Writing Classes

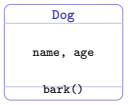
AP Computer Science A ▪ Unit 3

AP Computer Science A

```
class Dog
```


What we will cover

1. Abstraction & program design
2. The anatomy of a class
3. Constructors & methods
4. References & static members
5. Scope & the this keyword

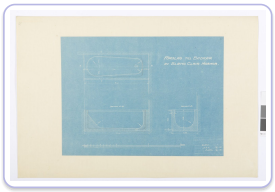


1 Design

Abstraction & program design

Abstraction 抽象 hides detail behind a simple interface, so we manage complexity one piece at a time.

> Good **program design** 程序设计 breaks a problem into classes, each with one clear responsibility. A well-designed class is easier to test, reuse, and change without breaking the rest.



Class blueprint

2 Anatomy

The anatomy of a class

class Dog

```
private String name;
private int age;
```
fields 字段 *(the object's data)*

```
public Dog(String n) ...   constructor 构造函数
public void bark() ...     methods 方法
```

Jigsaw design

Constructors & methods

Constructor 构造函数
runs once at `new`; sets the object's initial **fields** 字段

Method 方法
a named action; may take **parameters** 形参 and return a value

A method **returns** 返回 a value with `return`; a `void` method returns nothing.

3 References & static

References & static members

An object variable holds a **reference** 引用 – a pointer to the object, not the object itself. Passing it lets a method change the same object.

Instance member
belongs to **each object**: `d.bark()`

Static 静态 (class) member
belongs to the **class**: `Math.sqrt(9)`

Scope & the this keyword

Scope 作用域 is where a name is visible. A local variable lives only inside its method; a field lives as long as the object.

`this` refers to the current object. Use it when a parameter name hides a field: `this.name = name;` sets the field from the parameter.

Key points

A class has **fields**, a **constructor** & **methods**

The constructor sets initial state at `new`

Object variables hold a **reference**; **static** belongs to the class

`this` names the current object

Worked example – passing a reference

`s` is a `Student` with score `50`; we call `tweak(s)`

Java passes the reference by value: `tweak` gets a copy of the arrow, pointing at the same object. So `s.setScore(90)` inside `tweak` does change the caller's object – but reassigning `s = new Student()` inside `tweak` does not.

You can change what the object contains; you cannot change which object the caller's variable points to.

Check yourself

1. Can a method change the caller's object through a reference?
2. Can it change which object the caller's variable points to?
3. What does `static` mean – per object, or per class?
4. What does `this` refer to?

Answers **1.** yes **2.** no **3.** per class – shared by all objects **4.** the current object