

Plan Before Building

Define a design problem with goals and limits.

3-5-ETS1-1 "Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Circle the need that starts the problem. Underline each criterion for success, then number the three constraints 1, 2, and 3 to show materials, time, and cost.

Water for the Weekend

- ① The school garden has young bean plants, but the plants may not get water during a three-day weekend. A group of students wants to make a simple watering device. Their design problem is to deliver water slowly from a container to one plant bed while school is closed. This problem begins with a need: keeping the plants alive and growing.
- ② Before building, the group writes criteria for success. The device must give the bed enough water for three days without flooding it. It must keep working without an adult adding water. The group will test the device by checking whether the soil is damp, not soaked, at the end of the weekend. These details tell what success looks like.
- ③ The students also list constraints. They may use only one recycled plastic bottle, string, tape, and water. They have 30 minutes to build and test. Their supplies cannot cost more than \$4. A constraint is a limit the group must follow, even if another idea might work better. By naming the need, criteria, and constraints, the group has a clear problem to solve.

2 ANSWER WITH EVIDENCE Use the passage

1 What need led the students to plan a watering device?

2 What is the group's design problem?

3 Write two criteria the watering device must meet.

4 What are the three constraints on the students' design?

3 YOUR TURN Your own words

Choose a need or want at school or at home. Write a simple design problem, two criteria for success, and two constraints that include materials, time, or cost.

PART 1 • READ AND MARK

Circle the need that starts the problem. Underline each criterion for success, then number the three constraints 1, 2, and 3 to show materials, time, and cost. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What need led the students to plan a watering device?	The bean plants need water during the three-day weekend.
2	What is the group's design problem?	Deliver water slowly from a container to one plant bed while school is closed.
3	Write two criteria the watering device must meet.	It must give the bed enough water for three days without flooding it, and it must work without an adult adding water.
4	What are the three constraints on the students' design?	They may use only one recycled plastic bottle, string, tape, and water; they have 30 minutes; and supplies may cost no more than \$4.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Need: Pencils roll off desks during class. Design problem: Create a pencil holder that keeps six pencils on a desk.

Criteria: It holds six pencils, and pencils stay in place when the desk is bumped. Constraints: Use only cardboard and tape, and finish in 20 minutes.

Accept reasonable school or home needs or wants. The response should state a clear problem, at least two testable criteria, and at least two realistic limits involving materials, time, or cost.