

Test the Design

Use criteria, data, and fair testing to evaluate a solution.

6.2.D "evaluate experimental and engineering designs."

NAME _____

DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle the criteria, underline data-based statements about each design, and write 1 by the test limitation and 2 by its improvement to judge which design works and whether the evidence is trustworthy.

Filtering Muddy Water

- ① A sixth-grade team designed water filters for hikers who might need to clean muddy water. The team set two criteria: each filter should make water clearer and let at least 150 milliliters pass through in one minute. Constraints limited each design to gravel, sand, cotton, and one plastic bottle. To compare designs, they used equal amounts of muddy water.

FILTER TEST RESULTS

Design	Sediment Left (g)	Water Passed in 1 Minute (mL)
A	0.8	180
B	0.3	110
C	0.4	160

- ② Design A met the flow criterion, but it left the most sediment, so it did not clean as well. Design B left the least sediment, but missed the flow goal. Design C left little sediment and passed 160 milliliters in one minute. It met the flow goal while cleaning almost as well as B. The team judged C the strongest design among the three.
- ③ However, evidence had limits. The team tested each filter only once, so a single unusual result could affect the decision. They should repeat every test several times and calculate an average. They should also keep the starting water amount and muddiness the same. Before use, the team must test whether it removes germs, because clear water is not always safe drinking water.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What two criteria did the team use to evaluate the filters?

2 What did the team keep the same to make the comparison fair?

3 Which design best met both criteria? Use data from the table to support your answer.

4 What is one limit of the team's test, and how could the team improve the test?

3 YOUR TURN _____ Your own words

Create two possible designs for carrying a heavy school book. Use one row for each design to name a criterion, describe what you would measure, and state one condition you would keep the same during a fair test.

DESIGN	CRITERION	WHAT YOU WOULD MEASURE	CONDITION KEPT THE SAME

PART 1 • READ AND MARK

Circle the criteria, underline data-based statements about each design, and write 1 by the test limitation and 2 by its improvement to judge which design works and whether the evidence is trustworthy. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What two criteria did the team use to evaluate the filters?	The filter should make the water clearer and pass at least 150 mL of water in one minute.
2	What did the team keep the same to make the comparison fair?	They used equal amounts of muddy water.
3	Which design best met both criteria? Use data from the table to support your answer.	Design C. It passed 160 mL in one minute, meeting the flow goal, and left only 0.4 g of sediment.
4	What is one limit of the team's test, and how could the team improve the test?	Each filter was tested only once. The team should repeat the tests several times and calculate an average.

PART 3 • YOUR TURN (SAMPLE ANSWER)

DESIGN	CRITERION	WHAT YOU WOULD MEASURE	CONDITION KEPT THE SAME
Wide, padded shoulder straps	Comfort	The same student rates shoulder pressure after walking for 5 minutes.	Same books and walking route
Narrow, unpadded shoulder straps	Comfort	The same student rates shoulder pressure after walking for 5 minutes.	Same books and walking route

Accept equivalent statements of the two criteria and data-based support for Design C. For the open task, accept reasonable designs if the measurement matches the criterion and the controlled condition makes the comparison fair.