

Runoff Design Detectives

Use evidence to monitor pollution and test a practical solution.

MS-ESS3-3 "Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. Clarification Statement: Examples of the design process include examining human environmental impacts..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each monitoring step, circle each proposed solution, and number the evidence that would show whether the solution works. Your marks should trace the team's design process from question to evaluation.

Watching Water After Rain

- ① After several rainstorms, students at Cedar Creek Middle School noticed cloudy water flowing from the parking lot into a storm drain. The drain carries runoff to Willow Pond, where algae had become thicker near the outlet. The students did not assume the parking lot caused the algae. Runoff might carry soil, oil drips, road salt, or fertilizer from nearby grass. To investigate, their science team defined a question: Does runoff from the school area change the pond's water quality after rain?
- ② First, the team planned monitoring that could show a pattern rather than one unusual result. On dry days and after similar rainstorms, they would collect water at three places: upstream from the outlet, beside the outlet, and farther across the pond. They would record cloudiness with a turbidity tube, water temperature, and the amount of rain. They would use the same tools, sampling depth, and time of day each time. Repeating measurements for six weeks would make comparisons more reliable.
- ③ To reduce pollution, the team compared ideas. Sweeping leaves and soil before rain would be inexpensive, but it would not catch oily water. A rain garden between the lot and drain could slow runoff, let water soak into soil, and trap sediment. It would need space, plants, and care. The school chose a rain garden and signs asking drivers to report leaks. After installation, the team would compare results with earlier data. If cloudiness near the outlet decreased after storms, the design would be supported. Otherwise, they would inspect the garden and revise the plan.

2 ANSWER WITH EVIDENCE Use the passage

1 Why did the students avoid assuming that the parking lot caused the thicker algae near the outlet?

2 What three locations would the team sample, and how do these locations help them compare water quality?

3 What made the team's monitoring plan more reliable than taking one measurement after one storm?

4 What result would support the rain garden design, and what would the team do if the result did not support it?

3 YOUR TURN Your own words

Choose a human impact at your school that is different from pond runoff. In 4 to 5 sentences, describe the impact, a monitoring plan with a measurable variable, one feasible solution, and the evidence that would support or cause you to revise the solution.

PART 1 • READ AND MARK

Underline each monitoring step, circle each proposed solution, and number the evidence that would show whether the solution works. Your marks should trace the team's design process from question to evaluation. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Why did the students avoid assuming that the parking lot caused the thicker algae near the outlet?	They knew runoff could carry several possible pollutants, including soil, oil, road salt, or fertilizer, so they needed evidence before deciding on a cause.
2	What three locations would the team sample, and how do these locations help them compare water quality?	They would sample upstream from the outlet, beside the outlet, and farther across the pond. The locations allow comparison of water near the runoff source with water away from it.
3	What made the team's monitoring plan more reliable than taking one measurement after one storm?	The team would sample on dry days and after similar storms for six weeks while using the same tools, sampling depth, and time of day.
4	What result would support the rain garden design, and what would the team do if the result did not support it?	Lower cloudiness near the outlet after similar storms would support the design. If cloudiness did not decrease, the team would inspect the garden and revise the plan.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Students print many one-sided worksheets, which uses paper and adds waste to recycling or trash. For four weeks, the office will record the number of sheets printed and the number of students enrolled each week, using printer counters at the same time on Friday. Teachers will set double-sided printing as the default and post a reminder near printers. If sheets printed per student decrease compared with the first week, the change is supported; if not, the team will check printer settings and ask teachers about barriers.

Accept equivalent descriptions that identify a measurable environmental impact, a repeatable monitoring method, a feasible action, and a clear comparison for evaluating the action. For the open task, accept varied school impacts when the response includes all required design elements.