# Workshop 2

The purpose of this workshop is to:

- Declare memory locations for data
- Learn about the various data type
- Declare and manipulate strings
- Implement casting
- Become familiar with the components of a method
- Call class methods with and without parameters

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## Creating the GUI

1. Open Visual Studio and create a new application *workshop2* (1)

2. Familiarize yourself with the visual studio environment

3. Change the name of form1 to ***Mathematica.*** (1)
    *Right click on the form in the solution explorer*
    *Select Rename*
    *Type in the new name*

4. Drag the following controls on the form (see the GUI)
    a. A group box to organise your work. Use a GroupBox to logically group a collection of controls on a form. The group box is a container control that can be used to define groups of controls. Change the font size to 12. Include the following within this group box: (1)
        i. Labels for the numbers -  font size to 10 (1)
        ii. Text boxes for the numbers  - font size to 10  (1)
    b. A groupbox for the operations: Add, Minus, Multiplication and Division. Use Radiobuttons for each of these options within the groupbox. (3)
    c. An Answer label (1)
    d. A read only *outputText* textbox to display the answer.  Change the Readonly property of this control to true. (3)
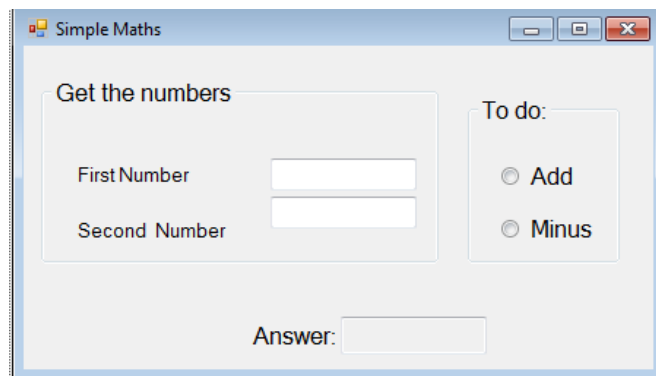
**Coding:**

5. Right click on the form and select *view code*

6. The coding section appears.
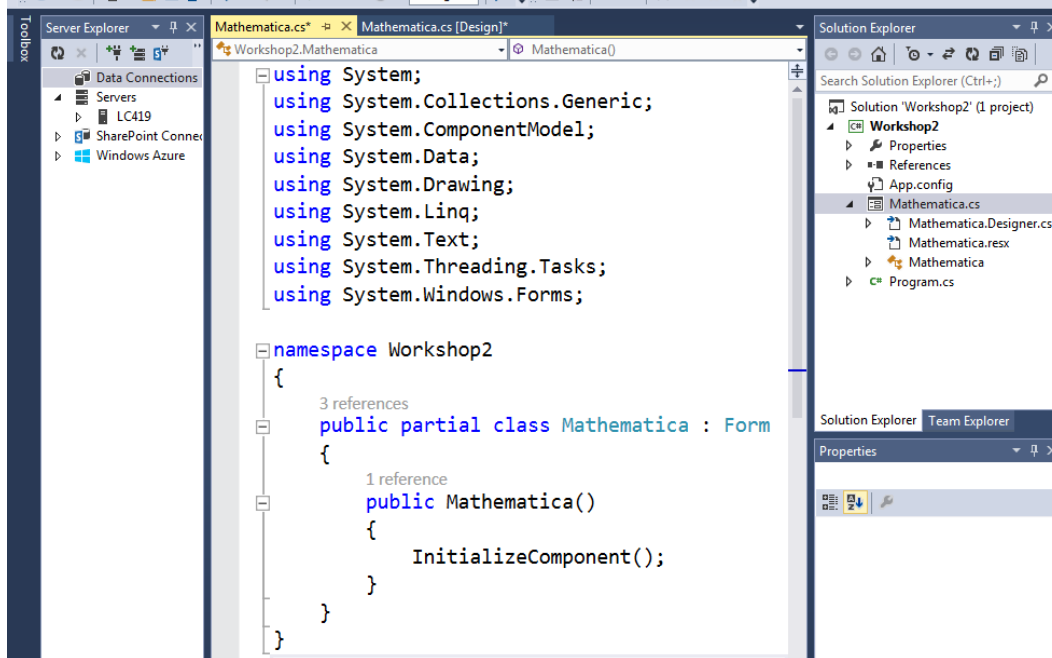


a. The namespace for this program is _____(1)

b. The name of the class for this program is _____(1)

7. Include comments in the program that states the purpose of the program. This program uses mathematical operations to add, subtract, multiply and divide numbers.

8. Declare two variables at form level as follows:

```
namespace Workshop2
{
    3 references
    public partial class Mathematica : Form
    {

        int x, y;
```

a. What is a variable? (1)

_____
_____
_____
_____
_____.

b. What is the data type of the declared variables in the figure above?   (1)

c. What is the purpose of declaring the data type? (1)

9. What determines the visibility of a variable or a method from another class? _____ (1)

Use the following to assist you:

| Modifiers | Explanation of accessibility |
|---|---|
| public | No restrictions |
| protected | Limited to the containing class or classes derived from the containing class |
| internal | Limited to current project |
| protected internal | Limited to current project or classes derived from class |
| private | Limited to containing class |

10. We will create different methods to carry out the different tasks. We will refine the program as we go along. Create a method **Addition** that will add the two numbers. The method requires two parameters, and will return a value.

```
3 references
public partial class Mathematica : Form
{

    int x, y;

    1 reference
    public Mathematica()
    {
        InitializeComponent();
    }

    0 references
    int Addition (int x, int y)
    {

        return x + y;
    }
}
```

a. Where are methods declared? _____ (1)

b. Method name is a unique identifier and it is case sensitive. What is the name of the method defined above _____ (1)

c. What is the return type for this method? _____(1)

d. How many parameters does this method have? _____(1)

   ▪ Parameter refers to items appearing in the heading used to pass information to a function
   ▪ Enclosed between parentheses, the parameters are used to pass and receive data from a method.
   ▪ The parameter list refers to the type, order, and number of the parameters of a method. Include data type and an identifier
   ▪ Parameters are optional; that is, a method may contain no parameters

e. To store a value in a variable you must use which operator? _____(1)

11. Double click on the Add Radiobutton for coding.
    a. Firstly, write the statement that will obtain the data from the user, cast it and assign it to the variable declared earlier. (1)
    b. Call the Addition method using the two variables as parameters. Assign the value returned by the method to the output label. (1)

```
1 reference
private void AddRadioButton_CheckedChanged(object sender, EventArgs e)
{
    x = int.Parse(num1.Text);
    y = int.Parse(num2.Text);
    outputText.Text = Addition(x, y).ToString();
}
```

If the results returned is >100, display the following message ***Maximum limit reached***. Note that this message is only shown when this condition is met.

12. Execute the program to ensure there are no errors.

13. Complete the program for the other mathematical operations: Minus, Multiplication and Division. (6)

14. The requirements for the program have been updated. Each time a specific method does the mathematical operation, 10 is added to the final answer.

    a. Declare a constant variable on form level, that will store the value 10 (2)
    b. For each of the method, add 10 using the constant value declared earlier. (2)

15. Do you think this is the best and most efficient way of implementing the Mathematica program? How can the program be improved?