# Chapter 5

# Performing Mathematical Operations

- ❖ Learn how to use Mathematical operators.

Computers can perform mathematical calculations much faster than human beings. However, the computer itself will not be able to perform any mathematical calculations without receiving instructions from the programmer. In VB2010, we can write code to instruct the computer to perform mathematical calculations such as addition, subtraction, multiplication, division and other kinds of arithmetic operations. In order for VB2010 to carry out arithmetic calculations, we need to write code that involves the use of various arithmetic operators. The VB2010 arithmetic operators are very similar to the normal arithmetic operators, only with slight variations. The plus and minus operators are the same while the multiplication operator use the * symbol and the division operator use the / symbol. The list of VB2010 arithmetic operators are shown in table 5.1 below:



| Operator | Mathematical function | Example |
|---|---|---|
| + | Addition | 1+2=3 |
| - | Subtraction | 4-1=3 |
| ^ | Exponential | 2^4=16 |
| * | Multiplication | 4*3=12, (5*6))2=60 |
| / | Division | 12/4=3 |
| Mod | Modulus (return the remainder from an integer division) | 15 Mod 4=3 255 mod 10=5 |
| \ | Integer Division (discards the decimal places) | 19\4=4 |

**Table 5.1: Arithmetic Operators**

**Example 5.1**

In this program, you need to insert two Textboxes, four labels and one button. Click the button and enter the code as shown below. When you run the program, it will perform the four basic arithmetic operations and display the results on the four labels.

```
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Dim num1, num2, difference, product, quotient As Single
    num1 = TextBox1.Text
    num2 = TextBox2.Text
    sum=num1+num2
    difference=num1-num2
    product = num1 * num2
    quotient=num1/num2
    Label1.Text=sum
    Label2.Text=difference
    Label3.Text = product
    Label4.Text = quotient
End Sub
```



**Example 5.2**

The program can use Pythagoras Theorem to calculate the length of hypotenuse c given the length of the adjacent side a and the opposite side b. In case you have forgotten the formula for the Pythagoras Theorem, We are showing it below:

$$c^2=a^2+b^2$$

```
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
```

```
Dim a, b, c As Single
a = TextBox1.Text
b = TextBox2.Text
c=(a^2+b^2)^(1/2)
Label3.Text=c
End Sub
```

**Example 5.3: BMI Calculator**

Many people are obese now and it could affect their health seriously. Obesity has proven by the medical experts to be a one of the main factors that brings many adverse medical problems, including the heart disease. If your BMI is more than 30, you are considered obese. You can refer to the following range of BMI values for your weight status:



Underweight = <18.5
Normal weight = 18.5-24.9
Overweight = 25-29.9
Obesity = BMI of 30 or greater

In order to calculate your BMI, you do not have to consult your doctor, you could just use a calculator or a homemade computer program, and this is exactly what I am showing you here. The BMI calculator is a Visual Basic program that can calculate the body mass index, or BMI of a person based on the body weight in kilogram and the body height in meter. BMI is calculated based on the formula weight/ (height) $^2$, where weight is measured in kg and height in meter. If you only know your weight and height in lb and feet, then you need to convert them to the metric system (you could indeed write a VB program for the conversion).

```
Private Sub Button1_Click (ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
Dim height, weight, bmi As Single
height = TextBox1.Text
weight = TextBox2.Text
bmi = (weight) / (height ^ 2)
Label4.Text = bmi
End Sub
```

The output is shown in the Figure 7-1 below. In this example, your height is 1.80m (about 5 foot 11), your weight is 78 kg( about 170 lb), and your BMI is about 23.5. The reading suggests that you are healthy. (Note; 1 foot=0.3048, 1 lb=.45359237 kilogram)



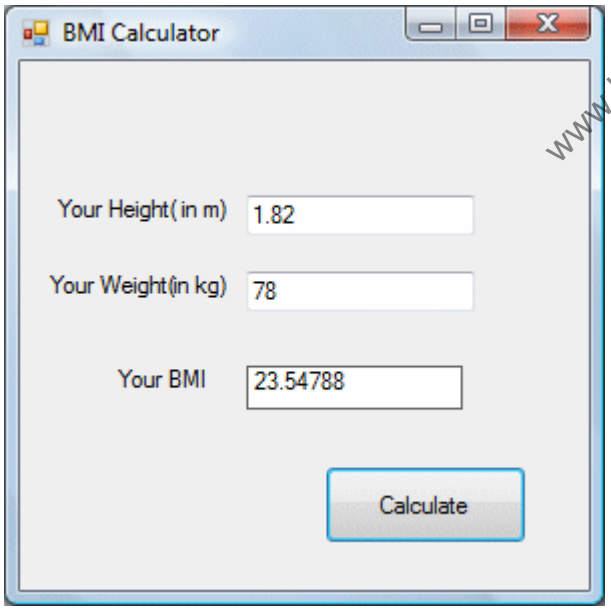


**Figure 5.1: BMI Calculator**

**Summary**

In this chapter, you learned how to use various mathematical operators in Visual Basic 2010 in writing code for mathematical calculations. You also learned how to create some programs to solve mathematical problems like Pythagoras Theorem. Besides, you learned how to create the BMI calculator.