Variables, Data Types and Constants

1. Variables

Variables are user defined identifiers for storing values. Everytime you want the computer to remember something you always store it in a variable. Rules for naming variables:

- Start with a letter, followed by one or more letters and or digits.
- Cannot have any symbols or spaces, except for the underscore (_).
- Upper case and lower case letters are different
- Cannot be a keyword

Use meaningful names for variables, for example, use the name "age" to store the age of a person.

2. Data Types

- Use the keyword int to declare an integer variable. Integer variables are used to store integer constants such as 8, 0, and -3.
- Use the keyword float to declare a floating point variable. Floating point variables are used to store decimal number constants such as 3.1415 and -5.0.
- Use the keyword double to declare a double floating point variable. It is just like a float but with double the precision.
- Use the keyword char to declare a character (or string) variable. Character variables are used to store character constants such as 'A', 'b', and '$'. Character constants must be enclosed inside the single quote.
- Use the keyword string to declare a string variable. String variables are used to store string constants such as "Computer Science" and "4500 Riverwalk Parkway". String constants must be enclosed inside the double quote.
- Use the keyword bool to declare a Boolean variable. Boolean variables are used to store the values true or false.

3. Variable Declarations

Syntax: type variable_name;

Example:
```
int number;
float height;
char character;
string firstName;
```


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4. Initialization of Variables

Syntax: type variable_name = value;

Example: int count = 0;

bool isRaining = false;

5. Constants

Constants are values that cannot be changed.

Example:			
	integer constant	23	
	float constant	3.14 1.49E11	
	char constant	'E'	use a single quote
	string constant	"La Sierra University"	use a double quote
	bool constant	true	

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

int main() {
   string name;
   char letter;
   int quantity;
   float price;

   name = "La Sierra University";
   letter = 'A';
   quantity = 3;
   price = 45.67;

   cout << "Name is " << name << endl;
   cout << "Character is " << letter << endl;
   cout << "Total price is " << quantity * price << endl;

   return 0;
}
```


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6. Named Constants

You can use the keyword const to declare a constant variable with an initial value, i.e., a variable whose initial value cannot be changed.

Syntax: const type variable_name = value;

Example: const float sales_tax = 7.5;

There are two main reasons why you would want to have named constants.

1) It makes the program easier to read. For example

```
total = price * sales_tax;

total = price * 7.5;
```

2) If the constant is used in many places within your program, and you need to change the constant to another value, then you'll have to find all the occurrences of where the constant is used and change them. However, with a named constant you'll only need to change the initial assigned valued because all the other places use the name and not the actual value.

7. Size of a Data Type

Different data types use different amount of memory storage. The sizeof operator may be used to find out how much storage is used by a data type.

```
cout << "The size of an integer is  " << sizeof(int) << endl;
```


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