

Timing Truth Test

Compare data-collection methods by checking how close results are to a reference.

PS.1.b.ii “planning and carrying out investigations evaluate the accuracy of various methods for collecting data”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each timing method, circle details that make the comparison fair or check accuracy, and write 1 beside the statement that explains how accuracy is judged.

Which Time Can We Trust?

- ① When a toy car rolls down a ramp, its speed can be found by measuring how long it takes to travel 2.00 meters. Maya’s team wanted data close to the car’s actual travel time. They marked a start line and finish line with a tape measure, kept the ramp height fixed, and released the car without pushing. The team tested three timing methods: a handheld stopwatch, a phone video, and two electronic light gates. Each method measured the same trip five times.
- ② A stopwatch is easy to use, but a person may start or stop it late because of reaction time. For the video method, the team counted frames between the car crossing each line and divided by the video’s stated frames per second. Light gates started and stopped a timer automatically when the car blocked each beam. Before collecting results, the team checked that timer against a calibrated reference timer. This check gave them a trustworthy value for judging accuracy.
- ③ After the trials, Maya’s team calculated a mean time for each method. They compared each mean with the calibrated reference time and found the absolute difference. The method with the smallest difference was the most accurate for this investigation. They also looked at the spread of the five trials. Closely grouped results showed precision, but precision alone did not prove accuracy. For example, a misplaced finish line could make repeated measurements consistently wrong on every trial.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Why did the team keep the ramp height fixed and measure the same 2.00-meter trip for every method?

2 Which timing method could be affected by a person starting or stopping late, and what is the source of that problem?

3 How did the team use the phone video to calculate the car's travel time?

4 Why are closely grouped trial results not enough to show that a method is accurate?

3 YOUR TURN _____ Your own words

Plan an investigation to measure how long a marble takes to travel 1.00 meter. Complete the table for three timing methods, and explain how you would check each method's accuracy after five trials.

TIMING METHOD	HOW YOU WILL COLLECT FIVE TIMES	ACCURACY CHECK

PART 1 • READ AND MARK

Underline each timing method, circle details that make the comparison fair or check accuracy, and write 1 beside the statement that explains how accuracy is judged. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Why did the team keep the ramp height fixed and measure the same 2.00-meter trip for every method?	Keeping these conditions the same makes the comparison fair because differences in results are more likely caused by the timing method.
2	Which timing method could be affected by a person starting or stopping late, and what is the source of that problem?	The handheld stopwatch could be affected. The problem is human reaction time.
3	How did the team use the phone video to calculate the car's travel time?	They counted the frames from the car crossing the start line to crossing the finish line, then divided by the video's frames per second.
4	Why are closely grouped trial results not enough to show that a method is accurate?	Closely grouped results show precision. A method can give similar results that are consistently wrong, so its mean must also be compared with the calibrated reference time.

PART 3 • YOUR TURN (SAMPLE ANSWER)

TIMING METHOD	HOW YOU WILL COLLECT FIVE TIMES	ACCURACY CHECK
Handheld stopwatch	Start at release and stop at the 1.00-meter line for five trials.	Compare the five-trial mean with the calibrated reference time and find the absolute difference.
Slow-motion video	Record five runs, count frames from release to the finish line, and divide by frames per second.	Compare the five-trial mean with the calibrated reference time and find the absolute difference.
Electronic light gates	Put one gate at each line and record five automatic times.	Check the timer against a calibrated reference, then compare the five-trial mean with the reference time.

Accept any three workable methods if the student holds the distance and release conditions constant, collects five trials, and compares mean results with a calibrated reference. Accuracy checks should focus on closeness to the reference, not only on how closely trials agree.