

CA146 Introduction to Programming in C++

CA146 Tutorial 2

Note: When you have finished the tasks, or at least as many as you were able to do, ask a tutor to sign off to confirm this.

1. Practice with integer variables and integer arithmetic

1.1 Type in, compile and run the following program:

```
#include <iostream>
#include <string>

using namespace std;

int
main()
{
    // Some statements to allow labelling of your output:
    string name;
    cout << "Please enter your name:" << endl;
    cin >> name;
    cout << "Person running this program is " << name << endl;

    // The main purpose of the program - defines some integer variables,
    // assigns them values, outputs the values, carries out some calculations
    // which modify the values, and then prints out the values again (to show
    // the changes):

    int m, n, p, q;
    m = 7; n = -9; p = n + m; q = n + m + p;

    cout << "(m, n, p, q) = (" << m << " , " << n << " , "
        << p << " , " << q << ")" << endl;

    m = 20; n = -p; p = n * m; q = (n + m) / p;

    cout << "(m, n, p, q) = (" << m << " , " << n << " , "
        << p << " , " << q << ")" << endl;

    return (0);
}
```

NB: Check the output very carefully to make sure you understand exactly why the output values of variables n, m, p and q are as they are.

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1.2 Write a program of a somewhat similar structure to that of 1.1 which does the following:

- It defines 3 integer variables f0, f1 and f2 [*instead of m, n, p, q of 1.1*]
- It sets $f0 = 0$, $f1 = 1$ and $f2 = f0 + f1$
- It outputs the values of f0, f1 and f2 to the screen (*using cout*)
- It sets $f0 = f1$, $f1 = f2$ and $f2 = f0 + f1$
- It outputs the values of f0, f1 and f2 to the screen (*using cout*)
- It sets $f0 = f1$, $f1 = f2$ and $f2 = f0 + f1$
- It outputs the values of f0, f1 and f2 to the screen (*using cout*)

N.B.: Again, check your results carefully to be sure you understand how the program works. Is there anything you notice about this program?

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2 Practice with “float” variables and arithmetic

2.1 Type in, compile and run the following program.

```
#include <iostream>

using namespace std;

int
main()
{
    // Some statements to allow labelling of your output:
    string name;
    cout << "Please enter your name:" << endl;
    cin >> name;
    cout << "Person running this program is " << name << endl << endl;

    // The main purpose of the program - defines some real variables,
    // representing some physical elements of the planets, assigns them values,
    // carries out some calculations and then outputs the values in a table:

    // Print headings (\t inserts some space and aids alignment
    cout << "Planet\t" << "Mass" << "\tRadius" << "\tRadial Ratios" << endl;

    float massE, radE, mass, rad;
    massE = 1.000; radE = 6378.0;
    cout << "Earth\t" << massE << "\t" << radE << "\t" << radE / radE << endl;

    mass = 0.056; rad = 2420.0;
    cout << "Mercury\t" << mass << "\t" << rad << "\t" << rad / radE << endl;

    mass = 0.817; rad = 6200.0;
    cout << "Venus\t" << mass << "\t" << rad << "\t" << rad / radE << endl;

    return (0);
}
```

2.2 Extend the program so that it includes the other planets where:

Planet	Equatorial Radius (km)	Mass (where Earth = 1)
Mars	3400	0.108
Jupiter	71370	318.0
Saturn	60400	95.2
Uranus	23530	14.6
Neptune	22300	17.3

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2.3 Fahrenheit to Celsius

Write a program to convert Fahrenheit to Celsius. The program should ask the user to enter a temperature in Fahrenheit, convert it to Celsius and then display the result to the user. (To convert Fahrenheit to Celsius we subtract 32 and divide by 1.8.)