

**Code:**

```
#include <stdio.h>
int main(){
    char ch;
    printf("enter a character: ");
    scanf("%c", &ch);

    if(ch >= 'A' && ch <= 'Z' || ch >= 'a' && ch <= 'z'){
        printf("%c is alphabet", ch);
    }
    else if(ch >= '0' && ch <= '9' ){
        printf("%c is digit", ch);
    }
    else{
        printf("%c is special symbol", ch);
    }

    return 0;
}
```

**Output:**

Test Case 1:

```
enter a character: #
# is special symbol
```

Test Case 2:

```
enter a character: 1
1 is digit
```

Test Case 3:

```
enter a character: a
a is alphabet
```

**Code:**

```
#include <stdio.h>

int isValidTriangle(double side1, double side2, double side3)
{
    if (side1 + side2 <= side3) return 0;
    if (side2 + side3 <= side1) return 0;
    if (side3 + side1 <= side2) return 0;
    return 1;
}

char* typeOfTriangle(double side1, double side2, double side3){
    if(side1 == side2 && side2 == side3) return "equilateral";
    if(side1 == side2 || side2 == side3 || side1 == side3) return "isosceles";

    return "scalene";
}

int main()
{
    double side1, side2, side3;
    printf("Enter all three sides of a triangle: ");
    scanf("%lf %lf %lf", &side1, &side2, &side3);

    if(isValidTriangle(side1, side2, side3)){
        printf("%s", typeOfTriangle(side1, side2, side3));
    }
    else{
        printf("Invalid triangle");
    }
    return 0;
}
```

**Output:**

Test Case 1:

```
Enter all three sides of a triangle: 1 2 3
Invalid triangle
```

Test Case 2:

```
Enter all three sides of a triangle: 4 4 7
isosceles
```

Test Case 3:

```
Enter all three sides of a triangle: 4 5 7
scalene
```

Test Case 4:

```
Enter all three sides of a triangle: 4 4 4
equilateral
```

**Code:**

```
#include <stdio.h>
int main(){
    // taking the input
    int sub1Marks, sub2Marks, sub3Marks;
    printf("enter the marks of all three subjects: ");
    scanf("%d %d %d", &sub1Marks, &sub2Marks, &sub3Marks);

    //calculating the percentage
    const int TOTAL_MARKS = 300;
    const long int SEM_FEE = 125000;

    int obtained = sub1Marks + sub2Marks + sub3Marks;
    float percentage = (float)obtained / TOTAL_MARKS * 100;
    int scholarship = 0;

    if(percentage < 50) scholarship = 0;
    else if(percentage < 61) scholarship = 5;
    else if(percentage < 75) scholarship = 20;
    else if(percentage < 85) scholarship = 30;
    else scholarship = 50;

    long int discount = SEM_FEE * scholarship / 100;
    long int payableAmount = SEM_FEE - discount;

    printf("Obtained Marks: %d\n", obtained);
    printf("Your Percentage %f%%\n", percentage);
    printf("Your Semester Fee is : %lld\n", SEM_FEE);
    printf("Your Scholarship is : %d%%\n", scholarship);
    printf("You Got Discount of : %lld%\n", discount);
    printf("Your Net Payable Ammount : %lld%\n", payableAmount);

    return 0;
}
```

**Output:**

Test Case 1:

```
enter the marks of all three subjects: 30 40 50
Obtained Marks: 120
Your Percentage 40.000000%
Your Semester Fee is : 125000
Your Scholarship is : 0%
You Got Discount of : 0
Your Net Payable Ammount : 125000
```

Test Case 2:

```
enter the marks of all three subjects: 50 60 70
Obtained Marks: 180
Your Percentage 60.000004%
Your Semester Fee is : 125000
Your Scholarship is : 5%
You Got Discount of : 6250
Your Net Payable Ammount : 118750
```

Test Case 3:

```
enter the marks of all three subjects: 60 70 80
Obtained Marks: 210
Your Percentage 70.000000%
Your Semester Fee is : 125000
Your Scholarship is : 20%
You Got Discount of : 25000
Your Net Payable Ammount : 100000
```

Test Case 4:

```
enter the marks of all three subjects: 80 90 95
Obtained Marks: 265
Your Percentage 88.333336%
Your Semester Fee is : 125000
Your Scholarship is : 50%
You Got Discount of : 62500
Your Net Payable Ammount : 62500
```

**Code:**

```
#include <stdio.h>

int isLeap(int year)
{
    if (year % 100 == 0 && year % 400 == 0) return 1;
    if (year % 100 != 0 && year % 4 == 0) return 1;
    return 0;
}

int main()
{
    int year;
    printf("Enter the year: ");
    scanf("%d", &year);
    printf(isLeap(year) ? "leap" : "not leap");
    return 0;
}
```

**Output:**

Test Case 1:

Enter the year: 2400  
leap

Test Case 2:

Enter the year: 2100  
not leap

**Code:**

```
#include <stdio.h>
int isPalindrome(int num)
{
    int rev = 0;
    int temp = num;
    while (temp)
    {
        rev = rev * 10 + (temp % 10);
        temp /= 10;
    }
    return rev == num;
}

int main()
{
    int n;
    printf("Enter the n: ");
    scanf("%d", &n);

    int i, count;
    i = count = 1;
    while (count <= n)
    {
        if (isPalindrome(i))
        {
            printf("%3d %d\n", count++, i);
        }
        i++;
    }

    return 0;
}
```

**Output:**

Enter the n: 40	11 22	21 121	31 222
1 1	12 33	22 131	32 232
2 2	13 44	23 141	33 242
3 3	14 55	24 151	34 252
4 4	15 66	25 161	35 262
5 5	16 77	26 171	36 272
6 6	17 88	27 181	37 282
7 7	18 99	28 191	38 292
8 8	19 101	29 202	39 303
9 9	20 111	30 212	40 313
10 11			

**Code:**

```
#include <stdio.h>

#include <math.h>

void convert(long long num, char type) {
    int mask, maskSize;
    int size = sizeof(num) * 8;
    const char *prefix;

    switch (type) {
        case 'b': (mask = 0b0001, maskSize = 1, prefix = "0b "); break;
        case 'o': (mask = 0b0111, maskSize = 3, prefix = "0 "); break;
        case 'h': (mask = 0b1111, maskSize = 4, prefix = "0x "); break;
        default: printf("Invalid Type\n"); return;
    }

    printf("%s", prefix);
    int segments = ceil((float)size / maskSize) - 1;
    int val, leadingZeros = 1;

    for(int i = segments; i >= 0; --i){
        val = num >> (i * maskSize) & mask;
        if(val != 0) leadingZero = 0;
        if(val > 9){
            printf("%c", 'a' + val % 10);
        }
        else{
            printf("%d", val);
        }
    }

    printf("\n");
}

int main() {
    long long int decimalNum;
    printf("enter a decimal number: ");
    scanf("%lld", &decimalNum);

    convert(decimalNum, 'h');
    convert(decimalNum, 'o');
    convert(decimalNum, 'b');
    return 0;
}
```

**Output:**

```
enter a decimal number: 526023479
0x1f5a7b37
03726475467
0b11111010110100111101100110111
```



**Code:**

```
#include <stdio.h>
char* digitToString(int digit){
    switch (digit)
    {
        case 0: return "Zero";
        case 1: return "One";
        case 2: return "Two";
        case 3: return "Three";
        case 4: return "Four";
        case 5: return "Five";
        case 6: return "Six";
        case 7: return "Seven";
        case 8: return "Eight";
        case 9: return "Nine";
        default: return "";
    }
}

void print(int num){
    if(!num) return;
    print(num / 10);
    printf("%s ", digitToString(num % 10));
}

int main(){
    int num;
    printf("enter a number: ");
    scanf("%d", &num);
    print(num);
    return 0;
}
```

**Output:**

enter a number: 1234 One Two Three Four
--

**Code:**

```
#include <stdio.h>
#include <math.h>

double series1(int i, int fact){
    return pow(i, i)/fact;
}
double series2(int i, int fact){
    return pow(i, i-1)/fact;
}
double series3(int i, int fact){
    return (i & 1)? fact : -fact;
}

double accumulat(int n, double (*callback)(int, int)){
    double sum = 0;
    int fact = 1;
    for(int i = 1; i <= n; ++i){
        fact *= i;
        sum += callback(i, fact);
    }
    return sum;
}

int main(){
    int n;
    printf("enter the nth term: ");
    scanf("%d", &n);

    printf("Series 1: %lf\n", accumulat(n, series1));
    printf("Series 2: %lf\n", accumulat(n, series2));
    printf("Series 3: %lf\n", accumulat(n, series3));

    return 0;
}
```

**Output:**

```
enter the nth term: 10
Series 1: 4511.870241
Series 2: 491.729169
Series 3: -3301819.000000
```

**Code:**

```
#include <stdio.h>
int HCF(int num1, int num2){
    int rem;
    do
    {
        rem = num1 % num2;
        num1 = num2;
        num2 = rem;
    } while (num2 != 0);
    return num1;
}

int LCM(int num1, int num2){

    return (num1 * num2) / HCF(num1, num2);
}

int main(){
    int num1, num2;
    printf("Enter two numbers: ");
    scanf("%d %d", &num1, &num2);

    printf("LCM: %d\n", LCM(num1, num2));
    printf("HCF: %d\n", HCF(num1, num2));
}
```

**Output:**

```
Enter two numbers: 12 18
HCF: 6
LCM: 36
```

**Code:**

```
#include <stdio.h>
int main(){
    int n;
    printf("Enter the nth Term: ");
    scanf("%d", &n);

    // ===== pattern 1
    for(int i = 1; i<=n; ++i){
        for(int j = 1; j<= n - i; ++j){
            printf(" ");
        }
        for(int j = 1; j<=i; ++j){
            printf("%d ", j);
        }
        for(int j = i - 1; j >= 1; --j){
            printf("%d ", j);
        }
        printf("\n");
    }
    for(int i = 2; i<=n; ++i){
        for(int j = 1; j < i; ++j){
            printf(" ");
        }
        for(int j = 1; j<=n + 1 - i; ++j){
            printf("%d ", j);
        }
        for(int j = n - i; j >= 1; --j){
            printf("%d ", j);
        }
        printf("\n");
    }
}

// ===== pattern 2
printf("\n\n");
for(int i = 1; i<=n; ++i){
    for(int j = 1; j<= n - i; ++j){
        printf(" ");
    }
    for(int j = n; j > n - i; j--){
        printf("%c ", j + 'A' - 1);
    }
    for(int j = n+2-i; j<=n; ++j){
        printf("%c ", j + 'A' - 1);
    }
    printf("\n");
}
for(int i = 2; i<=n; ++i){
```

```
for(int j = 1; j < i; ++j){
    printf(" ");
}
for(int j = n; j >= i; j--){
    printf("%c ", j + 'A' - 1);
}
for(int j = i + 1; j <= n; ++j){
    printf("%c ", j + 'A' - 1);
}
printf("\n");
}
return 0;
}
```

**Output:**

Enter the nth Term: 5

```
1
1 2 1
1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
1 2 3 4 3 2 1
1 2 3 2 1
1 2 1
1
```

```

E
E D E
E D C D E
E D C B C D E
E D C B A B C D E
E D C B C D E
E D C D E
E D E
E
```

**Code:**

```
#include <stdio.h>
struct Time{
    int hour;
    int minut;
    int second;
};

void input(struct Time *time){
    printf("enter time (hh mm ss) ");
    scanf("%d %d %d", &time->hour, &time->minut, &time->second);
}

void output(struct Time *time){
    printf("%02d:%02d:%02d\n", time->hour, time->minut, time->second);
}

struct Time sum(struct Time *t1, struct Time *t2){
    struct Time result;
    result.second = (t1->second + t2->second);
    result.minut = (t1->minut + t2->minut) + (result.second / 60);
    result.hour = (t1->hour + t2->hour) + (result.minut / 60);

    result.second %= 60;
    result.minut %= 60;
    result.hour %= 60;
    return result;
}

int main(){
    struct Time t1, t2, t3;
    input(&t1);
    input(&t2);
    t3 = sum(&t1, &t2);

    output(&t1);
    output(&t2);
    output(&t3);
}
```

**Output:**

```
enter time (hh mm ss) 12 45 30
enter time (hh mm ss) 03 20 45
12:45:30
03:20:45
16:06:15
```