C# .NET Fundamentals - Quick Notes & Examples

1. Hello World

```
using System;

class Program {
    static void Main() {
        Console.WriteLine("Hello, World!");
    }
}
```

2. Data Types & Variables

```
int age = 25;
double pi = 3.14;
char grade = 'A';
bool isActive = true;
string name = "John";
object obj = 42;
var score = 95;
```

3. Control Statements

```
// If-Else
if (age > 18) {
    Console.WriteLine("Adult");
} else {
    Console.WriteLine("Minor");
}

// Switch
switch (grade) {
    case 'A': Console.WriteLine("Excellent"); break;
    default: Console.WriteLine("Unknown"); break;
}
```

```
// Loops
for (int i = 0; i < 5; i++) {
    Console.WriteLine(i);
}
while (j < 5) {
    Console.WriteLine(j);
    j++;
}
```

4. Methods

```
void Greet(string name) {
    Console.WriteLine($"Hello, {name}");
}

int Add(int a, int b) {
    return a + b;
}
```

5. OOP Basics

```
// Class and Object
class Car {
    public string model = "Toyota";
}
Car myCar = new Car();
Console.WriteLine(myCar.model);

// Inheritance
class Animal {
    public void Speak() {
        Console.WriteLine("Animal speaks");
    }
}
```

```
class Dog : Animal {
    public void Bark() {
        Console.WriteLine("Dog barks");
    }
}
```

6. Exception Handling

```
try {
    int x = 5 / 0;
} catch (DivideByZeroException e) {
    Console.WriteLine("Cannot divide by zero.");
} finally {
    Console.WriteLine("This block always runs.");
}
```

7. .NET Concepts

.NET is a framework for building apps.

CLR: Common Language Runtime

Garbage Collector: Auto memory management

Assemblies: .dll or .exe files

Namespaces: System, System.IO etc.