

Halstead [ op = operator, od = operand  
(v) = unique / 1<sup>st</sup> occurrence

# Shape\_Rectangle.py

```

1 class Shape:
2     """Base class for all shapes."""
3     op(v)
4     def __init__(self, name):
5         self.name = name
6     op op(v) op(v)
7     def area(self):
8         """Calculate the area of the shape."""
9         return 0
10    op op(v) od(v)
11    def perimeter(self):
12        """Calculate the perimeter of the shape."""
13        return 0
14    op op
15    def describe(self):
16        """Return a description of the shape."""
17        return f"This is a {self.name} with area {self.area()} and perimeter {self.perimeter()}."
18    op op op od(v) op
19
20 class Rectangle(Shape):
21     """Rectangle shape class."""
22     op op od od(v) x 2
23     def __init__(self, width, height):
24         super().__init__("Rectangle")
25         self.width = width
26         self.height = height
27         op op op op
28     def area(self):
29         """Calculate the area of the rectangle."""
30         return self.width * self.height
31         op op op op(v) op
32     def perimeter(self):
33         """Calculate the perimeter of the rectangle."""
34         return 2 * (self.width + self.height)
        op / op op op(v) op od
        od(v) od

```

variable ref  
Line 24: super().\_\_init\_\_()

Halstead :

- Unique operators ( $n1$ ) = 8
- Total operators ( $N1$ ) = 35
- Unique operands ( $n2$ ) = 16
- Total operands ( $N2$ ) = 31

Traditional :

- LOC : 18 [Line numbers circled]
- Length of identifier = anything user-defined (even `--init--` & `self`) from self.name
- Identifiers (Shape class) = Shape, `--init--`, `self.name`, `self.name`, `name`,  
`area`, `self`, `perimeter`, `self`, `describe`, `self`, `self.name`, `self.area`,  
`self`, `perimeter`, `self`  
`self.perimeter``self.name``self.area`
- (Rectangle class) = Rectangle, Shape, `--init--`, `self.width`, `height`,  
`super`, `--init--`, `self.width`, `width`, `self.height`, `height`, `area`, `self`,  
`super`, `--init--()`, `self.width`  
`self.height`
- `self.width`, `self.height`, `perimeter`, `self`, `self.width`, `self.height`,  
`self.width`, `self.height`  
`self.width``self.height`

Total identifiers = 45

Total length = 234

$$\text{Length of identifier} = \frac{234}{45} = 5.2$$

- Fan\_in Shape, `--init--` : 1, Shape.area : 1, Shape.perimeter : 1,  
Shape.describe : 0.  
should be 1  
Rectangle, `--init--` : 0, Rectangle.area : 0, Rectangle.  
Rectangle.perimeter : 0
- Fan\_out : Shape, `--init--` : 0, Shape.area : 0, Shape.perimeter : 0,  
Shape.describe : 2  
Rectangle, `--init--` : 1, Rectangle.area : 0  
Rectangle.perimeter : 0

- CC : All 1 (No branches)

## Object-Oriented metrics

- WMC : Shape: 4 (C\_init--, area, perimeter, describe)  
Rectangle: 3 (C\_init--, area, perimeter)

- NOC : Shape: 1 immediate child  
(Rectangle should be 1 too)

- DIT : Shape: 1, Rectangle: 2

- CBO : Shape: 0, Rectangle: 1