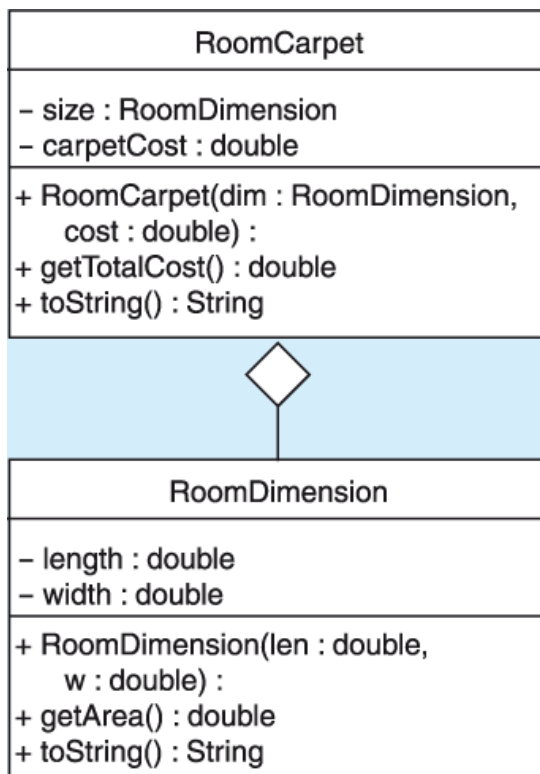# 3. Carpet Calculator (Ch 8)

The Westfield Carpet Company has asked you to write an application that calculates the price of carpeting for rectangular rooms. To calculate the price, you multiply the area of the floor (width times length) by the price per square foot of carpet. For example, the area of floor that is 12 feet long and 10 feet wide is 120 square feet. To cover that floor with carpet that costs $8 per square foot would cost $960. (12 × 10 × 8 = 960.)

First, you should create a class named **RoomDimension** that has two fields: one for the length of the room and one for the width. The **RoomDimension** class should have a method that returns the area of the room. (The area of the room is the room's length multiplied by the room's width.)

Next you should create a **RoomCarpet** class that has **a RoomDimension** object as a field. It should also have a field for the cost of the carpet per square foot. The RoomCarpet class should have a method that returns the total cost of the carpet.

See a UML diagram that shows possible class designs and the relationships among the classes. Once you have written these classes, use them in an application that asks the user to enter the dimensions of a room and the price per square foot of the desired carpeting. The application should display the total cost of the carpet.

```
┌─────────────────────────────────────┐
│              RoomCarpet              │
├─────────────────────────────────────┤
│ – size : RoomDimension               │
│ – carpetCost : double                │
├─────────────────────────────────────┤
│ + RoomCarpet(dim : RoomDimension,    │
│       cost : double) :               │
│ + getTotalCost() : double            │
│ + toString() : String                │
└─────────────────────────────────────┘
                  ◇
                  │
┌─────────────────────────────────────┐
│             RoomDimension            │
├─────────────────────────────────────┤
│ – length : double                    │
│ – width : double                     │
├─────────────────────────────────────┤
│ + RoomDimension(len : double,        │
│       w : double) :                  │
│ + getArea() : double                 │
│ + toString() : String                │
└─────────────────────────────────────┘
```

8. Parking Ticket Simulator

For this assignment you will design a set of classes that work together to simulate a police officer issuing a parking ticket. You should design the following classes:

- The **ParkedCar Class:** This class should simulate a parked car. The class's responsibilities are as follows:

    ✓ To know the car's make, model, color, license number, and the number of minutes that the car has been parked.

- The **ParkingMeter Class:** This class should simulate a parking meter. The class's only responsibility is as follows:

    ✓ To know the number of minutes of parking time that has been purchased.

- **The ParkingTicket Class:** This class should simulate a parking ticket. The class's responsibilities are as follows:

    ✓ To report the make, model, color, and license number of the illegally parked car

    ✓ To report the amount of the fine, which is $25 for the first hour or part of an hour that the car is illegally parked, plus $10 for every additional hour or part of an hour that the car is illegally parked

    ✓ To report the name and badge number of the police officer issuing the ticket

- **The PoliceOfficer Class:** This class should simulate a police officer inspecting parked cars. The class's responsibilities are as follows:

    ✓ To know the police officer's name and badge number

    ✓ To examine a ParkedCar object and a ParkingMeter object, and determine whether the car's time has expired

    ✓ To issue a parking ticket (generate a ParkingTicket object) if the car's time has expired

Write a program that demonstrates how these classes collaborate.