**Task 1**

Copy the program given below. Save (as projectile.cpp), compile and run it.

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

/* Program to compute the range of a projectile
Given the initial speed, and angle of elevation.
The solution is over simplistic:
R = v0^2 * SIN(2*theta) / g */

int main(){
    const double g = 9.8;
    double v0, theta, range;

    // get the values
    cout << "Input the speed (in m/s): ";
    cin  >> v0;
    cout << "Input the angle (in degrees): ";
    cin  >> theta;

    // convert angle into radian
    theta = theta * M_PI/180.0;

    // calculate range
    range = v0*v0 * sin(2.0*theta)/g;
    cout << "Range = " << range << " m." << endl;
    return 0;
}
```

(a) Verify that it works correctly.

(b) Modify the program to also output the time-of-flight, \( T = \frac{2v_0 \sin(\theta)}{g} \), of the projectile.

(c) Modify for program for a projectile launched on the moon.

**Task 2**

In the concentration of orange juice, fresh juice containing \( s_1 \) (%) solids is fed to a vacuum evaporator at a rate of \( L \) (kg/hour). In the evaporator, water is removed at a rate of \( W \) (kg/hour) and the solid content is increased to \( s_2 \) (%).

Write a C++ program that calculates the outlet concentrated \( C \) (kg/hour) for the input values \( L \), \( s_1 \) and \( s_2 \).

**EXAMPLE:**

For \( L=1000 \) kg/h, \( s_1 = 7.08\% \) and \( s_2 = 58.0\% \)

Material balance : 1000 = \( W + C \)

Mass flow : \( 1000*0.0708 = W*0 + C*0.58 \)

Solving these two equations gives:

\( C = 122.1 \) kg/h concentrated juice.

\( W = 877.9 \) kg/h water.

**Task 3**

Write a program that reads a logarithm base, \( b \), and value \( x \) and outputs the result of \( \log_b x \).

Hint use \( \log() \) or \( \log10() \) function defined in \( \text{cmath} \) library.