# Class 03

Input Instructions, Assignment Operator, Arithmetic Operations

# Variables

- Variables are used to store data in these boxes in memory
- Every variable needs a DATA TYPE and a NAME
- Variable names must conform to the following rules:
  - May only contain numbers, letters and underscores
  - Cannot begin with a number
  - Cannot be a C++ keyword

- Purely for reference, the list of C++ keywords is here: https://en.cppreference.com/w/cpp/keyword

# Primitive Data Types

- The computer needs to be told what type of data to store in memory
- Primitive types include:
  - Integer (int)
  - Double (double)
  - String (string)
  - Character (char)
  - Boolean (bool)

# Declaring Variables

- Before we use a variable, we must declare it
- Model:

  TYPE NAME;
- Examples:

  int years;

  double length;

  string catName;

  char letter;

  bool isTrue;

# Receiving User Input

- Steps:
  - Declare variable
  - Prompt user for input
  - Store user input in variable
- cin
  - Stands for “character input”
- Model:

  cin >> [variable name];

# Example 1 – Age in seconds

- Plan:
  - Declare variable for age
  - Declare variable for ageInSecond
  - Initialize age to 0
  - Prompt the user to enter his/her age as a whole number
  - Store input from user into age
  - Calculate the age in seconds
  - Tell the user the age in seconds

# Updating the value stored in a variable

- After a variable is declared, we can alter the value stored in it
- This is done via the assignment operator =
- Model:

  [variable name] = [value];

# Arithmetic Operations

- Addition +
- Subtraction -
- Multiplication *
- Division /
- Remainder %

# Arithmetic Expressions and Variables

- We can update the value stored in a number variable by performing arithmetic on it

```
age = age + 5;
```

- We can assign the result of an arithmetic expression to a number variable

```
ageInSeconds = age * 365 * 24 * 60 * 60;
```

# Pitfall to watch for:  Integer Division

- Normally, dividing an integer $x$ by an integer $y$ when $x$ is not a multiple of $y$ produces a number with a fractional component
  - Example:  7 / 2 = 3.5
- In C++, if both operands are integers, the result will be an integer
  - Example:  7 / 2 = 3