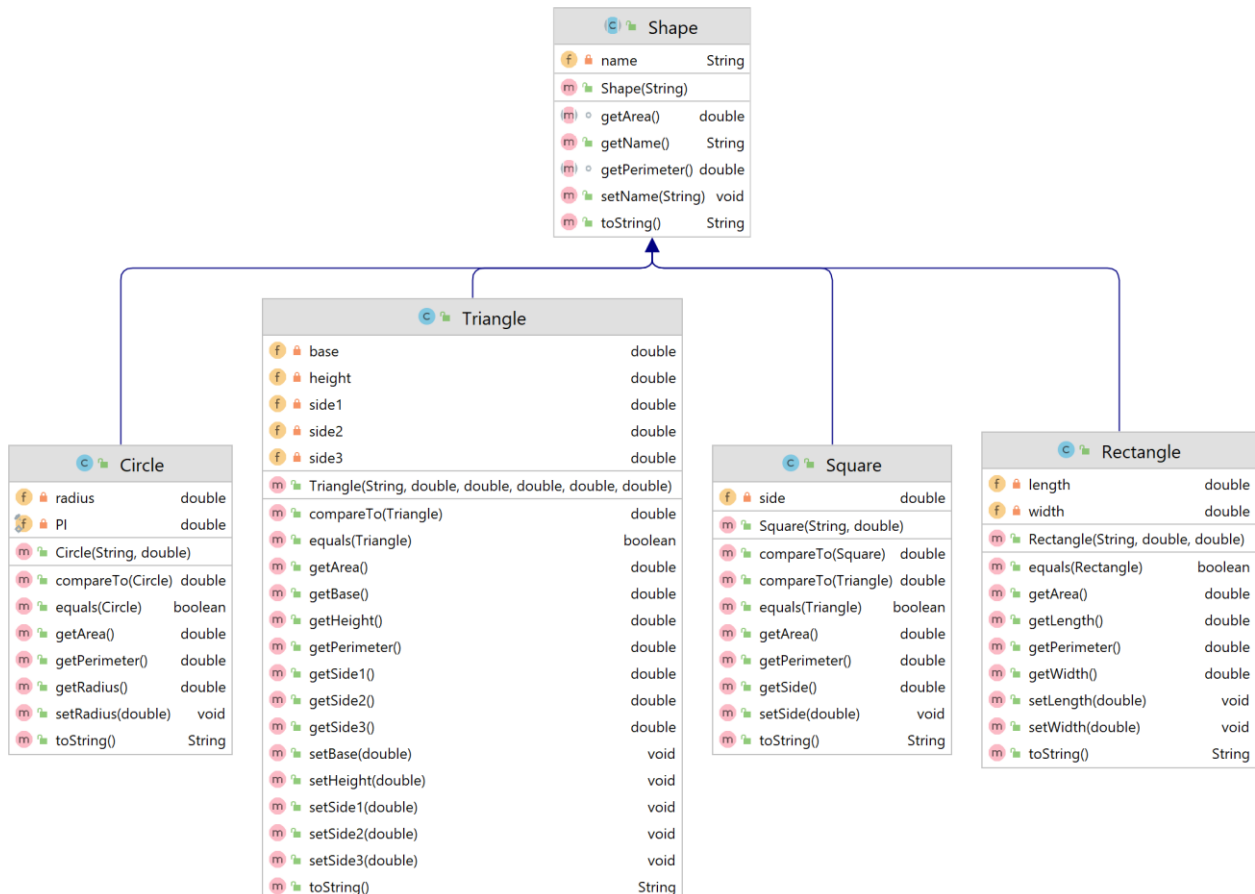


Name [] Date []

Instructions

The **Shape** and **TestClass** classes are given to you. Write the **Square**, **Rectangle**, **Triangle** and **Circle** classes according to the class diagram below:



You may want to use **Math.PI** in your Circle class instead of defining your own constant.

Work through the test from the beginning. Your Time class should build and grow –do not start a new program for each point.

During this test, you may use any resources that you have created, but you may **not** use Internet.

<<< Please Turn Over >>>

Marks Distribution

1. Successfully implement **inheritance** in all your classes.
2. Successfully implement **data hiding** in the fields/attributes of all your classes.
3. Successfully implement **constructors** in all your classes.
4. Successfully implement **accessors/getters** and **mutators/setters** in all your classes.
5. Successfully implement methods to calculate **areas** in all your classes.
6. Successfully implement methods to calculate **perimeters** all in your classes.
7. Make sure that your classes **only positive numbers** (constructors, setters)
8. Successfully implement **toString** methods in all your classes. They should return Strings as similar as possible to the display output on next page.
9. Successfully implement **equals** methods in all your classes. Use data/methods that you have already written do so to accomplish this.
10. Successfully implement **compareTo** methods in all your classes. Use data/methods that you have already written do so to accomplish this.

Extra challenge: Format the perimeter and area to three (3) decimals, as shown in the display output on next page.

<<< Please Turn Over >>>

Display Output

Squares

Shape: ABCD Side: 4.0 Area: 16.000 Perimeter: 16.000

Shape: EFGH Side: 10.0 Area: 100.000 Perimeter: 40.000

Equals (T): true

Equals (F): false

compareTo : -84.0

Rectangles

Shape: ABCD Length: 10.0 Width: 5.0 Area: 50.000 Perimeter: 30.000

Shape: EFGH Length: 3.0 Width: 7.0 Area: 21.000 Perimeter: 20.000

Equals (T): true

Equals (F): false

compareTo : 29.0

Triangles

Shape: ABC Base: 4.0 Height: 1.4524 Side 1: 2.0 Side 2: 4.0

Side 3: 3.0 Area: 2.905 Perimeter: 9.000

Shape: DEF Base: 5.0 Height: 4.33 Side 1: 5.0 Side 2: 5.0

Side 3: 5.0 Area: 10.825 Perimeter: 15.000

Equals (T): true

Equals (F): false

compareTo : -7.9201999999999995

Circles

Shape: C1 Radius: 3.0 Area: 28.274 Circumference: 18.850

Shape: C2 Radius: 1.7 Area: 9.079 Circumference: 10.681

Equals (T): true

Equals (F): false

compareTo : 19.1951149

Process finished with exit code 0

<<<Formulae on next page>>>

AREA & PERIMETER

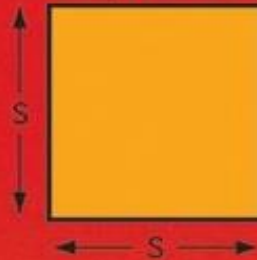
rectangle



$$A = l \times w$$

$$P = 2 \times (l + w)$$

square



$$A = s^2$$

$$P = 4 \times s$$

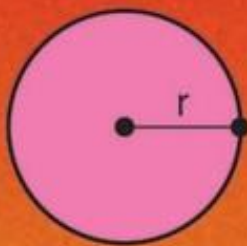
triangle



$$A = \frac{1}{2} b \times h$$

$$P = s_1 + s_2 + s_3$$

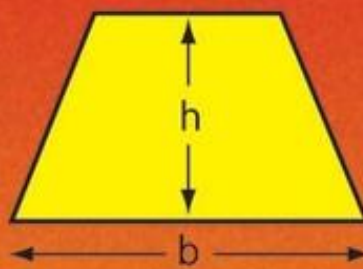
circle



$$A = \pi \times r^2$$

$$C = 2\pi \times r$$

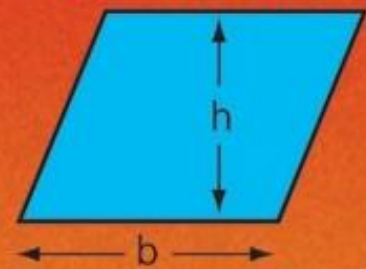
trapezoid



$$A = \frac{1}{2} h \times (b_1 + b_2)$$

$$P = s_1 + s_2 + s_3 + s_4$$

parallelogram



$$A = b \times h$$

$$P = 2 \times (l + w)$$

Basic Terms

A = area The measure of the inside of a closed figure, expressed in square units (8 sq. in. or 8 in.²).

P = perimeter The measure of the distance around the outside of a closed figure.

C = circumference The perimeter of a circle.

π = pi (3.14) The ratio of a circle's circumference to its diameter.

b = base

h = height

l = length

w = width

r = radius

s = side