Properties and Constructors

The objective of this exercise is to consolidate your understanding of C# properties and constructors.

1	Create a new Class Library project called **CarLibrary** in the {installedFolder}\Labs\08_Properties_and_Constructors\Begin folder. Rename **Class1.cs**to **Car.cs**
2	Add a Console Application project to the Solution called **CarConsole**. Set **CarConsole** as the start-up project. In **CarConsole**, add a project reference to the **CarLibrary** project.
3	In **Car.cs**, create a property of type *int* called **Speed** with a *backing field* **speed**. Validate that the speed set is above zero but under 100.
4	Add an auto-implemented property of type *string* called **RegistrationNumber**.
5	Add a calculated expression bodied property called **SpeedInKilometres**of type *double*. To calculate the speed in kilometres, multiply the speed by 1.609344
6	Add string properties for **Make**, **Model**, and **Colour**.
7	In **CarConsole**, in **Program.cs**: Delete the line of code that outputs 'Hello, World!' Instantiate a car object, **c1**. Issue a using directive to bring the **CarLibrary** namespace into scope. Write the name of the instance to the console:

	Console.WriteLine(nameof(c1)); Build and run the console applicationto confirm the object can be successfully instantiated. Set the make of **c1** to be **'Ford'**. Write the *make* of c1 to the console. Write the *model* of c1 to the console. What value is displayed?
8	In the **Car** class, create a constructor that accepts a *make* and a *model* only. Initialise these values within the constructor.
9	In **CarConsole:** Re-run the app. Does it build successfully?
10	Create a *parameterless* constructor Set the make and model to be **Unknown**and the colour to be **Black**. Confirm the console app builds and runs successfully. What value is displayed for the model?
11	In **CarConsole:** Instantiate a car object, **c2**, using the overloaded constructor. The make is **Audi**, the model is **TT**; Write the make and model of **c2** to the console. Set the colour property to **Red**. Write c2's colour property to the console. Set the speed of **c2** to **30 miles per hour**. Display the speed in the console in both *miles per hour* and *kilometres per hour*.
12	In **CarConsole:** Instantiate a car object, **c3**, using the overloaded constructor (**BMW**, **X5**) and an object initialiser that sets the colour to

	Grey and the registration number to **ABC 123.** Write the property values of **c3** to the console.
13	In **Car.cs**, chain the parameterless constructor to the overloaded constructor, passing **Unknown Make** and **Unknown Model** as the parameters. In the body of the parameterless constructor, remove the make and model and set the colour to be **White.** Confirm the console application still builds and runs successfully.
14	In **CarConsole:** Instantiate a car object, **c4**, using the parameterless constructor. Write the property values of **c4** to the console. Run the project and confirm **c4** is an unknown make and model that is white, with an empty registration number.