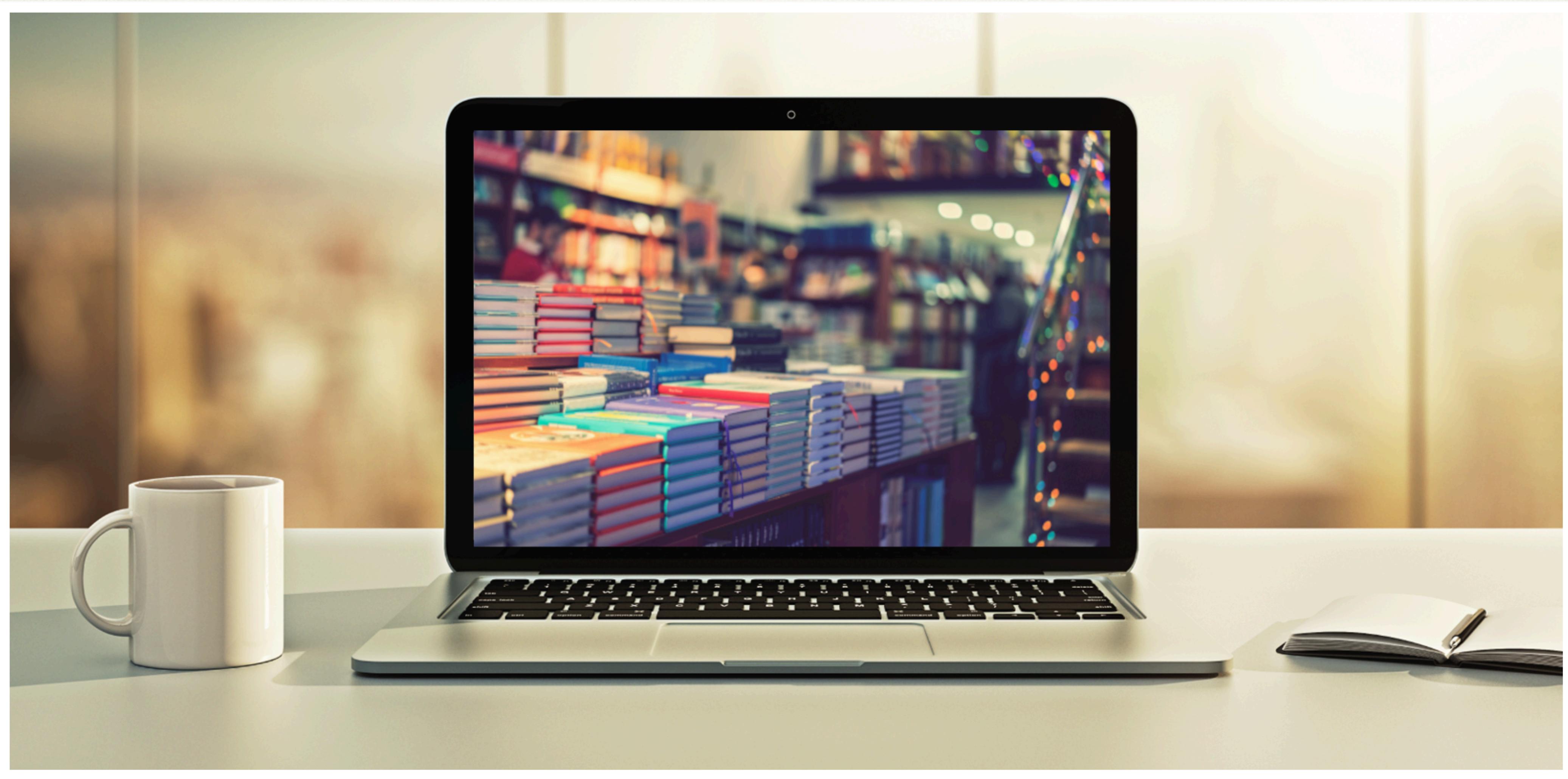


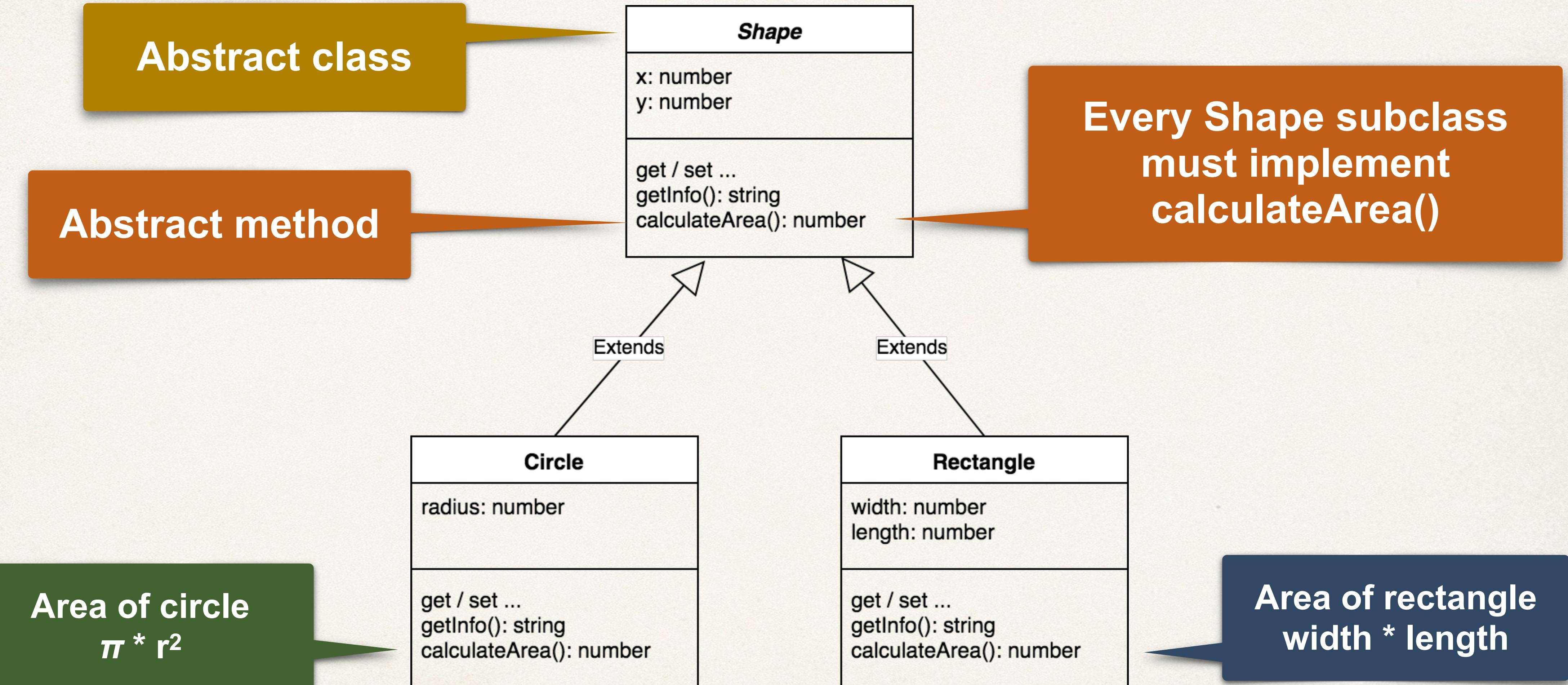
# Abstract Classes



# Abstract Class

- An abstract class represents a general concept
  - For example: Shape, Vehicle, Computer, etc ...
- Can't create an instance of an abstract class
- Abstract class can also have abstract method(s)
- Abstract method must be implemented by concrete subclasses

# Abstract Class Example



# Abstract Class Example

Mark the class as abstract

File: Shape.ts

```
export abstract class Shape {
```

// previous code ...

```
abstract calculateArea(): number;
```

```
}
```

Abstract method

Override the calculateArea() method

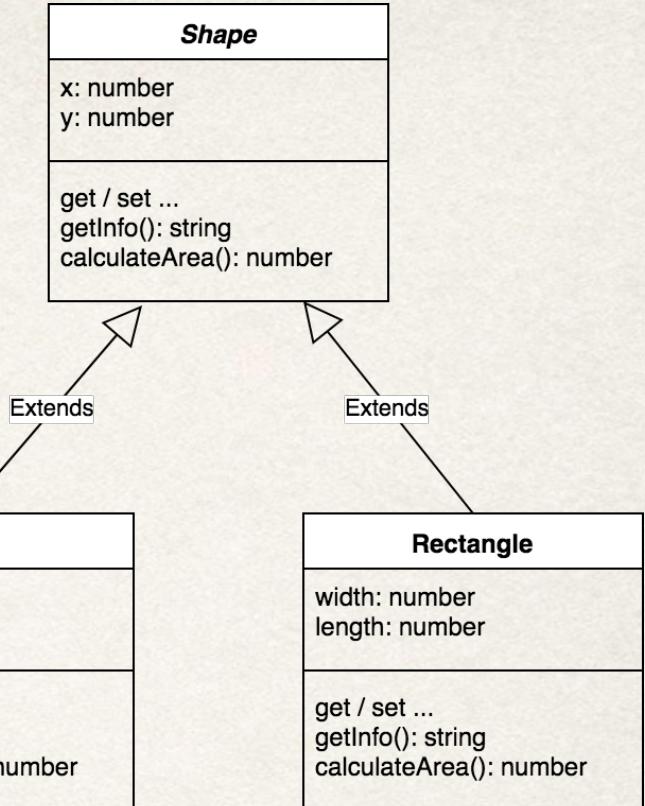
File: Rectangle.ts

```
import { Shape } from './Shape';
```

```
export class Rectangle extends Shape {
```

// previous code ...

```
calculateArea(): number {
    return this._width * this._length;
}
```



# Circle

Math is a built-in object that has properties and methods for mathematical constants and functions

File: Shape.ts

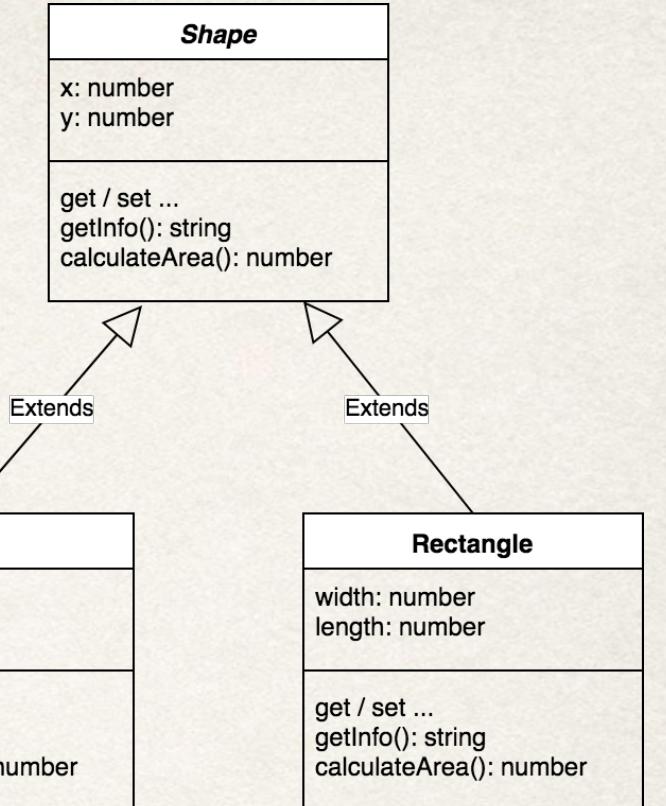
```
export abstract class Shape {  
  
    // previous code ...  
  
    abstract calculateArea(): number;  
}
```

Override the  
calculateArea() method

File: Circle.ts

```
import { Shape } from './Shape';  
  
export class Circle extends Shape {  
  
    // previous code ...  
  
    calculateArea(): number {  
        return Math.PI * Math.pow(this._radius, 2);  
    }  
}
```

Area of circle  
 $\pi * r^2$



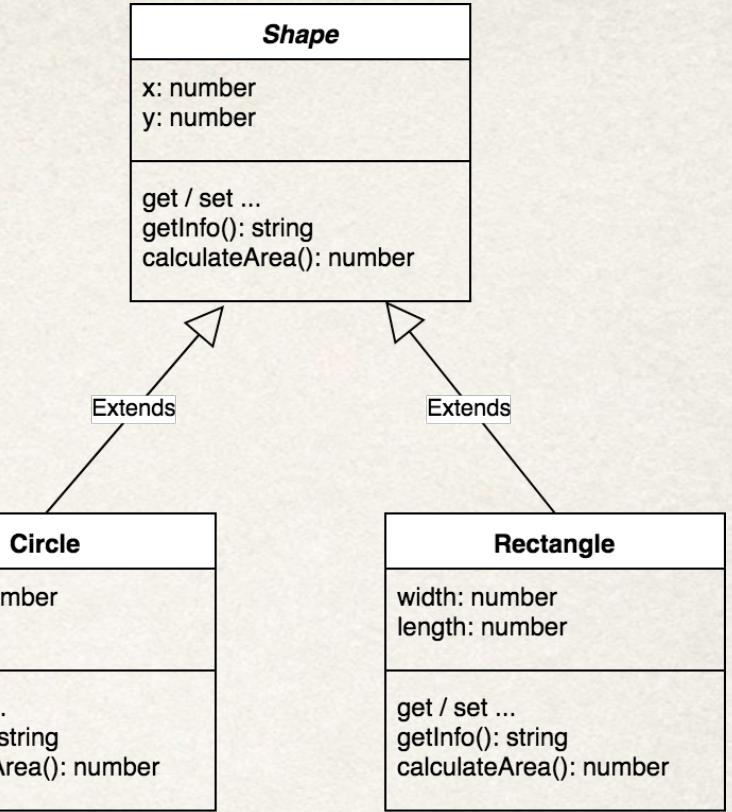
# Creating an Instance

```
let myShape = new Shape(10, 15);  
console.log(myShape.getInfo());
```

This will NOT compile since  
Shape is an abstract class

Can't create instance of  
abstract class directly

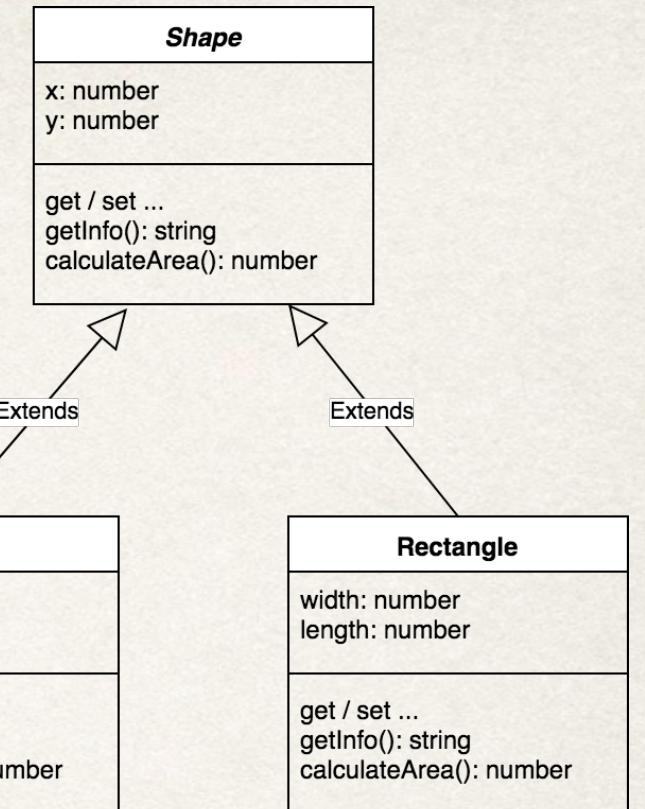
Only concrete subclasses:  
Circle, Rectangle, ...



# Creating an Array of Shapes

File: ArrayDriver.ts

```
...  
  
let myCircle = new Circle(5, 10, 20);  
let myRectangle = new Rectangle(0, 0, 3, 7);  
  
// declare an array for shapes ... initially empty  
let theShapes: Shape[] = [];  
  
// add the shapes to the array  
theShapes.push(myCircle);  
theShapes.push(myRectangle);
```



x=5, y=10, radius=20  
Area=1256.6370614359173

x=0, y=0, width=3, length=7  
Area=21

Area of circle  
 $\pi * r^2$

Area of rectangle  
width \* length