A C++ program is a collection of one or more functions

- there must be a function called main()

- execution always begins with the first statement in function main()

- any other functions in your program are subprograms and are not executed until they are called

Program With Several Functions

- main function
- square function
- cube function
Program With Three Functions

```cpp
#include <iostream>

int Square( int ); // declares these two
int Cube( int ); // value-returning functions

using namespace std;

int main( )
{
    cout << "The square of 27 is " << Square(27) << endl; // function call
    cout << "The cube of 27 is " << Cube(27) << endl; // function call
    return 0;
}
```

Rest of Program

```cpp
int Square( int n )
{
    return n * n;
}

int Cube( int n )
{
    return n * n * n;
}
```
Output of program

The square of 27 is 729
The cube of 27 is 19683

Shortest C++ Program

```cpp
int main ()
{
    return 0;
}
```
What is in a heading?

```
int main ()
```

- type of returned value
- name of function
- says no parameters

---

Block (Compound Statement)

- a block is a sequence of zero or more statements enclosed by a pair of curly braces
  
  ```
  { 
  Statement (optional) 
  
  
  }
  ```

SYNTAX
Every C++ function has 2 parts

```cpp
int main ()
{
    return 0;
}
```

What is an Identifier?

- An identifier is the name used for a data object (a variable or a constant), or for a function, in a C++ program.
- C++ is a case-sensitive language.
- Using meaningful identifiers is a good programming practice.
Identifiers

- an identifier must start with a letter or underscore, and be followed by zero or more letters (A-Z, a-z), digits (0-9), or underscores

- VALID
  - age_of_dog
  - taxRateY2K
  - PrintHeading
  - ageOfHorse

- NOT VALID (Why?)
  - age#
  - 2000TaxRate
  - Age-Of-Cat

C++ Data Types

- simple
  - integral
    - char
    - short
    - int
    - long
    - bool
  - enum
  - floating
    - float
    - double
    - long double

- structured
  - array
  - struct
  - union
  - class
  - address
    - pointer
    - reference
C++ Simple Data Types

- **Simple Types**
  - **Integral**
    - char
    - short
    - int
    - long
    - bool
  - **Floating**
    - enum
    - float
    - double
    - long double
  - **Unsigned**

C++ Data Type String

- A string is a sequence of characters enclosed in double quotes.

- **String Sample Values**
  - "Hello"  "Year 2000"  "1234"

- The empty string (null string) contains no characters and is written as "".
More About Type String

- string is not a built-in (standard) type
  - it is a programmer-defined data type
  - it is provided in the C++ standard library

- string operations include
  - comparing 2 string values
  - searching a string for a particular character
  - joining one string to another

What is a Variable?

- A variable is a location in memory which we can refer to by an identifier, and in which a data value that can be changed is stored.

- declaring a variable means specifying both its name and its data type
What Does a Variable Declaration Do?

A declaration tells the compiler to allocate enough memory to hold a value of this data type, and to associate the identifier with this location.

```c++
int ageOfDog;
float taxRateY2K;
char middleInitial;
```

4 bytes for taxRateY2K 1 byte for middleInitial

What is a Named Constant?

- A named constant is a location in memory that we can refer to by an identifier, and in which a data value that cannot be changed is stored.

**VALID CONSTANT DECLARATIONS**

```c++
const string STARS = "****";
const float NORMAL_TEMP = 98.6;
const char BLANK = '\';
const int VOTING_AGE = 18;
const float MAX_HOURS = 40.0;
```