20 OOP pillars and declarative – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
encapsulation	封装			
inheritance	继承			
polymorphism	多态			
abstraction	抽象			
declarative programming	声明式编程			
Functional programming	函数式编程			

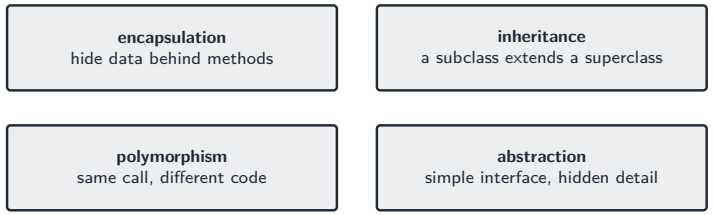
Recall

Object-oriented programming rests on four big ideas, and declarative programming takes a very different approach.

New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

1 The four pillars of OOP



- **encapsulation** 封装 — hide an object's data behind its methods;
- **inheritance** 继承 — a subclass extends a superclass;
- **polymorphism** 多态 — the same method call runs different code on different objects;
- **abstraction** 抽象 — show a simple interface, hide the detail.

Worked example. With inheritance, an `Animal` superclass has an `eat` method. A `Dog` subclass inherits `eat` for free and adds its own `bark` — so the shared code is written only once.

2 Declarative programming

In **declarative programming** 声明式编程 you say *what* to compute, not *how*. **Functional programming** 函数式编程 uses pure functions; logic programming states facts and rules.

Worked example. The query `SELECT name FROM students WHERE grade = 'A'` says *what* you want (the names of A-grade students) without saying *how* to loop through the table and test each row — that is declarative.

Watch out: encapsulation hides an object's *data* behind methods, while abstraction hides *complexity* behind a simple interface — related, but not the same pillar. Declarative code says *what*, not *how*.

Practice

Try these in order.

20.1 Which pillar means hiding an object's data behind its methods? [1]

20.2 Which pillar lets a subclass extend a superclass? [1]

20.3 What does *polymorphism* mean? [1]

20.4 In *declarative* programming, do you say *what* or *how*? [1]

20.5 What kind of functions does *functional programming* use? [1]

20.6 Explain how inheritance helps avoid repeating the same code in several classes. [2]

20.7 Challenge. The query `SELECT name FROM students WHERE grade = 'A'` is declarative. Explain what makes it declarative rather than imperative. [2]