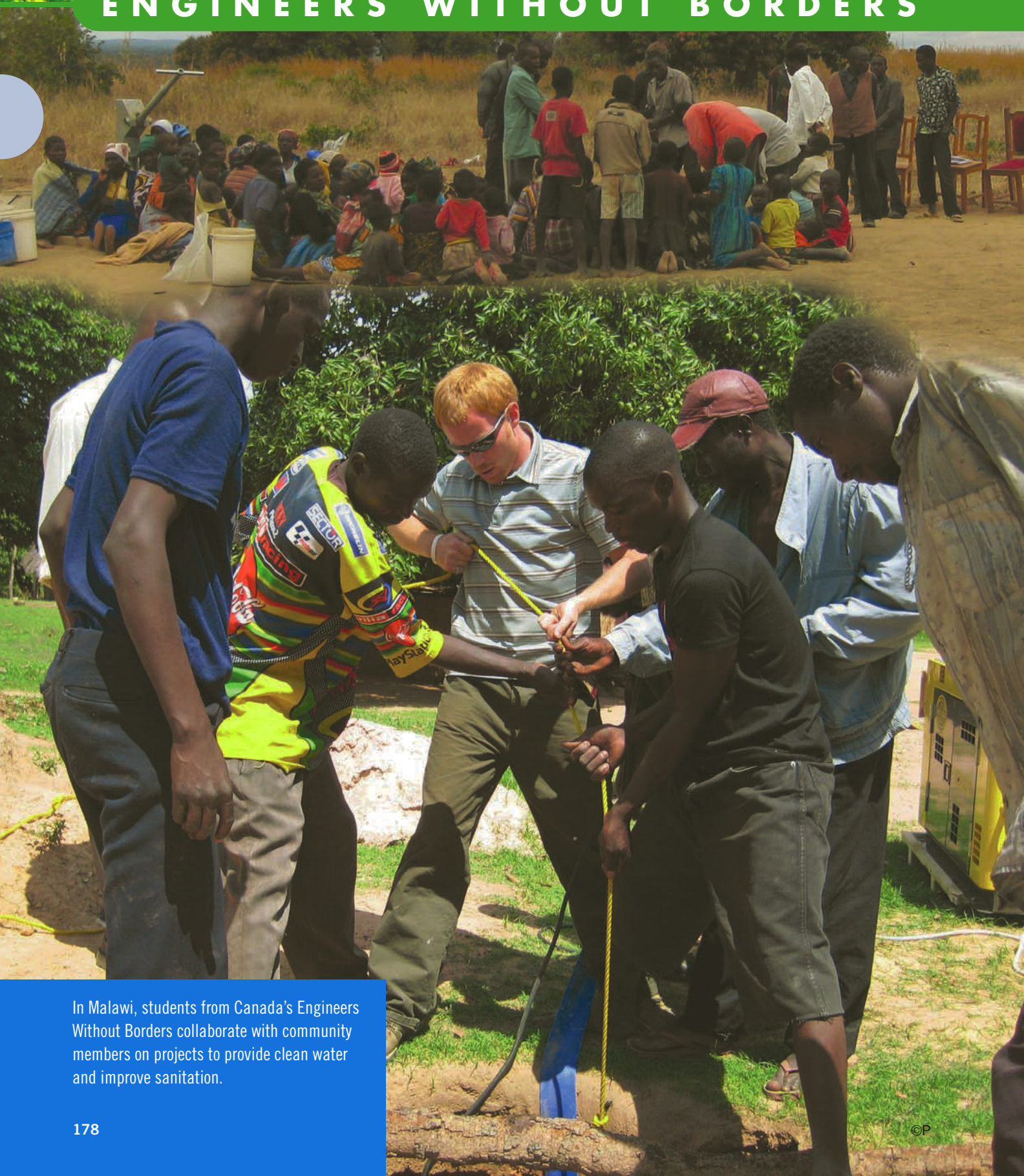
Invitation to Explore

ENGINEERS WITHOUT BORDERS



In Malawi, students from Canada's Engineers Without Borders collaborate with community members on projects to provide clean water and improve sanitation.

In Canada, we are used to turning on our taps and having clean, clear water flow into our equally clean and clear glass. Imagine having to walk over 500 m to a water source, and then using an unwashed bucket to carry untreated water back to your family. This is exactly the daily experience of many people who live in countries of the Global South, such as Malawi in Africa. The Global South refers to the countries of Africa, Central and Latin America, and most of Asia. As populations have grown, many bodies of water have become polluted or have dried up.

Many people do not think about the pumping and pipe systems that bring water into homes, or the systems that remove sewage and make communities safe from disease. Engineers Without Borders (EWB) is a Canadawide group of professional engineers and students who *do* worry about these systems. Part of their work is to help communities in Africa create sustainable systems that can ensure clean drinking water, and remove open sewage from the environment.

Saskatchewan Abroad in EWB

Every summer, EWB Saskatchewan volunteers travel overseas to learn from families and communities. Their work involves using technology to create pumping systems that ensure clean water supplies from ground water, and constructing latrines to help improve sanitation. Volunteers work to make sure that communities take ownership of these projects. That way, the technologies are accepted and the projects are sustainable.

One example of a Canadian technology being used in Malawi is the Waterloo pump. In 1978, the Canadian government asked Alan Plumtree and Alfred Rudin from the University of Waterloo to design a pump that could be used overseas. It had to be durable, cheap, simple, and easily manufactured in developing countries. The pumps that were designed were based on Mennonite hand pumps that have been used on Canadian farms for generations.

The hand pump was created out of polyvinylchloride (PVC), a strong, lightweight plastic. Since 1978, improvements have been made. For instance, the hyenas of Malawi chewed the bone-white plastic to bits, so in Malawi the hand pumps are made of black metal. This pump technology has brought clean groundwater to thousands of people throughout Africa.

Engineers call water and sewage systems "fluid systems." But what exactly is a fluid? What characteristics do fluids have?

Malawi is a landlocked country in Southeast Africa.

reSEARCH

Engineers Without Borders (EWB) works to improve water and sanitation systems using technology and community education. Interestingly, you do not have to be an engineering student to join.

- Research EWB to find out who can be a part of this organization and what the members do overseas and in Saskatchewan to fight the causes of poverty.

Farmers have used hand pumps like the Waterloo pump for generations.

INVESTIGATOR

Is It a Fluid?

The Question

What is a fluid?

Materials & Equipment

- 2 clear plastic glasses
- plastic spoon
- cornstarch
- water
- waxed paper

Procedure

1. Pour about 2 cm of water into one plastic glass. Spread out a sheet of waxed paper onto the table. Half fill your second glass with cornstarch.
2. Add enough cornstarch to your water so that you can still mix it, but it is difficult to stir. Oobleck is 1 part water to 1.5–2 parts cornstarch. What appears to happen when you try to stir the mixture? Record your observations.
3. Pour this mixture into the middle of the waxed paper. Record your observations.
4. Push the end of a spoon in a straight line slowly through the middle of the mixture. Record your observations.
5. Push the end of a spoon in a straight line quickly through the middle of the mixture. Do you think this is a fluid? Explain your reasoning.
6. Slap the mixture quickly with an open hand. Record your observations.

Is this mixture a fluid or not?

7. Place your hand slowly onto the top of the mixture. Record your observations.
8. Do you think the substance in this activity is a fluid? Explain your reasoning.

Keeping Records

9. List the reasons you gave when identifying the mixture as a fluid or not. Use a checkmark (✓) to indicate those characteristics that you feel are always present in a fluid, a question mark (?) to indicate those characteristics that you feel are sometimes present in a fluid, and an "X" to indicate those characteristics that you know are never present in a fluid.

Analyzing and Interpreting

10 Create a table similar to the one on the right to organize the results of your explorations and discussions about the characteristics of the mixture you explored.

Always present	Sometimes present	Never present

Forming Conclusions

11 Using the characteristics you listed as *Always present*, create a definition of a fluid.

Focus Your Thoughts

1 Using your definition of a fluid, determine whether each of the following is a fluid or not.

A

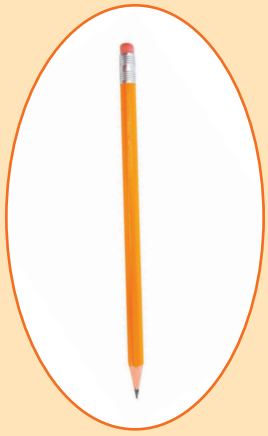
B

C

D

E

F



2 What are other examples of fluids? List five fluids that you have been in contact with today.

3 Suggest ways your class might investigate the characteristics of fluids in more detail.

4 What are the benefits of the Waterloo pump to African communities?