Cargo Crossing

Read how one vessel design changes after testing.

P.5.5A.5 "Design a vessel that can safely transport a dense substance (e.g., syrup, coins, marbles) through water at various distances and under variable conditions. Use an engineering design process to define the problem, design, construct..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the class's goal, circle the problems Mina finds during testing, and box the changes she makes to her vessel.

Mina's Washer Vessel

1. Mina's class must move twelve metal washers across a pool without getting them wet. A washer is dense, but a vessel can float when its shape pushes aside enough water to support the total weight. The class sets a clear goal: carry all twelve washers for two meters in calm water and in small waves. The vessel must stay upright, and every washer must be dry at the finish.

2. Mina builds a vessel from a wide plastic food tub. She puts the washers inside, near the left wall, and pulls the tub by a string tied to its front. In calm water, it travels one meter without trouble. At two meters, it leans left and lets water in. Small waves make the lean worse. Mina records where the water entered before changing her design.

3. Mina spreads the washers evenly across the bottom and snaps on a tight lid. She tests again, using the same twelve washers and the same string. This time, the tub travels two meters in calm water and two meters with small waves. It stays upright, and the washers are dry. Mina keeps the new design because it meets both distance and water condition goals.

2 ANSWER WITH EVIDENCE

Use the passage

1. What must Mina's vessel do to meet the class's goal?

2. What did Mina observe that showed her first design needed improvement?

3. Which change could help with leaning, and which could help keep water out?

4. What test results show that Mina's new design met the goal?

3 YOUR TURN

Your own words

Design a different vessel to carry fifteen washers three meters in calm water and small waves. In four or five sentences, describe how you would build it, test it in both conditions, and improve it if a test fails.

ANSWER KEY

Cargo Crossing

GRADE 5 · P.5.5A.5

PART 1 · READ AND MARK

Underline the class's goal, circle the problems Mina finds during testing, and box the changes she makes to her vessel. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What must Mina's vessel do to meet the class's goal?	**It must carry twelve washers two meters in calm water and small waves, stay upright, and keep the washers dry.**
2	What did Mina observe that showed her first design needed improvement?	**At two meters, the tub leaned left and let water in. Small waves made the lean worse.**
3	Which change could help with leaning, and which could help keep water out?	**Spreading the washers evenly could help prevent leaning. The tight lid could help keep water out.**
4	What test results show that Mina's new design met the goal?	**It traveled two meters in both calm water and small waves, stayed upright, and kept the washers dry.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would place a sealed plastic container holding fifteen washers on a raft made of six corks tied together. I would pull it three meters in calm water, then three meters in small waves, checking for tipping and leaks after each trip. If the raft tipped, I would add corks to both sides to make it wider. Then I would repeat both tests to see whether all fifteen washers arrived dry.

Accept other vessel designs if the plan includes fifteen washers, a three-meter test in each water condition, and a specific change to try after a failed test.