
        cout << "Enter name #" << i + 1 << ": ";
        cin >> names[i];
        cout << "Enter grade #" << i + 1 << ": ";
        cin >> grades[i];
    }

    double sum = 0;
    for (int i = 0; i < num_pairs; i++) {
        sum += grades[i];
    }
    double mean = sum / num_pairs;
    cout << "Mean grade: " << mean << endl;

    sort(grades.begin(), grades.end());
    double median;
    if (num_pairs % 2 == 0) {
        median = (grades[num_pairs / 2 - 1] + grades[num_pairs / 2]) / 2.0;
    } else {
        median = grades[num_pairs / 2];
    }
    cout << "Median grade: " << median << endl;

    map<int, int> freq;
    for (int i = 0; i < num_pairs; i++) {
        freq[grades[i]]++;
    }
    int mode = -1;
    int max_freq = -1;
    for (auto p : freq) {
```

```

        if (p.second > max_freq) {
            max_freq = p.second;
            mode = p.first;
        }
    }
    cout << "Mode grade: " << mode << endl;

    cout << "Names of students with mode as their grade: ";
    for (int i = 0; i < num_pairs; i++) {
        if (grades[i] == mode) {
            cout << names[i] << " ";
        }
    }
    cout << endl;

    return 0;
}

```

```

Enter the number of name/grade pairs: 4
Enter name #1: ali
Enter grade #1: 89
Enter name #2: talha
Enter grade #2: 76
Enter name #3: nouman
Enter grade #3: 90
Enter name #4: abdullah
Enter grade #4: 80
Mean grade: 83.75
Median grade: 84.5
Mode grade: 76
Names of students with mode as their grade: ali

```

```

Enter the number of name/grade pairs: 3
Enter name #1: ALI
Enter grade #1: 40
Enter name #2: AHMAD
Enter grade #2: 30
Enter name #3: AKBAR
Enter grade #3: 90
Mean grade: 53.3333
Median grade: 40
Mode grade: 30
Names of students with mode as their grade: ALI

```

TASK NO.3

```
#include <bits/stdc++.h>
using namespace std;
class Triangle {
private:
    double s1;
    double s2;
    double s3;

public:
    // initializing the sides of the triangle
    Triangle(double s1, double s2, double s3) : s1(s1), s2(s2), s3(s3) {
    }

    // Function to calculate the perimeter of triangle
    double calculatePerimeter() const {
        return s1 + s2 + s3;
    }

    // Function to calculate the area of the triangle
    double calculateArea() const {
        // Calculating semi-perimeter
        double s = calculatePerimeter() / 2.0;

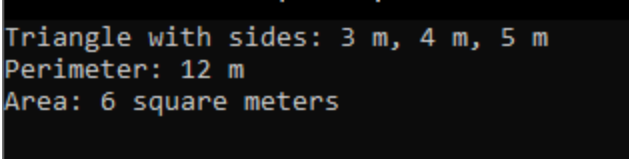
        // Calculate area using Hero's formula
        return sqrt(s * (s - s1) * (s - s2) * (s - s3));
    }

    // Function to print the area and perimeter of the triangle
    void printDetails() const {
        cout << "Triangle with sides: " << s1 << " m, " << s2 << " m, " << s3 << " m" << endl;
        cout << "Perimeter: " << calculatePerimeter() << " m" << endl;
        cout << "Area: " << calculateArea() << " square meters" << endl;
    }
};

int main() {
    // Create a Triangle object with sides 3 m, 4 m, and 5 m
    Triangle myTriangle(3.0, 4.0, 5.0);

    // Print the details of the triangle (area and perimeter)
    myTriangle.printDetails();

    return 0; }
```

A screenshot of a terminal window showing the output of the C++ program. The text is as follows:

```
Triangle with sides: 3 m, 4 m, 5 m
Perimeter: 12 m
Area: 6 square meters
```

TASK NO.4

```
#include <bits/stdc++.h>
using namespace std;
// Define a structure to store employee information
struct Employee {
    string name;
    double salary;
    int hoursWorked;
};

// Function to increase the salary based on hours worked per day
void increaseSalary(Employee& employee) {
    if (employee.hoursWorked >= 12) {
        employee.salary += 150.0;
    } else if (employee.hoursWorked >= 10) {
        employee.salary += 100.0;
    } else if (employee.hoursWorked >= 8) {
        employee.salary += 50.0;
    }
}

int main() {
    const int numEmployees = 10;

    // Create an array of Employee structures
    Employee employees[numEmployees];

    // Input information for each employee
    for (int i = 0; i < numEmployees; ++i) {
        cout << "Enter name of employee " << i + 1 << ": ";
        cin >> employees[i].name;

        cout << "Enter salary of employee " << i + 1 << ": $";
        cin >> employees[i].salary;

        cout << "Enter hours of work per day for employee " << i + 1 << ": ";
        cin >> employees[i].hoursWorked;

        // Increase the salary based on hours worked
        increaseSalary(employees[i]);
    }
```

```

// Print the names of all employees along with their final salaries
cout << "\nEmployee Details:\n";
for (int i = 0; i < numEmployees; ++i) {
    cout << "Name: " << employees[i].name << "\n";
    cout << "Final Salary: $" << employees[i].salary << "\n\n";
}

return 0;
}

```

Enter name of employee 1: AMIR	Employee Details:
Enter salary of employee 1: \$20	Name: AMIR
Enter hours of work per day for employee 1: 23	Final Salary: \$170
Enter name of employee 2: USMAN	Name: USMAN
Enter salary of employee 2: \$24	Final Salary: \$174
Enter hours of work per day for employee 2: 25	
Enter name of employee 3: MUBBASHIR	Name: MUBBASHIR
Enter salary of employee 3: \$50	Final Salary: \$200
Enter hours of work per day for employee 3: 14	
Enter name of employee 4: ASEES	Name: ASEES
Enter salary of employee 4: \$36	Final Salary: \$36
Enter hours of work per day for employee 4: 6	
Enter name of employee 5: FRASAT	Name: FRASAT
Enter salary of employee 5: \$43	Final Salary: \$193
Enter hours of work per day for employee 5: 12	
Enter name of employee 6: REHMAT	Name: REHMAT
Enter salary of employee 6: \$14	Final Salary: \$14
Enter hours of work per day for employee 6: 7	
Enter name of employee 7: AHMAD	Name: AHMAD
Enter salary of employee 7: \$34	Final Salary: \$184
Enter hours of work per day for employee 7: 13	
Enter name of employee 8: ALI	Name: ALI
Enter salary of employee 8: \$28	Final Salary: \$28
Enter hours of work per day for employee 8: 4	
Enter name of employee 9: AREEB	Name: AREEB
Enter salary of employee 9: \$6	Final Salary: \$156
Enter hours of work per day for employee 9: 15	
Enter name of employee 10: TAHA	Name: TAHA
Enter salary of employee 10: \$19	Final Salary: \$19
Enter hours of work per day for employee 10: 2	