TROUBLESHOOTING ESSENTIALS · COURSE TOOLKIT

Half-Split Isolation Worksheet

> **Toolkit 4 of 10** · Half-Split Isolation Worksheet · Based on §6.1 and §7.3 of Dr. Tahseen Al Doori's *Troubleshooting Essentials*, University Edition (2026). Worksheet layout by the course.

How to use this sheet

Use the half-split (divide and conquer) method when a fault lies somewhere along a **long chain of components or stages**, such as a network path or a signal passing through several devices. Divide the chain into two halves and test the point between them. If the first half works, the fault must lie in the second; divide that half again. Each test removes half of the remaining possibilities.

1. List every component in order from source to destination in Part 1.
2. Work out the maximum number of tests in Part 2.
3. Record each test in Part 3: the midpoint you tested, the result, and which half remains.
4. Stop when one component remains, then confirm it (for example by substitution with a known-good part).

Part 1 — The chain

Number the components from the source (1) to the destination (n).

#	COMPONENT OR STAGE	#	COMPONENT OR STAGE
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

Source: _____ **Destination:** _____ **Number of components (n):** _____

Part 2 — Maximum number of tests

Each test halves the remaining possibilities, so the maximum number of tests is the number of times n can be halved until one component remains.

COMPONENTS (N)	MAXIMUM TESTS
2	1
4	2
8	3
16	4
32	5
1,000	10

For a number between these, round up: for example, 12 components need at most 4 tests.

My chain needs at most _____ tests.

Part 3 — Test record

TEST	REMAINING RANGE (FROM # TO #)	MIDPOINT TESTED	HOW TESTED	RESULT (PASS / FAIL)	FAULT NOW LIES BETWEEN # AND #
1	1 to n				
2					
3					
4					
5					

Isolated component: _____

Confirmation test (for example, substitute a known-good part): _____
Result: _____

Part 4 — The network path as a half-split

The book's five-command connectivity sequence applies the half-split idea to every network fault: each command tests one more part of the path, and the **first command that fails shows where the fault lies**.

#	COMMAND (WINDOWS)	WHAT IT PROVES	RESULT
1	`ping 127.0.0.1`	The TCP/IP stack works locally	
2	`ipconfig`	The device has a valid IP address and gateway	
3	`ping <default gateway>`	The device can reach its router	
4	`ping 8.8.8.8`	The device can reach the internet by IP address	
5	`ping <a name, e.g. example.com>`	Name resolution (DNS) works	

First step that failed: _____ **What this tells me:** _____

Worked illustration

(Fictional scenario.) A laptop on office Wi-Fi cannot open a website. The path has eight stages: 1 laptop, 2 Wi-Fi adapter, 3 access point, 4 switch, 5 router, 6 modem, 7

provider's network, 8 web server. With 8 stages, at most 3 tests are needed.

TEST	RANGE	MIDPOINT TESTED	RESULT	FAULT NOW LIES IN
1	1–8	Stage 4: can the laptop reach a device on the switch? (ping the office file server)	Pass	Stages 5–8
2	5–8	Stage 6: can the laptop reach the modem? (ping the modem's local address)	Pass	Stages 7–8
3	7–8	Stage 7: does tracert to the web server stop at the first hop beyond the modem?	Replies stop there	Stage 7: the provider's network

Confirmation: the modem's internet light is red, other websites fail too, and the provider confirms a line fault. The modem's own connection to the line should be part of the provider's check, because test 2 proves only the modem's local side.

Sources

- Dr. Tahseen Al Doori — *Troubleshooting Essentials*, University Edition (2026), §6.1 and Fig 6.1, §6.2, §7.3, §11.1