

Mid-Term Sample Paper #1

The paper is divided into 3 sections:

- *Part A - Interview Questions*
- *Part B - Coding Question*
- *Part C - Walkthrough*

Part A - Interview Questions

Explain the following:

- *Magic Numbers*
- *Flags, also explain how do they enforce single entry and single exit principle*
- *Compilation Process in C*
- *Auto Sizing Vs Explicit sizing of the arrays*
- *It is better to work with currency as integers rather than floating point. Why?*
- *Advantages of Style Guidelines and Disadvantages of not maintaining style guidelines*
- *What is the significance of the number preceding the (.) in the display of the floating point numbers? Provide explanations with reference to %3.5f and %0.5f formatting?*
- *Coupling*
- *Modular Design*

Part B - Coding Question

C Programming Assignment

Write a C program that allows a user to input the grades of a group of students and calculates the total average, the highest grade, and the percentage of students who passed (defined as having a grade of 50 or more). The program should include the following functions:

1. `int getNumberOfStudents()`

This function will prompt the user to input the total number of students. It will validate that the number is positive and return the value.

2. `void inputGrades(int grades[], int size)`

This function will prompt the user to input the grades for each student, store them in the array, and validate that each grade is between 0 and 100.

3. `float calculateAverage(int grades[], int size)`

This function will take the grades array and the number of students as input, calculate the average grade, and return the result.

4. `int findHighestGrade(int grades[], int size)`

This function will find and return the highest grade in the grades array.

5. `float calculatePassPercentage(int grades[], int size)`

This function will calculate the percentage of students who scored 50 or more (passed) and return this percentage.

6. `void displayResults(float average, int highestGrade, float passPercentage)`

This function will display the average grade, the highest grade, and the percentage of students who passed.

Sample `main()` for Testing:

```
#include <stdio.h>

// Function prototypes
int getNumberOfStudents();
void inputGrades(int grades[], int size);
float calculateAverage(int grades[], int size);
int findHighestGrade(int grades[], int size);
float calculatePassPercentage(int grades[], int size);
void displayResults(float average, int highestGrade, float passPercentage);

int main() {
    // Get the number of students
    int numberOfStudents = getNumberOfStudents();

    // Create an array to store grades
    int grades[numberOfStudents];

    // Input grades for the students
    inputGrades(grades, numberOfStudents);

    // Calculate the average grade
    float average = calculateAverage(grades, numberOfStudents);

    // Find the highest grade
    int highestGrade = findHighestGrade(grades, numberOfStudents);

    // Calculate the percentage of students who passed
    float passPercentage = calculatePassPercentage(grades, numberOfStudents);

    // Display the results
    displayResults(average, highestGrade, passPercentage);

    return 0;
}
```

Part C - Walkthrough Question

```

// C++ program to implement a simple
// calculator
#include <iostream>
using namespace std;

// Function to add two numbers
int add(int x, int y)
{
    return x + y;
}

// Function to subtract two numbers
int sub(int x, int y)
{
    return x - y;
}

// Function to multiply two numbers
int mul(int x, int y)
{
    return x * y;
}

// Function to divide two numbers
int div(int x, int y)
{
    return x / y;
}

// Main function
int main()
{
    int a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z;

    // Taking input from user
    cout << "Enter two numbers: ";
    cin >> a >> b;

    // Calculating the sum, difference, product and quotient
    c = add(a, b);
    d = sub(a, b);
    e = mul(a, b);
    f = div(a, b);

    // Printing the results
    cout << "Sum: " << c << endl;
    cout << "Difference: " << d << endl;
    cout << "Product: " << e << endl;
    cout << "Quotient: " << f << endl;

    return 0;
}

```