Variable

Question: How do we know which type should we use for each variable?

Answer: It depends on how we going to use the variable data.
Variable Type - int

What can we do with integers?  
- Arithmetic

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Addition</td>
</tr>
<tr>
<td>-</td>
<td>Subtraction</td>
</tr>
<tr>
<td>*</td>
<td>Multiplication</td>
</tr>
<tr>
<td>/</td>
<td>Division</td>
</tr>
<tr>
<td>%</td>
<td>Modulus (Remainder)</td>
</tr>
<tr>
<td>( )</td>
<td>Parentheses</td>
</tr>
</tbody>
</table>

C++ does not directly support Exponent operation.
## Order of Operation

<table>
<thead>
<tr>
<th>Operation</th>
<th>Precedence</th>
</tr>
</thead>
<tbody>
<tr>
<td>( )</td>
<td>Contents inside parentheses has highest precedence. Should evaluate first.</td>
</tr>
</tbody>
</table>
| * / %     | Equal precedence  
            Evaluated from left to right |
| + -       | Equal precedence  
            Evaluated from left to right |
Examples of Operation

What is the remainder when 5 divided by 2?

5 % 2

Find the remainder of the sum of two numbers divide by 2.

A) number1 + number 2 % 2 = 
B) 2 % number1 + number2 = 
C) (number1 + number2) % 2 = 

Is the answer A, B or C?
Integer Division

Integer division in C++ will truncate any decimal value, for example:

\[\frac{5}{2} = 2\] for an integer division
\[\frac{4}{2} = 2\] this means \[\frac{5}{2} = \frac{4}{2}\]
\[\frac{10}{3} = 3\]
\[\frac{11}{2} = 5\]

The resulting type is an Integer. What makes this an integer division?
- Both the dividend and divisor are integers (not decimal).
Double (decimal) Division

Double division in C++ will retain the appropriate decimal value, for example:

5 / 2.0 = 2.5
4 / 2.0 = 2
10.0 / 3 = 3.33333...
11.0 / 2.0 = 5.5

The resulting type is a Double. What makes this a decimal division? - Either the dividend or divisor is a decimal.
All Other Operations

Same rule apply to Addition, Subtraction and Multiplication.

If both of the values are of type int, result will be int.

If either one of the type is double, result will be double.
Data Types and Order of Operation

Example:

\[ 5.0 + 5 / 2 \]
- What is the resulting data type of the first operation?
- What is the resulting data type of the second operation?

\[ 5 + 5.0 / 2 \]
- What is the resulting data type of the first operation?
- What is the resulting data type of the second operation?
Type Casting

- If we want to convert from int to double for a more precise result, we can do so with type casting.
- Type casting is a temporary change from one type to another.

double value = (double) 5 / 2;
//value = 2.5
int approx = (int) value;
//approx = 2, value = 2.5
Variable Type - string

How can we use data type string?
-A paragraph, a name, a comma, zip code, phone number, etc.

Why do we use string for zip code and phone number?
-We use it as plain text, no calculation involved.
Arithmetic for string?

It’s meaningless to do something like, minus “orange” from “apple”.

However, there is + for data type string.
- It means to append the second string to the end of the first string. The length of the new string the length of the first string plus the length of the second string.

Example:
string address = “65-30 Kissena Blvd.”;
string city = “Flushing, N.Y.”;
string zipcode = “11367”;
string newAdd = address + city + zipcode;

string num = “2” + “2”;
Comments

Comments in C++ source code is not part of the program, but serve many purposes:

- Explain to the reader or other programmers what this program does.

- Note to other developers on what the block of code is doing.

- A To-Do list on tasks you need to complete.
Styles of Comments

- In line comments, marks rest of the text in the line as comments.
  //this is a in line comment

- Multi-line comments, marks a block of text as comments.
  /** this is multi-line comments */