

Design Data Detective

Use test results to choose and improve a design.

5.1.c.iv "interpreting, analyzing, and evaluating data use data to evaluate and refine design solutions"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline two pieces of test data, circle the design the team chose, and number the two actions in its next refinement plan. These marks show how test data can guide a design decision.

Blades That Lift

- ① A team designed small wind-turbine blades to lift a cup of washers. Their first blade was flat cardboard. Their second blade was curved cardstock. Their third blade was curved cardstock with a wider tip. To make a fair test, the team used the same fan setting, same tower, and same 30-second test time for every blade.
- ② The team ran three trials for each design and found the average number of washers lifted. Averages helped them compare designs because one trial can be unusual. They also watched for wobbling and checked whether the blades stayed attached. Their results are shown in the table.

WIND-BLADE TEST RESULTS

Blade design	Average washers lifted	Observation
Flat cardboard	5	Stayed attached and steady
Curved cardstock	8	Stayed steady in all 3 trials
Curved cardstock, wider tip	9	Wobbled in 2 of 3 trials

- ③ The wide-tip blade lifted the most washers, but it wobbled during two trials. The curved blade lifted one fewer washer and stayed steady in all trials. The team chose the curved blade as the better starting design. Next, they planned to widen its tip a little, then test it again to see whether it could lift more without wobbling.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Which three conditions did the team keep the same to make the test fair?

2 Why did the team use averages from three trials instead of using only one trial?

3 Why was the curved cardstock blade a better starting design than the wider-tip blade? Use data from the table and passage.

4 What change will the team make next, and what will it test for?

3 YOUR TURN _____ Your own words

Write exactly 3 sentences about testing two paper-airplane versions. Describe a fair test, give a made-up average flight result for each version, and explain which version you would improve next and why.

PART 1 • READ AND MARK

Underline two pieces of test data, circle the design the team chose, and number the two actions in its next refinement plan. These marks show how test data can guide a design decision. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which three conditions did the team keep the same to make the test fair?	They used the same fan setting, the same tower, and the same 30-second test time.
2	Why did the team use averages from three trials instead of using only one trial?	One trial can be unusual. Averages help the team compare the designs more fairly.
3	Why was the curved cardstock blade a better starting design than the wider-tip blade? Use data from the table and passage.	The curved blade lifted 8 washers, only one fewer than the wider-tip blade's 9, and it stayed steady in all three trials. The wider-tip blade wobbled in two trials.
4	What change will the team make next, and what will it test for?	The team will widen the curved blade's tip a little. It will test whether the blade can lift more washers without wobbling.

PART 3 • YOUR TURN (SAMPLE ANSWER)

I would test a short-wing and a long-wing paper airplane by using the same paper, launcher, and indoor starting line for three flights each. The short-wing plane flew an average of 6 meters, and the long-wing plane flew an average of 8 meters but turned sharply. I would improve the long-wing plane next by making its wings more even, because it traveled farther but needs a steadier flight.

Accept equivalent wording for the controlled conditions and evidence-based comparisons. For the open response, accept reasonable invented data if the student includes a fair test, compares both results, and uses the results to justify a refinement.