#1 Multiplication table from 1 to 10

int Multiplication(int num1, int num2)

{

    return num1 \* num2;

}

void PrintTableHeader(int numOfMultipliers)

{

    cout << "\n\n\t\t\tMultiplication Table From1 to 10\n\n";

    for (int i = 1; i <= numOfMultipliers; i++)

    {

        cout << "\t" << i;

    }

    cout << "\n\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n";

}

string ColumnSeperator(int i)

{

    if (i == 10)

    {

        return "  |";

    }

    else

    {

        return "   |";

    }

}

void MultiplicationTable(int numOfMultipliers)

{

    PrintTableHeader(numOfMultipliers);

    for (int i = 1; i <= numOfMultipliers; i++)

    {

        cout << " " << i << ColumnSeperator(i) << "\t";

        for (int j = 1; j <= numOfMultipliers; j++)

        {

            cout << Multiplication(i, j) << "\t";

        }

        cout << endl;

    }

}

int main()

{

    MultiplicationTable(10);

}

#2 Print All prime Numbers From 1 to N

enum enPrimeNotPrime

{

    Prime = 1,

    NotPrime = 2

};

int ReadPositiveNumbers(string message)

{

    int num;

    do

    {

        cout << message << endl;

        cin >> num;

    } while (num <= 0);

    return num;

}

enPrimeNotPrime checkPrime(int number)

{

    int middleOfNum = round(number / 2);

    for (int counter = 2; counter <= middleOfNum; counter++)

    {

        if (number % counter == 0)

        {

            return enPrimeNotPrime ::NotPrime;

        }

    }

    return enPrimeNotPrime::Prime;

}

void PrintPrimeNumbersFrom1ToN(int N)

{

    cout << "\nOutput is :\n";

    for (int i = 1; i <= N; i++)

    {

        if (checkPrime(i) == enPrimeNotPrime::Prime)

        {

            cout << i << "\n";

        }

    }

}

int main()

{

    PrintPrimeNumbersFrom1ToN(ReadPositiveNumbers("please enter a positive number"));

}

#3 Perfect Number

Perfect number =sum (all divisors)

int ReadPositiveNumbers(string message)

{

    int num;

    do

    {

        cout << message << endl;

        cin >> num;

    } while (num <= 0);

    return num;

}

bool isPerfectnumber(int number)

{

    int middle = number / 2;

    int sumOfDivisors = 0;

    for (int i = 1; i <= middle; i++)

    {

        if (number % i == 0)

            sumOfDivisors += i;

    }

    return sumOfDivisors == number;

}

void printResult(int number)

{

    bool isPerfect = isPerfectnumber(number);

    if (isPerfect)

        cout << number << " is Perfect number ";

    else

        cout << number << " is not perfect number ";

}

int main()

{

    int number = ReadPositiveNumbers("Enter a positive number ");

    printResult(number);

}

#4 perfect number from 1 to n

int ReadPositiveNumbers(string message)

{

    int num;

    do

    {

        cout << message << endl;

        cin >> num;

    } while (num <= 0);

    return num;

}

bool isPerfectnumber(int number)

{

    int middle = number / 2;

    int sumOfDivisors = 0;

    for (int i = 1; i <= middle; i++)

    {

        if (number % i == 0)

            sumOfDivisors += i;

    }

    return sumOfDivisors == number;

}

void printPerfectNumbersFrom1toN(int N)

{

    cout << "Perfect numbers From 1 to " << N << " are :\n";

    for (int i = 1; i <= N; i++)

    {

        if (isPerfectnumber(i))

            cout << i << endl;

    }

}

int main()

{

    int N = ReadPositiveNumbers("Enter a positive number ");

    printPerfectNumbersFrom1toN(N);

}

#5 Print Digits in a Reversed Order

int ReadPositiveNumbers(string message)

{

    int num;

    do

    {

        cout << message << endl;

        cin >> num;

    } while (num <= 0);

    return num;

}

void printReversedDigits(int number)

{

    int reminder = 0;

    do

    {

        reminder = number % 10;

        cout << reminder << endl;

        number = number / 10;

    } while (number > 0);

}

int main()

{

    printReversedDigits(ReadPositiveNumbers("Enter a positive number :"));

}

#6 Sum of Digits

int ReadPositiveNumbers(string message)

{

    int num;

    do

    {

        cout << message << endl;

        cin >> num;

    } while (num <= 0);

    return num;

}

int SumOfDigits(int number)

{

    int reminder = 0, sum = 0;

    do

    {

        reminder = number % 10;

        sum += reminder;

        number = number / 10;

    } while (number > 0);

    return sum;

}

int main()

{

    int sumOfDigits = SumOfDigits(ReadPositiveNumbers("Enter a positive number :"));

    cout << "Sum OF Digits is : " << sumOfDigits;

}

#7 Reverse Number

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

int DivideTwoNumbers(int dividend, int divisor)

{

    return (dividend / divisor);

}

int ModulusTwoNumbers(int dividend, int divisor)

{

    return (dividend % divisor);

}

int ReversedOfNumber(int number)

{

    int modulus = 0;

    int revversed = 0;

    while (number != 0)

    {

        modulus = ModulusTwoNumbers(number, 10);

        revversed = (revversed \* 10) + modulus;

        number = DivideTwoNumbers(number, 10);

    }

    return revversed;

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    int n = ReversedOfNumber(number);

    cout << "reversed of  " << number << " is equal " << n;

}

#8 Digit frequency

using namespace std;

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

int CountDigitFrequency(short digit, int number)

{

    // index  على ال forloop لانه رقم ما بتقدري تعملي

    int freqCount = 0, reminder = 0;

    while (number != 0)

    {

        reminder = number % 10; //extract the last digit of the nnumber

        number = number / 10; //remove the last digit from the number

        if (reminder == digit)

        {

            freqCount++;

        }

    }

    return freqCount;

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    short digitToCheck = ReadPositiveNumber("enter  one digit to check");

    cout << "\n Digit  " << digitToCheck << " Frequency is  " << CountDigitFrequency(digitToCheck, number) << " Times(s) . \n";

}

#9 Print All Digits Frequencies of the number

#include <iostream>

#include <string>

using namespace std;

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

int CountDigitFrequency(short digit, int number)

{

    // index  على ال forloop لانه رقم ما بتقدري تعملي

    int freqCount = 0, reminder = 0;

    while (number != 0)

    {

        reminder = number % 10; // extract the last digit of the nnumber

        number = number / 10;   // remove the last digit from the number

        if (reminder == digit)

        {

            freqCount++;

        }

    }

    return freqCount;

}

void PrintAllDigitsFrequencies(int number)

{

    for (int i = 0; i < 10; i++)

    {

        int frequency = CountDigitFrequency(i, number);

        if (frequency > 0)

        {

            cout << "\n Digit  " << i << " Frequency is  " << frequency << " Times(s) . \n";

        }

    }

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    PrintAllDigitsFrequencies(number);

}

**# 10 print digits in order**

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

int DivideTwoNumbers(int dividend, int divisor)

{

    return (dividend / divisor);

}

int ModulusTwoNumbers(int dividend, int divisor)

{

    return (dividend % divisor);

}

int ReversedOfNumber(int number)

{

    int modulus = 0;

    int revversed = 0;

    while (number != 0)

    {

        modulus = ModulusTwoNumbers(number, 10);

        revversed = (revversed \* 10) + modulus;

        number = DivideTwoNumbers(number, 10);

    }

    return revversed;

}

void PrintDigits(int number)

{

    while (number > 0)

    {

        int reminder = ModulusTwoNumbers(number, 10);

        number = DivideTwoNumbers(number, 10);

        cout << reminder << endl;

    }

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    int n = ReversedOfNumber(number);

    PrintDigits(n);

}

**#11 palindrome number**

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

int DivideTwoNumbers(int dividend, int divisor)

{

    return (dividend / divisor);

}

int ModulusTwoNumbers(int dividend, int divisor)

{

    return (dividend % divisor);

}

int ReversedOfNumber(int number)

{

    int modulus = 0;

    int revversed = 0;

    while (number != 0)

    {

        modulus = ModulusTwoNumbers(number, 10);

        revversed = (revversed \* 10) + modulus;

        number = DivideTwoNumbers(number, 10);

    }

    return revversed;

}

bool isPalindrome(int number)

{

    return number == ReversedOfNumber(number);

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    bool isPalindrom = isPalindrome(number);

    if (isPalindrom)

    {

        cout << "Yes , " << number << " Is Palindrome number";

    }

    else

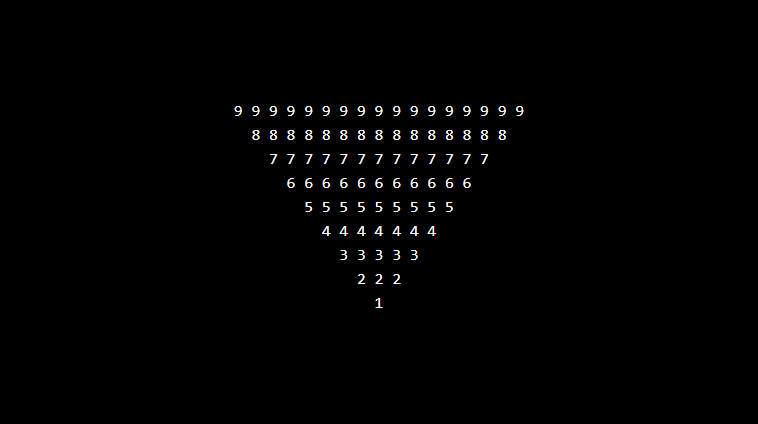
    {

        cout << "No , " << number << " Isn't Palindrome number";

    }

}

**#12 Inverted number pattern**

****

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

void PrintInvertedNumber(int number)

{

    for (int row = number; row >= 1; row--)

    {

        for (int column = 0; column < row; column++)

        {

            cout << row << " ";

        }

        cout << endl;

    }

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    PrintInvertedNumber(number);

}

**#13 Normal Number Pattern**

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

void PrintNumberPattern(int number)

{

    for (int row = 1; row <= number; row++)

    {

        for (int column = 0; column < row; column++)

        {

            cout << row << " ";

        }

        cout << endl;

    }

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    PrintNumberPattern(number);

}

**#14 Inverted letter Pattern**

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

void PrintInvertedLetterPatern(int number)

{

    for (int row = 65 + number -1 ; row >= 65; row--)

    {

        for (int column =1 ; column  <= number - (65+number -1 -row); column++)

        {

            cout << char(row) << " ";

        }

        cout << endl;

    }

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    PrintInvertedLetterPatern(number);

}

**#15 Normal letter Pattern**

int ReadPositiveNumber(string message)

{

    int number;

    do

    {

        cout << message << endl;

        cin >> number;

    } while (number < 0);

    return number;

}

void PrintInvertedLetterPatern(int number)

{

    for (int row = 65; row <= 65 + number - 1; row++)

    {

        for (int column = 1; column <= row - 65 + 1; column++)

        {

            cout << char(row) << " ";

        }

        cout << endl;

    }

}

int main()

{

    int number = ReadPositiveNumber("please enter positive number");

    PrintInvertedLetterPatern(number);

}

**#16 All Words From AAA to ZZZ**

void printAllFromAAAtoZZZ()

{

    string word = "";

    for (int i = 65; i <= 90; i++) // First char

    {

        for (int j = 65; j <= 90; j++) // Second char

        {

            for (int k = 65; k <= 90; k++) // third char

            {

                word += char(i);

                word += char(j);

                word += char(k);

                cout << word << endl;

                word = "";

            }

        }

    }

}

int main()

{

    printAllFromAAAtoZZZ();

}

**#17 Guess a 3-letters Password =🡺 ممكن تستخدمه لبعدين ليعمل login**

string ReadPassword()

{

    cout << "Enter Your Password \n";

    string password = "";

    getline(cin, password);

    return password;

}

bool GuessPassword(string originalPassword)

{

    string word = "";

    int trial = 0;

    for (int i = 65; i <= 90; i++) // First char

    {

        for (int j = 65; j <= 90; j++) // Second char

        {

            for (int k = 65; k <= 90; k++) // third char

            {

                trial++;

                word += char(i);

                word += char(j);

                word += char(k);

                cout << "Trial [" << trial << "] : " << word << endl;

                if (word == originalPassword)

                {

                    cout << "\nPassword is " << word;

                    cout << "\nFound After " << trial << " Trial(s)";

                    return true;

                }

                word = "";

            }

        }

    }

}

int main()

{

    GuessPassword(ReadPassword());

}

**#18 Encrypt-Decrypt Text**

## **🧠 أولًا: ما هو التشفير (Encryption)؟**

**التشفير** هو عملية **تحويل نص مفهوم (Plain Text)** إلى **نص غير مفهوم (Cipher Text)** بحيث لا يمكن قراءته إلا إذا عندك **المفتاح (Key)** الصحيح لفكّه.

ببساطة:

نص عادي + مفتاح → نص مشفر

نص مشفر + نفس المفتاح → نص عادي

**🔐 المفاهيم الأساسية**

1. **Plain Text** — النص الأصلي (قبل التشفير).  
   مثال: "Hello World"
2. **Cipher Text** — الناتج بعد التشفير.  
   مثال: "Khoor Zruog"
3. **Key (المفتاح)** — رقم أو كلمة تُستخدم للتحكم في عملية التشفير.  
   مثال: المفتاح = 3 يعني نحرك كل حرف 3 أماكن للأمام.
4. **Encryption Algorithm (خوارزمية التشفير)** — القاعدة اللي تقول *كيف* يتم التشفير.  
   مثلًا:
   * في Caesar Cipher: نحرك الحروف بعدد معين.
   * في XOR Cipher: نعمل XOR بين الحرف والمفتاح.
   * في AES/RSA: نستخدم خوارزميات رياضية قوية جدًا.
5. **Decryption (فك التشفير)** — هي العملية العكسية:  
   استرجاع النص الأصلي من النص المشفر باستخدام نفس المفتاح.

string ReadText()

{

    cout << "Enter A Text  \n";

    string text = "";

    getline(cin, text);

    return text;

}

// Encryption ==>convert NormalText to CipherText

string EncryptText(string text, short encryptionKey)

{

    for (int i = 0; i < text.length(); i++)

    {

        int num = (int)text[i];

        num += encryptionKey;

        text[i] = char(num);

    }

    return text;

}

// Decryption ===> convert cipherText to NormalText

string DecryptText(string text, short encryptionKey)

{

    for (int i = 0; i < text.length(); i++)

    {

        int num = (int)text[i];

        num -= encryptionKey;

        text[i] = char(num);

    }

    return text;

}

int main()

{

    string text = ReadText();

    const short EncryptionKey = 2;

    string encryptedText = EncryptText(text, EncryptionKey);

    cout << "Text after encrypted : " << encryptedText << endl;

    string decryptedText = DecryptText(encryptedText, EncryptionKey);

    cout << "Text after decrypted : " << decryptedText << endl;

}

**#19 Random 3 numbers from 1 to 10**

**rand =🡺 جوا ال cstdlib**

**srand() =🡺 Seeds the random number generator in c++ , called only once تهيئة العشوائية (تغير التسلسل)**

int RandomNumber(int from, int to)

{

    // rand -> from 0 to max

    return rand() % (to - from + 1) + from;

}

int main()

{

    srand((unsigned)time(NULL));

    cout << RandomNumber(1, 5) << endl;

    cout << RandomNumber(1, 5) << endl;

    cout << RandomNumber(1, 5) << endl;

}

**#20 Random,small letter , capital letter , special C ,and Digit in order**

enum enRandomNumberType{

    SmallLetter=1,

    CapitalLetter,

    SpecialCharacter,

    Digit

};

int RandomNumber(int from, int to)

{

    // rand -> from 0 to max

    return rand() % (to - from + 1) + from;

}

char GetRandomCharacter(enRandomNumberType charType){

    switch (charType)

    {

    case enRandomNumberType::SmallLetter:

        return RandomNumber(97,122);

        break;

    case enRandomNumberType::CapitalLetter:

        return RandomNumber(65,90);

        break;

    case enRandomNumberType::SpecialCharacter:

        return RandomNumber(33,47);

        break;

    case enRandomNumberType::Digit:

        return RandomNumber(48,57);

        break;

    default:

        break;

    }

}

int main()

{

    srand((unsigned)time(NULL));

    cout << GetRandomCharacter(enRandomNumberType::SmallLetter) << endl;

    cout << GetRandomCharacter(enRandomNumberType::CapitalLetter) << endl;

    cout << GetRandomCharacter(enRandomNumberType::SpecialCharacter) << endl;

    cout << GetRandomCharacter(enRandomNumberType::Digit) << endl;

}

**#21 Generate Keys**

enum enRandomNumberType

{

    SmallLetter = 1,

    CapitalLetter,

    SpecialCharacter,

    Digit

};

int ReadNumber()

{

    int n;

    cout << "please Enter  How Many Keys To Generate " << endl;

    cin >> n;

    return n;

}

int RandomNumber(int from, int to)

{

    // rand -> from 0 to max

    return rand() % (to - from + 1) + from;

}

char GetRandomChar(enRandomNumberType charType)

{

    switch (charType)

    {

    case enRandomNumberType::SmallLetter:

        return RandomNumber(97, 122);

        break;

    case enRandomNumberType::CapitalLetter:

        return RandomNumber(65, 90);

        break;

    case enRandomNumberType::SpecialCharacter:

        return RandomNumber(33, 47);

        break;

    case enRandomNumberType::Digit:

        return RandomNumber(48, 57);

        break;

    default:

        break;

    }

}

string GenerateWord(enRandomNumberType charType, int lengthOfWord)

{

    string word = "";

    for (int i = 1; i <= lengthOfWord; i++)

    {

        word += GetRandomChar(charType);

    }

    return word;

}

string GenerateKey()

{

    string s = "";

    for (int i = 1; i <= 4; i++)

    {

        s += GenerateWord(enRandomNumberType::CapitalLetter, 4);

        if (i < 4)

        {

            s += "-";

        }

    }

    return s;

}

void GenerateKeys(short numberOfkeysGen)

{

    for (int i = 1; i <= numberOfkeysGen; i++)

    {

        cout << " Key[" << i << "] : " << GenerateKey() << endl;

    }

}

int main()

{

    srand((unsigned)time(NULL));

    GenerateKeys(ReadNumber());

}

**#22 Repeated Elements Count In Array**

int ReadNumber(string msg)

{

    int n;

    cout << msg << endl;

    cin >> n;

    return n;

}

void ReadArray(int arr[100], int &lengthOfArr)

{

    lengthOfArr = ReadNumber("Enter Number Of elements");

    for (int i = 0; i < lengthOfArr; i++)

    {

        cout << "Element [" << i + 1 << "] : ";

        cin >> arr[i];

    }

}

void PrintArr(int arr[100], int &lengthOfArr)

{

    for (int i = 0; i < lengthOfArr; i++)

    {

        cout << arr[i] << " ";

    }

    cout << endl;

}

int TimesRepeated(int number, int lenthOfArray, int arr[100])

{

    int count = 0;

    for (int i = 0; i < lenthOfArray; i++)

    {

        if (arr[i] == number)

        {

            count++;

        }

    }

    return count;

}

int main()

{

    int arr[100], numToCheck, numOfElements;

    ReadArray(arr, numOfElements);

    cout << "Original Array  : ";

    PrintArr(arr, numOfElements);

    numToCheck = ReadNumber("Enter the number to check ");

    cout << "Number " << numToCheck << " is repeaed " << TimesRepeated(numToCheck, numOfElements, arr) << " time(s) \n";

}