

Trace Detective

SD-B039 / AGES 10+ / YOUNGER WITH SUPPORT

Follow three values through a plan, find the first step that calculates too soon, and prove your repair on a new example.

YOU NEED: A pencil and the trace table, or plain paper with columns Step, A, B and Total.

- MEET

The goal is to add 3 and 4. Start A, B and Total at 0. Will the plan below reach the goal?
- WATCH

Follow the first two instructions: set A to 3; set B to 2. Record every value.
- TRY

Next set Total to $A + B$, then set B to 4. Find the first instruction that calculates too soon.
- CELEBRATE

Repair the order, trace again, then test with A starting at 5. Explain your evidence.

Original plan	A	B	Total
Start	0	0	0
Set A to 3			
Set B to 2			
Set Total to $A + B$			
Set B to 4			

MY REPAIR

TELL THE STORY: Where does the trace first show that our plan cannot yet produce the intended sum?

THE SAGE DAD

SMALL ADVENTURES. TIME TOGETHER.

Trace Detective

SD-B039 / GROWN-UP GUIDE / CONFIDENT

A little help beside the learner. Read this page first; keep the answers here.

LEARNING GOAL

Record state after each instruction, locate an ordering bug, and test a repair with a new input.

BEFORE YOU BEGIN

Track separate stored values and explain that changing an input does not automatically update a previously calculated result. Try Number Keepers first if needed.

WHY IT MATTERS

A trace is evidence. It helps us find where a plan first differs from the intended behavior instead of changing things at random.

LOOK FOR THIS REASONING

Original final values: $A = 3$, $B = 4$, $Total = 5$. Repaired final values: $A = 3$, $B = 4$, $Total = 7$. For $A = 5$, the original $Total$ is 7 and repaired $Total$ is 9. Updating B alone does not re-run an earlier addition.

IF THEY GET STUCK

"The final B is 4, so $Total$ must be 7." Cover later rows and ask which B the addition actually read at that moment.

MAKE IT GENTLER

Return to Number Keepers. Use physical number cards and let the adult write one row at a time.

ADD A LITTLE STRETCH

After the loops adventure, compare a countdown that reduces $Left$ by 1 with one that reduces it by 0. Stop after five paper rounds and explain the difference between a safety limit and a correct stopping condition.

A USEFUL STOPPING POINT

Explain that the original addition reads $B = 2$, identify the ordering repair, and predict original $Total = 7$ versus repaired $Total = 9$ when A starts at 5.

TAKE THE IDEA INTO THE COMPUTER LAB

Use the stored-values adventure to observe the same read-and-write behavior. Then revisit the loops adventure for the stopping-rule stretch. The paper notation here is a teaching model, not a LearnRisc instruction set.

Open the lab: thesagedad.com/computer-lab/#lesson/where-did-the-number-go