Language Map for C#

Variable Declaration *Is this language strongly typed or dynamically typed? Provide at least three examples (with different data types or keywords) of how variables are declared in this language.*	C# Is a strongly typed programming language. Variables: const int num = 5; (I don't want the variable to change for the life of the program) string fName = "Lawrence"; bool myBoolean = true; char myLetter = 'A';
Data Types *List all of the data types (and ranges) supported by this language.*	**Integral Types** sbyte = -128 to 128 byte = 0 to 255 short = -32,768 to 32,767 ushort = 0 to 65,535 int = -2,147,483,648 to 2,147,483,647 uint = 0 to 4,29,967,295 long = -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 ulong = 0 to 18,446,744,073,709,551,615 **Float** float = +-1.5*10^-45 to +-3.4*10^38 double = +-5.0*10^-324 to +-1.7*10^308 decimal **Character and String** char = represents a single 16-bit Unicode character. String = represents a sequence of characters. **Boolean** bool = Represents a Boolean value with true or false **Enum** enum = represents a set of named integer constants **Structures** User-defined value types created with the struct keyword **Reference Types** object = The base type for all other data types. dynamic = A type that avoids compile-time type checking and resolves types at runtime. classes = user-defined reference types. **Nullable<T> or T?** Allows value types to have a null value. **Arrays** Represents a collection of elements of the same data type.

Selection Structures
Provide examples of all selection structures supported by this language (if, if else, etc.) ***Don't just list them, show code samples of how each would look in a real program.***
	if-statement
	int number = 20
	
	if (number < 50)
	{
	  return true;
	}
	
	if-else statement
	if (number < 50)
	{
	  return true;
	}
	else
	{
	  return false;
	}
	
	if-else-if statement
	if (number < 30)
	{
	  return true;
	}
	else if (number == 20)
	{
	  return true;
	}
	else
	{
	  return false;
	}
	
	switch statement
	int day = 4
	switch (day)
	{
	  case 1:
	  Console.WriteLine("Monday");
	  break;
	  case 2:

	Console.WriteLine(“Tuesday”); break; case 3: Console.WriteLine(“Wednesday”); break; case 4: Console.WriteLine(“Thursday”); break; }

Repetition Structures
Provide examples of all repetition structures supported by this language (loops, etc.) ***Don’t just list them, show code samples of how each would look in a real program.***
	for statement
	for (int i = 0; i < 3; i++)
	{
	Console.WriteLine(i);
	}
	
	foreach statement
	var fibNumbers = new List<int> {0, 1, 1, 2, 3, 5, 8, 13};
	foreach (int element in fibNumbers)
	{
	Console.Write($“{element}”);
	}
	
	do statement
	int num = 0;
	do
	{
	Console.Write(num);
	num++;
	} while (num < 5);
	
	while statement
	while (num < 5)
	{
	Console.Write(num);
	num++;
	}

Arrays *If this language supports arrays, provide* ***at least two examples*** *of creating an array with a primitive or String data types (e.g. float, int, String, etc.) If the*	int[ ] numbers = {1, 2, 3, 4, 5}; string[ ] cars = {“Toyota”, “Volvo”, “Honda”};

language supports declaring arrays in multiple ways, provide an example of way.	int[ ] numbers; int[ ] numbers = new int[5]
Data Structures *If this language provides a standard set of data structures, provide a list of the data structures and their Big-Oh complexity (identify what the complexity represents).*	**Array:** Access: O(1) constant Search: O(n) n depends on the size of the input Insertion: O(n) n depends on the size of the input Deletion: O(n) n depends on the size of the input **List:** Access: O(1) constant Search: O(n) n depends on the size of the input Insertion: O(n) n depends on the size of the input Deletion: O(n) n depends on the size of the input **Dictionary<TKey, TValue>(HashMap):** Access: O(1) average, O(n) worst case – constant time, n depends on the input size Search: O(1) average, O(n) worst case – constant time, n depends on the input size Insertion: O(1) average, O(n) worst case – constant time, n depends on the input size Deletion: O(1) average, O(n) worst case – constant time, n depends on the input size **HashSet:** Access: O(1) average, O(n) worst case – constant time, n depends on the input size Search: O(1) average, O(n) worst case – constant time, n depends on the input size Insertion: O(1) average, O(n) worst case – constant time, n depends on the input size Deletion: O(1) average, O(n) worst case – constant time, n depends on the input size **Queue:** Enque: O(1) constant time Deque: O(1) constant time **Stack:** Push: O(1) constant time Pop: O(1) constant time **LinkedList:** Access: O(n) n depends on the size of the input Search: O(n) n depends on the size of the input Insertion: O(1) constant time Deletion: O(1) constant time

	SortedSet: Access: O(log n) logarithmic time Search: O(log n) logarithmic time Insertion: O(log n) logarithmic time Deletion: O(log n) logarithmic time

Objects
If this language support object-orientation, provide an example of how you would write a simple object with a default constructor and then how you would instantiate it.
	public MyCar
	{
	private int numWheels;
	private string carMake;
	
	public myCar()
	{
	numWheels = 4;
	carMake = “”;
	}
	}
	
	public Application
	{
	static void Main(string[ ] args)
	{
	MyCar toyota = new MyCar();
	}
	}

Runtime Environment *What runtime environment does this language compile to? For example, Java compiles to the Java Virtual Machine.* *Do other languages also compile to this runtime? If so, what these other languages?*	C# uses Common Language Runtime Other languages that use CLR: VB.NET F# C++ J#
Libraries/Frameworks *What are the popular libraries or frameworks used by programmers for this language? List at least three (3) and describe what they are used for.*	ASP.NET – a widely used web framework for building dynamic web applications, including websites and web services. Entity Framework – An Object-Relational Mapping framework that simplifies database interactions in C# applications.

	Xamarin – A framework for building cross-platform mobile applications.
Domains *What industries or domains use this programming language? Provide at least three specific examples of companies that use this language and what they use it for**. E.g. Company X uses C# for its line of business applications.***	Microsoft – Microsoft, the creator of C# uses it extensively for developing various-software products and platforms, including Windows applications, cloud services (Azure), and game development with the Unity game engine. Ubisoft – Employs C# for game development. They have used C# in games like Assassin's Creed and Watch Dogs. Nasdaq – A stock exchange, use C# for developing trading platforms, order management system, and financial software.