Catch Before the Marsh

Test a litter barrier using a model and repeated trials.

MAQ.1.6 "Enrichment: Use an engineering design process to reduce the effects of pollution in aquatic ecosystems (e.g., microplastics, garbage patches, oil spills, and eutrophication)..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the barrier designs, circle the catch counts in the table, and number two limits of the model. Use your marks to judge what the test shows and what it cannot show.

A Barrier for Floating Litter

1 After a storm, volunteers spotted wrappers and bottle caps drifting toward a marsh. A student team proposed a floating boom across a model channel. Their goal was to catch litter before it entered the marsh while allowing water to pass. They used twenty identical floating plastic squares to represent larger pieces of trash, not microplastics.

2 The team poured the same volume of water at the same rate for every run. They tested three setups: no barrier, a plain boom, and a boom with a small collection pocket at one end. After each run, they counted squares caught before the channel outlet. They reset the channel and repeated each setup three times.

FLOATING SQUARES CAUGHT OUT OF 20

Setup	Run 1	Run 2	Run 3
No barrier	0	0	0
Plain boom	11	12	10
Boom with pocket	17	18	16

3 The pocket directed floating squares toward one place, so removing them could be easier than picking them off a long boom. The team planned a bar graph of mean squares caught for each setup. Their model did not test how the barrier would affect swimming animals or whether tiny particles could slip past. Those questions need different tests.

2 ANSWER WITH EVIDENCE

Use the passage

1. What did the team keep the same across runs so they could compare the barrier designs fairly?

2. In Run 3, how many more squares did the boom with a pocket catch than the plain boom? How does this result support the design change?

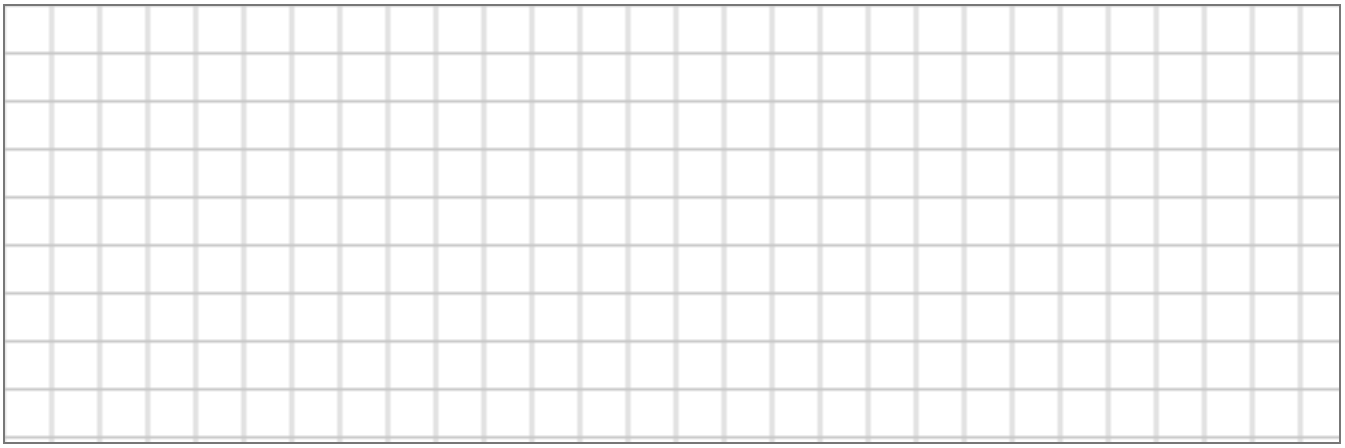
3. The pocket boom caught 17, 18, and 16 squares. What do these repeated results suggest about its performance?

4. Why can the team not use this model to claim that the pocket boom is safe for swimming animals?

3 YOUR TURN

Your own words

Design one change to the pocket boom that might catch floating litter while leaving a path for swimming animals. On the grid, draw a bar graph of the mean catch for each tested setup, then write two sentences describing your change and how you would test both litter catch and passage through your model.



ANSWER KEY

Catch Before the Marsh

PART 1 · READ AND MARK

Underline the barrier designs, circle the catch counts in the table, and number two limits of the model. Use your marks to judge what the test shows and what it cannot show. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What did the team keep the same across runs so they could compare the barrier designs fairly?	**They used the same water volume and flow rate, and they began each run with twenty identical floating squares.**
2	In Run 3, how many more squares did the boom with a pocket catch than the plain boom? How does this result support the design change?	**It caught 6 more squares, 16 instead of 10. This supports adding a pocket to catch more floating litter.**
3	The pocket boom caught 17, 18, and 16 squares. What do these repeated results suggest about its performance?	**It caught most of the squares in every run, with only a small difference among runs.**
4	Why can the team not use this model to claim that the pocket boom is safe for swimming animals?	**The model tested floating squares, not how swimming animals would move past the barrier.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Graph: The horizontal axis lists no barrier, plain boom, and boom with pocket; the vertical axis shows mean squares caught out of 20, with bars at 0, 11, and 17. I would add an angled guide that directs floating litter into the pocket while leaving an opening below it. I would compare its catch with the original pocket boom across three runs and count how many fish-shaped models pass through each opening.

Accept other plausible design changes if students describe a fair comparison and measure both litter catch and passage. Fish-shaped models can test passage through an opening, but they cannot establish safety for living animals.