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QUES:-

1. Sum of two numbers

```
#include <iostream>
using namespace std;

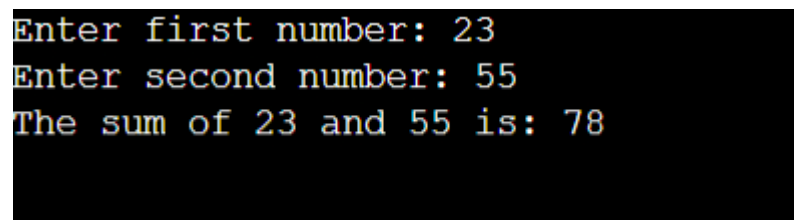
int main() {
    float num1, num2, sum;

    cout << "Enter first number: ";
    cin >> num1;
    cout << "Enter second number: ";
    cin >> num2;

    sum = num1 + num2;

    cout << "The sum of " << num1 << " and " << num2 << " is: " << sum
    << endl;

    return 0;
}
```



A screenshot of a terminal window showing the output of the C++ program. The text is displayed in a monospaced font with syntax highlighting: 'Enter first number: 23' on the first line, 'Enter second number: 55' on the second line, and 'The sum of 23 and 55 is: 78' on the third line.

```
Enter first number: 23
Enter second number: 55
The sum of 23 and 55 is: 78
```

2. Sum of all natural numbers

```
#include <iostream>
using namespace std;

int main() {
```

```

int n;

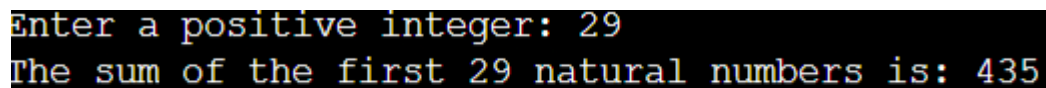
cout << "Enter a positive integer: ";
cin >> n;

int sum = n * (n + 1) / 2;

cout << "The sum of the first " << n << " natural numbers is: " << sum
<< endl;

return 0;
}

```



```

Enter a positive integer: 29
The sum of the first 29 natural numbers is: 435

```

3. Find the positive or negative numbers

```

#include <iostream>
using namespace std;

int main() {
    float num;

    cout << "Enter a number: ";
    cin >> num;

    if (num > 0) {
        cout << "The number is positive." << endl;
    } else if (num < 0) {
        cout << "The number is negative." << endl;
    } else {
        cout << "The number is zero." << endl;
    }

    return 0;
}

```

```
}
```

```
Enter a number: -55  
The number is negative.
```

4. write a c++ program to overload a function max that return the max of two integer and 3 floating value.

```
#include <iostream>  
using namespace std;
```

```
int max(int a, int b) {  
    return (a > b) ? a : b;  
}
```

```
float max(float a, float b, float c) {  
    return (a > b) ? ((a > c) ? a : c) : ((b > c) ? b : c);  
}
```

```
int main() {  
    int num1, num2;  
    cout << "Enter two integers: ";  
    cin >> num1 >> num2;  
    cout << "The maximum of " << num1 << " and " << num2 << " is: " <<  
    max(num1, num2) << endl;
```

```
    float f1, f2, f3;  
    cout << "Enter three floating-point numbers: ";  
    cin >> f1 >> f2 >> f3;  
    cout << "The maximum of " << f1 << ", " << f2 << ", and " << f3 << " is:  
    " << max(f1, f2, f3) << endl;
```

```
    return 0;  
}
```

```
Enter two integers: 2
6
The maximum of 2 and 6 is: 6
Enter three floating-point numbers: 6.5
4.5
8.6
The maximum of 6.5, 4.5, and 8.6 is: 8.6
```

5. Write a program to calculate the area of different shapes using function overloading. Implement overloaded functions to compute the area of a circle, a rectangle, and a triangle.

```
#include <iostream>
using namespace std;
```

```
class ShapeArea {
public:
    double calculateArea(double radius) {
        return 3.14159 * radius * radius;
    }

    double calculateRectangleArea(double length, double breadth) {
        return length * breadth;
    }

    double calculateTriangleArea(double base, double height) {
        return 0.5 * base * height;
    }
};
```

```
int main() {
    ShapeArea shape;

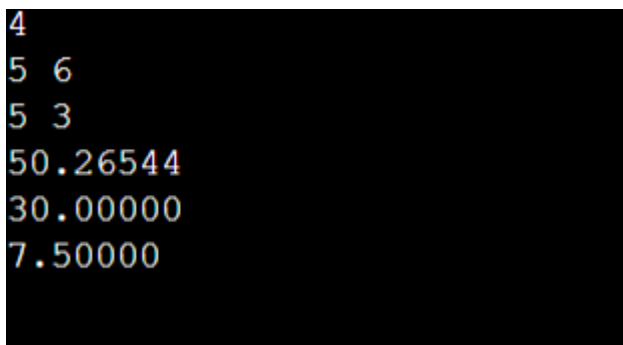
    double radius, length, breadth, base, height;
    cin >> radius;
    cin >> length >> breadth;
    cin >> base >> height;
```

```

// Calculate and output areas
cout << fixed << setprecision(5);
cout << shape.calculateArea(radius) << endl;           // Circle
cout << shape.calculateRectangleArea(length, breadth) << endl; //
Rectangle
    cout << shape.calculateTriangleArea(base, height) << endl; //
Triangle

    return 0;
}

```



```

4
5 6
5 3
50.26544
30.00000
7.50000

```

6. Write a program to demonstrate runtime polymorphism in C++ using a base class Shape and derived classes Circle, Rectangle, and Triangle. The program should use virtual functions to calculate and print the area of each shape based on user input.

```

#include <iostream>
#include <iomanip>
#include <memory>
using namespace std;

class Shape {
public:
    virtual double calculateArea() const = 0; // Pure virtual function
    virtual ~Shape() {}
};

class Circle : public Shape {
    double radius;

```

```

public:
    Circle(double r) : radius(r) {}
    double calculateArea() const override {
        return 3.14159 * radius * radius;
    }
};

class Rectangle : public Shape {
    double length, breadth;
public:
    Rectangle(double l, double b) : length(l), breadth(b) {}
    double calculateArea() const override {
        return length * breadth;
    }
};

class Triangle : public Shape {
    double base, height;
public:
    Triangle(double b, double h) : base(b), height(h) {}
    double calculateArea() const override {
        return 0.5 * base * height;
    }
};

void printArea(const Shape& shape, const string& shapeName) {
    cout << "Area of " << shapeName << ": " << fixed << setprecision(5)
    << shape.calculateArea() << endl;
}

int main() {
    double radius, length, breadth, base, height;
    cin >> radius;
    cin >> length >> breadth;
    cin >> base >> height;

    Circle circle(radius);

```

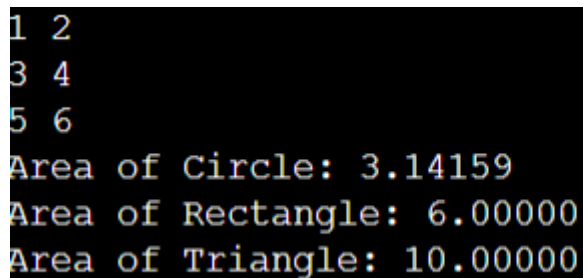
```

Rectangle rectangle(length, breadth);
Triangle triangle(base, height);

// Print areas
printArea(circle, "Circle");
printArea(rectangle, "Rectangle");
printArea(triangle, "Triangle");

return 0;
}

```



```

1 2
3 4
5 6
Area of Circle: 3.14159
Area of Rectangle: 6.00000
Area of Triangle: 10.00000

```

7. Create a C++ program to simulate an employee management system using hierarchical inheritance. Design a base class Employee that stores basic details (name, ID, and salary). Create two derived classes:

Manager: Add and calculate bonuses based on performance ratings.

Developer: Add and calculate overtime compensation based on extra hours worked.

The program should allow input for both types of employees and display their total earnings.

```

#include <iostream>
#include <string>
#include <iomanip>
using namespace std;

```

```

class Employee {
protected:
    string name;
    int id;
    double salary;

```

public:

```
Employee(const string& name, int id, double salary)
    : name(name), id(id), salary(salary) {}
```

```
virtual void displayDetails() const = 0;
```

```
virtual double calculateEarnings() const = 0;
```

```
virtual ~Employee() {}
```

```
};
```

```
class Manager : public Employee {
```

```
    int rating;
```

public:

```
Manager(const string& name, int id, double salary, int rating)
    : Employee(name, id, salary), rating(rating) {}
```

```
double calculateEarnings() const override {
```

```
    double bonus = (rating * 0.1) * salary;
```

```
    return salary + bonus;
```

```
}
```

```
void displayDetails() const override {
```

```
    double bonus = (rating * 0.1) * salary;
```

```
    cout << "Employee: " << name << " (ID: " << id << ")\n";
```

```
    cout << "Role: Manager\n";
```

```
    cout << "Base Salary: " << salary << "\n";
```

```
    cout << "Bonus: " << bonus << "\n";
```

```
    cout << "Total Earnings: " << calculateEarnings() << "\n";
```

```
}
```

```
};
```

```
class Developer : public Employee {
```

```
    int extraHours;
```

public:

```
Developer(const string& name, int id, double salary, int extraHours)
```



```

        : Employee(name, id, salary), extraHours(extraHours) {}

double calculateEarnings() const override {
    double overtimeCompensation = extraHours * 500;
    return salary + overtimeCompensation;
}

void displayDetails() const override {
    double overtimeCompensation = extraHours * 500;
    cout << "Employee: " << name << " (ID: " << id << ")\n";
    cout << "Role: Developer\n";
    cout << "Base Salary: " << salary << "\n";
    cout << "Overtime Compensation: " << overtimeCompensation <<
"\n";
    cout << "Total Earnings: " << calculateEarnings() << "\n";
}
};

int main() {
    int employeeType;
    cout << "Enter Employee Type (1 for Manager, 2 for Developer): ";
    cin >> employeeType;

    if (employeeType == 1) {
        string name;
        int id;
        double salary;
        int rating;

        cout << "Enter Name: ";
        cin >> name;
        cout << "Enter ID: ";
        cin >> id;
        cout << "Enter Salary: ";
        cin >> salary;
        cout << "Enter Rating (1-5): ";
        cin >> rating;
    }
}

```

```

    if (rating < 1 || rating > 5) {
        cout << "Invalid rating." << endl;
        return 0;
    }

    Manager manager(name, id, salary, rating);
    manager.displayDetails();
} else if (employeeType == 2) {
    string name;
    int id;
    double salary;
    int extraHours;

    cout << "Enter Name: ";
    cin >> name;
    cout << "Enter ID: ";
    cin >> id;
    cout << "Enter Salary: ";
    cin >> salary;
    cout << "Enter Extra Hours Worked: ";
    cin >> extraHours;

    if (extraHours < 0 || extraHours > 100) {
        cout << "Invalid extra hours." << endl;
        return 0;
    }

    Developer developer(name, id, salary, extraHours);
    developer.displayDetails();
} else {
    cout << "Invalid employee type." << endl;
}

return 0;
}

```

```
Enter Employee Type (1 for Manager, 2 for Developer): 1
Enter Name: Rohan
Enter ID: 15402
Enter Salary: 500000
Enter Rating (1-5): 5
Employee: Rohan (ID: 15402)
Role: Manager
Base Salary: 500000
Bonus: 250000
Total Earnings: 750000
```