Remember the work you did with syringes and flexible tubes. Discuss the results with a partner.

• Where might you have heard the term *pressure* applied to weather?
Focus question

• How does pressure affect air?
Introduce inquiry

What do you think will happen to the water in the clear tube when I squeeze the jar?
Record predictions

Notebook sheet 4, *Pressure in a Jar*
Describe assembly procedure

Teacher master B, *Pressure Indicator*
Assemble pressure indicators

Assemble the pressure indicators

1. Rubber stopper and clear plastic tube
2. Glass bottle
3. Plastic jar
Assemble pressure indicators

When you have assembled the pressure indicators, think about what will happen when you squeeze the jar.

Make a model in your notebook using diagrams and arrows.
Discuss results

1. Is the volume inside the plastic jar greater, the same, or less when you squeeze it?

2. Think about the particles of air in the jar. Can they be pushed closer together?
Discuss results

3. How does squeezing the jar push the particles together?

4. How is this system like the syringe system?

5. How do the air particles interact with the water in the bottle as you compress the jar?
Discuss results

6. Think back to the syringe online activity, and the way the air particles moved when compressed. If you could see the air particles in the bottle, what would you see near the surface of the water?

7. Why does the water in the tube go down when you push on the sides of the plastic jar?
“Gas in a Syringe”

Gas in a Syringe

Click the plunger to push it down.
What happens to
• the pressure outside the syringe?
• the pressure inside the syringe?
Introduce density

1. What happened to the volume of the jar surrounding the glass bottle?
2. What happened to the number of particles in the jar?
3. If the number of particles stayed the same, what happened to the total mass of the particles?
Introduce density

Teacher master C, *Gas in a Syringe*
Introduce density

When particles get pushed closer together because of pressure, the particles get pushed into a smaller space. The air increases in density.

Density refers to the mass of material in a given space.
Introduce density

1. Tell your partner which of the two syringes has air that is more dense and why.

2. What has remained the same in the syringe?
Discuss weather connections

1. What will happen if a syringe full of compressed air is suddenly opened?

2. Why will air leave the syringe?

When air moves from an area of high pressure to one of low pressure, it is returning to equilibrium.
Discuss weather connections

Think of the word **equal** when you think of equilibrium. If air is under high pressure in one area and has less space to move around in, and if it can escape, air particles will flow from the area of high pressure to low pressure until the pressure, or air density, is equal.
Discuss weather connections

Now, consider nature. Weather isn’t in a jar, like our experiment in class. So if an area of higher air pressure occurs in real life, how will it reach equilibrium?
Read “What Is Air Pressure” on page 32.

What Is Air Pressure?

We are all under pressure from the weight of the atmosphere. Why don't we feel it all the time? Why do your ears pop driving over a mountain pass? The answers have to do with air pressure.

The atmosphere is composed of air. Air has mass. In fact, a column of air 1 square centimeter (cm²) in area reaching to the top of the atmosphere has a mass of 1.2 kilograms (kg). Say the top of your head has a surface area of 110 cm². That means every time you stand under the open sky, you have 110 kg of air pushing down on your head. That is like wearing a bar with a refrigerant on it. Is it safe to go outside?

Yes, it is. The force applied by the air above you is called atmospheric pressure. Life on Earth has evolved in this high-pressure environment, so we can handle the pressure just fine. In fact, most of the time we are entirely unaware of the pressure.
Review the barometer

Teacher master D, *Barometer Images*

These are some examples of physical barometers.

The prefix *baro-* means pressure, and the suffix *-meter* means measure.
Review the barometer

In meteorology, air pressure is measured in **bars**. A bar is equal to the pressure exerted by the air in the atmosphere at sea level. The unit usually used to measure atmospheric pressure is the **millibar** (mb), equal to one $1000^{th}$ of a bar. Average sea-level air pressure is $1013\text{ mb}$. 
Barometer in a Bottle

Pressure applied to the jar squeezes the air particles closer together.
1. What could we do to change the pressure reading on the barometer in the jar?

2. Why do you think the pressure reading changed?

3. What could we do to decrease the air-pressure reading?
Review vocabulary

Spend a few minutes reviewing the vocabulary for this part. Update the vocabulary index and table of contents in your notebook.
Review vocabulary

- atmospheric pressure
- bar
- barometer
- density
- equilibrium
- kinetic energy
- millibar (mb)
Answer the focus question

• How does pressure affect air?
Weather and Water Big Ideas

• What big idea can help us explain weather?
Response sheet

Notebook sheet 6, Response Sheet—Investigation 2
Homework

Answer the Think Questions at the end of the article, “What Is Air Pressure?”

Weather and Water Course, 2.1: Air-Pressure Inquiry
Step 20
Wrap-Up/Warm-Up

View online activity “Weather-Balloon Simulation”