Python PolyAngle OOP

Contents

Time required: 90 minutes

Tutorial: Design Process for PolyAngle

This tutorial idea comes from dead reckoning planning for a student robot project. We are going to create a Python console program that allows you to enter the number of sides in a regular polygon, then calculate the interior and exterior angles.

The Math

Start with solving the problem, which is creating an algorithm. An algorithm is process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.

Problem statement: Given the number of sides of a regular polygon, how do we calculate the interior and exterior angles? Let's do the math.

The sum of interior angles in a triangle is 180°. To find the sum of interior angles of a polygon, multiply the number of triangles in the polygon by 180°. The formula for calculating the sum of interior angles is (n - 2) x 180° where n is the number of sides. All the interior angles in a regular polygon are equal.

The formula for calculating the size of an interior angle is:

```
interior angle of a polygon = sum of interior angles ÷ number of sides
```

The sum of exterior angles of a polygon is 360°.

The formula for calculating the size of an exterior angle is:

```
exterior angle of a polygon = 360 ÷ number of sides.
```

Interior Angle Formula

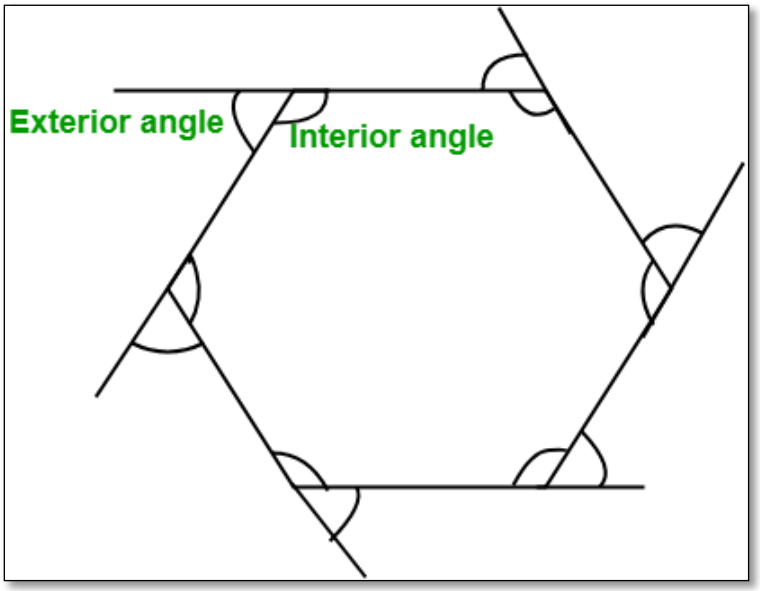
The angle between two adjacent sides inside the polygon is known as the Interior angle.

```
interior angle = (n-2) x 180 / n
```

Exterior Angle Formula

The angle formed by any side of a polygon and the extension of its adjacent side is known as the Exterior angle.

```
exterior angle = 360 / n
```



Pseudocode

The first step is a high-level look at the program. Think through what you want your program to do as if you were the user running your completed program.

```
Get the number of sides of a regular polygon from the user
Calculate and return the interior angle
Calculate and return the exterior angle
Calculate the perimeter
Determine the name, Triangle, Square, Pentagon, etc.
Display the results
```

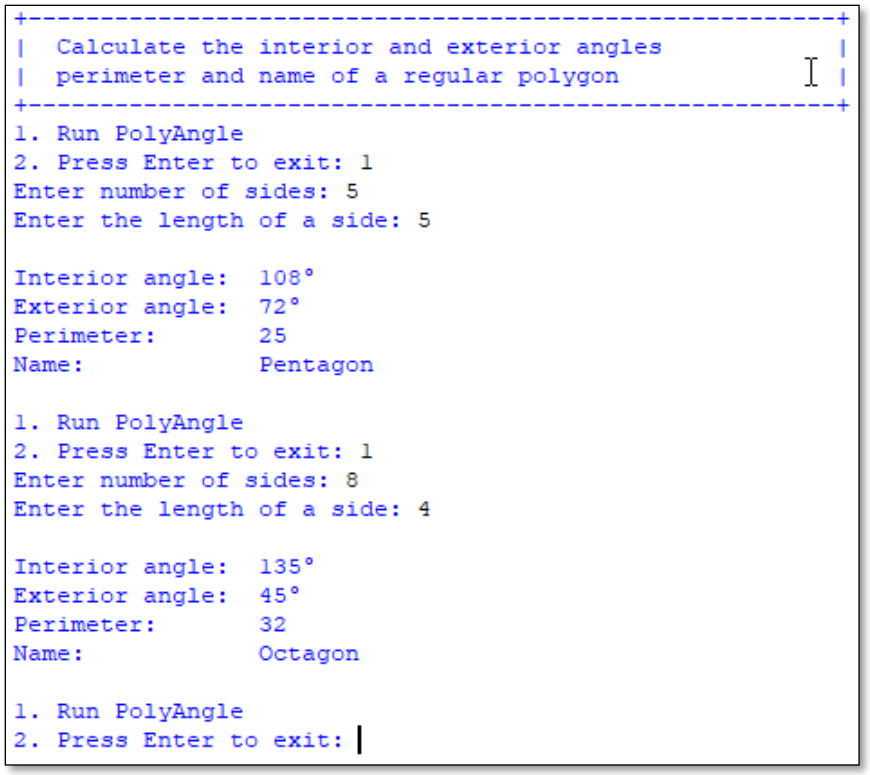
TODO Outline of Program

Please use OOP to create this program. Each method is listed.

You can use the following TODO outline to get started with your program.

```
"""
    Name: polyangle.py
    Author:
    Created:
    Purpose: Python program to calculate interior
    and exterior angles, and perimeter of a polygon
"""
class PolyAngle:
# TODO: Method Print creative program title

# TODO: Method Get user input for the number of sides of a polygon as int
# Do not allow input less than 3

# TODO: Method calculate and return interior angle
# formula: i = ((n - 2) x 180) / n

# TODO: Method calculate and return exterior angle
# formula: e = 360 / n

# TODO: Method calculate and return perimeter
# Research formula for perimeter of regular polygon

# TODO: Return the name of the polygon, Triangle, Square/Quadrilateral,
Pentagon, etc. from a list of names. Minimum of 10 names.

# TODO: Method Echo user input Display results

# Create program object
# Call object methods
```

Example run:



Assignment Submission

1. Attach the pseudocode.
2. Attach the program files.
3. Attach screenshots showing the successful operation of the program.
4. Submit in Blackboard.