

## Protecting Our City with Levees Activity – Levee Design Worksheet

### Instructions

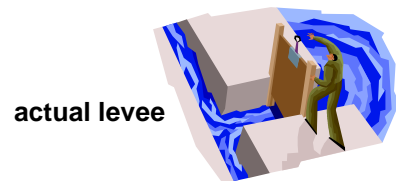
Follow the design process in this worksheet to design, build and test your model levee.

**STEP 1: Define the problem.** In this step, you determine what the problem is that you need to solve, and what your design constraints are. These are often given to you.



- **Problem:** Build a new levee system that will maintain the boundary between the lake/river and the city.
- **Constraints:**
  - ✓ **Size:** The real levee must be 5 meters higher than sea level and wide enough to prevent the surrounding lake or harbor from flooding. Your prototype must be at least 5 inches high, and wide enough to prevent the water on one side of a plastic container from flooding into the other side of the container.
  - ✓ **Budget & Materials:** Each group receives a plastic container in which to build the prototype levee. Each team receives \$10 (fun money) to purchase levee supplies. You may only buy from the following list of approved materials:

Material	Cost
1 cup of sand or gravel	\$1
5 cotton balls	\$1
straws	\$1
popsicle sticks	\$1
1 foot duct tape	\$2
1 sheet of paperboard	\$2
1 plastic bag	\$2
1 sponge	\$2



**STEP 2: Gather information:** In this step, you research and perform experiments that help inform your design.

- First, do some quick research to find out how real levees are constructed. Write down what you learned from this research:

✓ Next, take at least two of the approved materials and test how well they slow down water. To do this, put a small hole in a paper cup, and put your test material at the bottom of the cup. Measure a specific amount of water in another cup. Then pour the water into the cup with a hole and observe how well the material absorbs the water. Describe what you see.

- Material 1: \_\_\_\_\_

Observations:

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- Material 2: \_\_\_\_\_

Observations:

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**STEP 3: Brainstorm ideas.** When engineers brainstorm ideas, they are open to as many creative ideas as possible. No idea or suggestion is “silly”; in fact, the wilder the idea, the better!

- Discuss ideas for how to build your levee. In the space below, write down and/or sketch every idea suggested.

**STEP 4: Select the most promising concept.** Read through your ideas again, and choose the concept that you think will work best.

- Describe and/or sketch your idea in the space below.

- Use the following table to determine how you will spend your budget on materials.

Material	Cost	Amount You Want	Cost
1 cup of sand or gravel	\$1		
5 cotton balls	\$1		
straws	\$1		
popsicle sticks	\$1		
1 foot duct tape	\$2		
1 sheet of paperboard	\$2		
1 plastic bag	\$2		
1 sponge	\$2		
<b>TOTAL</b>			

**STEP 5: Build and test.** Purchase materials and build your levee prototype. Then, with the teacher’s help, test your levee by pouring water into one side of your container.

**STEP 6: Evaluate your design.** After engineers test their prototypes, they think about how well it worked. This helps them make changes to improve the final, real version.

- Describe what happened when you tested your levee.

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- What did you like best about your levee system design?

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- What changes would you make to your levee system if you were to build it again?

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