C# Interfaces

A PRACTICAL GUIDE TO INTERFACES

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Why Interfaces?

Maintainable

Extensible

Easily testable

Goals

Learn the “Why”

- Maintainability
- Extensibility

Implement Interfaces

- .NET Framework Interfaces
- Custom Interfaces

Goals

Create Interfaces

- Add Abstraction

Peek at Advanced Topics

- Mocking
- Unit Testing
- Dependency Injection

Pre-requisites

Basic Understanding of C#

- Classes
- Inheritance
- Properties
- Methods

Interfaces, Abstract Classes, and Concrete Classes

What are Interfaces?

Interface

Interfaces describe a group of related functions that can belong to any class or struct.

Microsoft

What are Interfaces?

Contract

Public set of members

- Properties
- Methods
- Events
- Indexers

Regular Polygons

3 or more sides

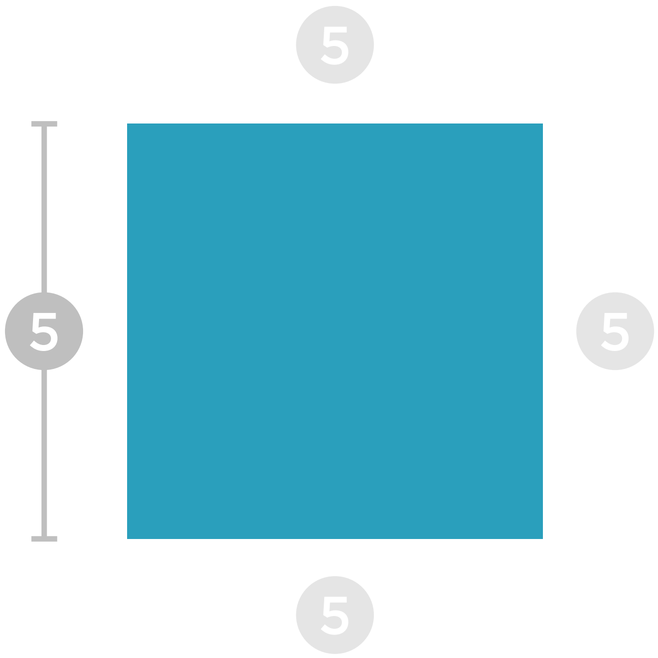
Each side has the same length

Scenario: Regular Polygons

3 or more sides

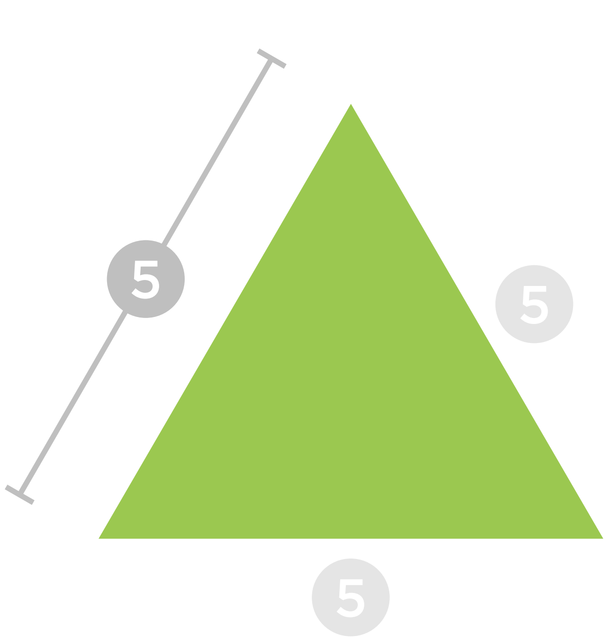
Each side has the same length

Scenario: Regular Polygons



Square

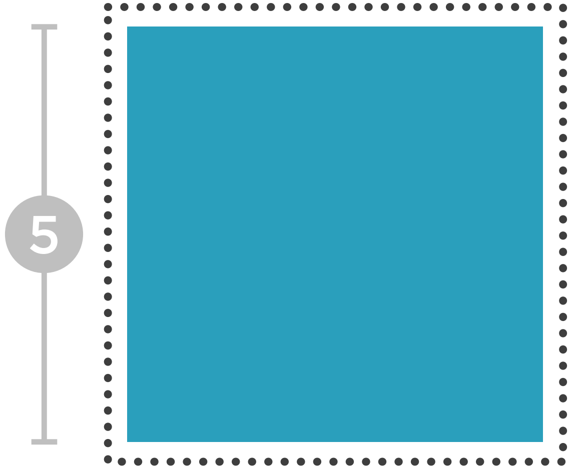
4 sides
Each side has same length



Equilateral Triangle

3 sides
Each side has same length

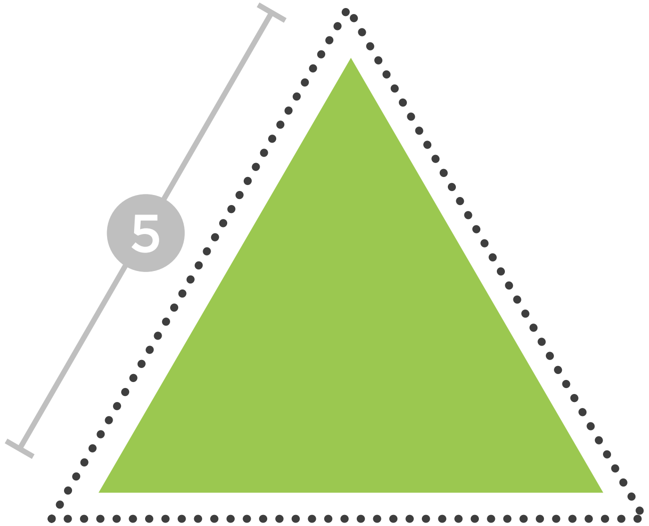
Perimeter



Perimeter =

Number of Sides x Side Length

Perimeter = 4 x 5
Perimeter = 20

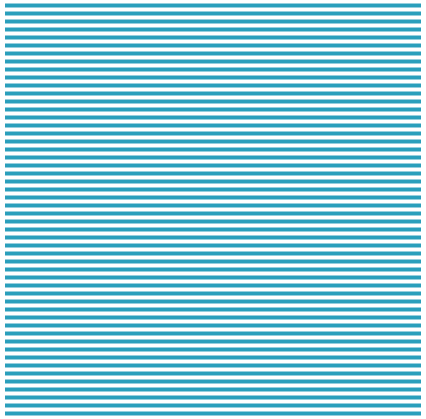


Perimeter =

Number of Sides x Side Length

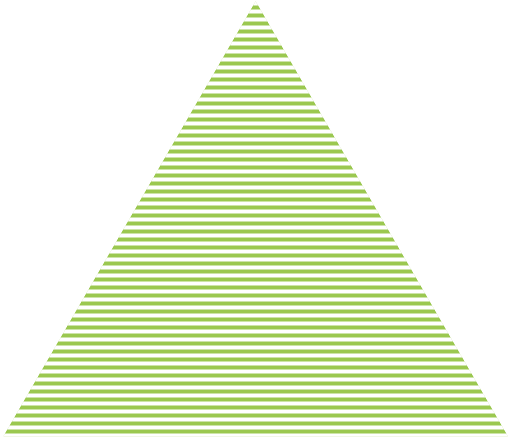
Perimeter = 3 x 5
Perimeter = 15

Area



Area =

Side Length x Side Length



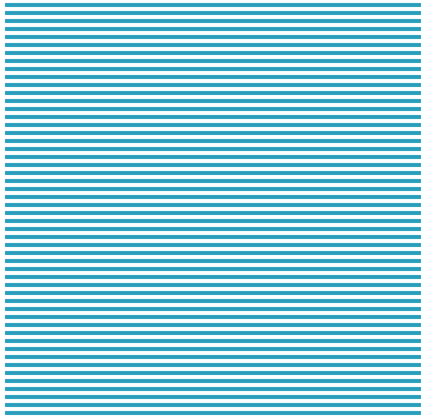
Area =

Side Length x Side Length

x Square Root of 3

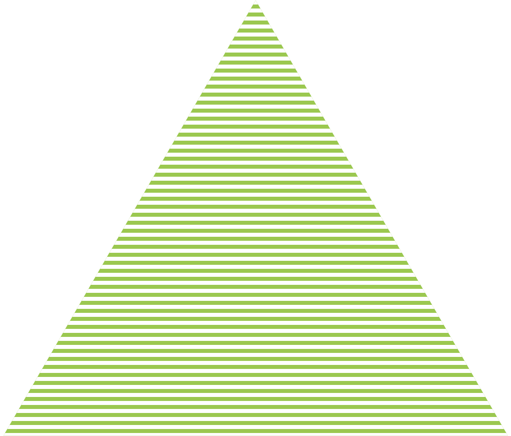
Divided by 4

Area



Area = 5 x 5

Area = 25



Area = 5 x 5 x Sqrt(3) /4

Area = 10.8 (approximately)

Concrete Class, Abstract Class, or Interface?

✗

Concrete Class

No Compile-time checking

✓

Abstract Class

Compile-time checking

✓

Interface

Compile-time Checking

```
public abstract class AbstractRegularPolygon
{
    public double GetPerimeter()
    {
        return NumberOfSides * SideLength;
        }

}
```

Comparison: Implementation Code

Abstract Classes may contain implementation

Interfaces may not contain implementation (declarations only)

```
Public class List<T> : IList<T>
      ICollection<T>, IList, ICollection,
      IReadOnlyList<T>, IReadOnlyCollection<T>
      IEnumerable<T>, IEnumerable
```

Comparison: Inheritance

Inherit from a single Abstract Class (Single Inheritance)

Implement any number of Interfaces

```
public abstract class AbstractRegularPolygon
{
    public int NumberOfSides { get; set; }
    public int SideLength { get; set; }
    public double GetPerimeter()…
    public abstract double GetArea();
}
```

Comparison: Access Modifiers

Abstract Classes Members can have access modifiers

```
public interface IRegularPolygon
{
    int NumberOfSides { get; set; }
    int SideLength { get; set; }
    double GetPerimeter();
    double GetArea();
}
```

Comparison: Access Modifiers

Interface Members are automatically public

Contract

Comparison: Valid Members

Abstract Classes

- Fields
- Properties
- Constructors
- Destructors
- Methods
- Events
- Indexers

Interfaces

- Properties
- Methods
- Events
- Indexers

Comparison Summary

Abstract Classes	Interfaces
May contain implementation code	May not contain implementation code
A class may inherit from a single base class	A class may implement any number of interfaces
Members have access modifiers	Members are automatically public
May contain fields, properties, constructors, destructors, methods, events and indexers	May only contain properties, methods, events, and indexers

Comparison Summary

	Abstract Classes	Interfaces	
👍	May contain implementation code	May not contain implementation code	👎
👎	A class may inherit from a single base class	A class may implement any number of interfaces	👍
	Members have access modifiers	Members are automatically public	
	May contain fields, properties, constructors, destructors, methods, events and indexers	May only contain properties, methods, events, and indexers	

Summary

The “What” of Interfaces

Public set of members:

- Properties
- Methods
- Events
- Indexers

Compiler-enforced Implementation

Comparison between Abstract Classes and Interfaces

UP NEXT:

The "Why" of Interfaces