Assignment for Object-Oriented Programming (OOP) Concepts

Instructions:

- Solve the following exercises related to Object-Oriented Programming (OOP) concepts in Python.
- Write the solution code for each exercise.
- Include comments to explain your code where necessary.
- Test your solutions with sample inputs to ensure correctness.
- Write the answers in a Python script file or a Jupyter Notebook.

Exercises:

Class Creation:

Create a Python class named `Student` with attributes `name`, `age`, and `grade`. Include a method `display_info()` to display the student's information.

Inheritance:

Create a subclass `HighSchoolStudent` of the `Student` class. Add an additional attribute `grade_level` and override the `display_info()` method to include the grade level.

Encapsulation:

Modify the `Student` class to make the `age` attribute private. Provide methods `set_age()` and `get_age()` to set and retrieve the age of the student.

Polymorphism:

Create a function `print_student_info()` that accepts an object of either `Student` or `HighSchoolStudent` class and prints the student's information using the `display_info()` method.

Abstraction:

Create an abstract class `Shape` with an abstract method `calculate_area()`. Implement subclasses `Circle` and `Rectangle` inheriting from `Shape` with methods to calculate their respective areas.