

Topic 1.1: Introduction to Algorithms, Programming, and Compilers

Scenario — Riverside Coding Club

Priya just joined the after-school coding club at Riverside High. Her first task is to write a short Java program that welcomes members and figures out how many water bottles the club needs for a weekend hike. Read what happens, then answer the questions.

Step 1 — Priya types her first version

She writes this and clicks Run. The IDE refuses to run it and underlines a line in red.

Version 1 — ClubWelcome.java

```
public class ClubWelcome {
    public static void main(String[] args) {
        System.out.println("Welcome to the Riverside Coding Club!")
    }
}
```

Step 2 — She fixes that and the program runs

Priya adds the missing semicolon. Now it runs, and she adds the bottle calculation below. It prints 16, but the club only has 12 hikers — that cannot be right.

Version 2 — bottle calculation

```
int hikers = 12;
int perBottle = 4;           // each bottle serves 4 hikers
int bottlesNeeded = hikers + perBottle;
System.out.println(bottlesNeeded); // prints 16, but the club has 12 hikers
```

Trace the three variables to see where 16 comes from:

Line executed	hikers	perBottle	bottlesNeeded	Output

Step 3 — A later version crashes

Priya rewrites the calculation to split hikers into groups. During a test where no groups have been entered yet, the program stops with an error message and quits.

Version 3 — splitting into groups

```
int hikers = 12;
int groups = 0;           // no groups were entered yet
int perGroup = hikers / groups; // divide by zero at run time
System.out.println(perGroup);
```

Questions

1. In Version 1, what type of error stopped the program from running, and which tool reported it?
2. In Version 2, the program runs but prints the wrong number. What type of error is this, and how did Priya discover it?
3. In Version 3, the program quits during execution. What type of error is this, and why did the compiler not catch it?
4. Priya says, "If it compiles, it must be correct." Use this scenario to explain why she is wrong.