

Before the next take

Goal: plan a comparable repeated trial and explain what a useful record can tell you.

Name: _____ Date: _____

Planning scenario, not measured results: You want to find whether changing a marble's release mark affects whether it stays in the cup. No marble experiment is needed for this worksheet.

MS01 | Before reading the explanation on page 2: a practice scenario includes a catch, followed by a miss when the track shifts. Which events would you record, and what extra note would help another person understand them? Keep your first idea; you may revise it later.

SETTING A: release mark A

SETTING B: release mark B

Keep comparable in both:

marble / track / cup / let-go method

Observe: stayed or missed

Repeat BOTH settings; note changes.

Plan, not results: Setting A uses release mark A and Setting B uses release mark B. In both, keep the marble, track, cup and let-go method comparable. Record stayed or missed and notes about changed conditions for repeated trials of each setting.

MS02 | Use the plan above. Name the factor (condition) to change, the response (outcome) to observe, and three conditions to keep comparable. Explain why keeping those conditions steady helps the comparison.

A record that keeps the awkward part

A factor is something you deliberately change. A response is the outcome you observe. In this simple comparison, change the release mark and keep the marble, track, cup and let-go method as steady as possible. Repeat both settings and keep all outcomes, including misses. Note any changed conditions. Variation means differences among repeated observations. A systematic error can persist in repeated measurements, such as a misplaced zero mark. Repetition does not by itself remove that error or prove a rule for every setup. Experiments can also be designed to study several factors together.

MS03 | In a planning scenario, a class changes both the release mark and the cup position between A and B. Sketch or describe a revised A/B plan that would help isolate the release-mark change. Label what changes and what stays comparable.

MS04 | Make a blank record for repeated trials of both settings. Include a place for the setting, trial, stayed/missed outcome, and changed-condition notes. Do not fill it with invented results. Then explain what you would do if a trial misses after the track shifts.

Trial	A / B	Stayed / missed	Changed-condition notes

Will doing it again solve everything?

MS05 | A hypothetical ruler has a misplaced zero mark. The same person repeatedly measures an unchanged object in the same way and gets closely agreeing readings. Does agreement show the ruler is accurate? Explain a limitation of repeating the measurement.

MS06 | Transfer: on paper, plan a comparison of whether two ways of arranging your study notes help you find a named topic. Define the outcome you would observe, one factor to change, three comparable conditions, how you would repeat both settings, and one limitation. You do not need to carry out the comparison or claim one method works better.

Revisit MS01: add a different-color or marked revision if your reasoning changed. Explain the reason; your first idea is not a mistake to hide.

Optional next curiosity

In One More Take, Quinn repeats releases and checks the changed arrangement before filming. Those story events illustrate a testing decision; they are not a laboratory dataset. What would you need to record before claiming a particular change helped?

Source notes (all activities here are paper planning)

NIST experimental design - planned factors, responses and uncontrolled influences
<https://www.itl.nist.gov/div898/handbook/pri/section1/pri11.htm>

NIST variability - differences among repeated measurements
<https://www.itl.nist.gov/div898/handbook/mpc/section1/mpc114.htm>

NIST measurement terminology - agreement, accuracy and systematic error (D.1.1.1-6)
<https://www.nist.gov/pml/nist-technical-note-1297/nist-tn-1297-appendix-d1-terminology>