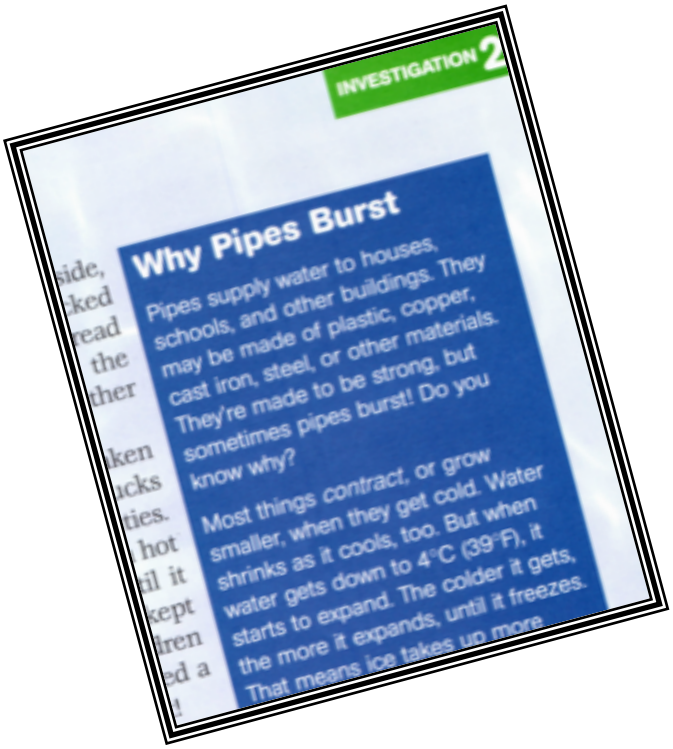
Close Reading and Text Dependent Questions in Science
Why Pipes Burst (Water – Grade 3)

The text selection, *Why Pipes Burst,* is found in *FOSS Science Stories*, *Water,* pg. 11.



INVESTIGATION 2

Why Pipes Burst

Pipes supply water to houses, schools, and other buildings. They may be made of plastic, copper, cast iron, steel, or other materials. They're made to be strong, but sometimes pipes burst! Do you know why?

Most things *contract*, or grow smaller, when they get cold. Water shrinks as it cools, too. But when water gets down to 4°C (39°F), it starts to expand. The colder it gets, the more it expands, until it freezes. That means ice takes up more

Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: http://bpsscience.weebly.com/ You will find the Student Learning Outcomes documents organized there by grade level.

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Icehouses looked like barns. Inside, the ice blocks were carefully stacked and stored. Straw or sawdust was spread over and around each one to keep the ice from melting and sticking to other ice blocks.

Throughout the year, ice was taken from the icehouse. Horse-drawn trucks carried blocks of it to towns and cities. Children loved to see the ice truck on hot summer days. They ran after it until it stopped. Canvas flaps on the truck kept the ice shaded and cool. The children stayed close when the iceman pushed a flap aside. How good the cold air felt!

The iceman wore leather shoulder pads and a leather apron. These kept him from getting wet and cold. He used ice tongs to grab the blocks, and he carried the ice on his shoulder. The ice blocks might weigh from 11 to 22 kilograms (25 to 50 pounds) each.

The iceman chipped at the block with an ice pick. The ice was cut and shaped to fit inside an icebox. The icebox was the place where the ice kept food cool. Most homes had an icebox. Children gathered around to watch the iceman do his work. There was sure to be a sliver of ice for each of them. What a treat on a steamy day!

Why Pipes Burst

Pipes supply water to houses, schools, and other buildings. They may be made of plastic, copper, cast iron, steel, or other materials. They're made to be strong, but sometimes pipes burst! Do you know why?

Most things *contract,* or grow smaller, when they get cold. Water shrinks as it cools, too. But when water gets down to 4°C (39°F), it starts to expand. The colder it gets, the more it expands, until it freezes. That means ice takes up more space than liquid water does. Ice needs room to expand, or it will break its container.

In places where temperatures drop below freezing, care must be taken to keep water from freezing in pipes. Pipes should be wrapped with insulation. Heating systems can keep areas with pipes warm. Sometimes unused water pipes can be drained of water before the cold season begins.

A Soggy Mass

Water played an important role in developing the metric system. It was used to set the standard for the *gram.* The gram is the metric unit of mass. The gram is equal to 1 cubic centimeter of pure water at 4°C. At that temperature, water is densest. That means its molecules are most tightly packed.

Why Pipes Burst (Water – Grade 3)
Student Questions

1. What are pipes used for?

2. What do the words “contract” and “expand” mean in paragraph 2?

3. What changes happen to the volume of water between 7°C and 5°C? Between 4°C and 1°C? At 0°C and below?

4. According to the text, what are three ways to prevent pipes from freezing?

5. Paraphrase the explanation given for why pipes burst.

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Why Pipes Burst (Water – Grade 3)
Sample Answers

1. **What are pipes used for?**
   Pipes are used to bring water to houses, schools, and other buildings.

2. **What do the words "contract" and "expand" mean in paragraph 2?**
   Contract means to grow smaller. Expand means the opposite of contract or shrink, so expand means grow larger.

3. **What changes happen to the volume of water between 7°C and 5°C? Between 4°C and 1°C? At 0°C and below?**
   At first the water would shrink between 7^oC and 5^oC, but then from 4^oC to 1^oC it would expand. Once it is frozen (at 0°C and below) it stays the same size.

4. **According to the text, what are three ways to prevent pipes from freezing?**
   The three different ways to keep pipes from freezing include wrapping them with insulation, keeping them warm with heat, and draining pipes of water.

5. **Paraphrase the explanation given for why pipes burst.**
   When water freezes, it expands. If there is no room in the pipes for the water to expand, the water will cause the pipes to burst.

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