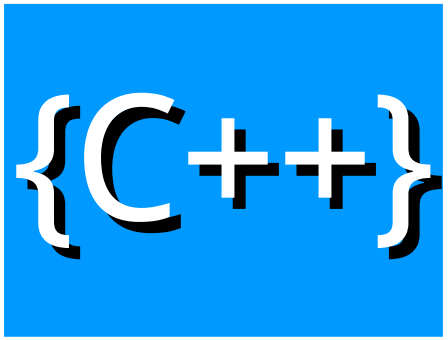
Control Statements

Week 2



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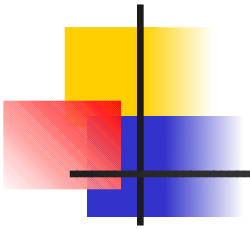
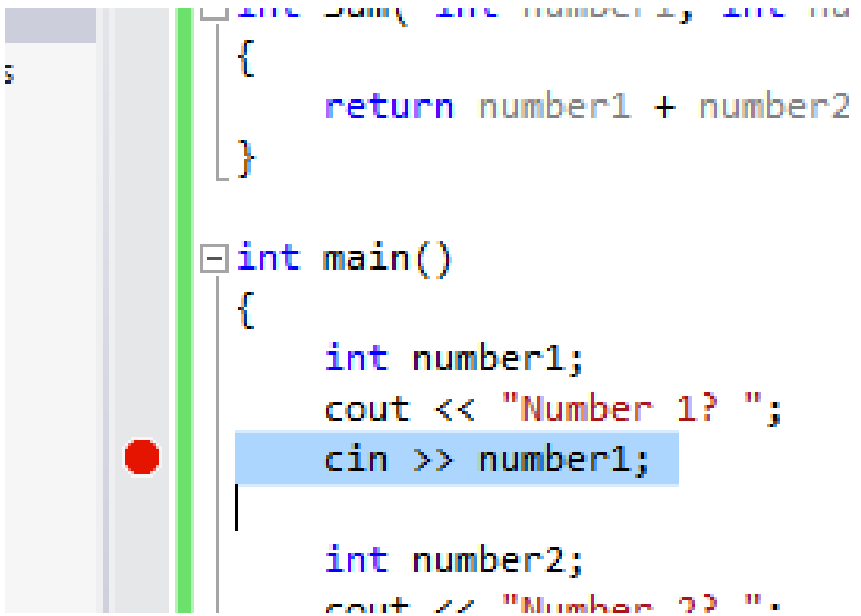


Debugging with Breakpoints

- At some point, you might have a non-obvious bug in your program you need to debug.
- Visual Studio (and other IDEs) have debugging tools available to make it easier.

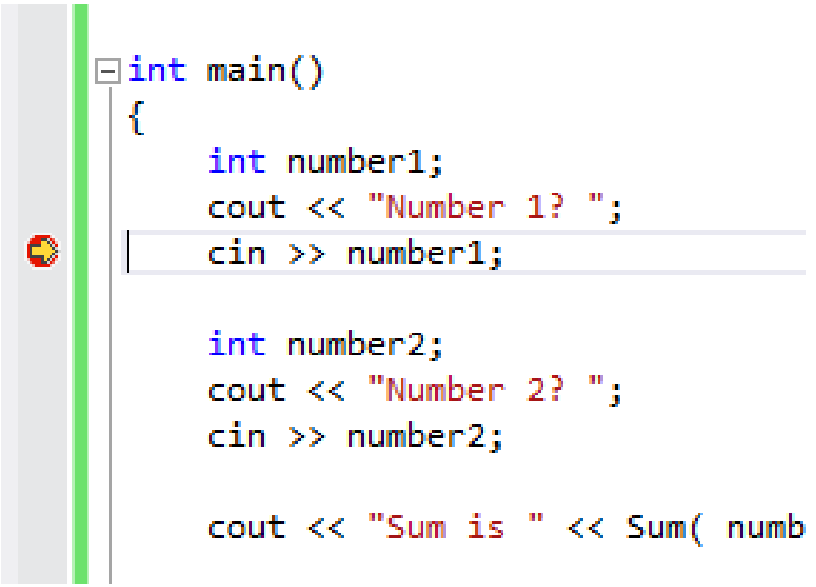
Debugging with Breakpoints

- You can activate a breakpoint by double-clicking in the margin next to your code.



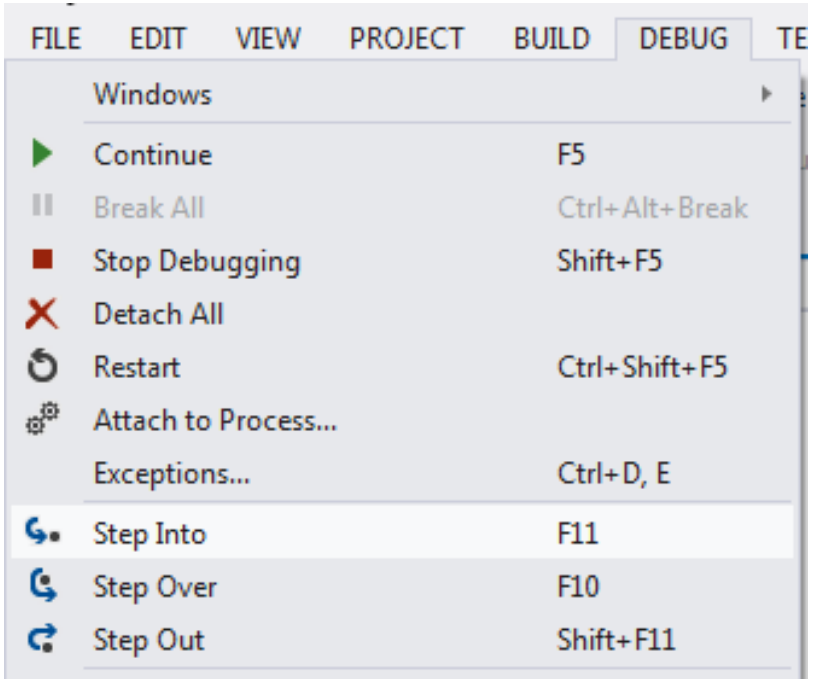
Debugging with Breakpoints

- When you run your program, it will start up as normal, but once it hits a breakpoint it will pause the program execution and bring you to the IDE.



Debugging with Breakpoints

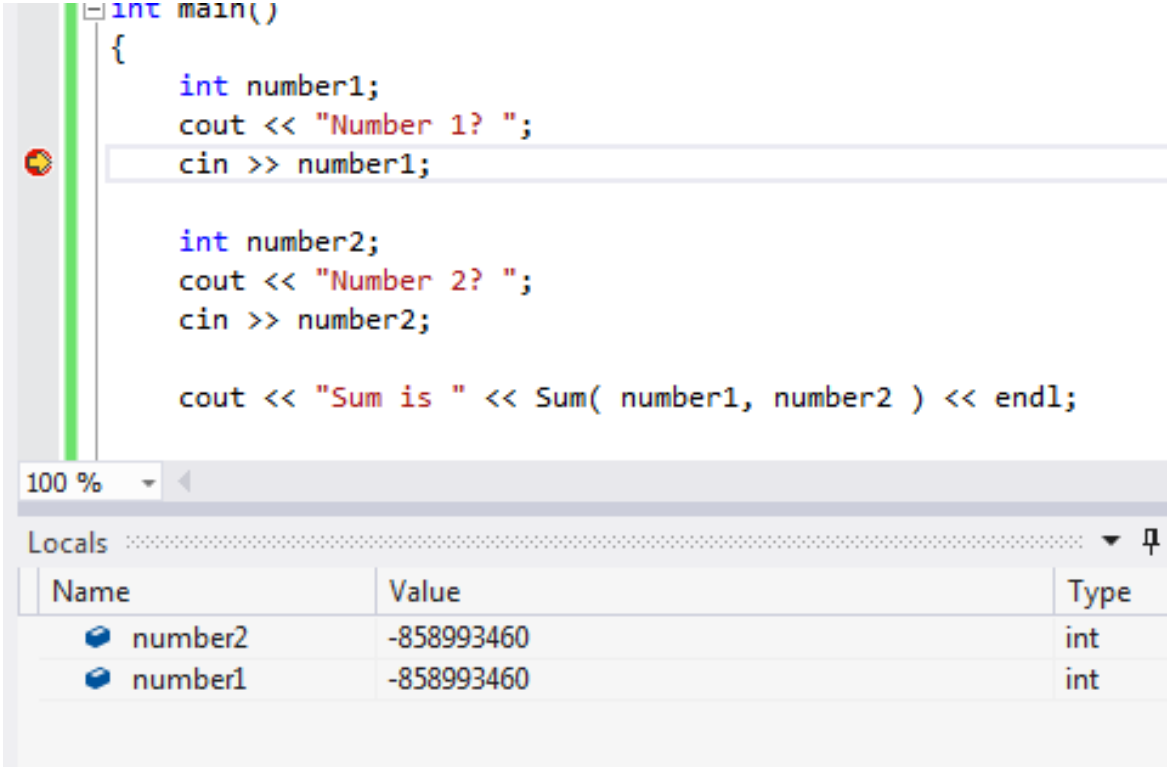
- You can continue stepping through the program execution line-by-line using the DEBUG menu.



- Step Into will take you into a function if called, or a block of code.
- Step Over will go over the line of code to the next line.
- Step Out will take you outside of a function or block.

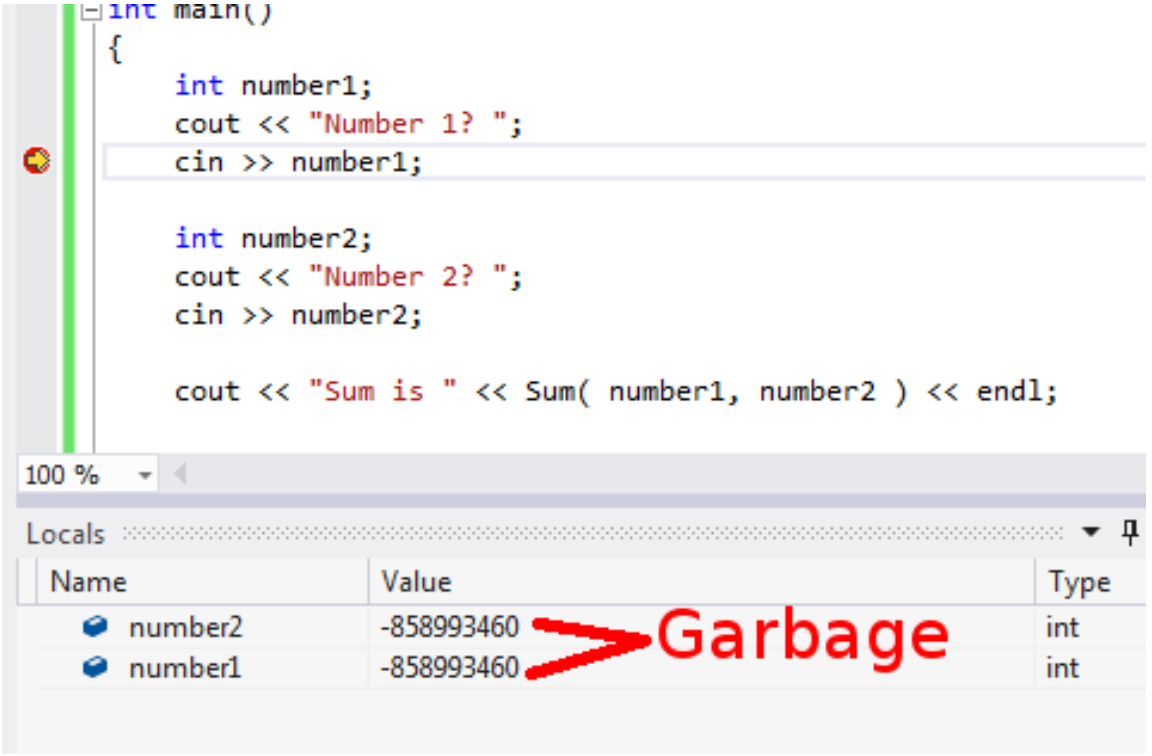
Debugging with Breakpoints

- The Locals window will show you variables that are ***local to the current function***.



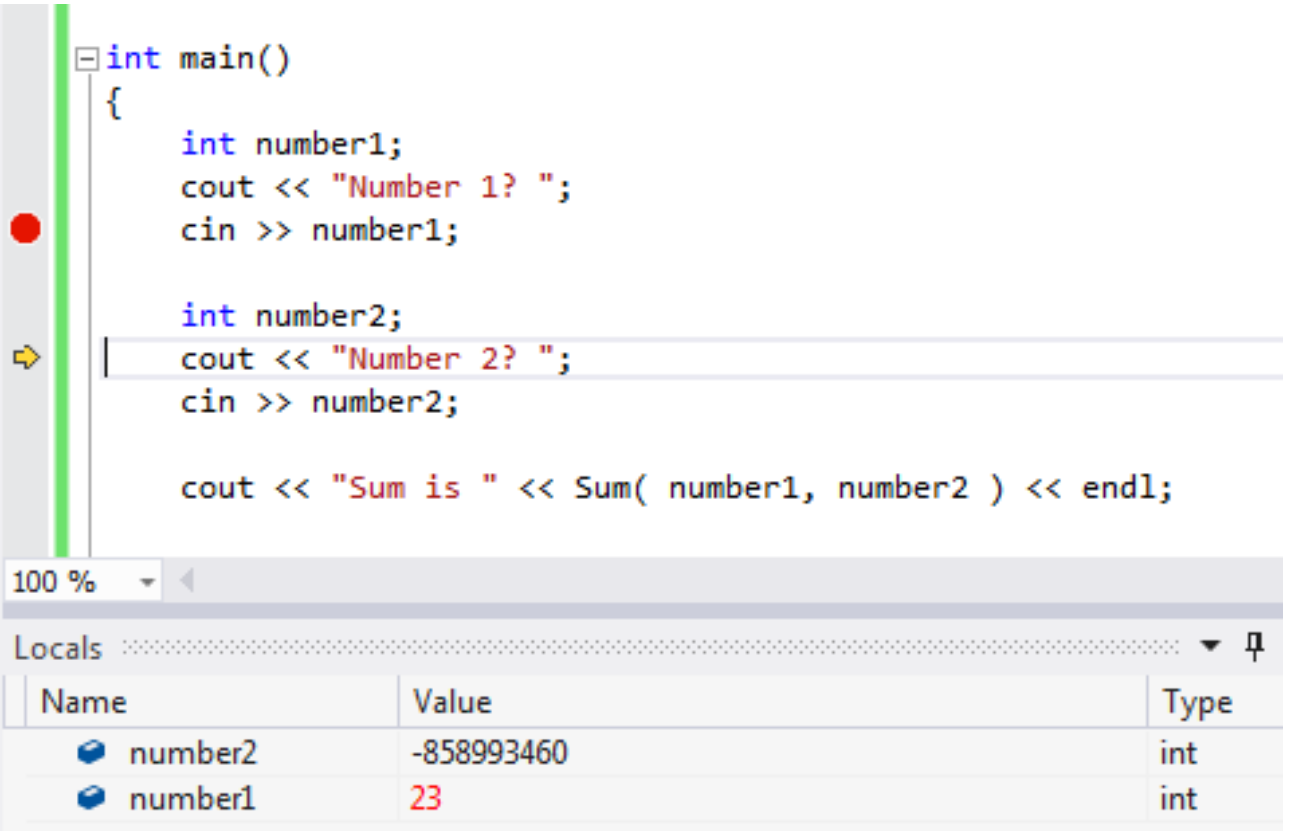
Debugging with Breakpoints

- At this point in the program, number1 has been declared but the cin >> number1; command has not executed.
- Both variables have “garbage” for their values.



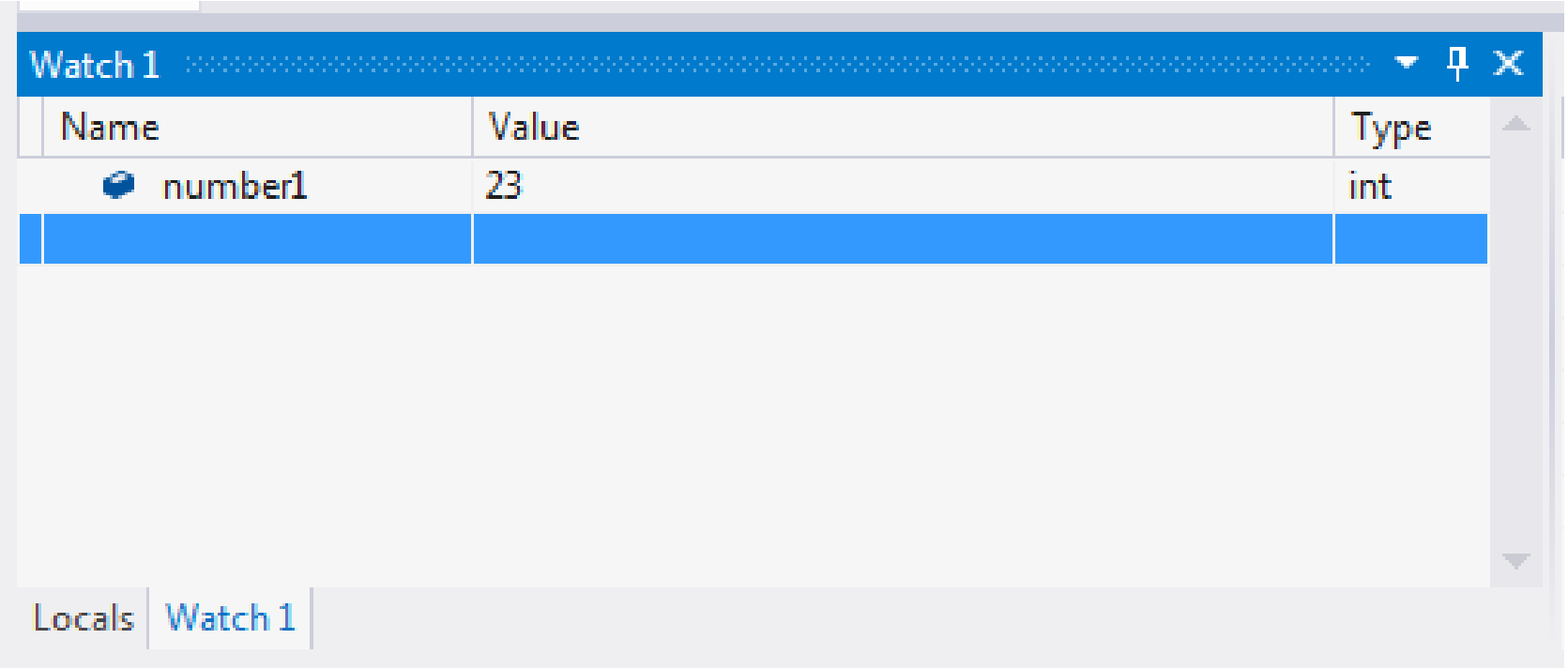
Debugging with Breakpoints

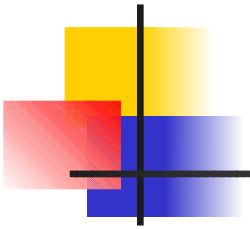
- If we use “Step Over” (then go back to the program and enter a number), the Locals window will be updated with the new value.



Debugging with Breakpoints

- In the same pane as the Locals window is the Watch tab. Here, you can type in a variable's name and keep track of its value as the program runs.





Debugging with cout

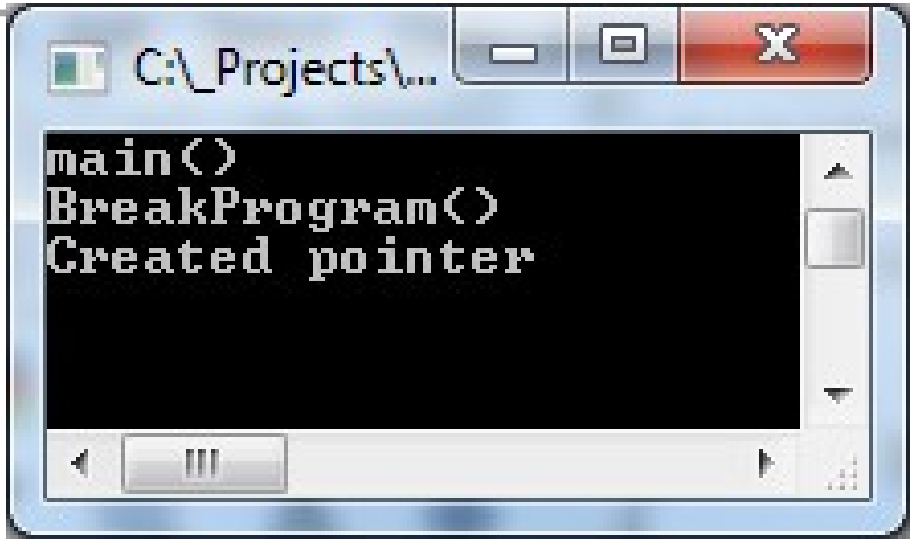
- If you want to be lazy, you can try to pinpoint where your program broke just by outputting information to the console at certain points to follow the program flow.

Debugging with cout

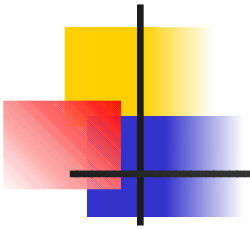
main.cpp

(Global Scope)

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

void BreakProgram()
{
    cout << "BreakProgram()" << endl;
    int* ptrStuff;
    cout << "Created pointer" << endl;
    cout << ptrStuff << endl;
    cout << "Output pointer" << endl;
}

int main()
{
    cout << "main()" << endl;
    BreakProgram();

    return 0;
}
```



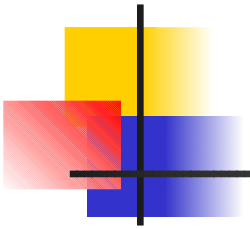
We can tell that the “Output pointer” text was never printed to the screen, so the crash happened between “Created pointer” and “Output pointer”.



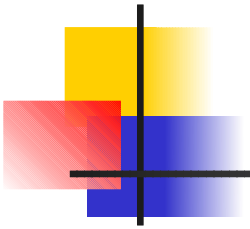
Example 1

- Download the C++ program(exercise_1.cpp) from Courseware Server of Virtual Classroom
- Identify and correct the errors
- Tip: You can find 5 errors.

Example 2



- Download the C++ program(exercise_2.cpp) from Courseware Server of Virtual Classroom
- Find why the result is "1 is right"
  - Tip1: In C/C++, 0.7
    - As float is stored as 0.69999998807907104492187 5
    - As double is stored as 0.69999999999999955591079014994
  - Tip 2: Use setprecision(20) to show the exact value of variables



Assignment 2

- Body Mass Index Calculator
- TDEE Calculator
- TIPS
  - Use **cout** to show a question or results
  - Use **cin** to read a input data
  - Use **if-else** statement ,**comparison operators** and **logical operators** to make a decision
  - Use **arithmetic operators** to calculate BMI and TDEE

- TIPS
  - Arithmetic operators: =, +, -, *, /
  - Comparison operators: ==, !=, >, <, >=, <=
  - Logical operators: and(&&), or(||), not(!)

BMI

$$BMI = \frac{mass(kg)}{height(m)^2}$$

Category	BMI range(kg/m^2)
Underweight	under 18.5
Normal	from 18.5 to 24
Overweight	from 24 to 27
Moderately obese	from 27 to 30
Severely obese	from 30 to 35
Very severely obese	over 35

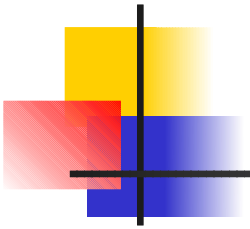
BMR(Basel Metabolic Rate)

- m: weight(kg)
- h:height(cm)
- a: age(year)
- s: gender, s=5(male), s=-161(female)
- BMR=10*m+6.25*h-5*a+s

$$P = \left(\frac{10.0m}{1\ \text{kg}} + \frac{6.25h}{1\ \text{cm}} - \frac{5.0a}{1\ \text{year}} + s \right) \frac{\text{kcal}}{\text{day}}$$

TDEE(Total Daily Energy Expenditure)

Category	TDEE
Sedentary(office job)	BMR*1.2
Light Exercise(1-2 days/week)	BMR*1.375
Moderate Exercise(3-5 days/week)	BMR*1.55
Heavy Exercise(6-7 days/week)	BMR*1.725
Athlete(2x per day)	BMR*1.9



TIPS

- In C/C++
  5 is an integer number
  5.0f is a float number
  5.0 is a double number.

Input Format

- Input Format

Input Gender(Male:1/Female:2): 1
Input Age(year): 40
Input mass(kg): 73
Input height(cm): 168
Activity List
1. Sedentary(office job)
2. Light Exercise(1-2 days/week)
3. Moderate Exercise(3-5 days/week)
4. Heavy Exercise(6-7 days/week)
5. Athlete(2x per day)
Input Activity: 1

Output Format

- Output Format

Gender: Male
Age(year): 40
Mass(kg): 73
Height(cm): 168
BMI:25.864
You are Overweight
BMR: 1585
You are Sedentary
TDEE: 1902