Design and Build Your Solar Still

Suppose you live in a community that has been devastated by a hurricane. You and your family have no access to electricity or running water. Most of the houses, including yours, and their contents have been swept away by the raging water. Now that the seawater has abated, your family's most immediate need is clean water for drinking and food preparation. You need to use the materials lying around your community to design and build a solar still. Your still should produce clean, fresh water suitable for drinking using seawater as a water source.

Timing Chapter 1, Lesson 2

DEFINE THE PROBLEM HOW CAN YOU DESIGN AND BUILD A SOLAR STILL THAT WILL PRODUCE FRESH WATER FROM SEAWATER?

1. **Define the Problem** In your own words, briefly define the problem you will be addressing.

2. **Identify Criteria and Constraints** A table of criteria and constraints that your design needs to meet is shown. List any additional criteria and constraints that you have identified or that have been provided by your teacher. Your teacher may also tell you to cross off some of the criteria and constraints in the table.

Criteria	Constraints
Produce at least 250 mL fresh water in a 24-hour period.	Be a passive solar device.
Produce fresh water with a chloride concentration of less than 250 mg/L or with the same clarity as distilled water when tested with silver nitrate.	Be portable.
Include a way to prevent or minimize re-evaporation of the fresh water.	Have no exterior dimensions that exceed 1 m.
Ensure that the evaporation surface is as large as possible.	Be made from available materials only.
Be as airtight as possible.	Have an empty mass of no more than 5 kg.

DEVELOP POSSIBLE SOLUTIONS

3. **Conduct Research** Review the sketch you made in the Problem Launch that identified the solar still design your team decided upon.

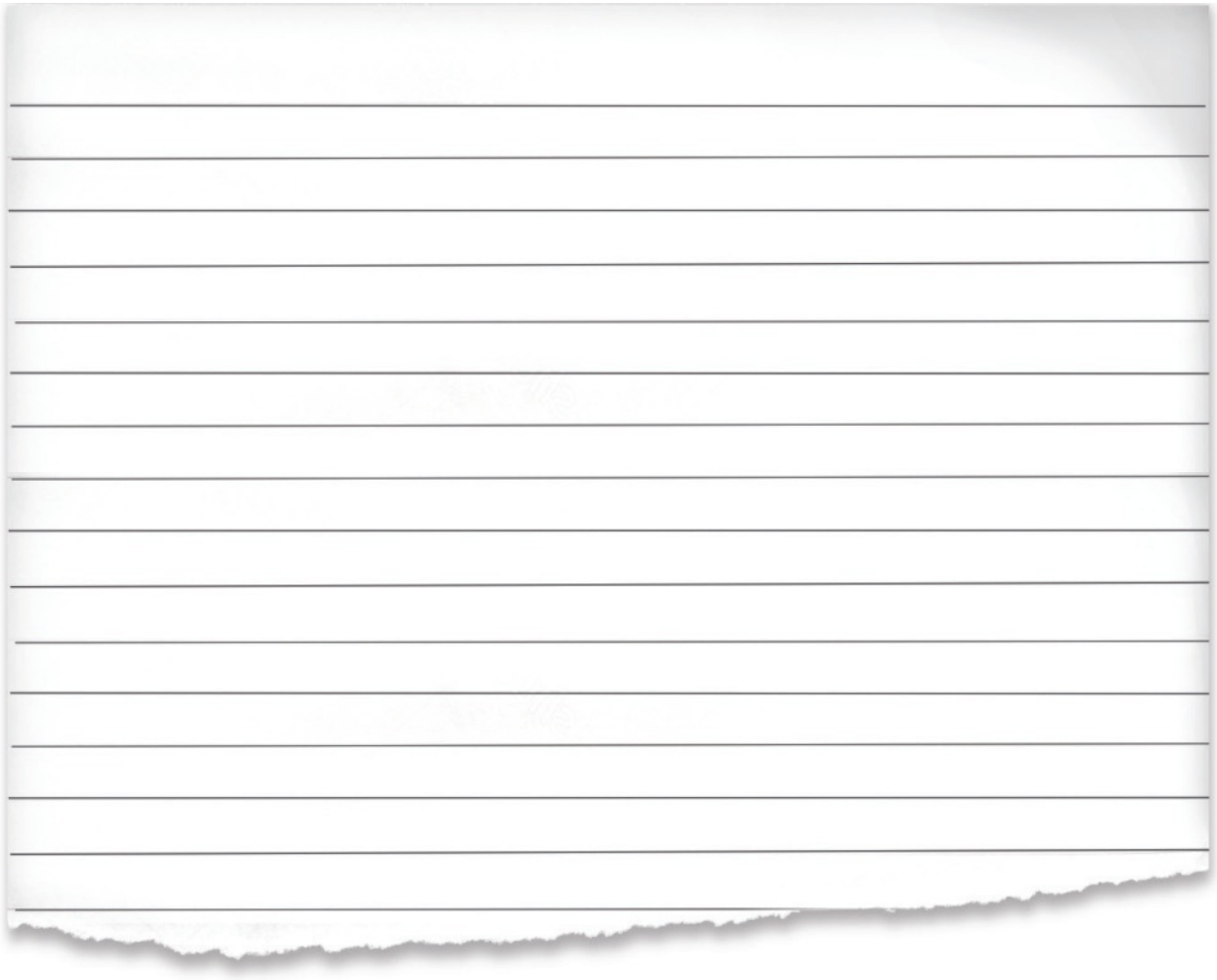
4. **Specify Design Criteria** Examine the materials available to your group. Discuss which you think might be the most useful for building your solar still. Explain your choices.

DESIGN YOUR SOLUTION

5. **Develop Possible Solutions** Examine the available materials again, and review your group's criteria and constraints. Draw an image of the still your group plans to build. In your drawing, be sure to:
   - **label each part of the still and its function in your proposed design**
   - **label the dimensions of the different parts of your solar still**
   - **specify the angle of the condensation surface**
   - **specify the depth or initial volume of salt water**

BUILD YOUR SOLUTION

6. **Design a Device** Describe, in detail, how your group plans to build its solar still. Include information related to time management and safety concerns in your proposed procedure. Show your plan to your teacher for approval.



7. **Construct a Solution** Once your teacher has approved your materials choices and proposed plans, construct your still. **CAUTION:** ***Use caution when working with any of the tools and materials to avoid injuring yourself and others.***

   - As you build your still, you may find that some of your original materials or ideas may not work as planned. If you modify your materials or your design, get your teacher's approval before you continue.
   - Once your still is built, add water to make sure that there are no major leaks. Also check that the apparatus will, in fact, allow water to evaporate to form fresh water that collects either inside or outside the still. If your still leaks, be sure to get your teacher's permission before you make any changes.

Use the space on the next page to make notes and observations as you work. You may also take photos and/or videos to document this part of the investigation.

NOTES AND OBSERVATIONS

