

Choices Have Costs

Evaluate designs by weighing priorities, evidence, and trade-offs.

HS-ETS1-3 "Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each criterion the team considered, circle details that compare the options, and box the final recommendation. These marks show how evidence and trade-offs support a design choice.

A Shelter for Riverview High

- ① At Riverview High, students often waited for buses in summer heat and heavy rain. A design team studied three shelter proposals for the busiest stop. Option A was a steel roof with open sides. It cost \$18,000, could be installed quickly, and needed little maintenance. However, its dark metal surface could become hot, and its plain shape did not match the nearby historic library. Option B used a larger roof, side panels, solar lighting, and a ramp-friendly layout. It cost \$32,000 and required more planning, but it offered better weather protection and safer visibility after school.
- ② Option C was a wooden shelter designed with local artists. It included patterns chosen through community meetings and used locally sourced lumber. At \$26,000, it fell between the other prices. The wood and artwork could make the stop welcoming and reflect neighborhood culture, but the team predicted repainting and weather repairs every few years. Its roof was smaller than Option B's, so fewer students could stand fully dry. The team also considered environmental effects. Solar lighting would avoid grid electricity for the lights, while lumber sourcing needed verification that forests were managed responsibly. No option met every goal, so the team had to decide which criteria mattered most.

- ③ Before choosing, the team ranked safety and reliable protection above appearance, because students would use the shelter daily in changing weather. They placed cost next, then cultural fit and environmental impact, while still treating each as important. Their recommendation was Option B if the district could fund it. Its ramp-friendly layout, lighting, and larger covered area best addressed the highest priorities. This choice involved trade-offs: the school would spend \$14,000 more than for Option A and accept a longer planning period. To reduce the cost impact, the team proposed seeking a transit grant and asking students to help select colors and panel designs that fit the library area.

2 ANSWER WITH EVIDENCE Use the passage

- 1 Which two criteria did the team rank highest, and why did they rank them that way?

- 2 Using the team's priorities, give one reason Option B fits better than Option C. Then give one criterion on which Option C is stronger than Option B.

- 3 What trade-off would the school accept by choosing Option B instead of Option A?

- 4 How do solar lighting and locally designed artwork represent impacts beyond cost and safety?

3 YOUR TURN

Your own words

Your town needs a public water-refill station at a sports field. Option 1 costs \$4,000, has one bottle filler, uses a plain metal cabinet, and needs a filter change twice a year; Option 2 costs \$7,500, has two fillers, a child-height spout, a mural panel designed by local students, and a solar-powered display, but needs a battery replaced every five years. Both options use lead-free plumbing and meet safety codes. Rank at least four criteria, recommend one option, and explain two trade-offs, including one social, cultural, or environmental effect.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

PART 1 • READ AND MARK

Underline each criterion the team considered, circle details that compare the options, and box the final recommendation. These marks show how evidence and trade-offs support a design choice. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which two criteria did the team rank highest, and why did they rank them that way?	Safety and reliable protection were highest because students would use the shelter every day in changing weather.
2	Using the team's priorities, give one reason Option B fits better than Option C. Then give one criterion on which Option C is stronger than Option B.	Option B has a larger covered area, ramp-friendly access, and lighting, which better support safety and reliable protection. Option C costs less and better reflects neighborhood culture.
3	What trade-off would the school accept by choosing Option B instead of Option A?	The school would spend \$14,000 more and accept a longer planning period in exchange for better protection, access, and visibility.
4	How do solar lighting and locally designed artwork represent impacts beyond cost and safety?	Solar lighting avoids grid electricity for the lights, an environmental consideration; it does not prove lower total impact than the unlit options. Locally designed artwork can make the shelter welcoming and reflect neighborhood culture, a social and cultural impact.

PART 3 · YOUR TURN (SAMPLE ANSWER)

I rank safe water first, access second, cost third, maintenance fourth, and community connection fifth. Both options meet the stated safety codes. I recommend Option 2 because two fillers permit more users to fill bottles at once, and the child-height spout improves access. The trade-offs are paying \$3,500 more and planning for battery replacement every five years. Its student-designed mural adds a cultural benefit through local involvement. I would request maintenance and reliability data before assuming that Option 2 lasts longer or costs less to operate.

Accept supported answers that use passage evidence and distinguish a benefit from a trade-off. For the open task, accept either option when the student prioritizes at least four criteria and explains realistic cost, reliability, safety, aesthetic, social, cultural, or environmental effects. Do not infer comparative electricity savings from Option 2's solar display: Option 1 has no stated display or electrical load. A solar-powered display is a feature, not proof of lower total environmental impact. Extra fillers support simultaneous access, not an unmeasured durability advantage.