Hold the Flood

Design and test a way to reduce flood damage

E.8.9B.3 "Using an engineering design process, create mechanisms to improve community resilience, which safeguard against natural hazards (e.g., building restrictions in flood or tidal zones, regional watershed management, Firewise construction).*"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the limits on the town's plan, circle the proposed flood-protection mechanisms, and number the team's tests and changes in order to track how the design improved.

A Basin for Cedar Creek

1 After three summer storms, water from Cedar Creek rushed into a neighborhood's ground-floor apartments. The town asked a student engineering team to reduce flood damage without moving current residents or blocking the creek. The team walked the streets after rain and found that water ran quickly off roofs and parking lots into one storm drain. They set two goals: keep water out of apartment entrances during a heavy storm and avoid sending a larger surge to homes downstream. Any plan also had to fit on a town-owned vacant lot.

2 The team compared two mechanisms. A taller wall beside the creek might shield the apartments, but it could push more floodwater toward downstream homes. Instead, they chose a shallow holding basin on the vacant lot. A ditch would guide runoff into the basin, where water could collect and then leave slowly through a small outlet after the storm. They built a tray model with a sloped surface, a basin, and a downstream cup. For each trial, they poured the same amount of water at the same rate.

3 In the first trial, water spilled over the model basin's edge and reached the marked apartment entrances. The team made the basin deeper and repeated the trial using the same pour. This time the entrance marks stayed dry, but the downstream cup rose above its flood line. They narrowed the outlet and tested again. The entrance marks stayed dry, and the downstream cup stayed below its flood line. The team recommended checking soil conditions and storm sizes before construction because a model cannot prove the full-size basin will work.

2 ANSWER WITH EVIDENCE

Use the passage

1. How did the town's limits shape where the team placed its design?

2. Why did the team choose a holding basin instead of a taller wall?

3. Why did the team use the same amount of water at the same rate for each trial?

4. What problem remained after the team deepened the basin, and how did the next change address it?

3 YOUR TURN

Your own words

Homes border a dry, grassy field, and the town cannot move them. In three or four sentences, propose one physical change to reduce wildfire damage, give a testable goal, describe a safe model test, and explain what you would change if the test fails.

ANSWER KEY

Hold the Flood

GRADE 8 · E.8.9B.3

PART 1 · READ AND MARK

Underline the limits on the town's plan, circle the proposed flood-protection mechanisms, and number the team's tests and changes in order to track how the design improved. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How did the town's limits shape where the team placed its design?	**The team placed the basin on a town-owned vacant lot so the plan would not require moving residents or blocking the creek.**
2	Why did the team choose a holding basin instead of a taller wall?	**A wall might protect the apartments but push more floodwater toward downstream homes. The basin would hold runoff and release it slowly.**
3	Why did the team use the same amount of water at the same rate for each trial?	**Keeping the pour the same let the team compare how changes to the basin and outlet affected flooding.**
4	What problem remained after the team deepened the basin, and how did the next change address it?	**The downstream cup rose above its flood line. Narrowing the outlet slowed the water leaving the basin, and the next test kept the cup below that line.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would replace a strip of dry grass beside the homes with gravel, keeping every home in place. My goal is to stop a surface fire before it reaches the homes. In a no-flame model, I would move a marker across touching paper grass squares toward model homes and check whether the gravel gap stops it. If the marker finds another path across, I would widen the gap and test again.

Accept other feasible physical changes that address wildfire damage without moving homes. The response should include a testable goal, a safe test, and a change guided by a possible test result.