Complexity Olympics — Results Recording Sheet

Name: ______________________________ **Date:** ____________

Station 1: O(1) — Constant Time

Input size (n)	Steps taken
10	
100	
1,000	

Pattern I noticed: ____

Station 2: O(log n) — Logarithmic Time

Input size (n)	Guesses needed
8	
16	
32	

Pattern I noticed: ____

Predict: n=64 would need ___ guesses. n=1024 would need ___ guesses.

Station 3: O(n) — Linear Time

Input size (n)	Cards examined
5	
10	
20	

Pattern I noticed: ____

Station 4: O(n²) — Quadratic Time

Input size (n)	Actual comparisons	Formula: n×(n-1)÷2
3		

Input size (n)	Actual comparisons	Formula: n×(n-1)÷2
4		
5		
6		

Pattern I noticed: ____

Graph — All Four Complexity Classes

Plot on the axes below. Use different symbols for each: O(1)=●, O(log n)=▲, O(n)=■, O(n²)=◆

```
Steps
 200 |◆                                         ◆
     |
 150 |
     |                                      ◆
 100 |
     |                               ◆
  50 |
     |
  20 |■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
     |▲  ▲   ▲    ▲     ▲
   5 |● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
     └──────────────────────────────────────────

     0    5   10   15   20  (input size n)
```

Sketch your actual data on the graph above.

Predictions for n=100

Complexity	Formula	Steps for n=100
O(1)	always 1	1
O(log n)	$\log_2(100) \approx 7$	7
O(n)	n	100
O(n^2)	n×(n-1)÷2	

Real-World Decisions

A social network has 1 billion users. A search through all users to find a match takes O(n) time. How many steps would that take? Why would this be unacceptable?

If you could choose between O(n) and O(n²) for sorting 10,000 names, which would you choose? How much better is it?

Big-O Summary

Fill in the final column:

Name	Notation	Growth rate	Real-world example
Constant	O(1)	Always the same	
Logarithmic	O(log n)	Grows very slowly	
Linear	O(n)	Proportional to n	
Quadratic	O(n²)	Squares with n	