

CS118 Programming Assignment

Exam 1 - Shapes

Farmer Bob is buying some property and will have to pay property taxes on it. Unusually, the taxes consist of two portions - there's a tax on the area of property, and there's a tax on the perimeter of the property. Farmer Bob naturally wants to minimize his taxes, so he'll pick a design that minimizes the tax. The formula for computing the tax (in dollars) is:

$$1.25\sqrt{A} + 2.56P$$

where A is the area (in square meters) and P is the perimeter in meters.

To these ends, he's asked you to construct a Python program. Your program will ask Farmer Bob to pick a shape - 1 for circle, 2 for square, and 3 for an equilateral triangle. Next, the measure of the shape is collected: the radius for the circle, or the length of one side for a square or a triangle. The program will then determine the area, perimeter, and tax of that shape. Repeat this process two more times. You may assume the user will provide valid choices for the shape (1, 2, or 3) and only numeric values for the other inputs.

Assume that the measures used for each shape are in meters. Recall these formulas:

Shape	Area	Perimeter
Circle	πr^2	$2\pi r$
Square	s^2	$4s$
Eq. Triangle	$\frac{s^2\sqrt{3}}{4}$	$3s$

When using these formulas, use the value of π and the square root function from the `math` module.

Have the program get the three different sets of information from Farmer Bob and display the results in a nice table (like the ones below). Use the `math` module's `ceil()` function to round up the area values to integers for display. All placeholders must use width specifiers. Left-justify the shape name, display the tax as dollars (i.e. two decimal places) and all other values to one decimal place.

```
(1) Circle
(2) Square
(3) Triangle
```

```
Your choice? 1
Measure (meters): 10
```

```
(1) Circle
(2) Square
(3) Triangle
```

```
Your choice? 1
Measure (meters): 13
```

```
(1) Circle
(2) Square
(3) Triangle
```

```
Your choice? 1
Measure (meters): 12
```

Shape	Measure	Area	Perimeter	Tax
Circle	10.0	315	62.8	\$ 183.01
Circle	13.0	531	81.7	\$ 237.91
Circle	12.0	453	75.4	\$ 219.61

```
(1) Circle
(2) Square
(3) Triangle

Your choice? 2
Measure (meters): 12
```

```
(1) Circle
(2) Square
(3) Triangle
```

```
Your choice? 3
Measure (meters): 14
```

```
(1) Circle
(2) Square
(3) Triangle
```

```
Your choice? 1
Measure (meters): 13
```

Shape	Measure	Area	Perimeter	Tax
Square	12.0	144	48.0	\$ 137.88
Triangle	14.0	85	42.0	\$ 119.04
Circle	13.0	531	81.7	\$ 237.91