10. Double and Character

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Float Data Type

float data type is used for floating point numbers (number having fractional part), like 123.5, 3.14, etc.

Note that 3 is an integer whereas 3.0 is a floating point number

You can declare a float variable as

```
float someName;
```

Operator / and % revisited

- For integers a and b, a/b gives us the quotient when a is divided by b.

```
cout << ( 5 / 3 ) << "\n";
cout << ( 3 / 9 );
```

```
Output :
1
0
```

- If either of a or b is a floating point number, then a/b simply divides a by b and returns the result

```
cout << ( 5.0 / 2 ) << "\n";
cout << ( 3 / 9.0 );
```

```
Output :
2.5
0.333333
```

Operator / and % revisited

- **Concept :** If either of a or b is a floating point number, a/b is a floating point number.

  Else if both of them are integers, a/b is an integer

```
cout << ( 5.0 / 2 ) << "\n";
cout << ( 5 / 2 );
```

Output :
2.5
2

- For % operator, both operands must be integers.

  The compiler would give an error if either of them is not an integer

Practice

Write a program which takes marks in 3 subjects as input and computes the average.

Note that the marks can have fractional parts too.

Practice

Write a program which takes marks in 3 subjects as input and computes the average.

```
#include <iostream.h>
#include <conio.h>
int main()
{
        clrscr();
        float m1, m2, m3;
        cout << "Enter marks : ";
        cin >> m1 >> m2 >> m3;
        float avg = (m1 + m2 + m3)/3;
        cout << "Average = " << avg;
        getch();
        return 0;
}
```

Double Data Type

- ***double*** data type is used when we need to store larger floating point numbers (numbers with fractional part) than what ***float*** can store

You can declare a double variable as

```
double variableName;
```

- Double is equivalent to long float, thus / and % behave the same way as float.

Double Data Type

Data Type	Approximate size (in bytes)	Range
double	8	1.7×10^{-308} to $1.7 \times 10^{308} - 1$ (Upto 15 digits of precision)
long double	10	3.4×10^{-4932} to $1.1 \times 10^{4932} - 1$ (Upto 19 digits of precision)

- **Tip :** Always use the smallest data type that fits your values because larger data types (like ***double)*** are slower than their smaller alternatives (like **float**)

Character Data Type

- ***char*** data type is used to store a character.

  You can declare a character variable as

  ```
  char variableName;
  ```

- Character in C++ are enclosed between single quotes.

  Example : 'a' , '1' , 'A' , '+' , '\n'

```
char ch = 'A';
cout << ch;
```

Output :
A

Character Data Type

- Characters are internally represented by integral codes, called ASCII code. For example, ASCII code for 'A' is 65
- There are 256 ASCII codes have the 256 characters of C++
- A character variable occupies 1 byte of memory

Practice

Write a program which prints the ASCII code of a character.

Example

Write a program which prints the ASCII code of a character.

```
#include <iostream.h>
#include <conio.h>
int main()
{
        clrscr();
        char ch;
        cout << "Enter character : ";
        cin >> ch;
        int code = ch;
        cout << "ASCII code : " << code;
        getch();
        return 0;
}
```

What’s next?

In the next video, we will study more about character variables.