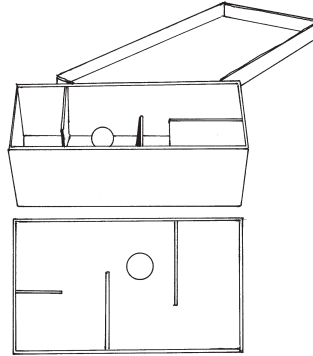


How Can You Study Something You Can't See?

How do you think you can make a model of something you can't see or observe directly? It's not easy, but sometimes scientists have to do just that. Let's start out by trying to make a model of something we can observe only by feeling, weighing, moving, and listening to.

What you need:

- two shoe boxes with lids
- a tennis ball
- a golf ball
- masking tape
- 10 index cards
- paper and pencil



What to do:

1. Build a different maze in each box with the index cards and the masking tape.
2. Put a tennis ball in one box and replace the lid. Put the golf ball in the other box and replace the lid.
3. Now put the boxes aside and move them around so you don't know which is which. (A better way to do this activity is if you have a helper. You can create the boxes for each other.)
4. Pick up each box. Try to determine which box it is and draw what the maze looks like. Record all your observations. What different ways did you use to observe what was going on inside the box? This is a good time to start a science journal.

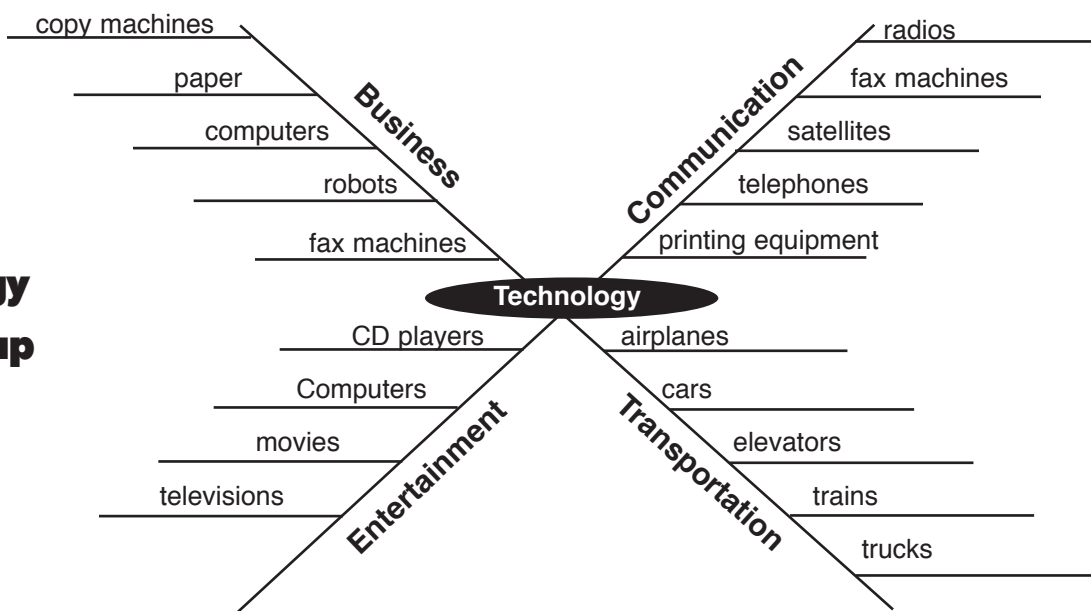
Scientists can't see atoms by themselves, so they have had to make models of atoms.

A Chemistry Spider Map

This graphic organizer is called a spider map. The spider map below is a sample to show you how information can be organized. Fill out the blank one below to help you organize some of the information you know about chemistry. This organizer may also help you think of other questions you want answered or more information you want to discover.

Use spider maps like this one to help organize any information you want to organize and remember.

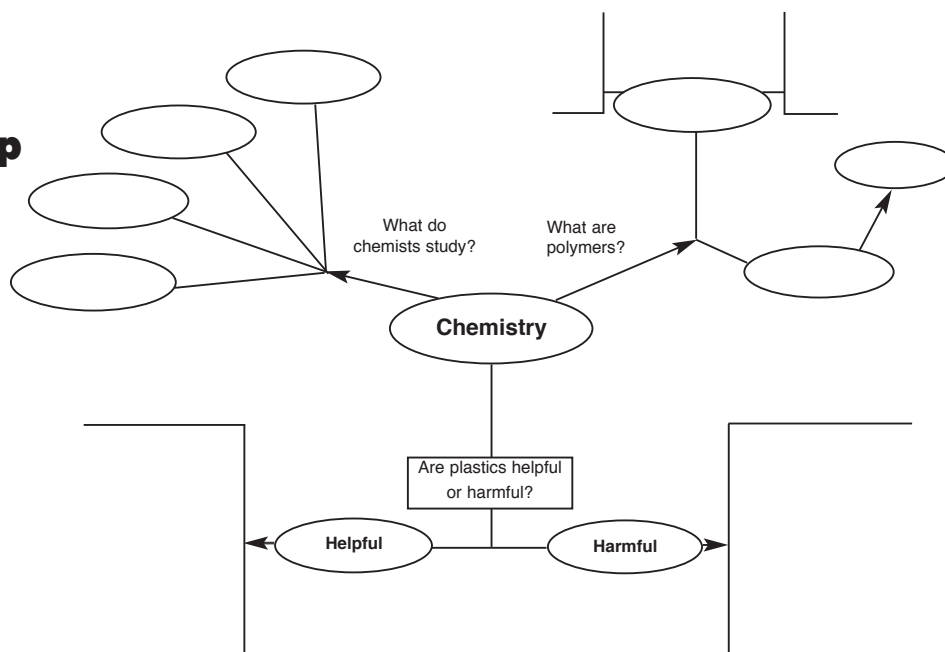
Technology Spider Map



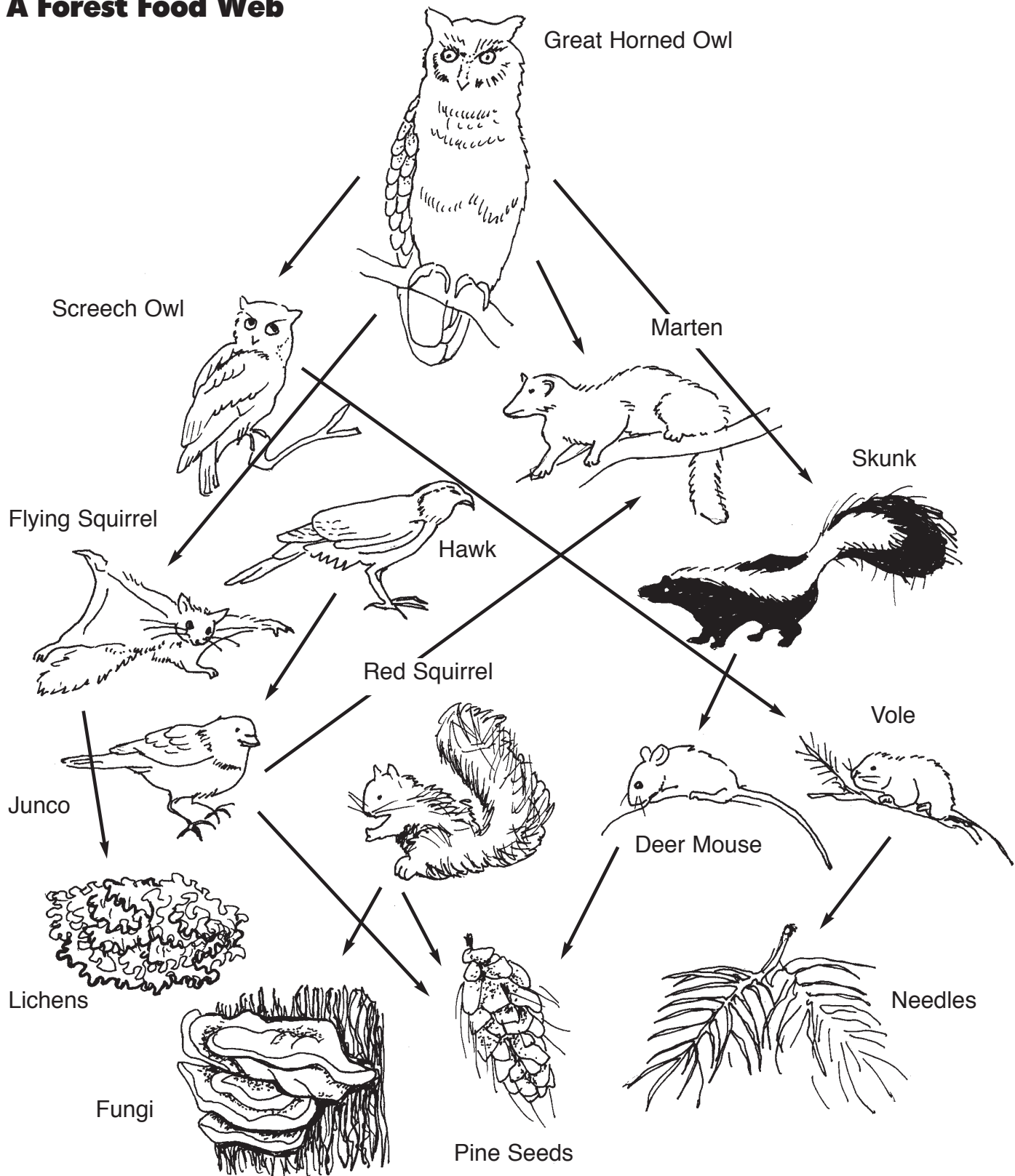
Chemistry

What do chemists do? What are atoms, molecules, elements? What are chemical reactions? What is a chemical change? What is a physical change? What are polymers? Synthetic polymers? Are they helpful? Harmful? What are enzymes?

Chemistry Spider Map



A Forest Food Web



What are some other ecosystems around the world? Find out what the producers and consumers are in those ecosystems and create your own food web.

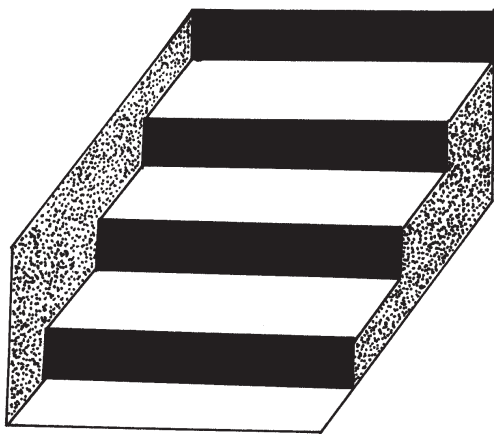
Do Your Eyes Play Tricks?

Scientists have learned that they can't make decisions based only on what they see. We need to check and double check to make sure what we think we see and what we think we know are true. Our eyes can play tricks on us because of relativity and prior knowledge.

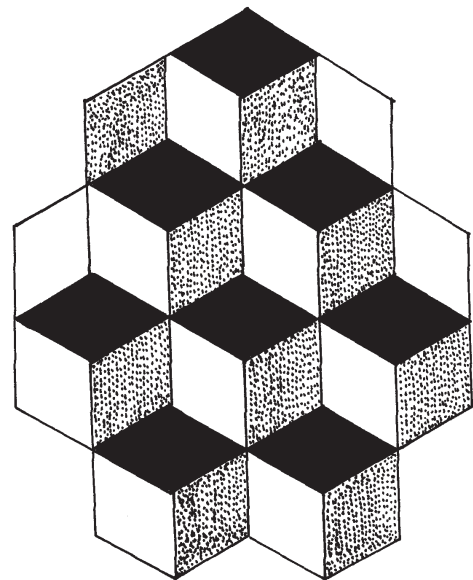
Prior knowledge is pretty easy to understand. Sometimes you think you know something, or you think you learned something before. Sometimes your prior knowledge is correct, and sometimes you need to check again to find out what is true.

Relativity is a much more difficult term. Let's try to figure it out. If you hold a baseball, it is pretty small relative to you. But if you throw the ball toward an ant, the ball is pretty big relative to the ant, isn't it?

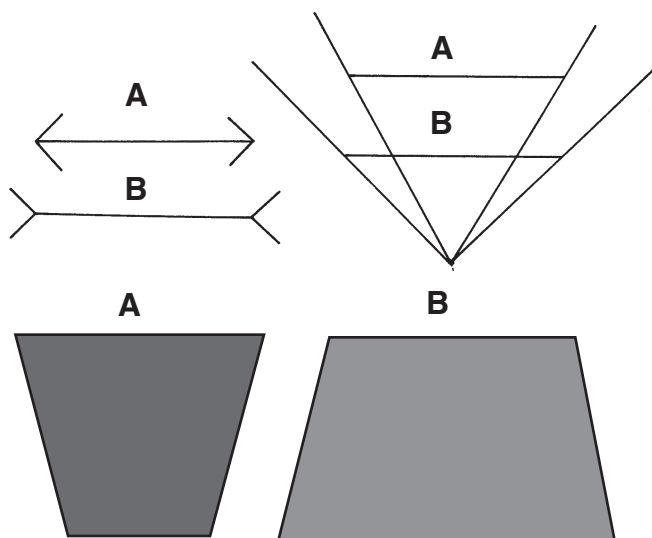
So optical illusions play tricks on us because of what we believe we should see from past experience and/or because of the relationship of what we are looking at to other things around it. Look at the pictures below. Try to answer the questions.



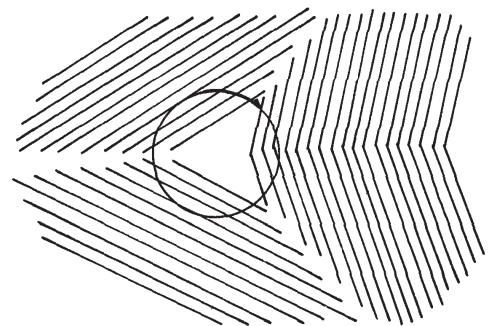
Are these stairs going up or down? If you think they're going up, stare at them and turn the page slowly.



Sometimes there are seven boxes here and sometimes there are eight. How many do you count?



In each pair, which line is longer—A or B?



Is the shape you see here a perfect circle? If you think it isn't, place a coin inside it and look again.