CS 111
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Data for Type - string

A double quotation mark indicates the beginning of the string data. Indicate the end of data by another double quotation. All texts should be surrounded by a double quotation mark.

“"This is a line of text.""  
“"10?""  
“"65-30 Kissena Blvd.""  
“"1234567""  
“" ""  
“"string name""

Basically anything can be inside quotation mark.
Data for Type - int

Any integers (whole number). No letters or special characters. Only negative sign is allowed.

10
0
2012
-99

Invalid Example:
“10”
zero
99.99
Data for Type - double

Any decimals, high precision
No letters, only negative sign and point is allowed.
Example:
  2.0
  3.14159
  2.71
  -3.5

Invalid:
  '4.5'
  "3.14159"
  neg 3
  2 point 5
Data for Type - bool

Boolean, true or false
Example:
  true
  false
  1
  0

Invalid:
  ‘true’
  “false”
  ‘0’
Data for Type - char

Single character surrounded by single quote. 

Example:

'c'
'2'
'?'

For special character like tab or newline. C++ differentiate them by a back slash

'\n' new line character
'\t' tab
'\'' regular`
'\n' regular`

All character is stored as an ASCII value internally. From 0-127

65 //ASCII value of letter 'A'

Invalid:

'character'
500
'\n'
Variable Type - Int

<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</td>
</tr>
<tr>
<td>( )</td>
<td>Parenthesis</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>
<tr>
<td>*</td>
<td>Equal precedence</td>
</tr>
<tr>
<td>/</td>
<td>Evaluated from left to right</td>
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<tr>
<td>%</td>
<td>Evaluated from left to right</td>
</tr>
<tr>
<td>+</td>
<td>Equal precedence</td>
</tr>
<tr>
<td>-</td>
<td>Evaluated from left to right</td>
</tr>
</tbody>
</table>
program.cpp

/* This program asks for user’s age,
   Then print the age in hours */

#include <iostream>
using namespace std;
int main(){
   // declare variables
   int age;
   // prompt user to enter the input
   cout << "Please enter your age:\n";
   // read in the input
   cin >> age;
   // output
   cout << "You’re " << age * 365 * 24
       << " hours old." << endl;
   return 0;
}
Examples of Operation

What is the remainder when 5 divided by 2? 
5 % 2

Find the remainder of the sum of number1 and number2 when divided by 2. 
A) number1 + number2 % 2 
B) 2 % number1 + number2 
C) (number1 + number2) % 2

Is the answer A, B or C?
C
#include <iostream>
using namespace std;

int main(){
  //declare variables
  double radius, area, circ;
  //prompt user to enter the input
  cout << "Please enter radius:\n";
  //read in the input
  cin >> radius;
  circ = 2 * 3.14 * radius;
  area = 3.14 * radius * radius;
  //output
  cout << "Circumference: " << circ << "\nArea:" << area << endl;
  return 0;
}
Integer Operation vs Double Operation

- When both operands are integers, the result is integer
- When either operand is double, the result is double

Integer Division:

5 / 2 = 2
When both the dividend and divisor are integer, the result is also integer

Double Division:

5.0 / 2.0 = 2.5
Integer Operation vs Double Operation

Example:
5.0 + 5 / 2

-What is the resulting data type of the first operation? int
-What is the resulting data type of the second operation? double

Answer:
7.0

5 + 5.0 / 2

-What is the resulting data type of the first operation? double
-What is the resulting data type of the second operation? double

Answer:
7.5
Type Cast

Convert to int and double from variables
- Integer division on doubles or Double division on integers

```java
int x = 5, y = 2;
double value = (double) x / y;
//value = 2.5
int approx = value;
//approx = 2, value = 2.5
```
/* Ask for temperature (int) in fahrenheit, print it in celsius (nearest int) fah minus 32, then times 5, divide 9 */
#include <iostream>
using namespace std;
int main(){
    //declare variables
    int fah, roundCel;
    double preciseCel;
    cout << "Fahrenheit temperature: ";
cin >> fah;

    preciseCel = (fah - 32) * 5 / (double)9;
    roundCel = preciseCel + 0.5;

    cout << "In celsius: " << roundCel << endl;
    return 0;
}
# program.cpp

/* Print coins for change*/
#include <iostream>
using namespace std;
int main()
{
  // declare variables
  int total, pn, nc, dm, qt;
  cout << "Please enter total change:\n";
  cin >> total;
  qt = total / 25;
  total = total % 25;
  dm = total / 10;
  total = total % 10;
  nc = total / 5;
  pn = total % 5;
  cout << "quarter: " << qt << "", dime:" "
       << dm << "", nickle:" " << nc
       << "", penny: " << pn << endl;
  return 0;
}