

Clean the Dirty Water

The Problem...

- Many people around the world do not have access to clean drinking water.
 - Water from rivers, lakes, or wells is often dirty and contains...
 - Dirt and sand.
 - Oils and grease.
 - Other household or environmental contaminants.
- Contaminated drinking water can cause illness and disease.



The Challenge Questions...

- How can we clean dirty water using simple everyday materials to make it safe to drink?
- How do we test the clean water to determine whether it is safe to drink?

Design Challenge...

You are a team of chemical and environmental engineers. Your mission is to design a filtration system to clean dirty water from a local water source in your city using inexpensive materials. The goal is to obtain approximately 10 mL of clean water.

 You are the Engineers!

 Think Like a Pro! Define → Plan → Test → Improve

 Use Your Science Skills — Matter • Mixtures • Materials that clean water

 Real-World Connection — Real engineers build water filters for communities.

 Big Idea — Science + Engineering = Cleaner Water & a Healthier Planet!

Phase 1: Qualitative and Quantitative Observations

Use your senses (except taste!!) to describe your dirty water sample.

- 👁 Sight
- 👂 Sound
- 👃 Smell
- ✋ Touch

Phase 2: Imagine and Plan Your Filtration System

Choose up to **THREE** layers from the materials.

☐	Coffee filter	☐	Gauze
☐	Cotton fabric	☐	Baking soda
☐	Cotton balls	☐	Untreated sawdust
☐	Paper towels	☐	Grass clippings
☐	Felt		

Which materials will you pick for each layer?

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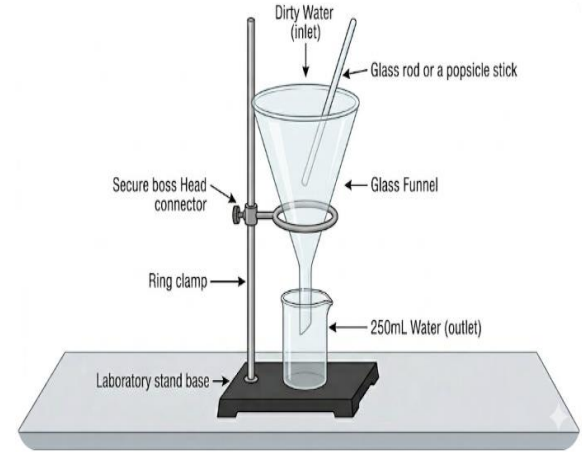
Which materials will you pick for each layer?

After you brainstorm your team's filtration system, draw and label your planned system in your worksheet to show how you and your partner will layer the materials.

Phase 3: Create Your Filtration System

Materials

- 1 large plastic funnel
- 1 large 250 mL beaker
- 1 50 mL graduated cylinder
- 1 lab stand
- 1 ring support for the large plastic funnel
- up to three chosen filter materials



Instructions to set up filter and testing apparatus.

1. Place your filtration system into the large plastic funnel.
2. Set up your lab stand with the ring stand attached to it.
3. Place your fully functional filtration system in the ring stand with the 250 mL beaker underneath it.
4. Adjust the ring to place the funnel into the beaker.

Phase 4: Test Your Filtration System

Set up your system using a funnel, beaker, and lab stand.

- Test the pH of the dirty water.
- Slowly pour the water through your filter.
- Observe changes in sight, smell, and sound.
- Test the pH again when clean water collects.
- Record in your data table:
 - pH before filtering.
 - pH after filtering.
 - Amount of clean water collected.
 - Observations of sight, smell, touch, and sound.

Phase 5: Reflect and Improve Like an Engineer

Think about your results.

- What did each material do?
- Why did you choose them?
- Was your water cleaner?
- What could you improve next time?
- Why are chemical engineers important?